

The Research Institute for Agriculture Economy and Rural Development (ICEADR)  
(Ed.)

**Proceedings**

Agrarian Economy and Rural Development - Realities and Perspectives  
for Romania. 4th Edition of the International Symposium. November  
21-22, 2013, Bucharest, Romania

**Provided in Cooperation with:**

The Research Institute for Agriculture Economy and Rural Development (ICEADR), Bucharest

*Suggested Citation:* The Research Institute for Agriculture Economy and Rural Development (ICEADR)  
(Ed.) (2013) : Agrarian Economy and Rural Development - Realities and Perspectives for Romania.  
4th Edition of the International Symposium. November 21-22, 2013, Bucharest, Romania, The  
Research Institute for Agricultural Economy and Rural Development (ICEADR), Bucharest

This Version is available at:

<https://hdl.handle.net/10419/111599>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen  
Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle  
Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich  
machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen  
(insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten,  
gelten abweichend von diesen Nutzungsbedingungen die in der dort  
genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal  
and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to  
exhibit the documents publicly, to make them publicly available on the  
internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content  
Licence (especially Creative Commons Licences), you may exercise  
further usage rights as specified in the indicated licence.*

**4<sup>th</sup> Edition of the International Symposium**  
**Agrarian Economy and Rural Development – (AERD `13)**

# **AGRARIAN ECONOMY AND RURAL DEVELOPMENT**

**REALITIES AND PROSPECTS FOR ROMANIA**

**Organizer:**

**The Research Institute for Agriculture  
Economy and Rural Development**

[www.iceadr.ro](http://www.iceadr.ro)



**NOVEMBER 21-22, 2013**

**Bucharest, ROMANIA**

**The publishers are not responsible for the content of the scientific papers and opinions published in the volume. They represent the author's point of view.**

**Scientific papers “Agrarian Economy and Rural Development – Realities and perspectives for Romania”**

**ISSN – 2285-6803**

**ISSN – L – 2285-6803**



**Copyright © 2013, Research Institute for Agriculture Economy and Rural Development**

**To be cited:**

**Scientific papers “Agrarian Economy and Rural Development – Realities and perspectives for Romania”, Volume 4, Issue 2013**

**This volume includes the scientific papers of the 4 th  
International Symposium**

**“Agrarian Economy and rural Development - realities and  
prospects for Romania”**

**November 21-22, 2013 Bucharest, Romania**

**organized under the patronage of**



**THE ACADEMY OF AGRICULTURAL AND FORESTRY SCIENCES  
“GHEORGHE IONESCU ȘIȘEȘTI”**

## **EDITORS:**

**Alexandru LAPUSAN** - Director of the Research Institute for Agriculture Economy and Rural Development - Bucharest, Romania

**Ana URSU** – Scientific Secretary of the Research Institute for Agriculture Economy and Rural Development - Bucharest, Romania

## **INTERNATIONAL PROGRAM COMMITTEE MEMBERS**

**Ioan Nicolae ALECU** - President of Section “Agrarian Economy and Rural Development” - Academy of Agricultural and Forestry Sciences “Gheorghe Ionescu Șişești” - Bucharest, Romania

**Alexandru LAPUSAN** - Director of The Research Institute for Agriculture Economy and Rural Development - Bucharest, Romania

**Alexandru STRATAN** – Director of The Institute of Economy, Finance and Statistics – Chişinău, Republic of Moldavia

**Agatha POPESCU** - University of Agronomic Sciences and Veterinary Medicine, Faculty of Management, Economic Engineering in Agriculture and Rural Development - Bucharest, Romania

**Cristian HERA** – Academician, Vice President of Romanian Academy - Bucharest, Romania

**Diego BEGALLI** – Faculty of Economy, University from Verona, Italy

**Drago CVIJANOVIC** – Director of Institute of Agrarian Economy, Belgrade, Serbia

**Elena STOIAN** – Department Director of Faculty of Management, Economic Engineering in Agriculture and Rural Development, University of Agronomic Sciences and Veterinary Medicine - Bucharest, Romania

**Edit LUCKAS** - Dean of Faculty of Economy and Business Administration, University “Dunărea de Jos”, Galați Romania

**Gina FÎNTÎNERU** – Pro-rector of University of Agronomic Sciences and Veterinary Medicine - Bucharest, Romania

**Gheorghe SIN** - President of Academy of Agricultural and Forestry Sciences “Gheorghe Ionescu Șişești” - Bucharest, Romania

**Ignacio DE LOS RIOS** - Polytechnic University - Madrid, Spain

**Jonel SUBIC** – Scientific Director of Institute of Agrarian Economy, Belgrade, Serbia

**Mariana EFTIMIE** – Dean of Faculty of Economic Sciences, University “Petrol-Gaze” – Ploiesti, Romania

**Mihai NICOLESCU** - Vice President of Academy of Agricultural and Forestry Sciences “Gheorghe Ionescu Șișești” - Bucharest, Romania

**Toma Adrian DINU** – Dean of Faculty of Management, Economic Engineering in Agriculture and Rural Development, University of Agronomic Sciences and Veterinary Medicine - Bucharest, Romania

**Victor MOROZ** – Head of „Food Economy and Rural Development” Section, Institute of Economy, Finance and Statistics – Chișinău, Republic of Moldavia

**Maria Magdalena TUREK RAHOVEANU** – Lecturer PhD University Dunarea de Jos, Galati

**Adrian TUREK RAHOVEANU** - Lecturer PhD University of Agronomic Sciences and Veterinary Medicine, Bucharest

# CONTENTS

## PLENARY SESSION

### **CHANGING OF AGRICULTURAL POLICIES IN ROMANIA DURING PREPARATION OF EU ACCESSION AND THEREAFTER**

Lucian LUCA ..... 1

### **ROMANIA'S POSITION IN THE EU EXTRA-EUROPEAN AGRIFOOD TRADE**

Camelia GAVRILESCU ..... 7

### **VALUE ADDED TAX (VAT): THE IMPACT ON THE CHAIN PRODUCER - PROCESSOR - TRADER - CONSUMER - STATE BUDGET**

Mircea TOMA..... 14

### **CAP REFORM PROGRESS**

Miron DUMITRESCU, Șerban ȚĂRANU ..... 22

### **CONTRIBUTION OF AGRICULTURE TO NATIONAL ECONOMIC DEVELOPMENT**

Oana CAMELIA IACOB, Ana-Maria VOLINTIRU, Aurel MARIN..... 27

### **CONSUMER BEHAVIOR IN THE ECONOMY**

Andrei Mihai CRISTEA, Oana CAMELIA IACOB, Dan Gabriel CRISTEA ..... 33

### **IMPACT OF ECONOMIES OF SCALE IN THE HORTICULTURAL SECTOR OF THE REPUBLIC OF MOLDOVA**

Alexandru STRATAN, Victor MOROZ, Anatolie IGNAT ..... 39

### **EVALUATION OF REALIZED INVESTMENTS IN BELGRADE'S AND DANUBE REGION1**

Jonel SUBIĆ, Lana NASTIĆ, Marijana JOVANOVIĆ ..... 47

### **THE MARKET POTENTIAL OF THE ORGANIC PRODUCTS AND NICHE COMPETITIVENESS**

Dan-Marius VOICILAȘ ..... 53

### **DEGREE OF ZOOTECHNICS – BAROMETER OF ECONOMIC DEVELOPMENT IN THE WORLD COUNTRIES**

Emilian MERCE, Cristian Călin MERCE, Iulia MUREȘAN ..... 61

## SESSION 1

### **DROUGHT MANAGEMENT IN THE AGRICULTURE OF DOBROGEA PROVINCE**

Aurel LUP, Liliana MIRON ..... 65

### **ASPECTS OF CLIMATIC FACTORS AND THE NEED OF IRRIGATION. CASE STUDY – BRĂILA COUNTY**

Elisabeta ROȘU ..... 71

### **CONSERVATION OF INVERTEBRATES' BIODIVERSITY IN SOILS OF THE REPUBLIC OF MOLDOVA**

Irina SENICOVSCAIA ..... 77

### **ECONOMIC AND ENVIRONMENTAL EFFICIENCY OF FERTILIZERS USE FOR ENHANCE THE FERTILITY OF DEGRADED SOILS IN THE REPUBLIC OF MOLDOVA**

Tamara LEAH, Nicolai LEAH ..... 85

**PRODUCTIVITY GAPS ALONG THE MILK CHAIN IN ROMANIA – COMPARISONS** 91

## **WITH THE EU-27 MEMBER STATES**

Mariana GRODEA .....	
<b>PROFITABILITY AND STANDARD GROSS MARGIN AT SHEEP</b>	
Lidia IURCHEVICI .....	96
<b>WORLDWIDE TRENDS AND ORIENTATIONS OF RAISING GOATS</b>	
Rodica CHETROIU, Ion CĂLIN, Carmen Georgeta NICULESCU .....	100
<b>COMPARATIVE STUDY ON THE QUALITY AND FOOD SAFETY</b>	
Paula – Angela VIDRAȘCU .....	107
<b>MONITORING AGRICULTURAL PLANTATIONS WITH REMOTE SENSING IMAGERY</b>	
Camelia SLAVE, Anca ROTMAN .....	112
<b>SOME ELEMENTS OF ECONOMIC EFFICIENCY OF BIOLOGICAL TREATMENT TO COMBAT CORN BORER (OSTRINIA NUBILALIS HBN) IN THE CONDITIONS OF TRANSYLVANIA</b>	
Felicia MUREȘANU, Voichița HAȘ, Mircea IGNEA .....	118
<b>THE INFLUENCE OF SOME TECHNOLOGICAL FACTORS ON PRODUCTION OBTAINED FROM THE AUTUMN WHEAT GROWN IN THE SYSTEM WITH MINIMUM SOIL WORKS AND THE ECONOMIC EFFICIENCY OF CROP TECHNOLOGIES</b>	
Mircea IGNEA, Felicia MUREȘANU, Felicia CHEȚAN .....	123
<b>THE PIONEERS OF THE GREEN REVOLUTION AS FORERUNNERS OF TODAY'S ECOLOGICAL AND BIOTECHNOLOGICAL REVOLUTIONS</b>	
Codrin ȚAPU .....	130
<b>ORGANIC FARMING IN THE CONTEXT OF THE BIOECONOMY</b>	
Elena COFAS, Cristina Mihaela VLAD, Rozi Liliana BEREVOIANU .....	136
<b>ENVIRONMENTAL PUBLIC GOODS SPECIFIC TO AGRICULTURE</b>	
Maria Magdalena TUREK RAHOVEANU, Adrian TUREK RAHOVEANU, Petruta TUREK RAHOVEANU .....	144
<b>COOPERATIVE PHENOMENON IN EUROPEAN CONTEXT</b>	
Gabriel POPESCU .....	152

## **SESSION 2**

<b>REGIONAL DEVELOPMENT BASED ON CLUSTERS IN AGRI-FOOD SECTOR. CASE OF ASSOCIATION „CLUSTER AGRO-FOOD-IND NAPOCA”</b>	
Felix ARION, Iulia MUREȘAN .....	160
<b>THE IMPACT OF THE NEW CIVIL CODE ON THE ASSOCIATIVE FORMS WITHOUT LEGAL ENTITY IN THE AGRICULTURAL FIELD</b>	
Anca POPESCU-CRUCERU .....	166
<b>COMPLEX OBLIGATIONS UNDER THE NEW CIVIL CODE</b>	
Ioana Nely MILITARU .....	170
<b>LEGAL SYSTEM OF AGRICULTURAL COMPANIES WITH LEGAL ENTITY</b>	
Eugenia Gabriela LEUCIUC .....	174
<b>FROM THE TRADITIONAL TO THE MODERN AND COMPLEX AGRICULTURAL COMPANIES THAT ARE USING BUSINESS INTELLIGENCE TOOLS</b>	
Antoniou Ovidiu BALINT .....	178



<b>BRAND - IMAGE OF RECOGNITION OF ENTREPRENEURIAL SYNERGY</b>	
Mircea Alecsandru UDRESCU, Andrei BUIGA .....	183
<b>THE AGRICULTURAL CONSULTANCY ACTIVITIES, STRUCTURES AND FEATURES PERFORMED IN THE TERRITORY OF THE OLT COUNTY</b>	
Emil MARINESCU, Raluca NECULA .....	191
<b>THE ANALYSIS OF THE AGRICULTURAL HOLDINGS STRUCTURE IN THE COMMUNES BISOCA, PIETROASELE AND GHERĂSENI, BUZAU COUNTY</b>	
Raluca NECULA, Diana NECULA .....	197
<b>FROM THE EXPERIENCE OF S.C. TOMA S.R.L. CĂLĂRASI COUNTY ON AUTUMN RAPE CROP TECHNOLOGY</b>	
Georgiana CRUDU, Marin TOMA .....	202
<b>ANALYSIS OF NOMINAL INCOME EVOLUTION IN THE RURAL AREA, ON TYPES OF HOUSEHOLDS. CASE STUDY, SOUTH MUNTENIA REGION.</b>	
Daniela CREȚU, Radu Andrei IOVA, Elena LASCĂR .....	207
<b>RESEARCHES ON SOCIAL INFRASTRUCTURE DEVELOPMENT, IN SOUTH MUNTENIA DEVELOPMENT REGION</b>	
Daniela CREȚU, Radu Andrei IOVA, Elena LASCĂR .....	212
<b>IMPROVEMENT OF THE SOCIAL REQUIREMENTS OF THE QUALITY-SOCIAL ACCOUNTABILITY-HEALTH AND SAFETY INTEGRATED MANAGEMENT SYSTEM</b>	
Romeo DENUNTZIO .....	218
<b>EMPLOYMENT AND UNEMPLOYMENT IN THE BUCHAREST-ILFOV REGION</b>	
Alina STOICESCU, Ioan Niculae ALECU, Valentina TUDOR, Marian BUTU .....	226
<b>PERFORMANCE EVALUATION OF PRODUCTION STRUCTURES IN AGRICULTURAL HOLDINGS – case study</b>	
Adrian TUREK RAHOVEANU, Maria Magdalena TUREK RAHOVEANU .....	231
<b>CONSIDERATIONS ON THE INTELLECTUAL POTENTIAL CREATIVITY</b>	
Simion CERTAN, Ion CERTAN .....	240
<b>ROMANIAN TRADITIONAL PRODUCTS</b>	
Valentina TUDOR, Ioana MĂCĂU (ȚOGOE), Marian BUTU .....	248
<b>HALOPHILIC MICROORGANISMS FROM ROMANIAN SALINE ENVIRONMENTS AS A SOURCE OF EXTRACELLULAR ENZYMES WITH POTENTIAL IN AGRICULTURAL ECONOMY</b>	
Mădălin ENACHE, Simona NEAGU, Roxana COJOC .....	252
<b>THE CONCEPT OF ECONOMIC EFFICIENCY IN AGRICULTURE</b>	
Rodica CHETROIU, Ion CĂLIN .....	258
<b>HOW TO UNBLOCK THE FINANCING OF SMALL AND MEDIUM SIZE FARMS IN ROMANIA? FINANCIAL INSTRUMENTS PROPOSAL FOR RDP 2014-2020</b>	
Cornelia MIHAI, Alexandra TODERIȚĂ .....	264
<b>SOME ELEMENTS OF ECONOMIC EFFICIENCY OF BIOLOGICAL TREATMENT TO COMBAT CORN BORER (OSTRINIA NUBILALIS HBN) IN THE CONDITIONS OF TRANSYLVANIA</b>	
Felicia MUREȘANU, Voichița HAȘ, Mircea IGNEA .....	271

# CHANGING OF AGRICULTURAL POLICIES IN ROMANIA DURING PREPARATION OF EU ACCESSION AND THEREAFTER

LUCIAN LUCA<sup>1</sup>

**Abstract:** *This article Provide a comprehensive perspective in the analysis and evaluation of Agricultural Policies, highlighting the arguments That lay at the basis of Common Agricultural Policy reform in the context of Pressures for Reforming the Agricultural Policies in OECD member countries the, on one hand, and of the radical transformations of the Agricultural Policies in Romania Accession DURING preparation and afterwards. Main Contribution is represented by interpretation of the significance of Romania's Agricultural Policies Adequate changes through the identification of data sources Referring to the Budgetary expenditures of agriculture and Their grouping by Intervention destinations. The analysis Revealed the right direction of agricultural policy changes, as well as the quasi-discretionary subsidies from national funds. Furthermore, the most targeted allocation of funds for agricultural policy Measures Funded from the national and European budget is Necessary.*

**Keywords:** *Romania, Agricultural Policies, national budget, European funds*

## INTRODUCTION

By the place they occupy in the Romanian economy agriculture can not be the main source of economic growth, but can contribute to poverty reduction and food security. Food security has always been an implicit objective of agricultural policy, a country's ability to provide food for its population being primarily provided by domestic production. In Romania the transition to market economy, food security was of ten explicit objective of agricultural policies, especially in a traditionalist approach, aimed at achieving a high degree of coverage of domestic food requirements through relative protection high.

Preparation for accession to the European Union (EU) led to a gradual reduction in the level of protection, while the modification of the subsidy to agriculture, according to the European one. After accession agricultural policies applied in Romania are the result of interaction between EU agricultural policy and national agricultural policy measures which complement the actions and programs. Under the umbrella of the CAP food security has become a common concern for the EU, but this does not exclude national responsibilities relating to the supply of food consumption of the population. Changes in the volume and structure of support to farmers, regardless of national origin or European funds capture the transformation of agricultural policies applied in Romania in the last decade.

## MATERIAL AND METHOD

Transforming agricultural policies in Romania during 2002 -2011 is tracked using three major indicators:

- 1) grants to support agricultural production financed by the state budget, analyzed compared to the pre-accession and post-accession
- 2) subsidies to farmers in the EU and national funds after accession period analyzed in the evolution of their structure;
- 3) The total subsidies, those actually benefiting farmers and default as a result of EU border protection, benchmarking with some EU member states.

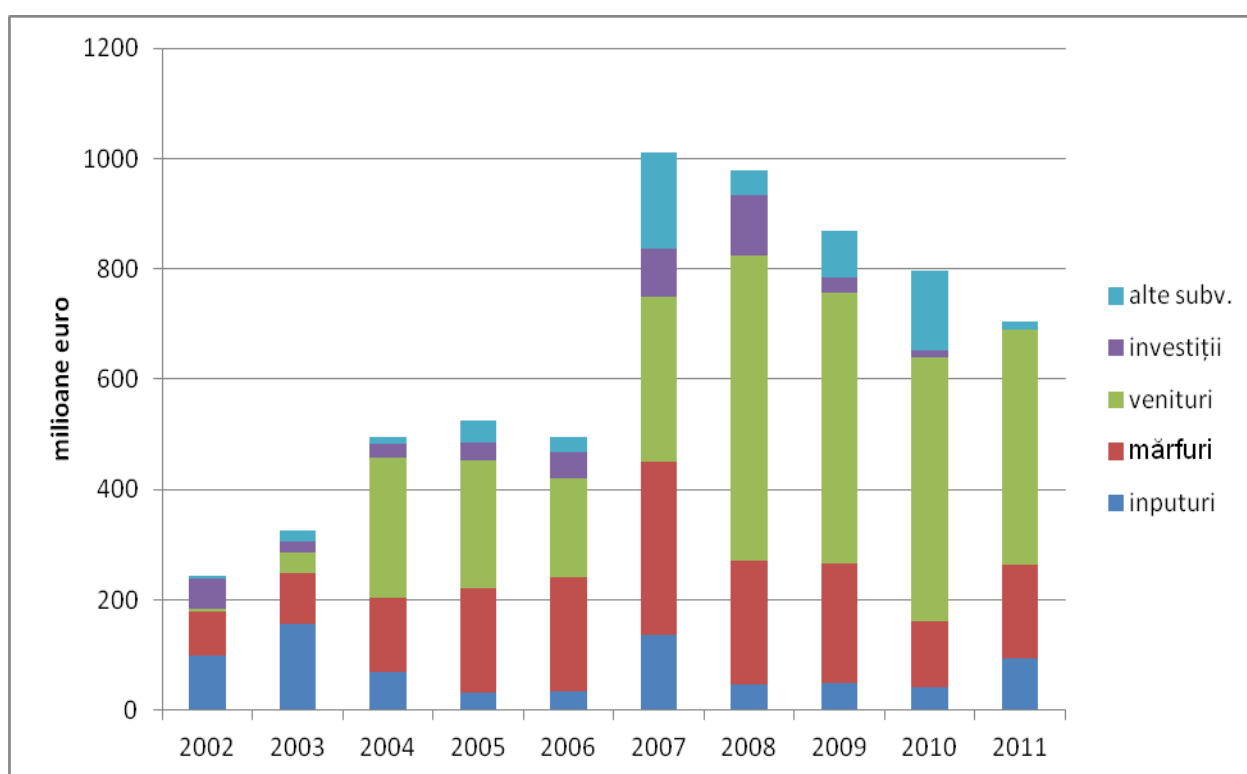
## RESULTS AND DISCUSSION

### *Volume and structure of national subsidies for agriculture*

<sup>1</sup>Institute of Agricultural Economics, Romanian Academy, Calea 13 Septembrie no. 13, sector 5, Bucharest, phone / fax: 021/3182411 e-mail: luca@eadr.ro

Preparation for accession to the European Union involved in agricultural policies introducing measures specific grant developed countries. A analysis of grants in the last decade reveals stabilization funds from the national budget allocation model compatible with the Common Agricultural Policy (CAP) since 2004. At the same time, there is an increase in national subsidies granted after accession in 2007. If in 2007 the subsidy was increased by the decision of the authorities to compensate farmers for losses caused by drought and subsequent maintenance of a high level of subsidies cannot be explained only by the temptation of governments to act exaggerated claims of farmers in electoral context of the period (elections in 2008, 2009 and 2012). Normal would have been like since 2007 the level of subsidies paid from the national budget to remain the same (or possibly decrease) in view of the fact that farmers began to receive and subsidies paid by European funds.

**Figure 1. Volume and structure of national agricultural subsidies in the pre-and post-accession interventions by destination**



Source: author's calculations based on data provided by the Ministry of Agriculture

Grants represented in Figure 1 refers only to national budget expenditure by the Ministry of Agriculture in their performance (even if they were rights due to previous years), given the various beneficiaries of the agro-food sector. Not included operating expenses of the ministry. Grants are grouped into five major categories:

- Subsidies for inputs, which reduced the volume continue to be allocated to producers of selected seeds, irrigation service providers (whether granted state agency SNIF / LRA or water user associations) or the diesel (the reduction of excise duty or actual subsidy) or fertilizer (2002-2003);

- Subsidies for goods that have been granted under the support programs of crop production (vegetables in greenhouses, vegetable and fruit processing) and the animals (pigs, poultry, milk) in the form of payments for products sold (to producers raw agricultural products), and welfare payments after 2010;

- Subsidies revenues, which meant both providing agricultural coupons and cash remittances, both the small and large farms, and amounts received as annuity and after joining here included

direct payments to national funding (additional payments of European vegetable sector and the animal), just as de minimis aid granted in the autumn of 2008;

-Investment subsidies, ie subsidies agricultural and irrigation, livestock Fit allowances for the modernization of dairy farms, or Romanian SAPARD program funding;

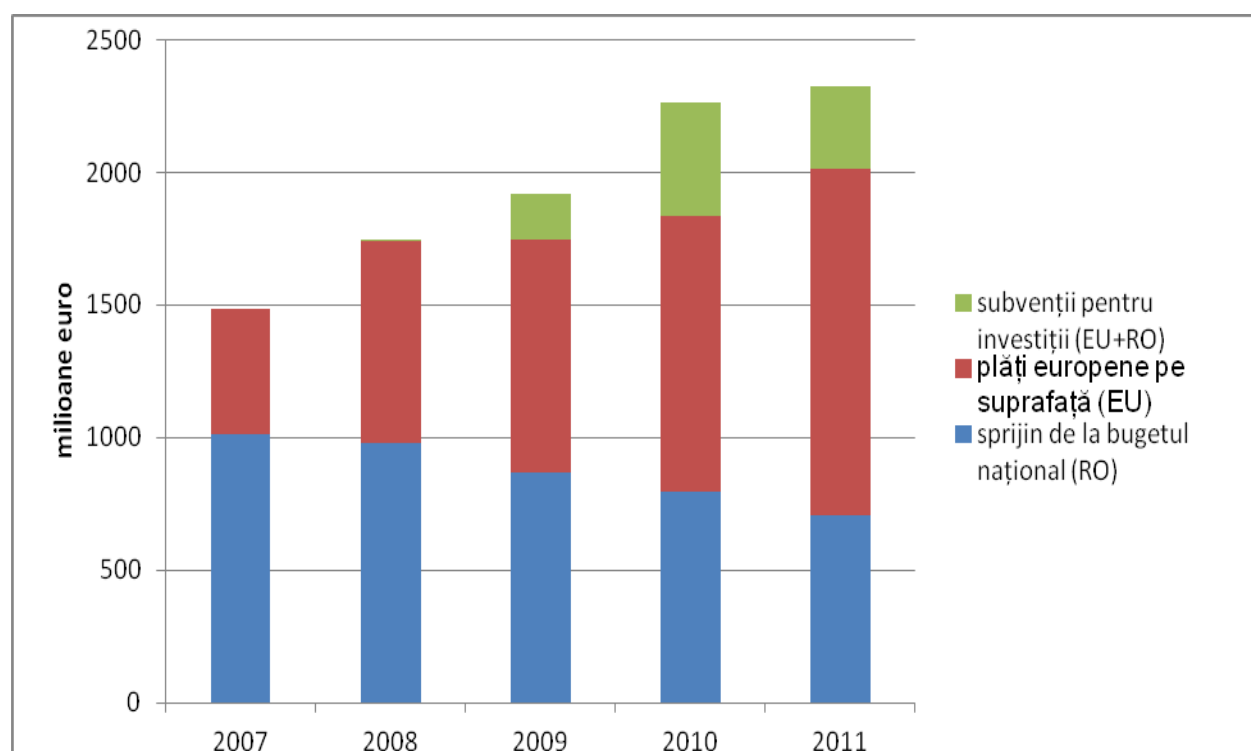
-Other grants, including loans are found production bonus es, compensation for disasters (especially drought in 2007 and floods in 2008), crop insurance premiums and costs of waste neutralization after accession, and co-distribution program fruit in schools.

Not included funds allocated by the EU SAPARD program or national contribution to this program, as it included no funds allocated to the National Rural Development Programme since 2008. In addition, national public expenditure of the Ministry of Agriculture from 2007 onwards were included only complementary national direct payments and direct payments not part financed by the EU budget.

### Volume and structure of agricultural subsidies after EU accession

A global overview of the support they received agricultural producers in Romania after the EU accession is shown in Figure 2.

**Figure 2. Total volume and structure of annual subsidies to farmers in Romania after the EU accession, the European and national funds**



Source: author's calculations based on data provided by the Ministry of Agriculture

Grants awarded total country each year, cumulative:

-Support from the national budget presented in detail above, whose main component is the complementary national direct payments;

-European payments area, who are paid from EU funds, meaning payments to the single area payment scheme (SAPS - Single Area Payments Scheme) and payments under Axis 2 of the Rural Development National Programme (RDP) and payments agricultural land in the mountains, those for land in disadvantaged areas natural and agri-environmental measures;

-Investment subsidies, representing the amounts awarded by the selection of projects in the form of public financing for the beneficiaries of the measures of Axis 1 of the RDP (mainly

investment in farms and processing units of agricultural production), EU funds and national rates agreed previous Commission.

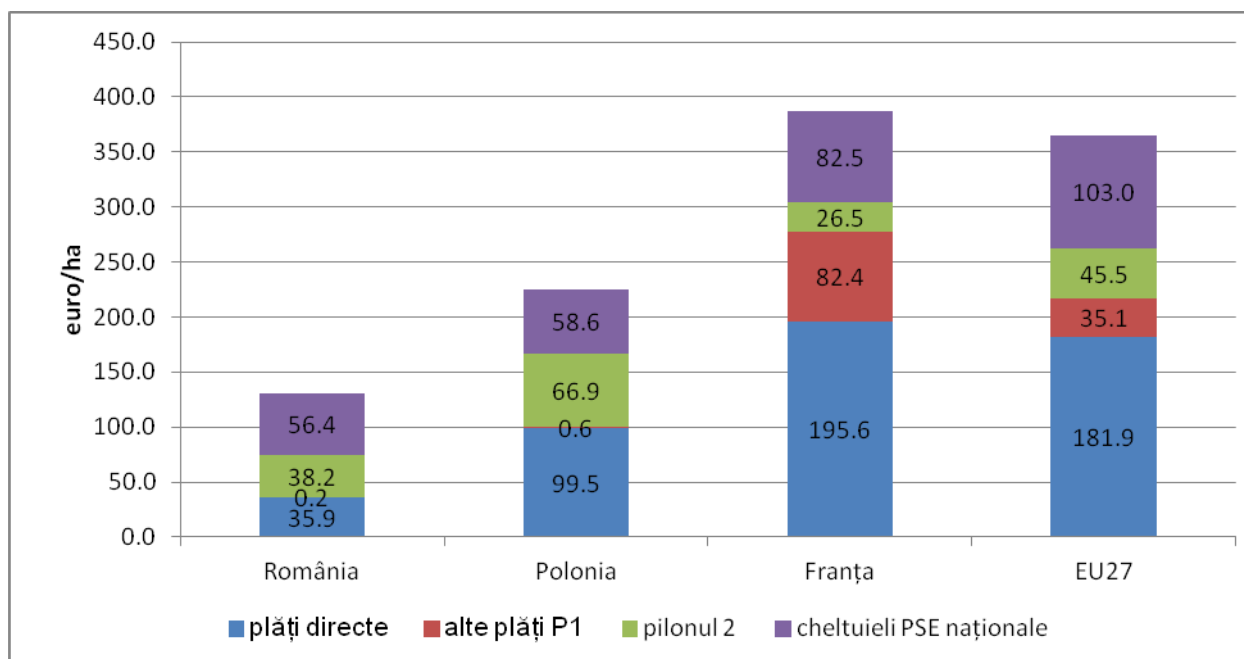
The situation in Figure 2 highlights the public effort of European and national funds for the agricultural sector in Romania over two billion annually from 2010. As is normal (according to the Common Agricultural Policy and the Accession Treaty of Romania) increase the share of payments from EU funds and national funds that decreases each year. The figure highlights the limited volume of subsidies for investment, compared to production payments and income support, which partially explains the low performance of Romanian agriculture.

### *Effort indicators of support for agriculture in Romania and in some EU countries*

The producer support estimate (PSE) is the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, based on the holding of the measures to support agriculture, regardless of their nature, their goals or effects on agricultural production or farmers' incomes. A analytical potential of this indicator, which is the main indicator for monitoring and evaluation of agricultural policies in OECD countries has been substantially improved twice since its introduction. Between PSE categories and subcategories, the most important has been to many countries support the market price (Market Price Support - MPS), which is the total transfers from consumers to producers resulting from measures such as tariffs, import quotas, prices administered and licensing measures that "charge" consumers. MPS is calculated by multiplying the volume of production with the support unit, ie the difference between the domestic price of a product and the reference prices at the border.

The producer support estimate (PSE) of Romania accession period, expressed as a percentage of the value added levels comparable with those of the European Union, which still belonged, indicating a convergence of agricultural policy measures, judged not only through the instruments used, but also the intensity of support for farmers. Thus, the PES in the European Union declined gradually in 2002-2006 from 36% to 31% of the production, development comparable to that of Romania, where the PSE decreased from 37% to 28%, recording and some fluctuations.

How the European Union is considered as a single country, the calculation effort indicators of agricultural support, the producer support estimate (PSE) its corresponding include support received by farmers in Romania, after its accession, and when interpreting data on the support and Romania apply the same EU average. However, the European Union, despite its agricultural markets unique convergence level of support between countries is an ongoing process, evolving relatively slowly, hampered by the difficulty of political acceptability redistribution of direct payments between Member States, as evidenced by the situation shown in Figure 3.

**Figure 3. Payments from EU funds and national equivalents per hectare in 2009, in some EU countries**


Source: taking OECD database

Comparison of the European support and national aid received by Romania, Poland and France shows that farmers in the new Member States are deprived not only of the different level of allocations from European funds, but also the level of support through national programs (which, however, must also obtain the approval of the European Commission, considered state aid).

The complexity of the convergence of the economies of the EU results before equalization rates support the adoption of the same model of subsidizing agriculture in all Member States. However, rigidity of the current Common Agricultural Policy can lead to a rapid reduction of the differences between countries which have historical reasons. The gap between the economic development of the old and new Member States are evident (Table 1 illustrates the situation for Romania versus France and Poland).

**Table 1. Key indicators of the development of the agricultural sector in some EU member states**

		<i>France</i>	<i>Poland</i>	<i>Romania</i>
Population	million inhabitants, 2009	64.3	38.13	21.49
GDP per capita	euro estimate in 2012	31093	9949	6380
GDP per capita	PPS estimate 2012	27554	17091	12726
Share of agriculture in GVA	%, 2010	1.8	3.5	6.5
Employment in agriculture	%, 2011	2.8	12.7	32.6
The average area of farm	ha, 2010	53.9	9.6	3.4
Share holdings under 2 hectares	%, 2010	14.7	24.1	74.3
Exports of agricultural products	billion, 2011	58.1	14.3	4.1
Imports of agricultural products	billion, 2011	42.4	12.0	4.5
Intra EU agricultural trade balance	million, 2011	4492.3	976.3	626.6
Extra EU agricultural trade balance	million, 2011	11189.6	1276.4	204.0

Source: *Agricultural Policy Perspectives. Member States factsheets 2012*, EC DG Agri

Comparison of the three selected countries shows that if differences in nominal GDP per capita (in EUR) attenuates when expressed in purchasing power standards (PPS), the share of agriculture in gross value added and employment remain high in Romania and a grifood trade

balance remains negative. It shows that despite growing agriculture spending over the past decade, costs have reached a critical mass, the performance of the agricultural sector in Romania remain modest. Improving this situation can result in a more results-oriented allocation of financial resources for agriculture.

## CONCLUSIONS

National public expenditure for agriculture showed a continuous upward trend in the period of preparation for accession, reaching a peak in 2007 and then decreased slowly, remaining at a high level. After accession, agricultural expenditure financed from European funds have come to represent the most important agricultural subsidies, direct payments a decisive contribution. However, the absolute level of subsidies keep farmers Pritam significant differences between EU member states, the contrast between old and new Member States is evident. Convergence supported by measures financed from the EU budget is a lengthy process, even in agricultural sectors falling under the Common Agricultural Policy.

## REFERENCES

1. Agrosynergie (2011), Evaluation of income effects of direct support, European Commission, Brussels
2. Cioloș, D., Luca, L. Giurca, D. (2009), 20 years in search of a coherent agricultural policies in Romania, blackberries, R., Boari, V., Vlas, N. (eds.), Romania after twenty years, Publisher European Institute, Iasi
3. EC (2012), Agricultural Policy Perspectives. Member States factsheets - November 2012 European Commission, Brussels
4. EP (2012) Comparative analysis of agricultural support agricultural Within the major trading nations, the European Parliament, Directorate General for Internal Policies, Agriculture and Rural Development, Strasbourg
5. OECD (2000), Evaluation of agricultural policies. Romania, OECD / MAA, Bucharest
6. OECD (2011), Evaluation of Agricultural Policy Reforms in the European Union, OECD Publishing, Paris
7. Sadoulet, ie, the Janvry, A. (1995) Quantitative Analysis Policy Development, The Johns Hopkins University Press, Baltimore
8. Steriu, V., Otiman, IR (Eds.) (2013) The national strategy for sustainable development of the agri-food sector and rural areas in the period 2014-2020-2030, Romanian Academy Publishing House, Bucharest

# ROMANIA'S POSITION IN THE EU EXTRA-EUROPEAN AGRIFOOD TRADE

GAVRILESCU CAMELIA<sup>1</sup>

**Abstract:** *Since the EU accession, Romania's agrifood trade increased significantly, in both volume and value terms. Although the old free trade agreements, that have been in force for the last 15 years, were discontinued when it joined the Single Market, Romania continued its trade relations with its traditional extra-EU partners, under the new EU rules. The EU is currently the largest player in the world agrifood markets, and the 2004 and 2007 enlargements contributed to the consolidation of that position. The present paper is empirically examining the position and contribution of Romania among the other EU member countries to the extra-EU agrifood trade, in terms of values, quantities and directions of flows. The competitiveness of the Romanian extra-community agrifood is analyzed as well, since it improved significantly for the last three years, shifting the trade balance from negative to positive.*

**Keywords:** *agrifood trade, extra-EU trade, competitiveness, trade balance*

## INTRODUCTION

The international agrifood markets experienced important changes during the last 15 years. The top 3 players, EU, USA and China changed several times their ranking, due first to the structural changes in the EU (the 2004 and 2007 enlargements), then to the occurrence of the economic crisis in 2008-2009 and then to the changes in the EUR/USD exchange rates.

Romania's international trade changed as well. At the accession time, Romania was presenting a significantly less developed and efficient agrifood sector as compared not only to the Old member States (OMS), but to many of the 2004 New Member States (NMS-10). Nevertheless, the free access on the Single Market, even hindered for several products by quality issues or sanitary and veterinary problems resulted in a spectacular increase of the Romanian agrifood trade.

## MATERIAL AND METHODS

After EU accession, the statistical registration of the international trade changed in Romania: the exchanges with the other Member States (MS) are accounted as intra-community trade, while the exchanges with non-EU countries are accounted as international trade (extra-community trade), and these are the figures used in international comparisons, as well as in the present paper.

The calculations used data from Faostat and Eurostat databases, in SITC rev.4 and 2-digits Combined Nomenclature (CN), taking into account the conversion rules between the two classification systems.

The analysis focused on the value and direction of the exchanges, as well as upon the export and import flows composition by products.

## RESULTS AND DISCUSSIONS

Since setting up the Common Agricultural Policy, EU aimed at increasing its agri-food production in order to maximize the coverage of the domestic demand and export the surpluses. In time, the first objective has been mostly achieved; moreover, due to the increased agrifood production volume and quality, EU became a major exporter on the world agrifood markets; at the same time, consumption increased as well, and imports completed the domestic demand.

Since 2000, the total world value of agrifood trade flows (exports+imports) increased continuously: in 2007 it had already doubled (2.12 times as compared to 2000) and in 2011 it had tripled (3.16 times as compared to 2000). The upward trend discontinued in 2009 only, due to the

<sup>1</sup> Dr. Camelia Gavrilăscu, CS II, Institute of Agricultural Economics, Romanian Academy, e-mail: cami\_gavrilăscu@yahoo.com



economic crisis, but resumed its growth since 2010. The EU has been the largest player on the world agrifood markets for the last two decades, followed by the USA and lately, by China.

In 2004, after the 15-25 enlargement, EU-25 became the largest world agrifood products exporter (with a 12% share), and kept its leading position until 2006 only; since 2007, USA took the first position and EU-27, despite the 25-27 enlargement, stepped down to the second position. Brazil maintained its third rank all along, and China the fourth (table 1). In a five-year period (2006-2011), despite the negative influence of the world economic crisis, exports increased; the highest rates were shown by Indonesia (almost 3 times), Thailand, Brazil, Argentina and China (more than 2 times) (table 1). EU-27 exports increased at the slowest pace among the top 10 group.

**Table 1 – Top 10 players on the world agrifood markets**

	2006	2007	2008	2009	2010	2011	2011/ 2006
<b>World – total exports (billion USD)</b>	<b>721.3</b>	<b>873.3</b>	<b>1063.0</b>	<b>950.2</b>	<b>1080.0</b>	<b>1313.9</b>	<b>1.82</b>
Share of top 10 exporters (%)							
EU-25/27	11.9	10.4	10.2	9.9	10.0	10.1	1.55
USA	9.9	10.6	11.1	10.6	11.0	10.6	1.96
Brazil	4.8	4.9	5.2	5.6	5.7	6.1	2.30
China	3.6	3.7	3.4	3.7	4.0	4.0	2.00
Canada	3.4	3.4	3.5	3.3	3.2	3.1	1.66
Australia	2.9	2.4	2.3	2.3	2.5	2.5	1.54
Argentina	2.7	3.1	3.3	2.8	3.0	3.3	2.21
Thailand	2.1	2.1	2.2	2.2	2.4	2.8	2.44
Indonesia	2.0	2.0	2.6	2.2	2.8	3.2	2.93
Mexico	1.9	1.6	1.5	1.6	1.6	1.6	1.56
<b>World – total imports (billion USD)</b>	<b>754.2</b>	<b>912.8</b>	<b>1117.9</b>	<b>987.4</b>	<b>1104.0</b>	<b>1350.7</b>	<b>1.79</b>
Share of top 10 importers (%)							
EU-25/27	11.7	11.5	11.4	10.6	10.1	10.3	1.58
USA	9.6	8.7	7.8	7.9	8.1	7.9	1.48
China	6.3	6.5	7.2	7.4	9.0	9.5	2.70
Japan	5.6	5.0	5.1	4.8	4.9	5.1	1.62
Russian Federation	2.6	2.7	2.8	2.7	2.9	2.8	1.93
Canada	2.6	2.5	2.3	2.5	2.5	2.3	1.61
Mexico	2.1	2.1	2.1	1.8	1.8	1.9	1.63
Republic of Korea	1.6	1.6	1.7	1.5	1.7	1.7	1.87
Saudi Arabia	1.2	1.3	1.2	1.1	1.5	1.4	2.10
Hong Kong	1.2	1.2	1.2	1.4	1.5	1.5	2.19

Source: author's calculation using Faostat data

In terms of imports, the EU has ranked first for the last 15 years, and increased 1.6 times in 2006-2011. China's imports of agrifood products almost tripled during the same period, while the USA imports increased at a slower pace. As a result, since 2010 China became the world second largest agrifood importer, and USA stepped down to the third position.

In its agrifood trade, the EU showed a continuous deficit for the last 15 years, while USA showed a continuous positive trade balance (except for 2005-2006). During 2006-2011, China's agrifood trade deficit increased sharply (3.6 times), from 21 to 76 billion USD.

The two consecutive enlargements, in 2004 and 2007, from 15 to 25 and then 27 countries, had significant impact upon the EU trade. In absolute value, the total general and agrifood international trade increased, but its weight on the world markets diminished as a result of several opposing trends:

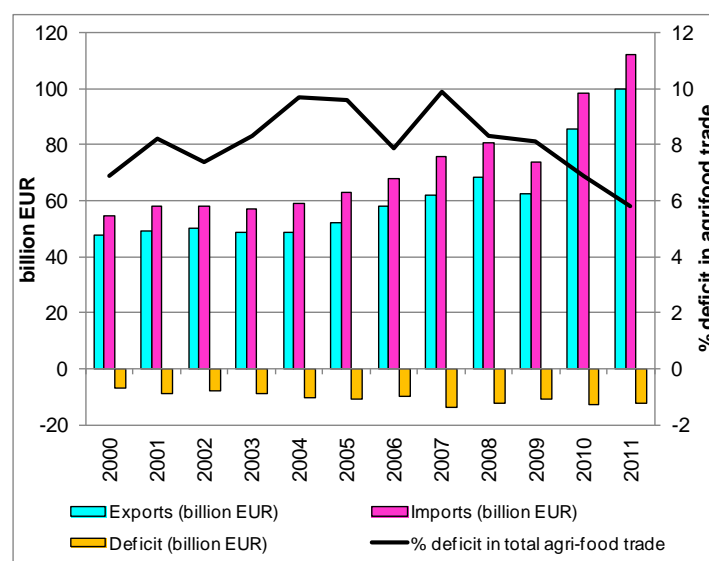
- a) Starting from the accession moment of a New Member States (NMS), its total international trade becomes statistically separated into intra-EU trade (trade between the NMS and the rest of the EU) and extra-EU trade (trade of the NMS with non-EU countries). As a consequence, the

extra-EU trade diminishes by the value of the trade with the NMS before accession, and increases by the trade of the NMS with non-EU countries;

- b) both Old Member States (OMS) and NMS increased their trade volumes in absolute terms during the period 2004-2007, since it has been a general economic expansion period in Europe;
- c) the NMS added their trade with non-EU to the general „extra-EU” trade volume;
- d) the overall continuous growth in both exports and imports since 2002 has been temporarily reversed in 2008-2009 due to the financial turmoil at the end of 2008.

After the two enlargements, both EU exports and imports increased immediately (figure 1), and the same happened with the agrifood trade deficit, since the combined extra-EU trade balances of the 10 and then 12 NMS has been negative. In 2008 the EU total agrifood trade (export + import) reached a first peak (149 billion EUR).

**Figure 1 – EU extra-community agrifood trade in the 2004 and 2007 enlargements decade**



*Source: author's calculations on Eurostat data*

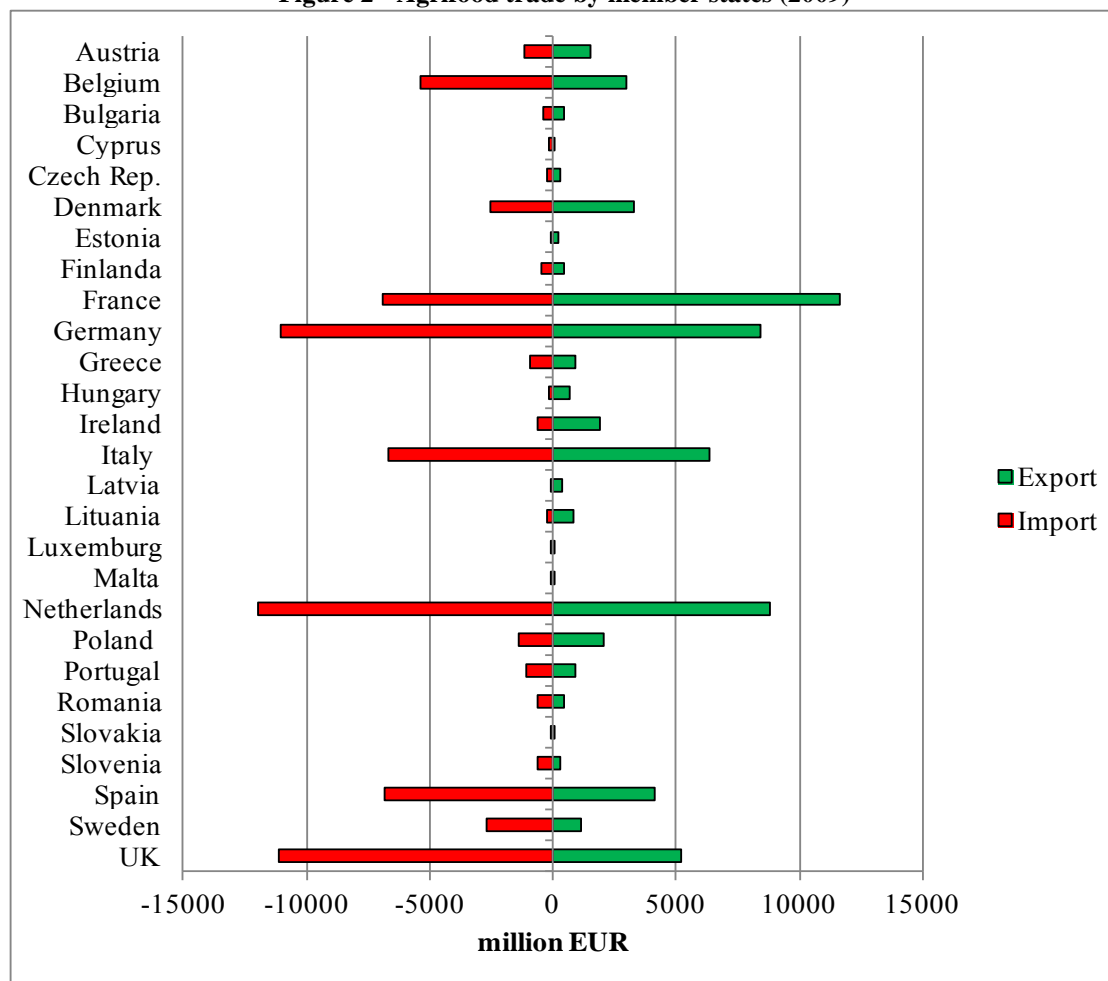
The economic crisis showed its effects upon trade as late as 2009, by both a net export contraction (of 7.5%), and import contraction (of 11.1%). Since 2010, the increasing trend in trade flows resumed and in 2011 a new peak has been reached: a total trade value of 212 billion EUR, of which 100 billion EUR agrifood trade exports and 112 billion EUR imports. The trade balance, which reached a 14 billion EUR maxim, diminished subsequently to a share of 5.8% of the total trade. The increased exports and imports were mainly the consequence of a substantially higher volume of traded goods, and at a far lesser degree of price and EUR/USD exchange rate variations.

In 2009, the top 5 countries exporting outside EU accounted for 65% of the total extra-EU exports and have been France, Netherlands, Germany, Italy and UK. In terms of agrifood exports, Romania ranked 19 of 27. The top 5 extra-EU importers have been the Netherlands, UK, Germany, France and Spain, accounting together again for 65% of the total imports, with Romania ranking 14 of 27.

In terms of trade balance, France, Ireland, Denmark, Poland and Lithuania were the top 5 with extra-EU positive balance; among the NMS, Hungary, Latvia, Estonia, Bulgaria and Malta had also a positive agrifood trade balance in 2009.

The main contributors to the 2009 EU trade deficit have been UK, Netherlands, Spain, Germany and Belgium; among the NMS, agrifood trade deficits were presented by Slovenia, Romania, Cyprus, Slovakia and Czech Republic.

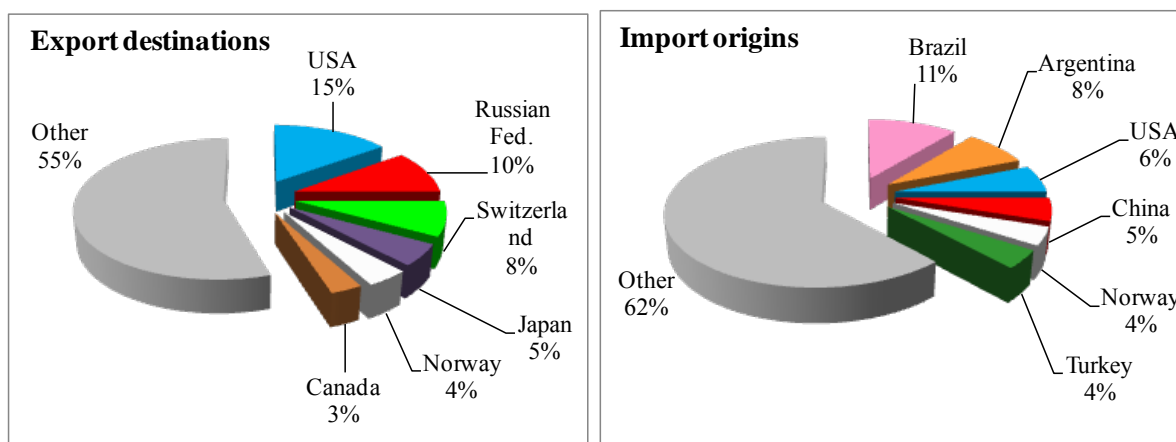
Figure 2 - Agrifood trade by member states (2009)



Source: author's calculations on Eurostat data

In terms of export destinations of the EU-27 exports, six countries are accounting for 45% of the total volume: USA, the Russian Federation, Switzerland, Japan, Norway and Canada. Among the exported products, beverages only accounted for a quarter of the exports, other products were cereals, fruit, vegetables and dairy products (figure 3).

Figure 3 – Main trading partners for EU-27 (2009)



Source: author's calculations on Eurostat data

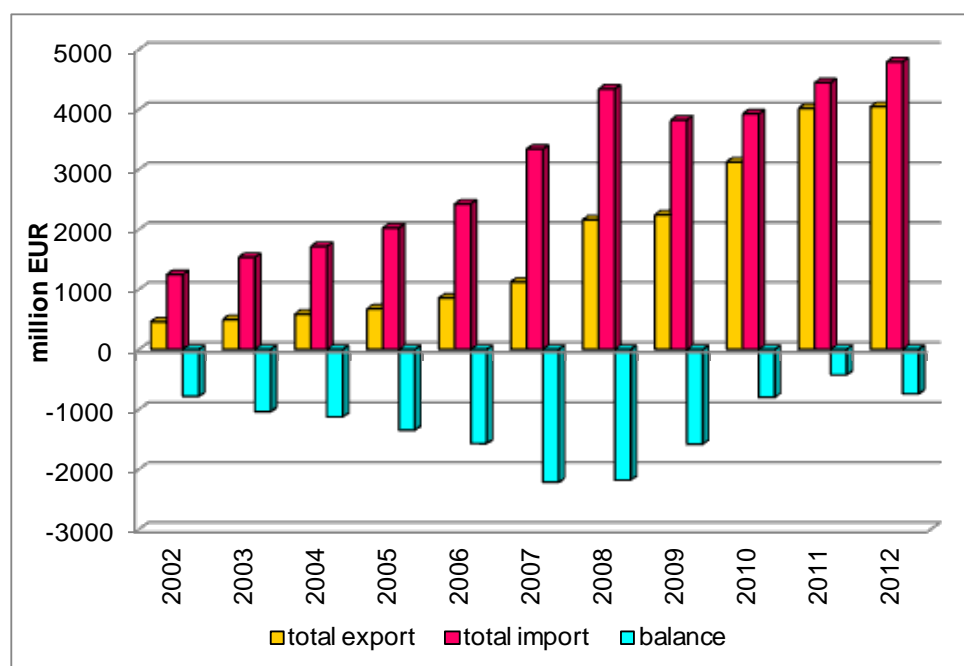
On the contrary, the EU-27 extra-community imports are more dispersed in terms of countries of origin and far more concentrated in terms of the trade flows composition. The top 6

countries supplying agrifood products to EU-27 are accounting for only 38% of the imports: Brazil, Argentina, USA, China, Norway and Turkey. The top 5 imported products are: coffee, tea, fruit, vegetables and fish, and they are accounting for almost 2/3 of the total imported agrifood products.

After EU accession, the efforts of the Romanian agrifood sector focused on enhancing competitiveness, by improving efficiency and product quality along the food chains, in order to achieve a better presence on both the EU Single Market as well as on the international markets.

The lifting of the import bans since 1990, the partial elimination of the trade restrictions, their complete removal in 1997, together with the enforcement of a moderate tariff regime allowed a massive penetration of imported agrifood products on the Romanian domestic markets. Due to the breakup of the traditional food chains as a result of the relocation on private basis of the whole agrifood system, from the agricultural production, to the industrial processing and finishing in the retail sector, the domestic supply could not keep pace with the demand expansion, both in quantity and quality terms, and was not able to face the competitive pressure of the imported products. Although the Romanian exports increased continuously since 2002, the imports increased at a faster pace, and, as a result, the agrifood trade deficit increased massively, to a historical peak of 2,2 billion EUR in 2007 (figure 4).

**Figure 4 – Romanian total international agrifood trade**



*Source: author's calculations on Eurostat data*

EU accession meant for Romania, at least during the first 2 years, a considerable increase in the agrifood total international exchanges; thus in 2008, the total value was double as compared to 2006, the last pre-accession year. The absolute value of the agrifood trade increased both in the pre-accession period, and in the post-accession period, with a slight contraction in 2009. From the agrifood trade point of view, the economic crisis resulted in a contraction of the total trade exchanges in 2009; afterwards, the upward trend resumed.

In the Romanian total international trade, the post accession extra-community trade is about 27% (for both exports and imports). A notable exception has been 2008, when the ratios changed substantially: for exports the extra / intra-community ratio dropped to 13% / 87% (as compared to 27/73 in 2007, 2009 and 2010), and for import the extra / intra-community ratio increased to 30% / 70% (as compared to 27/73% in 2007, 2009 and 2010) (table 3).

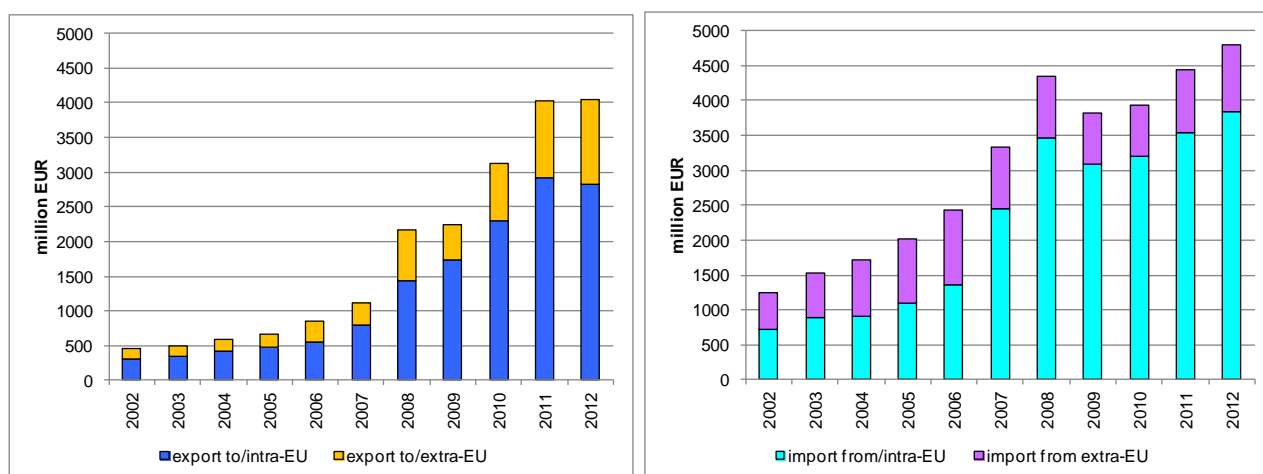
**Table 3 – Extra / intra-community ratio in the Romania agrifood trade (%)**

	2004	2005	2006	2007	2008	2009	2010
Extra-community export	45.5	35.0	39.3	30.0	35.0	22.9	26.9
Intra-community dispatches	54.5	65.0	60.7	70.0	65.0	77.1	73.1
Extra-community import	48.9	47.2	45.4	27.6	21.0	19.7	19.0
Intra-community arrivals	51.1	52.8	54.6	72.4	79.0	80.3	81.0

Source: author's calculations on Eurostat data

A possible explanation might be the faster RON/EUR exchange rate depreciation (by 10% in 2008/2007) as compared to the RON/USD exchange rate (by only 3% in the same period), which might have temporarily redirected the Romanian trade flows towards the EU at the expense of the extra-EU ones, and at the same time a temporary favoring, for 2008 only of the extra-EU imports in USD.

The evolution trends in the Romanian extra-community trade are different from those of the intra-community trade (figure 5). Thus, the extra-community exports increased continuously, reaching a peak in 2011 (1.1 billion EUR), while for imports, the increasing trend from the pre-accession period reversed since 2008, to drop in 2010 to a minimum of 720 million EUR, and then back upward to 903 million EUR in 2011.

**Figure 4 – Romanian extra-Eu versus intra-EU agrifood trade**


Source: author's calculations on Eurostat data

The intra-community agrifood trade deficit decreased continuously, the same as for the extra-community balance, due to the combined action of the export expansion and import contraction. The year 2010 is special, because for the first time since 1990, the extra-community agrifood trade balance turned positive: exports exceeded imports, and the trend continued in 2011 as well.

The Romanian extra-community agrifood trade flows are different from those of the EU-27 in terms of the share of destination and origin countries (table 4). It is quite normal, taking into account that:

- during the '90's, Romania lost some important export markets – the ex-COMECON markets, mainly Russia;
- penetrating new international markets and EU proved quite difficult, due mainly to sanitary and veterinary barriers;
- the enforcement of free trade agreements with various countries and country groups facilitated the access of the Romanian agrifood products on these markets;

**Table 4 – The Romanian extra-community agrifood trade: top destinations of exports and origins of imports**

Rank	2003		2006		2010	
	Country	%	Country	%	Country	%
<b>Destinations of exports</b>						
1	Croatia	18.1	Turkey	19.6	Turkey	17.3
2	Turkey	16.0	Croatia	14.8	Korea	10.6
3	Syria	14.2	Pakistan	9.2	Syria	6.5
4	Moldova	10.4	Moldova	6.4	Israel	5.5
5	Pakistan	7.9	Russian Fed.	5.2	Saudi Arabia	5.4
6	USA	4.5	Bosnia & Herzegovina	5.1	Philippines	4.9
<b>Origin of imports</b>						
1	Brazil	20.6	Brazil	25.3	Brazil	21.5
2	USA	13.0	USA	12.6	Turkey	15.6
3	Russia	9.3	Turkey	8.5	USA	6.8
4	Turkey	7.5	Canada	7.6	China	6.7
5	Canada	5.6	Moldova	5.3	Argentina	5.7
6	Moldova	5.5	Ecuador	5.0	Moldova	4.4

Source: author's calculations on Eurostat data

d) the proximity of these countries allowed the increased of trade flows stimulated by the lower transportation costs as well.

The EU accession changed the rules of the game in terms of tariffs and import quotas, but the directional flows remained almost the same, even if in some cases the volume of exchanges decreased somehow (such in the case of Republic of Moldova).

## CONCLUSIONS

Although it takes the leading position in the total agrifood world trade, EU-27 shows important trade deficits.

The last two enlargements (in 2004 and 2007) had a significant impact on the EU trade. The value increased in real terms, mostly due to the contribution of the NMS, through the increase in the traded goods volumes. But the NMS added as well their negative extra-community agrifood trade balances to that of the OMS, thus contributing temporarily to the increasing EU-27 trade deficit. Overall, the final result of the latest EU enlargements has been positive in the extra-community trade volume, and after the passing of the economic crisis shock, exports increased faster than imports, resulting in a diminished trade deficit from 24 million EUR in 2008 down to 4.5 billion EUR in 2012.

The absolute value of the Romanian international agrifood trade increased continuously during the last decade. The extra-community trade accounted 27% for the last three years. In the extra-EU trade hierarchy by countries, Romania ranked 19-th in exports and 14-th in imports in 2009.

As a result of the simultaneous action of the export expansion and import contraction after 2008, the Romanian extra and intra-community agrifood trade balance trade diminished continuously. As a first since 1990, the extra-community agrifood trade balance became positive in 2010: the exports exceeded the imports, and the trend continued in 2011 and 2012 as well.

## BIBLIOGRAPHY

1. European Commission: External and intra-European Union trade – Data 2004 -09 – 2010 edition, Luxembourg: Publication Office of the EU, 2011
2. <http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics>, retrieved October 01, 2013

# VALUE ADDED TAX (VAT): THE IMPACT ON THE CHAIN PRODUCER - PROCESSOR - TRADER - CONSUMER - STATE BUDGET

Mircea TOMA<sup>1</sup>

**Abstract:** *Counteracting the crisis, theoretically but also practically cannot ignore the direct and consequential effects (collateral) of taxes and contributions due to the state budget and distribution of profits, on the chain: Financial Institutions  $\Rightarrow$  Suppliers of inputs  $\Rightarrow$  Agricultural producers  $\Rightarrow$  Wholesalers  $\Rightarrow$  Processing industry  $\Rightarrow$  En – detail traders  $\Rightarrow$  Consumer  $\Rightarrow$  State budget. Solutions require transparency, solidarity, equity, social justice in the distribution of efforts and usufruct (profit) on all chain participants to achieve useful goods and services useful for the human society. An orderly adjustment of tax and contribution system may lead to the adoption of those measures to stimulate domestic consumption, domestic output growth and rotation speed of capital, reducing the budget deficit, uncontrolled growth of prices, inflation and unemployment, in a word of imbalances in economic life. To assess the impact of VAT on the chain was started from two hypotheses: rethinking the VAT quota level on the chain and determine and regularization of the VAT, by entitling the right to the users of agricultural production to deduct VAT from the price paid to individual producers (associated) namely calculating VAT from 100 price paid. The results are concretized in: increasing revenues (about 2.4 billion / year), reducing the public institutions spending on goods and services bearing VAT by 20% (about 200 million Euro/ year), reduction of VAT refunds from the budget, reducing the gap between theoretical and potential VAT collected from 42 % (49.5 %) to 24%, by increasing the collection from 58% (50.5 %) to 76 %, concentration collecting VAT chargeable (76,22 %) from merchants and diminishing the amount of payment by the economic operators on channel.*

**Keywords :** VAT, chain, VAT quota, tax evasion, state budget

## INTRODUCTION

**Value added tax in the world:** Value added tax was first applied in France (1957) and, from 1 January 1970, was adopted by the countries of the former Common Market (now the European Union) to avoid taxation in “cascade” as was the tax on turnover. (ICM). VAT gradually spread across the all economy domains and was adopted by most countries - 63 states, becoming the main source of budget revenues - over 40%. Denmark was the first country that used VAT, after France. The following was Germany (1968), Sweden (1969) and Norway (1970). The United States of America do not use VAT.

Today, all EU countries are obliged to use VAT to comply with the Directive (2006/112) of the European Commission.

**VAT in Romania vs. EU:** VAT is, for the 63 countries that apply it, the main source of revenue to the budget, including Romania, and as a source for reducing the effects of the financial crisis triggered in 2008. Romania, with a VAT rate of 24% ranks third in the EU, after Hungary (27%) and Denmark (25%). After Romania, follows Finland by 22%. A group of three countries have 21% and 20% 7 countries. The lowest rates have Cyprus and Luxembourg, 15% and Greece with 13%, reduced from 22%.

**Collection rate:** According to European Commission study, Romania has lost 10.3 billion Euros of VAT in 2011, which represents 7.86% of GDP achieved, 131.1 billion Euros, compared with 1.5% at GDP of 12669 billion Euros at the level of the Union, occupying first place. Romania collects only 58% of potential VAT collected to the state budget, compared with Greece which has a collection of 70%, Slovakia 72%, Italy 75%, but Sweden has 97% and the Netherlands 95%.

**The collecting gap** in the VAT domain at the level of the EU countries is 17% in the period 2000 – 2011 and only 42% in Romania.

**Tax evasion:** The current crisis is accentuated by increasing tax evasion manifested by “evasion of tax liabilities”, namely the action to appropriate by fraud of the economic operators by cashing, failure to record and use for personal the amounts due to state. Evasion was estimated at

<sup>1</sup> PhD in Economics, Economic Director of The Academy of Agricultural and Forestry Sciences Bucharest

3.5-4% (20 billion lei) by the Romanian Fiscal Commission. The 10.3 billion Euros represent about 80% of VAT revenue from the 2014 budget (57 billion lei: 4.45 lei / euro).

## MATERIAL AND METHOD

The research method used is the qualitative analysis by studying the fiscal legislation of the Common Agricultural Policy (CAP) documents, the NIS, MFP and NBR communiqués on the evolution of inflation prices, specialty literature which help to reduce the effects of the current crisis manifested also in agriculture.

For assessing the impact on pathway, were taken into account two hypotheses.

The first working hypothesis: rethinking the VAT rate level, on the chain producer - processor - retailer - consumer, by establishing differentiated VAT rates (reduced) on chain for farmers - the agricultural production users as raw materials, for retailers and that supported by consumer.

The second hypothesis: application of the second method of determination and settlement of VAT, by allowing agricultural production users to deduct VAT from the price paid to individual producers (associated), namely the calculation of VAT from 100 of price paid.

It keeps the principle of deductibility and of VAT management procedures.

## RESULTS AND DISCUSSIONS

### Analysis of the value added tax on chain

In Romania, VAT was introduced and implemented on 1 July 1993 as a form of harmonization with the EU tax system used. Currently applies 3 rates:

- standard rate of 24% (from 1 July 2010, compared to 19% practiced);
- reduced rate of 9% on the bread chain (wheat and flour) from September 1, 2013;
- two reduced rates of 9% and 5% to the consumer

Although since its introduction as a modern form of consumption tax, the base and the level of the tax rate and procedures have undergone several changes, they have not solved the budget income growth and the amount of revenue (cash) of individual farmers (associated), compared with the legal, creating more parallel markets:

- *peasant market* – on the relation individual producer (associated) - consumer;
- *regulated market* – on the relation legal farmers (companies, agricultural associations) - wholesalers - processors - retailers - consumer;
- *speculative market* – on the relation individual producers - wholesalers (merchants) not taxed (speculators) – consumer

The synthesis of VAT influences on chain in relation with the rate level and collection procedures, regularization and payment is shown in Tables 1 and 2.

Table 1

Specification	1) STANDARD TAX (24%)				2) REDUCED TAX (9%=5 %)					
	Agricultural producer	Processor	Retailer	Consumer	Producer	Processor	Retailer		Consumer	
							9%	5%	9%	5%
Cumulative price on chain*)	40	76	100	124	40 (52)	76			109	105
Costs on chain	36	32,4	21,6	-	36	32,4	21,6	21,6		
VAT collected	9,6	18,46	24	24**	9,6	18,46	9	5		
VAT deductible	4,75	13,86	21,31	(11,88)**	4,75	13,86	21,31	21,31	(11,88)**	(13,77)**
a) Afferent to merchandise	-	9,60	18,46		-	9,60	18,46	18,46		



1) STANDARD TAX (24%)					2) REDUCED TAX (9%=5 %)					
Specification	Agricultural producer	Processor	Retailer	Consumer	Producer	Processor	Retailer		Consumer	
							9%	5%	9%	5%
b) Affertent to the cost on chain	4,75	4,28	2,85		4,75	4,28	2,85	2,85		
VAT chargeable	4,85	4,58	2,69	(12,12)**	4,85	2,69	-12,31	-16,31	(4,77)**	(-8,77)**
Theoretic degree of recuperation	43,55	21,84	11,21	50,50**						

\*) Data source: Own calculations – cumulative price also represents the share in the product/service price at the economic agents \*\*\*) – total on chain

Table 2

REVERSE CHARGE				OPTIONAL CHARGE	
Specification	Agricultural producer	Processor	Retailer	Consumer	The economic operators can now opt to be registered for VAT if they have a turnover of up to 220,000 lei (EUR 65,000). Moreover, operators with a turnover of up to 2, 250,000 lei (€ 500,000) can make optional the payment of VAT on the receipt of goods or services.
Cumulative price on chain*)	40	76	100	124	
Costs on chain	36	32,4	21,6	-	
VAT collected	-	18,46	24		
VAT deductible		4,28	21,31	(11,88)**	
a) Affertent to merchandise	-	-	18,46		
b) Affertent to the cost on chain	4,75	4,28	2,85		
TVA – recuperated	4,75	-	-	(4,75)**	
TVA chargeable	(- 4,75)	14,18	2,69	(12,12)**	

Note: Own calculations – cumulative price also represents the share in the product/service price at the economic agents \*\*\*) – total on chain

The synthesis of VAT contribution due to the state budget is presented in Table 3.

Table 3

Specification	Standard VAT		VAT reduced		Reverse charge
	24%	19%			
			9%	5%	
Producer	4,85	3,84	4,85	4,85	-4,75
Processor	4,58	3,45	4,58	4,58	14,18
Commerce	2,69	2,30	-12,3	-16,31	2,69
TOTAL chain	12,12	9,59	-4,77	-8,77	12,12
Collecting degree	<b>50,50</b>	<b>50,50</b>	<b>-139,35</b>	<b>-172,23</b>	<b>50,50</b>

Source: own calculations

Conclusions: From the VAT rate of 24%, supported by consumer, only 50.50% (12.12 um) is VAT payable (chargeable) to budget. The difference is the deductible share, immobilized on the chain producer - processor - trader. In determining the indicators has been considered a profit rate of 10% and a share of inputs subject to VAT in price of 55%.

In the case of a profit of 15% and a 51% share of inputs, the gap between theoretic VAT and chargeable VAT (payment) is reduced from 49.5 to 43.3 which are closer to the EU's Economic Commission determined, of 42%, but well above the EU average of 17% and 97% of Sweden and 95% of Netherlands.

These data demonstrate that theoretic VAT and VAT collected by state are influenced of the rate of profit and the share of labor costs, procedures and mechanisms of managing VAT collected and deductible VAT on chain.

### VAT influence on individual farmer (without legal status)

The most affected by the current methodology and procedures for managing VAT is the individual producer that has no possibility in regularization of VAT paid afferent to inputs (seeds, fertilizers, herbicides and pesticides, feed, fuel and lubricants, spare parts, electricity and heat, other goods and services, as appropriate) to achieve agricultural production with VAT collected. In fact under the phrase „exempt from VAT” the agricultural producer is exempt from the quality of „fiscal agent” instead bears the expenses on VAT, thereby negating the character of neutrality. The synthesis of VAT influence is shown in Table 4

Table 4

Specification	S.C. – Agricultural associations	INDIVIDUAL PRODUCER			
		V1	V2	V3	V4
a) Inputs with VAT	55	55	55	44,3	55
b) TVA deductible	(13,2)	13,2	13,2	10,6	13,2
c) Other inputs (labour)	35	35	21,8	35	35
d) Total costs	90	103,2	90	90	113,2
e) Profit	10	-3,2	10	10	10
f) Producer price	100	100	100	100	123,2
g) TVA collected -24%	24	-	-	-	-
h) Amount invoiced	124	100	100	100	123,2
i) TVA chargeable (g-b)	10,8	-	-	-	-

Data sources: own calculations

To cancel the negative influences of the negative influence of the VAT, the farmer can do so:

V1 - apply the same technology. Although it can get a comparable production, VATs shall be charged at costs, it creates an unfair competition and he sells the production at a loss compared to commercial agricultural companies;

V2 - reduce spending on other inputs (wages, taxes, depreciation, interest, etc.) Does not guarantee the same profit;

V3 - reduce costs with VAT inputs (seeds, fertilizer, pesticides, mechanical works, fuels, lubricants, spare parts, other materials, etc.) Not guaranteed getting the same production and thus profit per unit of area.

V4 - sell the production on the open market at costs and get a profit (10% -15%). Not guaranteed production sale.

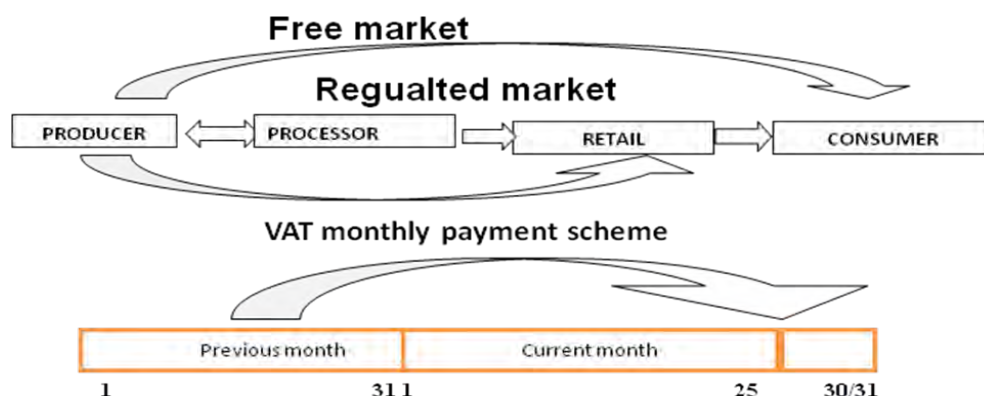
To remove the effects, the individual producer must join in legal form or to register as PFA (individual).

## The influence of VAT on retail trade

**The current system** of regulation and paying VAT chargeable (VAT collected - VAT deductible) to the state budget, on the 25th of the current month for the previous month (after 25 days) **turns VAT into fiscal credit**.

The movement of goods and services can be represented on graph as:

**Scheme 1: Movement of goods and services on chain**



Through the phenomenon of "the snowball", after 4 days, the trader recovers the invested capital of 1 RON / euro. By the end of the month, he gets incomes of 634 lei / euro but until the payment of the chargeable VAT 100 730 lei / euro. Shopping malls, supermarkets, etc. reported turnover of over one billion euro / year, which is about 2.739 million euro / day. About 546 720 euros / day are drawn as the VAT amount collected, used to finance business.

To eliminate the negative effects of the VAT on the chain, we developed two hypotheses with several working options.

**I). The first working hypothesis:** rethinking the level of VAT rate on the chain producer - processor - retailer - consumer, by establishing differentiated VAT rates (reduced) on chain for farmers - agricultural production users as raw materials, for retailers and VAT paid by consumer.

**1). Radical version (V1, a):** Reduce the standard VAT rate from 24% to 19% for consumers and the optional use of the reduced rate of 9% on the chain producer-processor-retailer only on economic contract directly and without right of refund of VAT from the budget. It eliminates the reverse charge.

### Adjusting VAT: Radical version

Table 5

Specification		Producer	Processor (user)	Retailer	Consumer Total chain
1	VAT rate applied %	9	9	19	
2	Price cumulated on chain	40	76	100	119
3	Costs on chain	36	32,4	21,6	90
4	VAT collected	3,60	6,84	19	19 (100)
5	VAT deductible	1,78	5,2	7,91	4,45 (23,42%)
6	VAT chargeable (rows 4-5)	1,82	1,64	11,09	14,55 (76,58%)
7	Current VAT chargeable -	4,85	4,58	2,69	12,12
8	Differences (row 6- row 7)	-3,03	-2,94	+8,40	+2,43

Source: own calculations

**2). Moderate version (V.1b)** Reducing the VAT rate from 24% to 12% on the chain for goods and services purchased directly, based on contract and maintaining the VAT rate of 24% to consumer, with the results shown in Table 6.

### Adjusting VAT: Moderate version

Table 6

Specification	Producer	Processor	Retailer	Total chain
1. VAT rate on chain	12	12	24	-
2. VAT collected	4,8	8,4	24	24(100)
3. VAT deductible	3,76	8,19	11,68	9,71( 40,45)
4. VAT chargeable (row 2-3)	1,04	0,93	12,32	14,29(59,55)
5. Current VAT chargeable	4,85	4,58	2,69	12,12
6. Differences (4-5)	-3,81	-3,65	+9,63	+2,17( 17,%)

Source: own calculation

**3). Transient version (V3):** Setting VAT differentiated on sectors for goods and services purchased directly on contract, of 9% in the primary sector and agriculture and in manufacturing sector (processors) and maintaining current level of 24% for consumer, with the results shown in (table 7) as follows:

### Adjusting VAT: Transient version

Table 7

Specification	Producer	Processor (user)	Retailer	Total chain
1 VAT rate applied	15	19	24	
2 Price cumulated on chain	40 (52)	76,(48)	100	124
3 Costs on chain	36	32,4	21,6	-
4 <b>VAT collected</b>	6	14,44	24,00	24
5 <b>VAT deductible</b>	4,75	10,27	17,29	11,87(49,45)
6 <b>VAT chargeable (rows 4-5)</b>	<b>1,25</b>	<b>4,17</b>	<b>6,71</b>	12,13(50,55)
7 Current VAT chargeable	4,85	4,58	<b>2,69</b>	12,12
8 Differences (row 6– row 7)	-3,60	-0,41	4,01	+0,1

Source: own calculations; 58,74% of VAT chargeable is paid by retailers compared to about 23,13 % in present

### Synthesis of chargeable VAT contribution to the state budget (table 8)

Table 8

Specification	Current situation mUE/R/c.n rate 24 %	Versions proposed			
		V1		V2 15/15/24	V3 9/9/24
		a(9/9/19)	b(12/12/24)		
Agricultural produces	4,85	1,82	0,25	1,04	-1,15
Processor (user)	4,58	1,64	1,25	0,93	-1,03
Retailer Share from VAT chargeable	2,69 (22,19)	11,09 (76,22)	12,75 (87,93)	12,32 (86,21)	14,31(100)
<b>TOTAL chain</b>	<b>12,12</b>	<b>14,55</b>	<b>14,5</b>	<b>14,29</b>	<b>12,13</b>
<b>Theoretic collecting</b>	83/58/50,50	76,58	60,42	59,54	55,23
<b>Collecting gap</b>	<b>17 /42 /49,5</b>	<b>23,42</b>	39,58	40,46	44,77

Source: own calculations;

From the data presented, it results that all the proposed variants are superior to the current situation, noting that the most beneficial in their effects on both the operators and the consumer are those of V.1). This requires modification of domestic legislation with the EU and IMF permission. V3 operative is more operative, although supposes to include the movement of goods and services between operators to the current share of 9%, it does not change the current rate of 24 % to the consumer. Variant V2 is considering limiting the rate at 15% pursued by the EU as a unique rate.

**II. The second hypothesis:** application of the second method of determination and settlement of VAT, by entitling the users of agricultural production to deduct VAT from the price paid to individual producers (associated), namely calculate VAT from 100 price paid.

To counteract the negative results, we propose the following measures:

a) Granting the right to deduct the VAT rate of the price paid to individual producers by the agricultural production users, organized as legal, with the right to deduct VAT and renounce at reverse charge of:

- processing industry of vegetal and animal products for human consumption;
  - livestock and poultry units, for fodder;
  - gross markets, agricultural products purchase and storage wholesale centres;
- b) negotiation and circulation of agricultural products purchased from individual producers at prices with VAT included.
- c) generalization of „procurement slip” as document with special regime, for self-billing and VAT regulation, monitoring farmers' income.
- d) reduced rate must not be less than the deductible, thereby eliminating VAT refunds from the state budget.

Changing the current VAT treatment procedures at individual farmers ensures the production inclusion in the fiscal circuit, eliminates intermediaries and tax evasion, increases their income and efficiency, and reduces the pressure to subsidize agricultural production and agricultural contribution to the formation of budget revenues.

Other general and specific measures for agriculture:

- Establish an agricultural bank (on APIA structure or other structure);
- Setting up a temporary fund to support producer groups;
- Review the current conversion coefficients of the main agricultural products, as part of orientation in determining crop structure and negotiate prices.
- Include bank services in the circuit of economic operators that pay VAT by canceling the ir exemption from the Tax Code.
- Payment of chargeable VAT in two bank rates, as advance ( 60 %) until 10 of the month and regularization by 25 -th of the current month for the previous month, in conjunction with the granting of a bonus to those who pay the full amount by 10 of the month.
- Increasing the role of the state and inter- professional or organizations on agricultural products market.
- Increasing the role of civil society through NGOs, foundations, in drawing up laws and the control of the governance.

## CONCLUSIONS

- Improving the indicators of the state budget by increasing revenues and reducing spending on goods and services;
- Allocation of amounts made available to finance education, research and health;
- Improving the economic environment;
- Increased income of individual farmers;
- Stabilization of agricultural product markets by reducing prices, eliminating unfair competition, speculation and tax evasion;

- Reduce the pressure on MARD budget for subsidies for agriculture and increasing the share of agriculture to the state budget resources.

## BIBLIOGRAFIE

1. Toma, M. – Agricultura - sincopetele tranzitiei, riscuri asumate, editura SC Tipografia Slobozia SA 2007;
2. Toma, M. – Cercetarea - sincopetele tranzitiei, riscuri asumate, editura SC Tipografia Slobozia SA 2007;
3. Toma, M. - Contracurarea efectelor crizei. Reforma radicala a sistemului fiscal si contributiv. Agricultura, prima sansa. Cine, cum, cat, cu ce efecte? Editura: Terra Nostra” Iasi, 2009;
4. Toma, M. – Estimarea efectelor reducerii taxei pe valoarea adaugata pe filiera la paine; revista “Lumea satului nr 16 (189), 16-31 august 2013, Bucuresti;
5. Toma, M. – Impactul TVA pe filiera, Revista “Agricultorul roman”. Nr. 11 (167) noiembrie 2012, Bucuresti;
6. \*\*\* Directiva 112, **Directiva 2006/112 a Consiliului Uniunii Europene din 28 noiembrie 2006 privind sistemul comun al TVA**, publicată în Jurnalul Oficial al Comunităților Europene (JOCE), Legea 347/11 decembrie 2006, cu modificările și completările ulterioare;
7. \*\*\* **Codul fiscal – Legea nr. 571/2003** (publicată în M.O. Nr. 927/28 decembrie 2003), cu modificările și completările ulterioare – TITLUL VI;
8. \*\*\* **Codul de procedură fiscală – OG. Nr. 92/ 2003** (republicat în M.O. Nr. 513/ 31 iulie 2007), cu modificările și completările ulterioare;
9. \*\*\* **Hotărârea Guvernului nr. 44/2004** pentru aprobarea normelor metodologice de aplicare a Legii nr. 57/2003 privind Codul fiscal, publicată în M.O. Nr. 112/6 februarie 2004, cu modificările și completările ulterioare (25 de rectificări).

## CAP REFORM PROGRESS

MIRON DUMITRESCU<sup>1</sup>, ȘERBAN ȚĂRANU<sup>2</sup>

**Abstract:** *CAP reform is a n opportunity for t he E U and t he ne w m ember s tates t o m ake pr ogress i n t erms of protecting pe asant a griculture and f armers themselves i n de veloping E urope's future. This r equires r eform o f t he Common Agricultural Policy as a necessity for the new Member States. They need to establish a set of clear objectives for s ustainable de velopment of t he a gricultural s ector and also m ethods for a m ore efficient i mplementation of t he common policy. This article follows a description of the CAP reform. While EU countries are developed, showcasing a stable economy, agricultural production and prices of agricultural products are influenced by favorable or unfavorable weather conditions. The new Member States have to find ways of solving old problems of agriculture, but also to meet the new challenges of European integration.*

**Key words:** *economic reform, sustainable agriculture, eligible prices.*

### INTRODUCTION

In the ne w context of acc elerating globalization and E U e nlargement<sup>3</sup> from 25 t o 27 member states, they are facing new demands and opportunities, which imposed further CAP reform through a new approach to developing the agricultural sector and rural areas.

European Union is currently undergoing a process of fundamental reform of the CAP, as it was designed between 2003 and 2004, t he first steps being applied in the old Member States (EU 15) since 2005, and since 2007 the whole market reform and rural development was implemented.

The new reform of the Common Agricultural Policy is a fundamental reform in the sense of m oving s upport m easures f rom pr oducts t o pr oducers, f rom m arket r egulation t o r ural development and environmental protection. Intervention prices and some public intervention will remain frozen and will g radually b e e liminated. Considering pr ices i n l ine w ith w orld pr ices, farmers will be guided only by market prices, of which income level will depend.<sup>4</sup>

Discontinuing t he i ntervention pr ices o f pr oduction, b y i ntroduction of t he s ingle fa rm payment s cheme w ill e stablish direct r elationships between farmers and the market, community support being no longer necessary for supply control, directed i nstead towards the application of healthy m ethods of a gricultural pr oduction, e nvironmental pr otection a nd s ustainable r ural development programs. Farmers' incomes will be no l onger dependent on subsidies because they won't be allocated to a production level anymore, but i ndependent of it, subsidies supporting the environmental conditions and the quality of public health and animal health instead.

New CAP reform aims to improve market mechanisms to increase the competitiveness of agriculture a nd t he gr adual l iberalization of a gricultural m arkets. T he e volution of E uropean agriculture t owards a ne w sustainable bus iness mode l is linke d to market libe ralization. In this regard negotiations taking place in the WTO are seen differently. According to some experts, the liberalization of the agricultural market is a mistake and keeping price at a s table level should be enough for agriculture to remain viable. Others consider necessary to eliminate export subsidies (as in pr ocess o f completion i n the W T O n egotiations) a nd ph asing out of di rect aids to eliminate surpluses. T he l atter i s f ound b etween t he m easures of t he ne w C A P r eform, but w ill oc cur gradually and the funds will be diverted to the environment and rural development. Farmers will not be abandoned, however, as their presence is vital in rural areas and agriculture is its "backbone". In

<sup>1</sup> National Institute of Economic Research - Romanian Academy, Bucharest, Romania, [miron\\_hyp@yahoo.com](mailto:miron_hyp@yahoo.com)

<sup>2</sup> Hyperion University, Bucharest, Romania, [taranus35@yahoo.com](mailto:taranus35@yahoo.com)

<sup>3</sup> [www.gov.ro](http://www.gov.ro), Romania's post-accession strategy.

<sup>4</sup> Gheorghiu, A ., Gheorghiu, A ., S pânulescu, I., *Target market r isk e valuation*, Proceedings o f t he I nternational Conference o n E conophysics, New E conomics & Complexity - ENEC-2009, Editura Victor, București, 2009, ISSN 2065-2550, p. 113

the new phase of CAP reform, the mechanism of direct payments per hectare and per animal used today will gradually be replaced by the "single farm payment scheme".<sup>5</sup>

This mechanism was partially introduced since 2005 in most of the old member states. Single farm payment as a mechanism to support farm incomes meet all direct aid granted today and simplify their management. The aim is to gradually disconnect allocated support of production, at entire community level. Full decoupling of production single payment is operational since 1 January 2007 in the old member states. However, member states may maintain limited coupling elements of direct production payments, to avoid major market imbalances and land abandonment. Additional payments are accepted and coupled to support significant agricultural activities or to protect the environment and improve marketing of agricultural growth, but these payments must be within the general limits set for those activities.<sup>6</sup>

Within the new payment system amounts are calculated based on a historical reference with the areas and production levels for all member states, the average of the years 2000, 2001 and 2002. It establishes a single farm payment and the support is given by surface (number of eligible hectares of a farm). Livestock (cattle, sheep and goats) may be converted in eligible hectares for allocating support, as well as the maximum guaranteed quantities for some products (milk, meat, etc.).

Tools and mechanisms used to promote sustainable agriculture in the EU as well as aid for agro-environment and less favored areas will have increasing importance in the new phase of CAP reform.

This mechanism seeks a better allocation of community support between market policy and rural development policy to meet consumer demands and environmental concerns, food safety, animal health and comfort. In order to achieve these demands it was decided that payments for large farms to be reduced by the mechanism of "modulation" and thus, those amounts shall be used to finance additional rural finance measures. Modulation mechanism was established by Agenda 2000 and has been improved as a result of new decisions on CAP reform. Modulation mechanism was to reduce the amounts owed to a member state, year by year, by the end of 2012, with the following percentages (see table no. 1.).

**Table 1.**

**Evolution of the year to reduce the payments allocated to farmers in the modulation**

Budget Year	005	006	007	008-2013
Farms with direct payments under 5000 Euro / year				
Farms with direct payments over 5000 Euro / year	%	%	%	%

Source: The provisions of the Council Regulation (EC) no. 1782/2003

## DEVELOPMENT OF THE AGRICULTURAL SECTOR IN THE EUROPEAN UNION

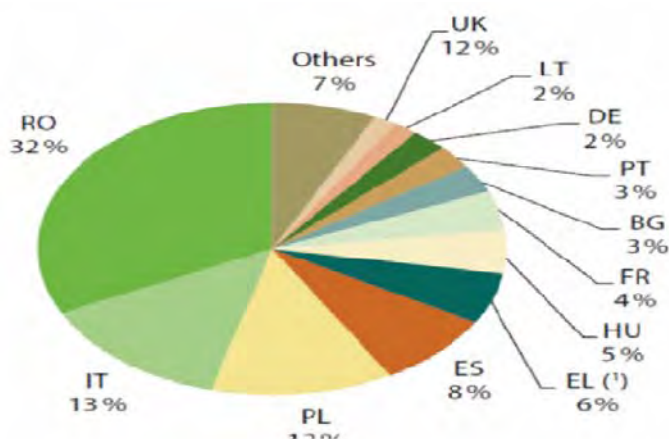
CAP has become a necessity for the construction of an economic union. Implementation of this policy aimed to ensure food security in Europe. In Western Europe, it has been implemented with great success, although it faces important issues now. With the enlargement of the EU to 27 member states, the agricultural sector outlook has changed at European level. We refer to various

<sup>5</sup> Profiroiu, M., *Instituții și politici europene*, Editura Economică, București, 2008

<sup>6</sup> Burghilea C., *Trend analysis of the autochthonous agricultural segment evolution*, in Supplement of Quality-access to success Journal, Year 11, no.111, 2010, ISSN 1582-2559, pp. 50-56



types of agriculture, differences in development and exploitation of agricultural potential (see figure 1).<sup>7</sup>



Sursa: [www.eurostat.ro](http://www.eurostat.ro)

Figure 1. Number of holdings by country

2010 agricultural census interviewed up to 12 million farms in the EU 27. These farms cover a total of 170 million hectares of utilized agricultural area, resulting that over 40% of all EU27 territory is occupied by agricultural land in use.

Work performed on farms increased to 9.7 million annual work units in the EU27, of which 9.7 million people working full time.

Holdings in Romania (32%) and Italy (14%) amounted to 46% of total holdings.

Of the total number of farms in the EU27, 49% have less than 2 ha. There were 325,000 ha from holdings (3%) of utilized agricultural area of 100 ha at least.

The distribution of used agricultural land has not been uniform regarding size. 49% of small farms had less than 2 ha and represented 2% of the utilized agricultural area. 3% of large farms (less than 100 ha) accounts for 50% of the total utilized agricultural area in the EU27.

The results showed that a quarter of farms is specialized in field crops (cereals, industrial crops and vegetables). 20% of farms in the EU-27 are specialized crops and 15% of farms concentrate their activities on breeding. With a total of 1.7 million km<sup>2</sup> utilized agricultural area (UAA) in the EU 27 was about 0.34 ha per capita in 2010. 60% of total EU27 UAA represents arable land. Ireland, Spain, Luxembourg, Austria, Portugal, Slovenia and the UK had more than 50% of its total, while permanent pasture covered a third of the UAA. An impressive percentage is to be found in Ireland, Austria, UK and Switzerland where most farms are specialized in animal breeding. Area of permanent crops accounted for 6% of the UAA. They have a high share in the Mediterranean countries. Malta also has 10% of UAA covered by gardens vegetable.

In the EU, most crops grown on arable land are cereals (including rice). After a high grain production in 2008, due to favorable weather and increased price, production decreased in 2009 and 2011.

Production of fruit and vegetables is becoming increasingly important, both from the point of view of consumption and of value. Some fruits are widespread in EU countries such as apples, while others are specific to countries and regions, such as eggplant. Most fruits and vegetables are concentrated in the Mediterranean countries due to favorable climate. Cereal production fluctuates considerably; after reaching 350 million tons in 2004, production decreased considerably during 2004 to 2007 (-20%). As a reaction to high prices in 2007, production increased in 2008 by 21% compared to the previous year. Between 2008 and 2010, the production was reduced by about 10%

<sup>7</sup> [www.eurostat.ec.europa.eu](http://www.eurostat.ec.europa.eu), Recensământ agricol, 2010

in 2010 compared to 2008. Weather conditions have influenced this decline, characterized by drought in some areas and heavy rain in other regions. In 2011, grain production fell slightly by 2.3% over the previous year. Sugar beet production fell 18% in 2006, after it reached a point of 136 million tonnes produced in the previous year. Since 2006, production has stabilized around 110 million tonnes per year (114 million tons in 2011).

Rapeseed production has followed an upward trend until 2009 (+24 % in 2005-2009) but fell slightly in the coming years, reaching 19 million tons in 2011.

Sunflower had a different trend. After a sharp decline of 29% in 2007, production increased surprisingly in 2008 (47% compared to 2007). Sunflower production remained stable over the next two years, increasing in 2011 (21% compared to 2010). Pea production declined between 2005 and 2008 (-50% over the period), reaching 1.2 million tons in 2008 due to lower production in France, the largest producer of peas in the EU. The steepest drop in French production occurred during 2006-2007 (-42 %). Since 2008, production began to recover significantly, increasing by 24% to 1.5 million tons in 2011. This change is also due to increased production in France. Crops are grown in all EU countries, but there are about 4 countries, depending on the culture, responsible for most of the production. France, Germany, Poland and Spain together produce more than half of the EU-27. Regarding the production of peas, France produces 43% of the total, followed by Spain (14%) and Germany (10%).

For sugar beet and rapeseed, Germany and France are the largest producers, up to 53% of production for sugar beet and 48% for rape. It is interesting to note that over the years the largest producers of sugar beets almost disappeared. For example, production in Ireland fell by 95 % between 2005 and 2006 and 40 % in the next year. Latvian production had decreased by 97% between 2006 and 2007, leaving the country with almost no sugar beet production in 2008. Regarding sunflower production, this is most concentrated in Eastern Europe. Although France is the largest producer (22%), Romania (22%), Bulgaria (17%) and Hungary (16%) contribute substantially to the whole production. Major disease outbreaks such as mad cow disease crisis of 1996 and 2000, the 2001 FMD and avian influenza of 2005 had detrimental effects not only on animal production in the EU, but also on the society and the economy in general. International trade, demand and EU enlargement bring some challenge to livestock. Therefore, CAP tracks the following aims: stabilizing European market; fair living standards for farmers; restore consumption levels of animal products, and EU animal production to become more competitive in the world market. As the price of meat has grown steadily since 2010, reflecting the global trend, the EU meat production was not stimulated automatically for all kinds of meat. Cattle and sheep have declined significantly in recent years while the number of pigs and goats has stabilized overall.

From 2010 to 2011, the number of cattle, pigs, sheep and goats in the EU fell by 1.4%, 1.7%, 1.3% and 3% in member states with significant numbers. From 2010 to 2011, meat production increased for beef, lamb and mutton, but goat meat production decreased. Since 1995, meat production in the EU fell for sheep, cattle and goats, while pigs production increased.

Pork production increased rapidly between 1997 and 1999, declined slightly between 1999 and 2001, then increased slightly until 2007, when a new record was reached. Poultry production has increased steadily until 2006 and by 1.8% in 2011.

Beef price index increased globally due to increased demand. This was reflected in the EU since mid-2010. Production increased in 2010 due to attractive prices; however, production levels rose to a peak in 2011, before falling back.

## CONCLUSIONS

Reforming the Common Agricultural Policy in 2020 remains a challenge, both because of unstable international context and diversity of agriculture in the European Union countries. Economic development gaps generate further gaps in the farmers' revenues; from this point, we have completely different options in terms of financial allocation tools and agricultural policy.

For example, in countries with developed agriculture, with large, efficient farms, with reduced agricultural employment, the trend is towards environmental investment, balanced development of rural areas, etc. In contrast, in less developed countries, like Bulgaria and Romania, with a considerable amount of small farms and high employment in agriculture it is important to maintain a policy to subsidize agriculture in one form or another to cope community agricultural market competition.

At European level there was a first step towards leveling the field between large agricultural businesses and other producers from PAC area. What this means: setting a limit on the amounts received as direct payments for bigger farms. For a better development of the competitiveness of the agricultural sector, farmers should primarily be supported.

The new member states should fight for equal treatment between West and East. Farmers in Eastern Europe are and will remain at disadvantage compared to farmers in the West, as long as they will not benefit from an equally developed infrastructure<sup>8</sup>

After 2013, new CAP legislation will come into force, being of strategic importance for food security, environment and territorial balance. Forms of direct payments as income support to farmers will be: basic payment to farmers, payment to farmers that apply agricultural practices beneficial for the climate and the environment, payment for young farmers who commence their agricultural activity (up to 2% of limit), simplified scheme for small farmers with simple requirements and procedures (10% of limit), a framework to allow Romania to compensate direct payments with complementary national direct payments in the years 2014 and 2015.

## BIBLIOGRAPHY

- Alecu, I., Alecu, E. (2011), *Situația Agriculturii și exploatațiilor în țările membre ale UE*, Bucharest, Editura Ceres
- Bocacea, S. (2004), *Instituții și politici publice în Uniunea Europeană*, Editura Cantes, Iași
- Burghilea, C. (2010), *Trend analysis of the autochthonous agricultural segment evolution*, in Supplement of Quality-access to success Journal, Year 11, no.111, ISSN 1582-2559, pp. 50-56
- Dinu, M. (2006), *Fundamentarea și coordonarea politicilor economice în Uniunea Europeană*. Bucharest, Editura Economică
- Gheorghiu, A., Gheorghiu, A., Spânulescu, I. (2009), *Target market risk evaluation*, Proceedings of the International Conference on Econophysics, New Economics & Complexity - ENEC-2009, Editura Victor, București, ISSN 2065-2550, p. 113
- Mărcuță, L., Mărcuță, A., Tindeche, C. (2013), *Analysis of Romanian GDP during crisis*, 20th International Economic Conference - IECS 2013, „Post Crisis Economy: Challenges and opportunities”, Sibiu, România
- Odobescu, L., T., Zamfir, A. (2002), *Politica Agricolă comunitară, armonizarea politicii agricole românești cu cea comunitară*, teză de doctorat. A.S.E., București
- Pascariu, G. (2009), *Politici Europene*, Editura Universității Alexandru Ioan Cuza, Centrul de studii europene, Iași
- Popescu, G., H. (2007), *Economie europeană*, Bucharest, Editura Economică
- Prisecaru, I., P., Baltatu, L. (2004), *Politici comune ale Uniunii Europene*, Bucharest, Editura Economică
- Profiroiu, M. (2008), *Instituții și politici europene*, Bucharest, Editura Economică
- Zahiu, L. (2005), *Politici și piețe agricole: reformă și integrare europeană*, Bucharest, Editura Ceres
- [www.eurostat.ec.europa.eu](http://www.eurostat.ec.europa.eu), Recensământ agricol, 2010
- [www.gov.ro](http://www.gov.ro), Strategia Post-Aderare a României

<sup>8</sup> Mărcuță, L., Mărcuță, A., Tindeche, C., *Analysis of Romanian GDP during crisis*, 20th International Economic Conference - IECS 2013, „Post Crisis Economy: Challenges and opportunities”, Sibiu, România, mai, 2013

# CONTRIBUTION OF AGRICULTURE TO NATIONAL ECONOMIC DEVELOPMENT

OANA CAMELIA IACOB<sup>1</sup>, ANA-MARIA VOLINTIRU<sup>2</sup>, AUREL MARIN<sup>3</sup>

**Abstract:** At national economic level there is a fierce competitiveness, experienced more and more perhaps due to the crisis. Functionality of the economy has been a challenge that many have failed to honor, but at least led us to try to. The chance to succeed was related to everyone's desire to ensure durability. This article is to demonstrate the need to develop agricultural policies in rural areas, but measures to encourage private initiatives are also included in order to satisfy completion of measures on the farm and to provide alternative employment opportunities for the rural population. Improvement of the poverty status of the population employed in agriculture, development of entrepreneurial initiative and increasing economic competitiveness leads to a harmonious development.

**Keywords:** agricultural policy, productivity, rural development.

## INTRODUCTION

Romanian economy after 1989 went through a prolonged period of transition which has had negative effects on all sectors. This transition period was a continuous process which attempted to seek solutions to the country's economy to become functional, search that had different economic and technical means, depending on the programs of political parties succeeded in power.

Based on provisional data of 2010 General Agricultural Census, of the 23.8 million ha representing Romania's total area, utilized agricultural area in farms is about 13.3 million ha (55.9%), of which about 8.3 million ha is arable land. By use arable land covers about 62.5% of agricultural land; cereals and oilseeds occupy about 80% of arable land (see table no. 1).

Table no. 1.

Land resources by use in Romania (thousands ha.)

Specification	2007	2008	2009	2010 beginning	2010 end
Agricultural area, of which:	14.709,3	14.699,3	14.684,9	14.690,1	13.298,0
Arable	9.423,3	9.415,1	9.422,5	9.417,7	8.305,0
Pastures	3.330,0	3.330,0	3.313,8	3.343,2	4.494,0
Meadow	1.531,4	1.532,4	1.528,0	1.521,1	
Vineyards and vine nurseries	218,0	214,5	215,4	209,8	317,0
Orchards and tree nurseries	206,6	207,3	205,2	198,3	
Family gardens***	-	-	-	-	182,0

Source: [www.madr.ro](http://www.madr.ro)

The ratio of arable land and population means that every citizen of Romania represents about 0.41 hectares of arable land, value superior to many European Union countries and almost double of the EU27 average, which is 0,212 ha per capita. After accession, Romania shall ensure a high degree of convergence of national agricultural policy measures with the community, with some bilateral permitted exceptions and subsequent approvals. Romania opted to introduce direct payments scheme per hectare and per animal (SAPS), introduced after accession and to be applied in 3 to 5 years in order to prepare the required Community demands required for the gradual

<sup>1</sup> Ph. D. Student, Valahia University, Târgoviște, Romania, [ioanabaghi@yahoo.com](mailto:ioanabaghi@yahoo.com)

<sup>2</sup> Ph. D. Student, Valahia University, Târgoviște, Romania, [anavolintiru@gmail.com](mailto:anavolintiru@gmail.com)

<sup>3</sup> Ph. D. Student, Valahia University, Târgoviște, Romania, [aurel.marin@yahoo.com](mailto:aurel.marin@yahoo.com)

introduction of the single farm payment scheme (SPS) which will later be generalized, since by 2013 a further CAP reform is expected.

The LEADER program aims to introduce a new approach to rural development planning, bottom-up, integrated, which builds on identifying local needs and developing local development strategies that combine one or more priority objectives: competitiveness and quality of life.

Payments for market support and rural development have been fully allocated in the first year after accession, in the form of reimbursement of actual expenditure by the paying agencies (if these expenditures are made).

Financial package consisting of allocations from the European Union and the National State Budget, set for Romania, spread over a period of 10 years (Euro 1766 million) was allocated in ascending percent since 2007 (25%) until 2016 (when the full amount may be spent).

The latest official information reveal that the total budget allocations for Romania from the EU budget for 2007-2009 totals approx. 30 billion, of which agriculture accounting for over 40 % (about 12 million Euro)<sup>4</sup>.

These values will be supplemented with considerable additional amounts from the national budget. Aid will continue by supporting measures initiated by the Farmer Program, which provides funding modalities and investment in farms for absorption of amounts and extension of the SAPARD program in mass farm to form a viable commercial sector, as well as the foundations of the future legal framework for creating Houses for Rural Credit.

Due to the excessive number of subsistence and semi-subsistence households, which can only be financed selectively in the future, it is necessary to accelerate the formation of producer groups to focus on the allocation of small areas to invest in modernization<sup>5</sup>.

### Economic fluctuations in Romania

The agricultural sector used to occupy a relatively high percentage during the transition to a market economy. The contribution of agriculture, after a decade of transition (1990-2000) to total gross value added declined from 23 % in 1990 to 12.1% in 2000. Amid a major expansion of the services sector and revival of industrial production, the contribution of agriculture to GDP has declined continuously. In the years of sustained economic growth (2000-2008), Romanian agriculture reached a maximum weight of about 14% of GVA in 2004; this year was considered an exceptional crop year. Between 2000-2009, in Romania the population employed in agriculture decreased by 41.1 %, similar to that of other EU countries, which have a relatively high share of agriculture in GDP. Decreasing workforce input led to reduced utilized agricultural area. Thus, annual fluctuations in agricultural productivity were recorded due to changes of agricultural production instability strongly influenced by climatic conditions. Calculated as gross value added (GVA) per annual work unit (AWU), productivity in agriculture, compared to the EU27 average is significantly lower (see table no. 2). Year 2000 was characterized by a decline in agricultural production, agricultural productivity in Romania being 25.2% in the EU-27 and in 2009; the best year was 43.2%. Such oscillations are also observed in other countries (Slovakia, Greece). One significant problem is our position towards the EU, even during favorable agricultural productivity years, at a level below 50 % of the EU-27 average.

<sup>4</sup> Mărcuță, L., Mărcuță, A., Tindecu, C., *Analysis of Romanian GDP during crisis*, 20th International Economic Conference - IECS 2013, „Post Crisis Economy: Challenges and opportunities”, Sibiu, România, mai, 2013

<sup>5</sup> Zahiu, L. *Agricultura Uniunii Europene sub impactul Politicii Agricole Comune*, Editura Economică, București, 2006, p.155

Table no. 2

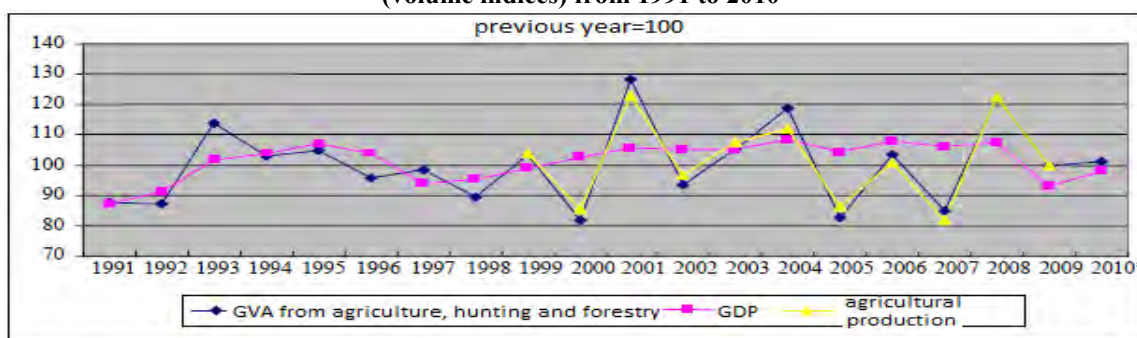
## Position of agriculture in some of the EU countries

	Share of agriculture (including hunting and fishing) industry in total GVA		Share of employment in agriculture in total employed population	Dynamics of employment in agriculture	Agricultural GVA per person employed in agriculture (EU-27 = 100%)	
	2000	2009	2009	2009/2000	2000	2009
UE-27	2.4	1.6	5	-24.9	100	100
Share of agriculture in GVA > 3%						
<b>Romania</b>	<b>12,1</b>	<b>7,0</b>	<b>23,4</b>	<b>-41.1</b>	<b>25,2</b>	<b>43,2</b>
Bulgaria	13,6	5,6	10,7	-48.1	51,9	59,4
Slovakia	4,5	3,9	3,8	-42.5	109,9	256,1
Poland	5,0	3,6	14,0	-11.3	47,3	51,6
Lituania	6,3	3,4	10,4	-21.1	60,3	55,5
Latvia	4,6	3,3	9,4	-38.2	35,1	53,5
Hungary	5,4	3,3	11,0	-34.8	56,5	60,6
Greece	6,6	3,2	12,0	-2.6	132,8	79,4

 Source: [www.insse.ro](http://www.insse.ro)

Romanian economy performance was influenced, from the supply perspective, by four key factors<sup>6</sup>: existence of an important sector of chronically inefficient ventures, underutilization or complete demise of many manufacturing capabilities, undercapitalization of a large part of the viable economy segment, high taxation.<sup>7</sup> These factors also apply to the agriculture and causes low efficiency of production. Variability of weathering after 2000 led to a change in the agricultural production under the low level of modernization of the sector (lack of irrigation, flood protection system failure). These changes are most prominent at the GVA of agriculture to GDP growth (see Fig. No. 1).

## Indices of total GDP, GVA from agriculture (including hunting and forestry) and agricultural production (volume indices) from 1991 to 2010



\* Preliminary autumn forecast, the National Weather, 6 Sept.2010

 Source: [www.insse.ro](http://www.insse.ro), time series and other NIS

<sup>6</sup> Dobrescu, E., Albu, L., *Dezvoltare durabilă în România. Modele și scenarii pe termen mediu și lung*, Editura Expert, București, 2005, p.280

<sup>7</sup>Gheorghiu, A., Gheorghiu, A., Spănulescu, I., *Target market risk evaluation*, Proceedings of the International Conference on Econophysics, New Economics & Complexity - ENEC-2009, Editura Victor, București, 2009, ISSN 2065-2550, p.113



There is a low supply of crop products on the domestic market, where the biggest gap is in fruits and vegetables supply. In 2009, due to the crisis that reduced the consumption of vegetables and canned vegetables to 50% of the total, 40% in 2008 and 42.5% in 2004. After 1990, the small subsistence farming sector resisted thanks to the structure of the old rural households. Large companies hold an important role in the domestic market and increase of farms hereby. These companies may lead to advantages in the production of pigs, livestock, grain and oilseeds, etc. Peasant households are not excluded from the market, producing mainly for own consumption; they do not meet the acquis in terms of marketing.

Employment in agriculture declined between 2000-2009, measured in annual work units; however, this equivalence does not represent reality in employment in agriculture. The large number of people in agriculture is evident if considering working population in agriculture holdings in European economic size unit. In 2007, a quarter of Romanian population carried work in uneconomic size holdings. Reduction of employment in agriculture is interrupted in 2009 because of the crisis, so we face the same situation in 1990 where agriculture is an occupational damper. In the first three quarters of 2010, data from the INS revealed a decreasing number of employees as well as the unemployment rate. In the South-West Oltenia, Muntenia South and Northeast, the employment rate tends to increase slightly, while in Bucharest labor force is absorbed by the service sector. Agricultural production has not been outstanding as a result of what happened in 2000-2008 by reduction in agricultural employment and then its increase by seasonal labor in response to crisis events.<sup>8</sup>

Meeting the food needs of the population depends not only upon food availability but also on the existence of solvent demand of the population (see table no. 3).

Table no. 3.

Average annual consumption of main food of plant origin, per capita					
Specification	MU	2006	2007	2008	2009
Cereals and cereal products:					
- in grain equivalent	kg	207.9	206.9	204.0	200.8
- in flour equivalent	kg	157.3	156.0	154.1	151.7
Potatoes	kg	97.4	96.1	99.5	93.1
Vegetables and vegetable products (equivalent fresh vegetables), legumes and watermelons	kg	181.7	164.1	176.0	168.2
Fruit and fruit products (fresh fruit equivalent)	kg	83.2	67.8	62.9	62.3
Sugar and sugar products (refined sugar equivalent)	kg	29.0	24.9	23.2	25.8
Vegetable fat (gross weight)	kg	15.4	13.8	14.6	16.0

Sursa: [www.insse.ro](http://www.insse.ro)

After Romania joined the EU, CAP mechanisms apply in agriculture, providing a mixture of structural adjustment policies required to comply with Community requirements, taking into account national peculiarities. But Romanian agriculture was far from the EU's objectives in terms of cost competitiveness and development of services in rural areas.

CAP is based on two pillars: Pillar 1, including market measures aimed at seeking population food security and food safety, supply-demand adjustment, growth and income stability for farmers, and Pillar 2, which includes measures for restructuring and modernization of agriculture and agro-food sector in connection with the economic development of rural areas, sustainable management of natural resources, economic and social cohesion and welfare of rural inhabitants. The process of globalization and trade liberalization trend that require international competitiveness of agriculture to face tough competition in international markets, the energy crisis,

<sup>8</sup> Dachin, A., *Contribuții ale agriculturii la fluctuațiile economice în România*. Economie teoretică și aplicată, Volumul XVIII (2011), No. 1(554), pp. 154-165

which has worsened and global climate change affecting agriculture<sup>9</sup>. The European Union has established uniform strategic lines for all Member States taking into account structural and economic differences between the old Member States (EU-15) and the new Member States (EU 10+Romania and Bulgaria) undergoing a transition in the way to full integration into EU structures. In Romania, direct support from the Community allocated to farmers is based on "Single Area Payment Scheme" (SAPS), designed to move gradually towards "Single Farm Payment Scheme" (SPS) introduced in the EU-15 since 2005-2006. "Complementary national direct payments" (top-up mechanism) is also applied within SAPS, providing support to supplement agricultural production by targeting the local market consolidation requirements by up to 30 % of the amount allocated by the Community. Moving from SAPS to SPS is appropriate for Romania in terms of rapid formation of a broad sector of medium farms and small farmers association to prevent excessive concentration of production in large enterprises, abandonment of rural areas for an increase of external workpower drain. New CAP reform, which applies after 2013, will change the current mechanisms by targeting expenditure towards rural development, aiming thereby at increasing investment in alternative economic activities. Supporting agriculture will rely on financing investment projects that lead to accountability applicants for EU and national funds.

Projects will follow objectives relating to complex economic interests of rural communities, aiming at building facilities for processing and forms of association for joint marketing of agricultural products.

Switching to the allocation of payments per farm should be an incentive for economic development rather than social support for farmers who do not produce for the market. Application of CAP requirements in Romania is done by the Ministry of Agriculture and Rural Development, together with its regional structures, while management of funds to support agriculture is done through the Agency for Payments and Intervention in Agriculture (APIA) and the Paying Agency for Rural Development and Fisheries (APDRP). APIA makes direct payments for market measures and state aid from the European Agricultural Guarantee Fund (EAGF) as well as from the European Agricultural Fund for Rural Development (EAFRD) budget, and additional amounts from the national budget are added to these funds. EAFRD makes payments for projects and financial support under the National Rural Development Plan (RDP) and the Plan for Fisheries and Aquaculture (PNPA), approved by the European Commission for 2007-2013. EAFRD funding aimed at both economic development and environmental protection measures. There are a lot of agricultural policy measures applied in Romania in 2007: the single area payment scheme, national complementary payments per hectare and per animal, various forms of support for market measures - intervention. The application of direct payments scheme in Romania (SAPS) and the complementary national direct payments (PNDC) follows the accomplishment of sustainable, competitive market driven farming. Allocation of direct payments is subject to compliance requirements of good agricultural and environmental practices, complementary to some actions supported by Pillar 2 on the environment. Combination of market mechanisms to direct payments and rural development measures aim at the development of the rural economy.

Romania is entrusted with the sum of 101 694 000 Euros for European Economic Recovery Plan, which complements the budget allocated by the European Agricultural Fund for Rural Development (EAFRD) to support investments in energy, climate change, modernization of the dairy sector, water resources management, renewable energy and biodiversity.

<sup>9</sup> Burghilea, C., Crăciun, L., Molănescu, A., G., *Goals of the national agricultural policy*, International conference, Fifth edition, Ecological performance in a competitive economy, Bucharest, Proceedings Supplement of "Quality-Access to Success" Journal, ISSN 1582-2559, Vol. 14, S1, March 2013, p.315



## CONCLUSIONS

In 2007-2013 the amount allocated from the EU budget for agriculture, rural development and fisheries is over 13.5 billion Euros, of which 39.29% for the single area payment, 1.77% for market measures, 57.29% for rural development and 1.65% for the fisheries sector<sup>10</sup>. Of the 7.5 billion allocated by the EU to Romania in 2013 for rural development, 45% are provided to finance competitiveness of agriculture and forestry. Measures under Axis 2 funded through A PIA, supporting disadvantaged areas or agro-environment payments have a much higher level of access to the measures outlined above. Between 2007-2013, under Axis 2 financial resources were allocated for measures for the sustainable use of agricultural land.

Measures included within RDP Axis 3 aim at attracting existing resources as natural resources on which businesses can emerge and develop in rural areas, but measures are also included aim to encourage environmental initiatives to comply with measures of the farm and to provide alternative employment opportunities for the rural population. This axis was developed primarily to help improvement of the poverty of the population employed in agriculture, development of entrepreneurial initiative and increase economic competitiveness in rural areas, as well as infrastructure development. LEADER program is an important component of the National Rural Development Programme (Axis 4), whereas aims to create the design and conduct of strategies and sustainable rural development projects. Romania is implementing the LEADER program in the timeframe between 2007-2013. In preparation for implementation of the program, 120 sub regions were shortlisted from 37 districts, their representatives being trained for constructor of partnerships, local development strategy, territorial action plan etc.

## BIBLIOGRAPHY

- Burghilea, C., Crăciun, L., Molănescu, A., G. (2013), *Goals of the national agricultural policy*, in Proceedings Supplement of "Quality-Access to Success" Journal, ISSN 1582-2559, Vol. 14, S1, p.315
- Dachin, A. (2011), *Contribuții ale agriculturii la fluctuațiile economice în România*. Economie teoretică și aplicată, Volumul XVIII, No. 1(554), pp. 154-165
- Dobrescu, E., Albu, L. (2005), *Dezvoltare durabilă în România. Modele și scenarii pe termen mediu și lung*, Editura Expert, București, p.280
- Gheorghiu, A., Gheorghiu, A., Spânulescu (2009), I., *Target market risk evaluation*, Proceedings of the International Conference on Econophysics, New Economics & Complexity - ENEC-2009, Editura Victor, București, ISSN 2065-2550, p. 113
- Iancu, A. (2005), *Dezvoltarea economică a României, vol. 1 și 2. Competitivitatea și integrarea în Uniunea Europeană*, Editura Academiei Române, București
- Istudor, N. (2006), *Dezvoltarea Rurală și regională a României în perspectiva integrării în Uniunea Europeană*, Editura ASE, București
- Mărcuță, L., Mărcuță, A., Tindeche, C. (2013), *Analysis of Romanian GDP during crisis*, 20th International Economic Conference - IECS 2013, „Post Crisis Economy: Challenges and opportunities”, Sibiu, România
- Pasti, V. (2009), *Noul capitalism românesc*, Editura Polizom, București
- Rădulescu, C. (2007), *Integrarea cerințelor dezvoltării durabile în agricultură. O cale spre performanță economică, ecologică și socială*, Editura ASE, București
- Rojey, A. (2011), *Viitorul încotro? Schimbare pentru supraviețuire*. Editura Didactică și Pedagogică, București
- Socol, C. (2004), *Opțiunile de politică agricolă și dezvoltare durabilă a agriculturii*. Editura Economică, București
- Tanase, I., Angelescu, C. (2006), *Integrarea României în Uniunea Europeană*. Editura ASE, București
- Toma, E. (2010), *Agricultura României în procesul de integrare europeană*, Editura Ars Academica, București
- Zăhău, L. (2006), *Agricultura Uniunii Europene sub impactul Politicii Agricole Comune*, Editura Economică, București
- Zăhău, L. (2005), *Politici și piețe agricole – reforma și integrare europeană*. Editura CERES, București
- [www.apia.org.ro](http://www.apia.org.ro); [www.ec.europa.eu](http://www.ec.europa.eu); [www.infoeuropa.ro](http://www.infoeuropa.ro); [www.insse.ro](http://www.insse.ro); [www.madr.ro](http://www.madr.ro).

<sup>10</sup> Toma, E., *Agricultura României în procesul de integrare europeană*, Editura Ars Academica, București, 2010, p.21

## CONSUMER BEHAVIOR IN THE ECONOMY

ANDREI MIHAI CRISTEA<sup>1</sup>, OANA CAMELIA IACOB<sup>2</sup>, DAN GABRIEL CRISTEA<sup>3</sup>

**Abstract:** *This paper aims to carry out an analysis of the disparities between urban and rural economic environment in Romania, which have negative effects over time for the entire country. The key imbalances between the two areas will be identified and a chronological analysis of figures obtained from the two areas over the years will be presented. A comparative analysis of urban / rural consumption behavior of households in the period 2005-2012 is showcased. The rural population is still heavily dependent on agriculture, while consumption characteristics are specific to relatively poor populations. Reducing disparities between urban and rural incomes and improvement of the quality of household consumption are priorities in regional development policy.*

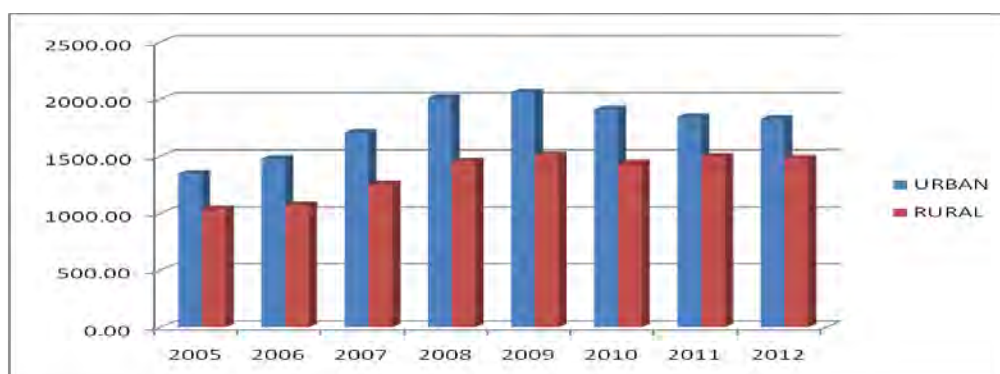
**Keywords:** *sustainable consumption, economic growth, consumerism interdependence, economic disparities.*

### INTRODUCTION

Sustained economic growth in Romania, since 2000, had a positive impact on improving the living standard of the population. Unfortunately the gap between urban and rural areas is still significant, depending on different income levels and lifestyles.

Strengthening linkages with the EU through trade, movement of people and information and increasing incomes in Romania led to higher household consumption as well as structural changes. The Romanian consumer model tends to approach the European one, by assimilating foreign habits, access to information on a healthy lifestyle and the implementation of policies of economic development and cohesion. In order to have a successful cohesion policy, accurate assessment of the existing situation should be considered.<sup>4</sup>

Sustained economic growth in Romania in early 2000 was the main source of household income growth both in urban and in rural areas, and an increase in their consumption (see Fig. Nr. 1). Hence we can deduce an overall increase in living standards in Romania, total income per household being in 2007 by about 68% higher than in 2001 in real terms.



Source: [www.insse.ro](http://www.insse.ro)

Figure 1. Total average income per household

Impact of economic growth in Romania was relatively uniform by type of household, age and occupational categories and the economic gap between urban and rural areas was maintained. While in 2005 total income in real terms (taking as base year 2005) in urban areas were RON

<sup>1</sup> Hyperion University Bucharest, Romania, [cristeaandm@yahoo.com](mailto:cristeaandm@yahoo.com)

<sup>2</sup> Ph. D. Student, Valahia University, Târgoviște, Romania, [ioanabaghi@yahoo.com](mailto:ioanabaghi@yahoo.com)

<sup>3</sup> Hyperion University Bucharest, Romania, [dancristea2@yahoo.com](mailto:dancristea2@yahoo.com)

<sup>4</sup> Gheorghiu, A., Gheorghiu, A., Spănulescu, I., *Target market risk evaluation*, Proceedings of the International Conference on Econophysics, New Economics & Complexity - ENEC-2009, Editura Victor, București, 2009, ISSN 2065-2550, p. 113

1347.74 and those in rural areas were 1036.47, the year 2006 brought a uniform increase in revenue maintaining the gap between the two environments, respectively 1477.83 and 1069.30 in the urban areas (see Table 1). We can see how once with the entry into the economic crisis in 2009, revenues steadily declined until 2012.

**Table 1.**

**Total revenue by the environment of residence**  
(real terms, base year 2005)

	<b>Total revenue by the environment of residence</b>	
<b>Year</b>	<b>URBAN</b>	<b>RURAL</b>
<b>2005</b>	1347.74	1036.47
<b>2006</b>	1477.83	1069.30
<b>2007</b>	1707.16	1255.09
<b>2008</b>	2011.73	1453.74
<b>2009</b>	2059.41	1510.12
<b>2010</b>	1909.58	1437.46
<b>2011</b>	1844.12	1494.55
<b>2012</b>	1826.39	1478.95

Source: [www.insse.ro](http://www.insse.ro)

Statistics show that Romania's population has felt the impact of the crisis in 2009, when total revenue was a decrease in both urban and rural areas (in real terms figures are as follows: in urban areas from 2009 to 2059.41 to 1826.39 in 2012 while in rural areas from 1510.12 in 2009 to 1478.95 in 2012).

As we can see the disparities between urban and rural areas maintained each year, if in 2005 the difference between urban and rural household income was RON 520.23 (higher for urban areas), the year 2012 brings a difference of about RON 347.44 between the two environments, so there is a quite significant improvement. Therefore we can draw a conclusion that the imbalances found over the years began to fall.

Referring to the share of revenue in nature in total income, urban areas experienced a steady increase in the percentage of cash income and a similar steady decrease in kind revenues; the same thing happened in rural areas. Comparing urban and rural areas, in 2005 the share of cash income in the total revenues was 88.41% in urban areas and only 64.77% in rural areas. This discrepancy persists in the forthcoming years, in urban areas the percentage of income in 2012 was 91.72% and 67.20% in rural areas.

In rural areas, revenues in nature are a greater source of income than in urban areas. In 2005 the share of revenues in kind in total income in urban areas was 11.59% versus 35.23% in rural areas. In 2012 the share was 8.28% in urban and 32.80% in rural environment rural.<sup>5</sup>

## INTERDEPENDENCE BETWEEN RURAL AND URBAN CONSUMPTION

In developing countries, there is a major discrepancy between the wages of urban and rural inhabitants. Income from agriculture is the entire money from companies and agricultural

<sup>5</sup> Mărcuță, L., Mărcuță, A., Tindeche, C., *Analysis of Romanian GDP during crisis*, 20th International Economic Conference - IECS 2013, „Post Crisis Economy: Challenges and opportunities”, Sibiu, România, mai, 2013

associations, sales of agricultural products, animals and poultry as well as provision of agricultural labor. Often farm income cannot be determined easily, especially in subsistence agriculture or where income is paid in kind, i.e. agricultural products.

The rural population in Romania generally have lower incomes than urban, self-employment in agriculture predominating in the occupational structure and income in low-performing agriculture are low-performing as well. Many self-employed in agriculture are members of subsistence farms, and many households have a retired as the head of the household. Low income households are also a result of the phenomenon of underemployment, combined with low productivity in agriculture. However, revenue growth in agriculture will support the growth of rural incomes. A contribution to this development will be the implementation of the Common Agricultural Policy (CAP) and the use of EU funds for rural development and that will stimulate both agricultural competitiveness and diversification of activities, given the potential of multifunctional agriculture.

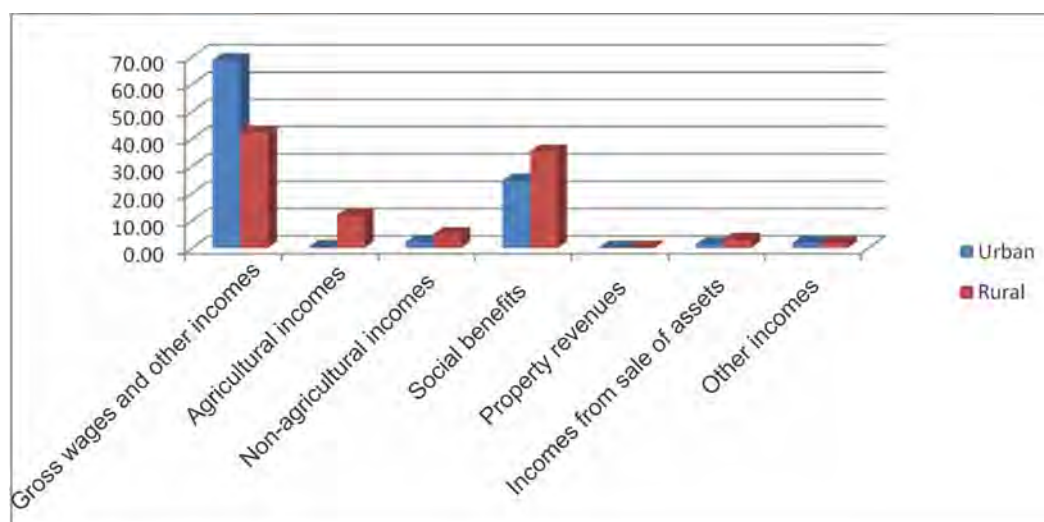
Having a job paid by salary is very important to increase rural household welfare. If at least one family member is employed, income levels change significantly. Share of income from agriculture (12.09%) and the share of income from social benefits (35.44%) in 2012 in rural areas were higher than the share of gross wages (42.40%), which shows that subsistence agriculture is a major option for rural residents and state aid is also an important source of income. If we compare the weights of monetary structures of urban and rural areas will see very obvious major differences in structure and persistence of disparities between these two environments. Thus for urban residents wages are a very important source of income, with a share of 68.97% of the total money income in 2012.

Due to the global crisis of recent years both urban and rural households experienced a decrease in wages. Rise in food prices led to further decline in consumption and lower farm income in rural areas. The only income that increased over the period were those from the government (social benefits), rural environment depending more of social benefits than salary or other income. A major cause of this is the sharp drop in consumption and employment, especially in rural areas.

Disparity between urban and rural areas is also maintained in 2012 at a high enough rate. In 2005, wages in urban areas had a share in cash income of about 69.08%, while in rural areas the wage share was about 37.13%. From here we can see a difference of about 30% of the revenue shares, between the wages in urban and rural areas, this difference of 30% in rural areas is covered by higher shares in other structures, such as agricultural incomes and social benefits.

These disparities have been maintained over the years; if urban wage share increased from 2005 until 2008 and declined slightly in 2012, not the same thing happened in rural areas, where there was a slight increase in 2008 followed by a decrease until 2011. Year 2012 brings an increase from 2009-2011; in order to reduce the gap of the two averages, rural areas should have a larger increase in the share of wages, but this increase was approximately similar to that in urban areas, maintaining the gap.

Disparities of income from social benefits were maintained between the two environments, highlighting the development level of each environment. In rural areas, social benefits have a share in the money income of about 35% compared to 25% in urban areas, this shows that the country people more dependent than urban inhabitants of state aid. Regarding this issue over the years we can see that although the social benefits share increased in both areas, the imbalance has remained almost the same, i.e. in 2005 revenues from social benefits were approximately 21.84% in urban areas and in rural areas 34.50% in 2012 brought social benefits from 24.72% in urban areas and 35.44% in rural areas (see Figure 2).



Source: [www.insse.ro](http://www.insse.ro)

Figure 2. The structure of average income (%) in 2012

## CONSUMER SPENDING REFLECTS A LOW LEVEL OF WELFARE

The main destination of income is consumption, supported by money spending and the consumption of agricultural products from own resources. Dynamics of consumer spending follows the trend of the incomes, but increasing or decreasing income level does not mean an immediate change in the same measure of living standards.<sup>6</sup> The size and structure of consumption are determined by economic factors, namely household income and consumer prices, but also demographic, social, geographical, conjunctural, etc. These interdependent influences generate inter-regional disparities even in rural areas.

Total household expenditures have fluctuated in the period 2005 -2012, the most significant increase was in 2009, both in urban and in rural areas: in urban areas from 1559.52 in 2007 to 1819.46 in 2009 and in rural areas from 1212.83 in 2007 to 1492.74 in 2009 (see table no. 2.).

Total expenditures by residence environment

Table 2.

real terms, base year 2005

Total expenditures	Urban	Rural
2005	1259.71	1006.25
2006	1375.11	1060.85
2007	1559.52	1212.83
2008	1801.81	1428.91
2009	1819.46	1492.74
2010	1674.31	1333.96
2011	1626.89	1401.52
2012	1624.38	1383.84

Source: [www.insse.ro](http://www.insse.ro)

Income is the most important factor determining consumption behavior of the household and a person. The relationship between consumption and income of the people has been studied by

<sup>6</sup> Burghelea, C., *Securitatea și protecția consumatorului*, Revista Amfiteatru Economic, ASE București, Facultatea de Comerț, Anul XII, Iunie 2010, Nr. 28, ISSN 1582-9146, pp. 476-489



economists over time and is known as "Engel curve". This law has been verified over time and can be used for international comparisons as well as in-country between populations with different levels of income. Manifestation of this law shows effects in long term, being one of the causes of the decline of agriculture in the national economy.

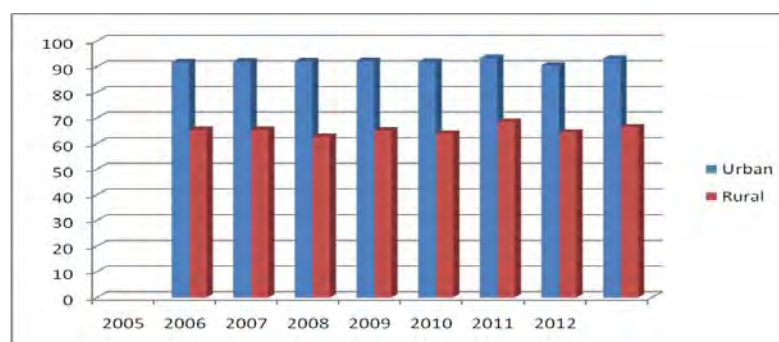
Specifically, due to Engel's law, as the income of the nation is higher, the share of food expenditure in consumer spending is lower. If we compare the share of food consumption expenditure in two countries with very different income levels we see that, for example, in Romania it was about 45% in 2006, while France was under 15%.

Analyzing consumer expenditure weights in total cash costs, we see the trend of the share of urban decline, from 76.55% in 2005 to approximately 73.40% in 2012. In rural areas, a different phenomenon happens; consumer spending during this period fluctuates from year to year, indicating a decrease followed by an increase. Year 2012 brings a higher percentage of rural areas (77.67%) than the urban (73.40%).

There is a significant difference between urban and rural money spending practices. Average cash costs per household in urban areas were higher than rural cash spending by approximately RON 497.8 in 2005. This difference was maintained throughout the years that followed, namely in 2006 the difference was RON 571.61, RON 677.60 in 2007, in 2008 about RON 733.82 and in 2012 this difference has diminished considerably reaching RON 595.12 (Table 2). Cash expenditures in urban areas have experienced a steady decline, while in the rural areas these expenditures floated at around RON 910. Considering percentages in the two environments, cash expenditures accounts for urban approximately 91.77% of total expenditures in 2005, while rural has a share of only 65.42%. We can easily see the disparities between the two areas, disparities that persist over the next few years. In 2012 the share of spending cash difference between urban and rural areas is maintained; urban records a percentage of 93.20% and rural environment 66.39%.

In 2005, rural areas the consumption of agricultural products from own resources holds approximately 34.58% of total expenditures, versus only 8.23% in urban areas. This reveals that the rural consumer is somewhat addicted to food and non-food household from own resources (agricultural production, stocks of previous periods, products received in gift etc.); this trend has been maintained over the years, reaching in 2012 a share of 33.66% of total expenses.

The consumption of agricultural products in urban areas is not significant (8.23% in 2005) as most of urban household consumption expenditure goes on money expenditure, i.e. consumer spending, spending for food and beverage, investment expenditure and not least tax expenditures, contributions, and fees. In the period 2005-2012 urban areas experienced a 93.20% increase in financial expenses in 2012 and a decrease in the value of consumption of agricultural products from own resources of about 6.80% in 2012 (see figure 3).



Source: [www.insse.ro](http://www.insse.ro)

Figure 3. Cash expenditures share of total expenditures

Between the two areas there is a pretty significant gap on household spending. Rural environment attach greater importance to agricultural production costs, inventory of prior periods than in urban areas. Urban inhabitants focus largely on monetary consumption of time.

## CONCLUSIONS

Sustained economic growth in Romania since 2000 had a positive impact on improving the living standard of the population. Unfortunately the gaps between urban and rural areas are still significant, differences being dependent on income and lifestyle.

National Rural Development Programme 2007-2013 has changed in the second half of the decade, young people began to leave the rural areas while older people migrate in rural areas. The countryside has become increasingly attractive to the population over 35 years and especially for those of 45-54 years, who are usually more vulnerable in the labor market in urban area and head to rural areas where they start their subsistence activity. However, for some people, living in rural areas is preferred to urban crowd. Young active population migrates to urban areas in search of jobs and a better, more attractive way of life.

Although positive, the percentage of internal migration from urban to rural can not compensate for this decline. In the early 1990s there was a massive migration from rural to urban areas. The trend has reversed over the years, as economic restructuring and restitution of land have increased the attractiveness of rural areas, so that by the end of 2000, the net rural-urban migration became positive, although fluctuating in absolute terms. However, urban-rural migration remains insufficient to offset the decline in rural population. For this reason, consumption also registered fluctuations. Generally young people prefer to live in rural areas but work in urban areas to work for a lifting of living standards, as well as competitive growth and liberalization of individual ideas.

## BIBLIOGRAPHY

- Antonescu, D. (2003), *Dezvoltarea Regională în România – concept, mecanisme, instituții*, Bucharest, Editura Oscar Print
- Bal, A., Luțaș, M., Jora, O., Topan, V. (2007), *Scenarii privind evoluțiile comunitare în domeniul competitivității, politicii de coeziune și politicii de dezvoltare regională*, Proiect SPOS-2007, Studii de strategie și politici, Institutul European din România
- Burghilea, C. (2010), *Securitatea și protecția consumatorului*, Revista Amfiteatru Economic, ASE București, Facultatea de Comerț, Anul XII, Iunie 2010, Nr. 28, ISSN 1582-9146, pp. 476-489
- Gheorghiu, A., Gheorghiu, A., Spânulescu, I. (2009), *Target market risk evaluation*, Proceedings of the International Conference on Econophysics, New Economics & Complexity - ENEC-2009, Editura Victor, București, ISSN 2065-2550, p. 113
- Istudor, N. (2006), *Dezvoltarea rurală și regională a României din perspectiva integrării în Uniunea Europeană*, Bucharest, Editura ASE
- Jula, D., Jula, N., Ailenei, D., Gârbovean, A. (1999), *Economia dezvoltării, Teoria dezvoltării – probleme naționale – dimensiuni regionale*, Bucharest, Viitorul Românesc
- Mărcuță, L., Mărcuță, A., Tindeche, C. (2013), *Analysis of Romanian GDP during crisis, 20th International Economic Conference - IECS 2013*, „Post Crisis Economy: Challenges and opportunities”, Sibiu, România
- Păun, O. (2006), *Dezvoltarea rurală durabilă în România*, Editura Academiei Române, Bucharest
- Zahiu, L. (2006), *Agricultura Uniunii europene sub impactul politicii agricole comune*, Bucharest, Editura Ceres
- Zahiu, L., Toma, E., Dachin, A., Alexandri, C. (2010), *Agricultura în economia României, între așteptări și realități*, Bucharest, Editura CERES
- [www.cnp.ro](http://www.cnp.ro)
- [www.europa.eu](http://www.europa.eu)
- [www.eurostat.ro](http://www.eurostat.ro)
- [www.insse.ro](http://www.insse.ro)

## IMPACT OF ECONOMIES OF SCALE IN THE HORTICULTURAL SECTOR OF THE REPUBLIC OF MOLDOVA

STRATAN ALEXANDRU<sup>1</sup>, MOROZ VICTOR<sup>2</sup>, IGNAT ANATOLIE<sup>3</sup>

**Abstract.** *The major objective of the article is to provide an overview of the Moldovan High Value Agriculture (HVA) sector that can be useful to investors, producers, traders, donors and government officials alike, enabling concrete actions to be taken toward significantly increasing HVA exports. The article examines how the farm restructuring and land reform processes in Moldova have affected productivity and incomes in horticulture. To capture a comprehensive picture of the impacts of farm restructuring this study integrates analysis into the different quantitative and qualitative surveys during last ten years. The quantitative surveys cover the present situation mostly through questions that can be answered simply through multiple choices of yes/no responses or in a numerical form. The article integrates also the major findings from the Agricultural Census 2011. The qualitative surveys complement the quantitative research by focusing on the process of change involved in restructuring, the reasons for these changes and people's attitudes toward the changes. The major conclusion of this paper is that the HVA sector, which used to make a significant contribution to Moldova's economy has undergone a profound collapse which resulted from major structural changes, including the fragmentation of land, depopulation of rural areas, collapse of most irrigation schemes, and the rapid change in the demand of its traditional destination markets. Faced with this situation it would be unrealistic to expect a rapid recovery of the sector, even though a number of existing private sector initiative demonstrate the potential for profitable investment in a wide range of fresh and partly processed products.*

**Key words:** *Horticulture, structural changes, agricultural policies.*

### INTRODUCTION

In an era of rapid changes and increase of risk and uncertainty, agricultural policies and practices in developing states face a number of limitations that reveal their long term durability shortcomings and their ability to meet the range of objectives which they are expected to provide. The transformation process in most countries of Central and Eastern Europe (CEEC) focused on the restructuring of the organization of agricultural production in promoting the privatization of former agricultural production co-operatives and state farms. Production entities compatible with the market economic system emerged although in many cases the legal label was changed, only.

Moldova has been engaged in substantial export trade with its wine, fruit and vegetable products, and within former USSR, has enjoyed a good reputation as a supplier of these commodities. In addition to export of canned products, Moldova has traditionally exported fresh fruits and vegetables. Moldovan horticultural products are being displaced from their traditional FSU markets by other economies in the region that are fast developing their capacity in agricultural production and marketing. Production has steadily decreased throughout the decade. Furthermore, access to new European markets is very limited. Due to the inability to respond to changing market demands and due to uncompetitive production method in horticulture, Moldova is continuing its slide toward a subsistence rural economy. However, a number of local initiatives referring to development of horticultural production were launched during last few years.

### MATERIAL AND METHODS

Given the challenges the national economy has to face with, we highlight the following socio-humanistic research methods such as: conceptual approach, analysis of the impact of public policies in rural areas, including in agriculture, comparative analysis of the experience of Central and Eastern European countries, etc. There were also used quantitative research methods to evaluate the agricultural systems in the Republic of Moldova. The qualitative surveys complement the

<sup>1</sup> Dr. hab., Stratan A., Institutul de Economie, Finanțe și Statistică. Chișinău, Republica Moldova

<sup>2</sup> Dr. Moroz V, Institutul de Economie, Finanțe și Statistică. Chișinău, Republica Moldova, email: [vmoroz27@gmail.com](mailto:vmoroz27@gmail.com)

<sup>3</sup> Ignat A. Institutul de Economie, Finanțe și Statistică. Chișinău, Republica Moldova



quantitative research by focusing on the process of change involved in restructuring, the reasons for these changes and peoples' attitudes toward the changes.

The purpose of this study is to observe the structural changes in agriculture and their effects on the social and economic development of the country. In this context, we have studied several studies, scientific papers and strategic documents related to High Value Agriculture (HVA) and structural transformations in rural areas [2, 3, 4, 6, 7, 8, 9]. Also studies where authors participated have been used as reference documents. Based on this fact, the current transformations in rural areas have been conceptualized in connection to migration and depopulation of rural areas of the Republic of Moldova.

The article highlights the existing agricultural systems, in order to show the causes of low agricultural productivity. Assumptions are based on the comparison and interpretation of calculated indicators for rural areas. The analysis refers mainly to economic and social problems, with a special attention to the impact of the economy of scales over the High Value agricultural production.

## RESULTS AND DISCUSSIONS

Moldova enjoys a favorable climate and good farmland, but has no major mineral deposits. As a result, the economy depends heavily on agriculture, featuring fruits, vegetables and wine. Moldova imports most of its supplies of oil, coal, and natural gas, largely from Russia.

Agriculture contributed with 12% of the country GDP in the year 2011. About 28% of the active population of the country was engaged in agriculture in 2011, and about 5% were employed in the food processing industry.

Horticulture, including primary production and agro-processing has a multiplier role in the national economy, creating demand and stimulating the creation of added value in other branches of the national economy, such as trade, construction and financial services. The share of horticulture in the total agricultural production amounted to about 33% in the year 2011. Production of the grapes - 14,4% and fruits - 4,8% of total agricultural production in 2011 are predominantly export oriented, while vegetables -7,8% and potatoes -5,8% are used mostly for local consumption (see figure 1).

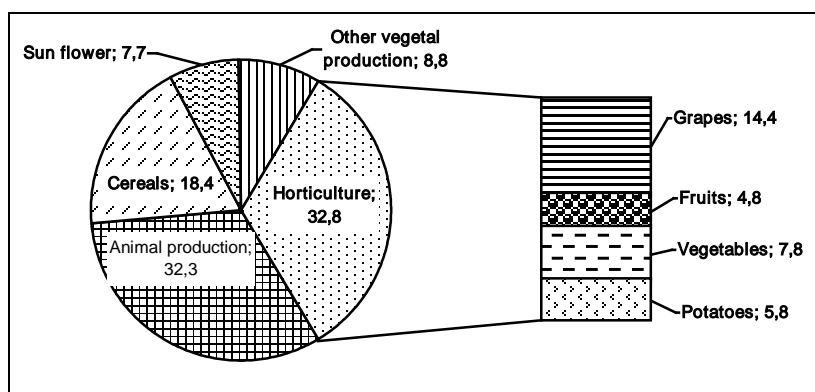


Figure 1. Structure of the agricultural production, 2011, %

According to the national land cadastre on January 1, 2011 most of private agricultural land (40.4%) is owned by limited liability companies. In the possession of peasant farms are about 33 percent of the land. About 13% of agricultural land are cultivated independently by private owners, while cooperatives and joint stock companies own 7.5% and 2.4% of private land, respectively (see figure 2).

According to preliminary data of the General Agricultural Census in 2011 were working 903 000 agricultural units, including 391,646 peasant farms, 232 agricultural cooperatives, 161 joint stock companies and 3624 limited liability companies.

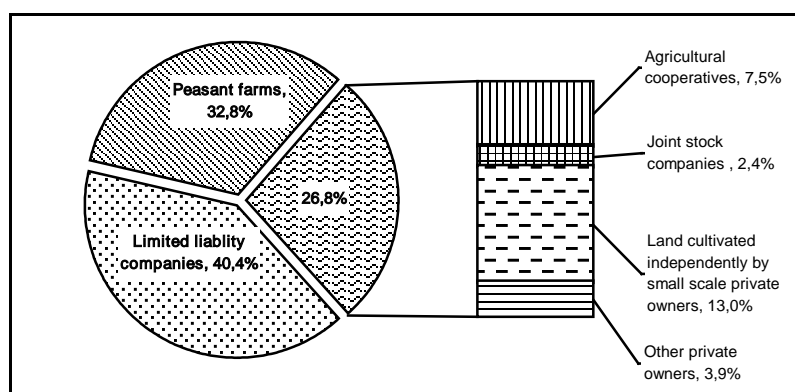


Figure 2. Structure of the private agricultural land according to the form of farms' organization, 2011, %

Average size of an agricultural holding is 2.2 ha, including agricultural holdings with legal entity - 247.9 ha, and those with physical entity - 0.8 ha.

According to the General Agricultural Census of 2011 lands of agricultural holdings are divided into 2.65 million plots. Each farm holds on average 2.9 plots of land. At national level the average size of parcels is 0.8 ha, including farms with legal entity - 25.8 ha, and those with physical entity - 0.4 ha. In many cases these parcels are located at a distance of 9-20 km from each other [1].

This fragmentation of agricultural land is largely a consequence of the imperfection of the legal framework and insufficient law enforcement. Thus, under the latest version of the Land Code, art.13 – the equivalent land share to be granted in kind in accordance with the land management project can be divided, depending to the situation at most within 3 plots of land (arable land, vineyards and orchards). However, within the framework of privatization process "Land" the equivalent shares of land in many cases were divided into 5-7 plots with the minimal size of the plot of about 4-5 ars.

Of the total number of 903 000 agricultural units registered within the General Agricultural Census of 2011, only 4800 (0.5% of the total) are farms with legal entity (limited liability companies, agricultural production cooperatives, joint stock companies, state enterprises, research institutes and agricultural schools, local councils / municipalities owning agricultural land, religious establishments, NGOs and other agricultural enterprises) and about 898 000 (99.5%) are agricultural units with physical entity (peasant farms, individual and family households, etc.). The corporate type of farms in particular such as Limited Liability Companies and Joint stock Companies in recent years have shown increasing trends of the number of households and respectively the reduction of the areas held by them as a result of adjustment to market conditions. Simultaneously, family peasant farms shows increasing trends of the number of households with areas larger than 5 hectares in recent years, keeping at the same level the number of households with 1-5 ha and reducing the number of households that have less than 1 ha of land (see table 1).

Table 1. The number of agricultural holdings, 2007-2011

Agricultural units	2007	2008	2009	2010	2011
Agricultural cooperatives	239	259	283	233	232
Joint stock companies	116	109	108	170	161
Limited liability companies	1342	1344	1513	2038	3624
Peasant farms (thousand)	390	386	381	400	392
<i>Including with area</i>					
Larger than 100 ha	186	209	203	276	559
From 50 up to 100 ha	105	113	143	524	780
From 10 up to 50 ha	746	904	1126	1794	2729
From 5 up to 10 ha	3307	4156	4320	3958	4175
From 1 up to 1a 5 ha (thousands)	2405	216	224	241	240
Less than 1 ha (thousands)	147	165	152	146	144

Source: Elaborated by authors based on data from the National Land Cadastre [3]

Currently about 98% of the total number of peasant farms have areas less than 5 ha, including about 37% of them that have less than 1 ha, and 61% that holds areas from 1 to 5 ha. Together these agricultural units have worked about 42% of total agricultural land in Moldova in 2011.

Peasant farms have a significant share in total agricultural production. Together with population households they deliver essential quantities of agricultural products. Thus the major part of the production of corn, potatoes, vegetables, fruits and grapes are concentrated in the community of small-scale farmers (see table 2).

Table 2. Share of population households and peasant farms in the total volume of vegetal agricultural production, 2007-2011, %

Crops	2007	2008	2009	2010	2011
Winter wheat	23,6	29,7	33,0	28,7	28,3
Barley	26,3	26,8	30,5	36,0	37,7
Corn	91,3	83,8	89,9	84,5	80,9
Leguminous vegetables	53,9	56,9	51,4	58,9	69,5
Sun flower	33,4	31,7	33,2	30,2	31,9
Soya	32,9	26,0	31,3	22,3	21,6
Sugar beet	14,8	9,6	12,1	13,5	8,5
Tobacco	19,4	17,9	13,6	19,7	22,2
Potatoes	88,6	90,7	88,9	83,4	84,6
Field vegetables	80,2	78,9	84,5	83,9	84,0
Pumpkins	96,6	96,7	97,5	97,8	98,0
Fruits and berries	52,1	50,5	57,9	59,8	62,2
Grape	80,0	77,8	79,7	85,7	78,6

Source: elaborated by authors based on the Statistical Yearbook, 2012 [5]

The concept of the land reform was grounded on the assumption that the thriving smallholder rural economy based on small household farms, combined with rapid development of land markets will allow exit from farming of those individuals and households who did not see their future in farming. The resulting fragmented small agricultural farms have proved unviable in all, excepting those located in peri-urban areas. Moreover the small households who own the land have neither the financial and technical means to farm their land, in many cases were abandoned by the most part of the young people opting rather to migrate, either internally to larger urban areas or to seek a job abroad [8]. As a result the number of people employed in agriculture decreased from about 533 thou in 2004 to about 323 thou in 2011. The same trend is typical also for large agricultural enterprises (see figure 3).

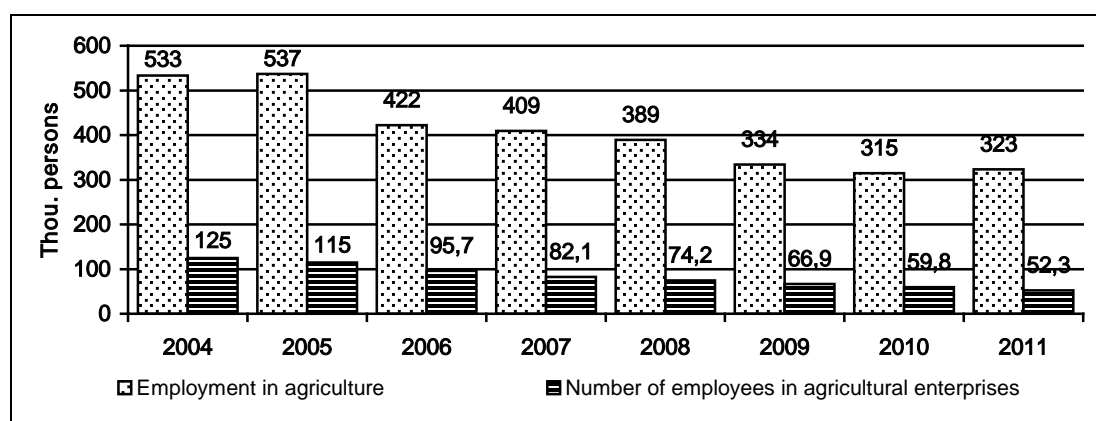


Figure 3. Employment in the agriculture of the Republic of Moldova, 2004-2011, thou. persons  
Source: Statistical Yearbook of the Republic of Moldova, 2012 [5]

The land reform process also caused an abrupt collapse of the majority of the former large irrigation schemes. Many of these became uneconomic due to the increase of the energy prices to the market level, and others collapsed due to the management problems which arose from the fragmentation of land, as institutional arrangements for the management of the irrigation schemes did not keep pace with the distribution and new ownership of land. To the extent that the fruit and vegetables production depended on irrigated water supply, this was a major factor in depressing horticultural productivity in the late 1990s.

During the post land privatization period there have been developments which have tended to correct these problems from the point of view of agricultural supply, even though the land markets remain non-transparent and ineffective. Substantial concentration of control over land has in fact occurred, typically based on extended lease-holdings taken on relatively large areas of land by the “leaders” who emerged from the land reform process, and other types of corporate farms established by one or more leaders or commercial investors into the agricultural sector. While this development has been effective in ensuring that the larger part of the arable area is cultivated, it has been less effective in restoring competent management and investment to the orchards and vineyards which require a longer term investment based process for which the present lease-holding-based arrangements are not well suited [8].

An alternative to individual farming in order to increase their bargaining power in relation to the processing industry is creating local associative structures such as marketing and production cooperatives.

The efficiency and competitiveness of the rural sector is dependent on a coherent approach regarding land tenure. Land fragmentation is an important factor affecting the Republic of Moldova as many other countries and its resolution through land consolidation would give to agricultural producers an incentive to invest in their farms and to remain in rural areas.

Taking into account the risk of land abandonment and depopulation, due to the high level of migration from rural areas, there are several opportunities for intervention in order to assure a sustainable development of the rural sector. Thus the demographic development can be influenced to a limited extent, while socio-economic factors and institutional frameworks can be addressed by appropriate policies.

The traditions of wine making, has a long history, Moldova being one of the oldest wine-producing countries known. Between the two World Wars vineyards were destroyed, production yielded and the previous practices and cultural developments were lost. It was only until the 1960s that wine-production became a viable activity again as demand in CIS increased significantly, and the practices (specifically the storage in caves) resumed [9].

Up until the 1980s, the increasing demand initiated the development of winery sector in Moldova, and it became the largest supplier of wine in the Soviet Union. Nowadays, Moldova's wine sector continues to be one of the most significant agricultural sub-sectors in a predominantly agricultural economy. As an industry it accounts for about 10-11 percent of total exports on average for the period 2008-2011. About 6 percent of total agricultural land is used for production of grapes. Although figures are difficult to obtain, it is recognized that the wine industry provides employment to a significant number of rural households, with an estimated 70 thou of persons, predominantly smallholder farmers involved in the commercial cultivation of grapes, and a further 5,000 individuals involved in wine processing. The significant numbers of smallholders engaged in grape cultivation, as well as those who derive employment from working on vineyards means that the industry has potentially significant impact on poverty reduction

The total vineyard area has seen a significant decline from the 201 thou ha in 1990 to about 140 thou hectares in 2011. Technologies based on these previously distorted energy prices became, in many cases, economically unviable, which prompted a number of 30 companies, out of 174 of companies acting in this sector to purchase modern equipment for grape processing, wine storage and bottling, mainly from Western Europe. Despite this investment prior to the privatization process, capacity remained low with most enterprises using only 20-30 percent of their production capacity.

The majority of enterprises within the sector, immediately after the privatization, were characterized by obsolete primary wine making equipment often affecting the wine's quality. This was compounded by a slow enterprise restructuring process that came at high cost to both farmers and the economy in general. Many had problems of ownership, management and control, the results of which were a large accumulation of debt and lack of investment. This led to limited marketing opportunities for the farmer's grapes and low prices. The low prices inhibited the supply response, curbed revenues and prevented the critical reinvestment required for vineyard replanting.

Thus, in the period 2004-2008 only between 4,500 ha and 5,600 ha were planted annually, with a strong decline in 2009 due to marketing and financial difficulties.

The country's plan for the recovery and development of viticulture and wine processing for the years 2011 to 2020, foresees the replacement of 80,000 ha of old plantations, with 70,000 ha of new vineyards [9].

Wine sector restructuring program was designed by the Government of the Republic of Moldova and the European Investment Bank (EIB) in order to address structural vulnerabilities of the wine industry. The program will ensure that its investments in vineyards, wine processing and related industries are performed in order to advance the production of bottled wines classified: as Protected Designation of Origin (PDO), or Protected Geographical Indication (PGI) [6].

The potential for development of the Moldovan horticulture can be estimated by reference to its results obtained during the period of 1986 - 1990, when the total area of orchards was about 220 thousand hectares, including the fruit orchards - 150 000 hectares, and the global harvest - about 1.043 million tons.

In the 90s of the last century this sector went through a deep crisis due to the economic crisis that arose from the collapse of the USSR, including reduced demand for horticultural products in traditional markets, reorganization of the distribution channels, problems related to production means, and so on. By 1999 the volume of fruit production decreased to 136 thousand tons, while foundation of new plantations was practically stopped.

However, during the last decade some positive changes were manifested in this sector. Thus, as a result of stabilization of the fruit orchard area and increasing yields, the total production of fruits has increased and reached the volume of 378 000 tones in 2011, including 278 000 tones of seed fruit species, 84 thousand tons of stone fruit species, 14 thousand tons of nuts and 2300 tons of berry crops.

In case of fresh products, the adequate post-harvest infrastructure is required in order to supply continuously the market demands and maintain the products quality, especially those delivered to long distances. Additionally, the availability of cold storage capacity allows deliveries during off-season, when higher prices are recorded.

Expansion of cold storage capacity was a priority for Moldovan horticulture during the last 5-6 years. Thus, the functional capacity of cold storage chain has doubled in the period 2004 -2012, currently representing about 135 000 tones distributed in about 250 locations.

Refrigerators are used almost entirely for safekeeping (3-5 months) of apples and grapes. However, even for these products, only about 35% of production goes through the cold storage chain.

Vegetable production remains one of the main branches of the horticultural sector of the Republic of Moldova, aimed to ensure the population with fresh vegetables and the canning industry with raw material. Relatively favorable climatic conditions of our country, traditions and experience allows the cultivation of over 60 species of vegetable crops, obtaining high yields and an impressive benefit to most crops. This is confirmed by vegetable development indices registered in the period of 80-90s of the last century, when the annual global harvest of vegetables constituted 1200-1300 tons, including 700 thousand tons were processed by canneries and more than 250 thousand tons exported fresh.

Over the years the vegetable production has dropped considerably. According to statistical data it declined to 362 thousand tons in the year 2011. In particular, decreased the volume of vegetables production for processing (only 30 000 tones) and export (only 20 thousand tons). At

present, Moldova has a neutral balance in international trade with vegetables. The country is a net importer of fresh vegetables with a negative balance of about 15 000 tons and a net exporter of processed vegetables with a positive balance of about 12 000 tons [4].

The average yield of potatoes in Moldova is currently 10-12 tons per ha. However, the potential of potatoes production, with the proper investment in seed material, chemicals and fertilizers, irrigation and modern technology, it is possible to be increased up to 30-40 tons of per ha. Moldovan climate allows producing early potatoes ready for harvest in late May or early June that makes it possible to organize potatoes export in neighboring countries. In the Republic of Moldova the yearly potatoes is cultivated mostly in the Central zone of the country, while the later varieties are cultivated in the North part of the country. Despite of the increasing production of potatoes Republic of Moldova remains dependent on import of potatoes, mostly from Poland. The export of potatoes is limited also by the small size of private households and family farms specialized in potatoes production.

The branch of processed fruits and vegetables traditionally has an important place in horticulture, represented by 79 processing units, of which seven are of large capacity, while others are of medium and small capacity.

Processing capacity for fruits and vegetables at existing enterprises is estimated at 300 thousand tons of fruit and 120 thousand tons of vegetables. In 2011 have been collected and processed 136 000 tons of fruits and vegetables, including 108 000 tons of fruits and 28 thousand tons vegetables. This demonstrates the under utilization of the existing processing capacities.

The main products of the fruit and vegetables processing industry are concentrated apple juice and canned vegetables. At the same time, the production of traditional products of processing industry such as canned tomatoes and fruit jams is constantly decreasing due to continuing loss of competitiveness in export markets.

Moldova has a strong underlying comparative advantage as a producer of fresh and semi-processed fruits and vegetables for export. This potential is not being achieved at present and the prospects under existing conditions are that sector recovery and export growth will only occur slowly. By comparison with the wine sector, which is recognized as of key national importance by the authorities during last two decades, the fruit and vegetable sector only recently has got such a status and started to receive state support. However, by virtue of the small size of the operators in the sector, fruit and vegetables exports are particularly vulnerable to constraints stemming from excessive bureaucracy and an adverse trade facilitation environment. Specific actions in order to stimulate development of the High Value Agriculture are related to: creation of product sales centers, strengthening quality control, organizing regional wholesale markets assisting producers to sell their products, development of market infrastructure at central level: storage, transportation and information.

## CONCLUSIONS

The horticultural production sector still has a significant contribution to Moldova's economy. However it is undergoing a range of serious difficulties which resulted from major structural changes, including the fragmentation of land, depopulation of rural areas, the collapse of most large scale irrigation schemes, and the rapid change in the demand of its traditional destination markets. These sectors have to date attracted insufficient foreign investment interest, both because of the difficulties faced at a sector level and because of the wider unfriendly environment for inward investment. The existing enterprises are poorly equipped to develop new non-traditional markets and have little experience on the EU markets.

Faced with this situation it would be unrealistic to expect a rapid recovery of the sector, even though a number of small existing private sector initiatives demonstrate the potential for profitable investment in a wide range of fresh and partly processed products.

The wine sector has been able to attract more investments for modernization, mostly from Russian investors. This is due to the fact that the industry has a product which, with appropriate

investment can be readily marketed into the Russian market on a profitable basis, using the existing large scale production locations. By contrast the fruit and vegetable sector offers no comparable attractive areas for investment arising directly out of the privatization process. Most investment is in green-field locations and based on substantial product innovation compared to former export products. The fruit and vegetable sector is proving much more vulnerable to the adverse effects of the demanding bureaucratic requirements for export. This is largely a function of size. For the wineries the bureaucratic obstacles to export trade are a nuisance, but given the larger sizes of both the companies and of their average consignments, the wineries are able to overcome the bureaucratic obstacles. At the same time penetration of the new markets needs new approaches positioning Moldovan wines at higher price categories.

In the same time, for the fruit and vegetables production the whole range of new networks has to be created. While this has happened to a modest degree through pure private sector initiative, there has been little public or donor investment to accelerate the process. It is unlikely that the fruit and vegetable export sector will develop rapidly in the absence of accelerated development of the domestic market, as regular supplies on the domestic market should provide the launch-pad for development of export markets. The export strategy promotion should include also strengthening of regional trade with neighboring countries.

## BIBLIOGRAPHY

1. Agricultural Census of the Republic of Moldova 2011. Accessed: <http://www.statistica.md/pageview.php?l=ro&idc=352>
2. Dudwick N., Fock K., Sedik D.J. Land Reform and Farm Restructuring in Transition Countries: The Experience of Bulgaria, Moldova, Azerbaijan, and Kazakhstan. World Bank Working Paper (No. 104), World Bank, 2007, ISBN 082137088X, 9780821370889, 87 pages.
3. National Land Cadastre, 2011
4. Programul de dezvoltare a horticulturii pe anii 2013-2020 (versiunea preliminară). Accessed: <http://www.maia.gov.md/doc.php?l=ro&idc=49&id=15452>
5. Statistical Yearbook of the Republic of Moldova. 2012.
6. Strategic priorities for the activities of the Ministry of Agriculture and Food Industry of the Republic of Moldova in the years 2011 – 2015, <http://maia.gov.md/doc.php?l=ro&idc=48&id=14595>
7. Sutton W., Lerman Z., *et al.* Moldova: Note cu privire politica agrară. Volumul 1: Terenuri agricole /, Banca Mondială, 2006. 48 p.
8. World Bank, 2004, 'The Republic of Moldova: Trade Diagnostic Study', Report No. 30998-MD.
9. Гаина Б., Арикова З., *et al.* Менеджмент качества винодельческой продукции. Комрат, Комратский государственный университет, 2013

## EVALUATION OF REALIZED INVESTMENTS IN BELGRADE'S AND DANUBE REGION<sup>1</sup>

JONEL SUBIĆ<sup>2</sup>, LANA NASTIĆ<sup>3</sup>, MARIJANA JOVANOVIĆ<sup>4</sup>

**Abstract.** *Investments in the economy are the basic driver of economic development of the country, or areas where the investment is made. To accomplish the economic development requires constant investment in development activities carried out in that area, but the limiting factor is shortage of own funds to commercial entities invested in the expansion and modernization of its products. Among the most important problems that arise in the Republic of Serbia are the problem of obtaining funds from favourable financing conditions and unstable market system, especially for agricultural products, which in addition to other macroeconomic indicators show a high risk of investing in the entire economy, as well as in agriculture, as one of the most important sectors of the Serbian economy. Given the importance of this investment research has focused on the area of Belgrade and the Danube area, which has a very favourable geographical position and as such it is a favourable area for investment.*

**Key words:** *investments, economy, agriculture*

### INTRODUCTION

The Belgrade's region and Danube region consist the Belgrade city, which in its structure has 17 city municipalities and the city of Smederevo, which is located in Danube region and geographically is belongs to Central Serbia. According the last census of inhabitants, which was carried in 2011. year, on this area has lived 1.767.649 inhabitants, out of which on Belgrade's region and city of Belgrade, which is and administrative centre of the Republic of Serbia and largest city of area of Republic were enumerated 1.659.440 inhabitants, until of the area of Smederevo city has lived 108.209 inhabitants.

Belgrade's area and Danube region covers in total 25 3604 hectares of agricultural land (Belgrade's area 21 5414 hectares and Danube region 38.190 hectares), of which is 78.89% arable land. This area have a large advantages for development of agriculture in general, as well for development the agricultural activity, first of all because of geographical position, proximity of market, infrastructure development, availability of qualified personnel for all activities, as well and large areas with quality soil, water resources and others necessary conditions for dealing with agricultural production.

Although on the territory of Belgrade's and Danube region are located two large cities, this area covers large areas of agricultural land and it is significant in production of agricultural products and products of food industry.

Signification of investments in general development of economy and agricultural activity is multiple. According to Subić (2007) investment growth in agriculture represents condition his technical and technological modernization and ultimately is one of condition of economic stability of all national economy. Without an adequate scope and meaningfulness structure of investment cannot be provide growth of fixed and current assets, increasing the number of working places, raising the performance of working tools, better productivity of work, multifirmity of production, etc., on every regional agrarian and rural level, even at national level.

Starting from the assumption that investments as invested resources of social accumulation, a necessary precondition, can be concluded that economic development, after all, can be observed as well

<sup>1</sup> This paper is part of Project III 46 006 named "Sustainable agriculture and rural development in the function of achievement goals of Republic Serbia within Danube Region" and Project 179028 named "Rural labor markets and rural economy of Serbia - the diversification the income and reducing the rural poverty", financed by Ministry of Education and Science of the Republic Serbia, project period 2011-2014.

<sup>2</sup> Ph.D. Jonel Subić, Senior Research Associate, Institute of Agricultural Economics, Volgina 15, Belgrade, Republic of Serbia, phone number; (+381)11/697-28-63, e-mail: [jonel\\_s@iep.bg.ac.rs](mailto:jonel_s@iep.bg.ac.rs)

<sup>3</sup> M.A. Lana Nastić, Research Associate, Institute of Agricultural Economics, Volgina 15, Belgrade, Republic of Serbia, phone number; (+381)11/697-28-52, e-mail: [lane\\_n@iep.bg.ac.rs](mailto:lane_n@iep.bg.ac.rs)

<sup>4</sup> B.Sc. Marijana Jovanović, Research Trainee, Institute of Agricultural Economics, Volgina 15, Belgrade, Republic of Serbia, phone number; (+381)11/697-28-42, e-mail: [marijana\\_j@iep.bg.ac.rs](mailto:marijana_j@iep.bg.ac.rs)



like function of investment, with the fact that exist a reverse functional dependency between this two category. Development and increasing of production capacity and productivity in functional interdependence with investments, and by the rule with that part of investments which is routed to fixed assets (Subic 2010).

To achieve better insight in moving of investment activity in economy in general, in table 1. is shown the level of investment, not only on territory of Republic of Serbia, but also on the territory of Central Serbia and Belgrade's and Danube areas. Listed indicators has shown for time period since 2001. until 2011. year.

Table 1. Realized investments in economy\* (000 RSD)

Year	Republic of Serbia**	Central Serbia		Belgrade's and Danube region	
	RSD	RSD	% of total investment in Republic of Serbia	RSD	% of total investment in Republic of Serbia
2001.	55.188.399	41.840.003	75,81	21.002.168	38,06
2002.	102.860.663	79.557.972	77,35	39.968.468	38,86
2003.	115.662.223	89.976.409	77,79	50.786.973	43,91
2004.	152.929.464	123.445.066	80,72	69.551.531	45,48
2005.	163.549.507	133.776.108	81,80	85.724.905	52,42
2006.	340.795.050	246.477.735	72,32	128.417.334	37,68
2007.	482.340.888	366.865.027	76,06	198.883.036	41,23
2008.	472.746.680	360.307.995	76,33	234.954.950	49,70
2009.	369.438.089	280.898.157	76,03	182.660.713	49,44
2010.	425.400.001	325.375.393	76,49	193.785.764	45,55
2011.	493.100.031	359.940.418	73,00	210.281.902	42,64

\* Investments in fixed assets.

\*\* Without data for Kosovo and Metohija (with exception in 2010<sup>th</sup>).

Source: Statistical Office of the Republic of Serbia. Municipalities in Serbia 2002-2012.

Realized investment in Republic had growth tendency in period 2001. – 2007<sup>th</sup>, after which comes to their decline during 2008<sup>th</sup> and 2009<sup>th</sup>. After that, i.e. 2010. and 2011. year, they making the positive trend, i.e. show growth tendency.

Investments in economy of Central Serbia in investment of Republic achieved share from 72,32% (2006. year) to 81,80% (in 2005. year). In period 2007-2010. year, this indicator was equalized and amounted something more than 76%, while in the last year of observing is decline to 73%. In absolute amount tendency of investment moving on territory Central Serbia is the same as on level of Serbia. Accordingly, until 2007<sup>th</sup> is been showed the growth tendency, after that in period 2008-2009. year decreases, and after that again comes to increasing a level of investments activity in economy of this area. Investment in economy of Belgrade's area and Danube region since beginning of analysed period (2001. year) until 2008<sup>th</sup> are in constantly increasing, and the in 2009. year comes to significant decline, until 2010<sup>th</sup>, when again showing the growth tendency. Belgrade's and Danube region have significantly share in total investment of Republic Serbia and ranges from 37,68% till 52,42%. Although this indicator is exceptionally high relative to the surface which occupying mentioned area, however must be taken into consideration that it is area in which are located largest city in country and that this area is especially interested for investors.

According to Subic and authors (2012), investments represent basic material factor of economic and social development of any country, region and local community. The scope, structure and efficiency of investing in greatest extent depends how and until which level will be resolved basic question of sustainable development of agriculture.

The level of investment resources in agriculture, hunting, forestry and water management on level of republic of Serbia, Central Serbia and Belgrade's and Danube area is shown in table 2.

Table 2. Realized investments\* in agriculture\*\* (000 RSD)

Year	Republic of Serbia**	Central Serbia		Belgrade's and Danube region	
	RSD	RSD	% of total investment in Republic of Serbia	RSD	% of total investment in Republic of Serbia
2001.	3.146.845	998.683	31,74	278.503,00	8,85
2002.	5.206.654	2.012.596	38,65	844.026,00	16,21
2003.	3.260.612	1.219.717	37,41	684.400,00	20,99
2004.	3.721.166	1.702.354	45,75	1.038.959,00	27,92
2005.	5.028.793	2.881.800	57,31	1.952.072,00	38,82
2006.	13.250.369	5.170.798	39,02	2.829.159,00	21,35
2007.	14.384.811	5.736.605	39,88	4.617.389,00	32,10
2008.	21.357.929	5.306.541	24,85	2.739.063,00	12,82
2009.	14.174.921	4.376.208	30,87	2.820.282,00	19,90
2010.	9.219.328	2.535.698	27,50	1.543.726,00	16,74
2011.	12.211.147	2.152.174	17,62	1.631.087,00	13,36

\* Investments in fixed assets.

\*\*Agriculture, hunting, forestry and water management.

\*\*\* Without data for Kosovo and Metohija (with exception in 2010<sup>th</sup>).

Source: Statistical Office of the Republic of Serbia. Municipalities in Serbia 2002-2012.

On the level of republic of Serbia, realized investments in agriculture, in period since 2001.- 2008. year (with exception in 2003. year), shown growth tendency, then in period 2009-2010., this indicator is on the decline. In last analysed year (2011), comes to increasing of investment activity in agriculture.

Moving of investments in agriculture on level of Central Serbia shows the tendency of growing in period 2001-2007. year, with exception in 2003<sup>rd</sup>. In period from 2008. year until the end of observed period (2011. year), level of investments in agriculture is on constant decline. Also, share of investments this activity from area of central Serbia in investments in Republic of Serbia are lowest in last year and it amounts 17,62%, until the highest share is realized in 2005.

Investments on area of Belgrade's and Danube region have the same moving as on the territory of Central Serbia, with the fact that in this area in last analysed year is come to slight growth this indicator. Share of investments this domain in total investments of Republic is extremely varies, but in the last year has been realized one of the most lower values this indicator in analysed period (beside 2001. and year of 2008.).

The average year growth rate for economy during period 2001-2011. year is highest on area of Belgrade's and Danube region and it amounts 25,91%, while on the territory of Serbia is somewhat lower and amounts 24,48%. The average growth rate in Central Serbia is the lowest and it amounts 24,01%.

Investments in agriculture, also at all levels had a positive average annual growth rate, and as in the first case, i.e. total economy, the highest growth rate was achieved in the area of Belgrade and the Danube region (19,33%), followed by the Republic as a whole (14,52%), while lowest value achieved at the level of Central Serbia (7,98%).

## MATERIALS AND METHODS

During the research, we used the literature from the area of investments, agriculture, industry, etc., and a large number of statistical and scientific publications.

In this paper was performed the evaluation of realized investments in the economy, with special emphasis on investments in agriculture, as one of the most important economic branches in the Republic,

which has a significant share in value of total exports of the Republic. Analysis of realized investments was based on the following indicators<sup>5</sup>:

- realized investments in the economy per inhabitant;
- realized investments in the economy per employee;
- realized investments in agriculture per person employed;
- realized investments in agriculture per unit of agricultural land;
- realized investment in agriculture per unit of arable land;
- realized investments in agriculture per unit of ploughed land;
- realized investments in agriculture per holding.

Macroeconomic indicators presented here are of great importance for the follow-up of the next development of this area, i.e. the economy as a whole, and as well agriculture.

## RESULTS AND DISCUSSION

Rating of realized investments in the economy, and agriculture is based on a number of indicators. Indicators used for the evaluation of total investments in the economy are realized investments in the economy per inhabitant and gross fixed capital per employee (Table 3). This type of investment evaluation is carried out to their more realistic rated, and indicators were calculated both for industry and for agriculture, presented at the national level, of the Central Serbia and Belgrade, and the Danube area. Calculation of indicators was carried out for two years, 2002<sup>nd</sup>, and 2011<sup>th</sup> year.

At analysed indicators of investment in the economy, higher value was obtained from investments in the economy per employee in relation to the investment per inhabitant in the interrelated:

- at the level of the Republic of Serbia in 2002<sup>nd</sup> year (5,14:1) and in 2011<sup>th</sup> year (5,35:1);
- Central Serbia in 2002<sup>nd</sup> year (5,08:1) and in 2011<sup>th</sup> year (5,32:1);
- and Belgrade's and Danube area in 2002<sup>nd</sup> year (4,31:1) and in 2011<sup>th</sup> year (3,70:1).

Table 3. Evaluation the realized investments\* in economy

Indicator	Unit	Year	Territory		
			Republic of Serbia**	Central Serbia	Belgrade's and Danube area
Realized investments in economy per inhabitant	RSD	2002	13,72	14,56	23,71
		2011	68,61	68,49	118,96
realized investments in economy per employee	RSD	2002	70,52	73,91	102,27
		2011	367,19	364,14	439,94

\* Investments in fixed assets

\*\* Without data for Kosovo and Metohija

Source: Statistical Office of the Republic of Serbia. Municipalities in Serbia 2002-2012.

Realized investments in the economy, if we analyse the observed areas are the lowest, either per inhabitant or per employee, at the level of the Serbia, and the highest in Belgrade's and the Danube area. Rating of realized investments in the agriculture was done using four indicators (Table 4). The highest values were obtained in actual investment in agriculture per person employed, and the lowest values in of realized investments in agriculture per unit of agricultural land, in the following proportions:

- Republic of Serbia: 2002. year (43,16:1) and in the 2011<sup>th</sup> year (146,14:1);
- Central Serbia: 2002. year (120,34:1) and in the 2011<sup>th</sup> year (233,94:1);
- Belgrade's and Danube area: 2002. year (35,11:1) and in the 2011<sup>th</sup> year (51,86:1).

<sup>5</sup> Part of indicators taken from the methodology presented in the monograph written by: Cvijanovic D., Hamović, V., Popovic V., Subic, J., Katic, b. and Paraušić, V. (2007). *Multifunctional Agriculture and Rural Development in AP Vojvodina*. Belgrade, Serbia. Institute of Agricultural Economics.

At area of Belgrade's and Danube region are in 2002. year, the highest value of realized investments are per person employed, while the lowest value is realized in area of Republic in general. Shown indicator in 2011. year, the highest value had at national, while the lowest is in Central Serbia.

Table 4. Evaluation of realized investments\* in agriculture\*\*

Indicator	Unit	Year	Territory		
			Republic of Serbia***	Central Serbia	Belgrade's and Danube region
Realize investments in agriculture per person employee	RSD	2002	44,02	73,41	113,75
		2011	350,74	152,06	333,49
Realized investment in agriculture per unit of agricultural land	RSD	2002	1,02	0,61	3,24
		2011	2,40	0,65	6,43
Realized investments in agriculture per unit of arable land	RSD	2002	1,22	0,77	3,41
		2011	2,87	0,83	7,58
Realized investment in agriculture per unit ploughed land	RSD	2002	1,55	1,14	4,00
		2011	3,71	1,25	8,15

\* Investments in fixed assets.

\*\*Agriculture, hunting, forestry and water management.

\*\*\* Without data for Kosovo and Metohija (with exception in 2010<sup>th</sup>).

Source: Statistical Office of the Republic of Serbia. Municipalities in Serbia 2002-2012.

In Belgrade's and Danube region were achieved better results in the other three indicators (realized investments in agriculture per unit of agricultural land, realized investments in agriculture per unit of arable land and realized investments in agriculture per unit of ploughed land) in both analyzed year, until on the territory of Central Serbia are lowest values of listed indicators.

Table 5 are shown the realized investment in agriculture at agricultural holding. The source of data about the number of agricultural holdings is the Treasury of the Republic of Serbia. Data are given for 31.12.2011. years, and have been recorded by branches, which for the Republic of Serbia has 34. In the area of Belgrade's and Danube area there are 6 branches: Smederevo, Novi Beograd, Zemun, Novi Beograd, Zemun and the Stari Grad, and the total number of farms in the area is 34.432 agricultural holding.

Table 5. Realized investments per agricultural holding\*

Unit	Republic of Serbia	Central Serbia	Belgrade's and Danube
RSD	26,98	6,76	47,37

\* Agricultural holdings that include the legal entities and individuals

Source: *The number of registered of agricultural holdings* by branches of the Treasury. Treasury. Ministry of Finance of the Republic of Serbia, Belgrade. 2011

Investments per agricultural holding are highest in Belgrade's and Danube area, amounting to 47,37 thousand per holding (Table 5). The lowest value was achieved in Central Serbia, where this ratio is only 6,76.

## CONCLUSIONS

Based on the evaluation of realized investments in the areas of Belgrade and the Danube area, Central Serbia and the Republic can be drawn the following conclusions:

- Investments in the economy and the Danube in the Belgrade area are at a much higher level than the other two areas, and the average annual growth rates calculated from the absolute value of investing investments;

- The average annual growth rate of investment in agriculture, like in the overall economy of the highest in Belgrade and the Danube area, and at all three levels were achieved positive values of average annual growth rates;
- Rate of realized investments in the economy of the highest value was recorded in the District, as in most indicators of gross assessment for agriculture (excluding realized investment in agriculture per person employed in 2011.)
- Belgrade and the Danube region also has a much higher investment per agricultural holding compared to other areas.

Of the three analysed levels of the most important investments in the Investment industry and agriculture are carried out in Belgrade and the Danube area, as this area is classified into areas where economic and social security of citizens at a higher level than in most other areas.

## BIBLIOGRAPHY

1. Statistical Office of the Republic of Serbia. *Municipalities in Serbia, 2002-2011*.
2. Statistical Office of the Republic of Serbia. *Census of inhabitants 2002. (Total and agricultural inhabitants in Serbia)*.
3. Subić, J., Popović, V., Roljević, S., (2012). *Evaluation of realized investments in agriculture in the Carpathian region in Serbia*. Agrarian Economy and Rural Development Realities and Perspectives for Romania. International Symposium. Bucharest, Romania. Research Institute for Agricultural, Economy and Rural Development
4. Subić, J. (2007). *Mesto Južnog Banata u poljoprivredi Srbije i Crne Gore na putu ka evropskoj integraciji*. Beograd, Srbija: Institut za ekonomiku poljoprivrede, Beograd.
5. Subić, J. (2010). *Specifičnosti procesa investiranja u poljoprivredi*. Beograd, Srbija. Institut za ekonomiku poljoprivrede.
6. Subić, J. (2012). *Strateško planiranje održivog poljoprivrednog i ruralnog razvoja lokalnih zajednica – model MZ Glogonj*. Cvijanović, D. i Subić, J. (Urednici). *Investicije u poljoprivredu i ruralni razvoj* (str. 46-61). Beograd, Srbija. Institut za ekonomiku poljoprivrede.
7. Cvijanovic D., Hamović, V., Popovic V., Subic, J., Katic, b. and Paraušić, V. (2007). *Multifunctional Agriculture and Rural Development in AP Vojvodina*. Belgrade, Serbia. Institute of Agricultural Economics.

# THE MARKET POTENTIAL OF THE ORGANIC PRODUCTS AND NICHE COMPETITIVENESS

DAN-MARIUS VOICILAŞ<sup>1</sup>

**Abstract:** *We are presenting the organic farming in Romania, the general background, the legislation bearing on it, the institutions created to coordinate this activity, the evolution of areas and productions, organization of producers, trade, the new challenges in the field, tendencies and traditions. By this paper we would like to put in evidence the importance of the organic products on the present market characterised by high competitiveness and niche opportunities. For the analysis, we use long time series data based on statistical data provided by the National Institute of Statistics of Romania, the Ministry of Agriculture and various publications in this field. The conclusions and results of the paper will underline the present market tendencies, the opportunities of the Romanian business environment, the benchmarks for policy makers, niches alternatives and the level of the Romanian organic products market on a competitive global market.*

**Key words:** *Organic products, Niche market, Competitiveness*

## INTRODUCTION

Organic foods are foods that are produced using methods of organic farming – with limited modern synthetic inputs such as synthetic pesticides and chemical fertilizers ([http://en.wikipedia.org/wiki/Organic\\_food](http://en.wikipedia.org/wiki/Organic_food)). Organic foods are also not processed using irradiation, industrial solvents, or chemical food additives.

A niche market is a focused, targetable portion of a market. By definition, then, a business that focuses on a niche market is addressing a need for a product or service that is not being addressed by mainstream providers. You can think of a niche market as a narrowly defined group of potential customers. According to the University of Arizona (Archer, C., 2013), niche markets are segments within your larger target audience that have similar demographic, buying behavior and lifestyle characteristics. Small business owners often function as niche companies, targeting a specific industry or type of consumer. Through strategic marketing tactics, specialized industries can use marketing and advertising to directly appeal to their niche market. Some advantages of using niche marketing include lower levels of competition, and the ability to set products and services at premium prices. Reaching target markets are more effortless and more directed. The main disadvantage of niche marketing can be attributed to greater difficulty in gaining high profit levels due to smaller market size (truetobusiness.com).

According to “businessdictionary”, competitiveness is the ability of a firm or a nation to offer products and services that meet the quality standards of the local and world markets at prices that are competitive and provide adequate returns on the resources employed or consumed in producing them.

The paper evaluates all the concepts mentioned above on present Romanian market.

## MATERIAL AND METHODS

For the analysis, we use long time series data based on statistical data provided by the National Institute of Statistics of Romania, the Ministry of Agriculture and various publications in this field. Last but not least, we use the partial results from the FP7 Project COMPETE (International comparisons of product supply chains in the agro-food sectors: determinants of their competitiveness and performance on EU and international markets), financed by European

<sup>1</sup>Associate professor Ph.D, Senior researcher II, Romanian Academy-Institute of Agricultural Economics, dmvoici@yahoo.com

Communities and National Ministry of Education, leaded by IAMO (Halle/Saale-Germania). The Institute of Agricultural Economics-Romanian Academy is partner in this consortium.

## 1. Legal framework

The legal basis of the organic farming system was established in the 1990s by the Commission Regulation (EC) no. 2092/1991 regarding organic farm production and the indications for their presentation as agricultural and agri-food products.

At the national level, together with the signing up of the Association Agreement and the initiation of the EU accession negotiations – Romania's legislation had to get in line with the EU legislation. Following this process, at present, Romania's legislation complies with EU requirements and orientations.

The main normative acts, produced are: Government's Emergency Ordinance (OUG) no. 34/2000 on the organic agri-food products, approved by Law no. 38/2000; Government's Decision no. 917/2001, for the approval of the Methodological Norms for the application of provisions from OUG no. 34/2000 regarding the organic agri-food products; The Joint Order no. 417/2002 and no. 110/2002 of the Minister of Agriculture and of the President of the National Authority for Consumers' Protection; Order no. 70/2002 of the Minister of Agriculture on the establishment of the Commission for Organic Farming Development in Romania; Order no. 527/2003 of the Minister of the Agriculture for the approval of the Rules on the inspection and certification system and the accrediting conditions for the inspection and certification bodies in organic farming; Order no. 721/2003, of the Minister of the Agriculture for the approval of Rules on the import and export of organic agri-food products; Order no. 153/2006 regarding the approval of the componency of the Commission for the accrediting of inspection and certification bodies in the organic farming sector, which inspects and controls the operators on Romania's territory; Order no. 317/2006 regarding the modification and completion of the Annex to the Order of the Ministry of Agriculture and of the President of the National Authority for Consumers' Protection no. 417/110/2002, for the approval of the Specific labelling rules for the organic agri-food products; OUG no. 62/2006 for the modification and completion of OUG no. 34/2000 on the organic agri-food products; Law no. 513/2006 on the approval of OUG no. 62/2006 for the modification and completion of OUG no. 34/2000 regarding the organic agri-food products; Order no. 219/2007 on the approval of Rules regarding the organic farmers' official registration. All these provide information, rules and norms necessary in this field like: the authority responsible for organic farming; the general rules and principles of organic production; the duration of the conversion period; the inspection and certification system; the list of accepted products to be used by the organic farming practice; the list of ingredients and processing methods that can be used in the preparation of organic foodstuffs; sanctions etc.

## 2. Institutional framework

In Romania, the government, the civil society and the business environment are becoming increasingly aware of the need to promote organic farming.

The governmental policy is elaborated and coordinated by Ministry of Agriculture and Rural Development (MADR), under which the Office of the National Authority for Organic Products (ANPE) is operating, which is the authority in charge of the organic farming sector. ANPE is collaborating (or collaborated) with different agencies, education and research institutions, foundations, among which we can list the following:

- The National Agency For Agriculture Consultancy – ANCA (no longer exist nowadays);
- The Academy of Agricultural and Forestry Sciences – ASAS;
- Higher education institutions, agricultural research institutes and stations;

- The National Organic Farming Federation, whose activity is based on the “sustainable development principle”, a development type which should not disable the next generations’ access to a clean environment.

The Ministry of Agriculture establishes an action plan for the development of the domestic market of organic products, which includes:

- The intensification of actions promoting the organic farming concept;
- The improvement of information on organic farming practice, and the qualification of the participants in this sector;
- The increase of areas under the experimental modules “organic micro-farms”;
- The delimitation of organic farming areas;
- Support to farmers during the conversion period;
- The creation of an information system accessible to farmers.

## RESULTS AND DISCUSSIONS

As organic farming contributes to sustainable development, through an increase of biodiversity, soil fertility and environmental protection, the organic farmers are supported through the agro-environmental programs of the European Commission (EC). Thus, starting with 2007, the year of Romanian accession into EU, organic farmers benefit from a compensatory premium per hectare (and by crops), in order to make up for the income losses incurred during the conversion period and for the certified production, through the National Rural Development National Plan (PNDR) – Axis 2 – the agro-environmental sub-measure, from the European Agricultural Fund for Rural Development (EAFRD), non-refundable support in conformity with the Commission Regulation (EC) no. 1698/2005.

At the same time, EU provides support for the promotion of organic products, through co-financing programs, with a 50% funding from the EC, 20% from professional organization, and 30% from the state budget, in conformity with the procedure of the Commission Regulation (EC) no. 1071/2005.

### 1. Organic farming analysis in Romania

The data supplied by MADR reveal the increasingly importance of this activity sector for the domestic producers. The positive evolutions of the areas and production in the organic farming sector prove the existing potential, initiative, development prospects and increasing demand from the consumers’ part.

In the following tables (Table 1, 2 and 3) we shall present the dynamic of the field, which proves the above statements.

**Table 1–Evolution of areas under the organic farming system before accession (2000-2006)**

Specification	Index						2006
	2000	2001	2002	2003	2004	2005	
Total area, out of which:	100 (17,438 ha)	1.65	2.51	3.28	4.23	6.33	<b>8.20</b>
Cereals	100 (4,000 ha)	2.00	3.00	4.00	5.12	<b>5.52</b>	4.08
Pastures and fodder crops	100 (9,300 ha)	1.51	2.15	2.58	3.37	4.55	<b>5.51</b>
Oilseeds and protein crops	100 (4,000 ha)	1.58	2.50	3.90	5.02	5.65	<b>5.97</b>
Vegetables	100 (38 ha)	2.63	18.40	5.26	7.89	11.58	<b>18.95</b>
Fruits (sour cherries, cherries,			100	2.00	4.00	<b>8.64</b>	5.84



Specification	Index						2006
	2000	2001	2002	2003	2004	2005	
apples)	-	-	(50 ha)				
Spontaneous flora collection	100 (50 ha)	2.00	6.00	8.00	10.00	352.60	<b>774.00</b>
Other crops	100 (50 ha)	6.00	16.00	18.00	18.00	97.68	<b>242.00</b>

Source: Own calculations based on MADR database

Land areas increased in the mentioned period. The trend is increasing and the perception of these crops as an alternative activity and income source is positive (Voicilas, D.M., 2007). Comparing the objectives established by the government's strategy with the field results, we could say that the objectives were reached, the bases were created for the development of this activity and for the use of the market niches, both on the domestic and world markets.

As in the case of land areas, productions continuously increased in the investigated period. Although the production levels are much higher than those obtained 5-6 years ago, the domestic supply cannot totally meet the demand yet, which makes it possible for the imported organic products to penetrate the Romanian market, as we shall see later on (Voicilas, D.M., 2007).

**Table 2–Evolution of organic farm production before accession (2000-2006)**

Specification	Index						2006
	2000	2001	2002	2003	2004	2005	
<b>Total crop</b> production, out of which:	100 (13,502 to)	1.81	2.39	2.25	6.46	9.77	<b>12.34</b>
-Cereals, out of which:	100 (7,200 to)	1.74	2.22	2.00	5.69	<b>7.64</b>	6.73
Export	-	-	-	-	100 (7,100 to)	1.56	<b>2.55</b>
-Oilseeds and protein crops, out of which:	100 (5,500 to)	1.31	2.00	2.27	6.73	8.29	<b>13.29</b>
Export	-	-	-	-	100 (9,800 to)	1.23	<b>2.26</b>
-Vegetables	100 (600 to)	6.67	6.67	3.33	5.00	12.00	<b>14.51</b>
-Fruits (sour cherries, cherries)	-	-	100 (200 to)	1.50	2.50	<b>5.00</b>	1.70
-Spontaneous flora collection, out of which:	100 (200 to)	2.00	1.50	1.60	22.50	83.74	<b>124.81</b>
Export	-	-	-	-	100 (3800 to)	<b>3.74</b>	-
-Other crops	100 (2 to)	150.00	400.00	450.00	600.00	3175.00	<b>5520.50</b>

Source: Own calculations based on MADR and INS database

In the Table 3, we present the evolution of the organic agriculture in last years, after the accession into EU.

**Table 3–Evolution of areas and producers in organic agriculture after accession (2006-2010)**

Indicator	2006	2007	2008	2009	2010
No. of farmers	100 (3409)	1.12	1.23	0.95	0.93
Area in arable area (ha)	100 (45605)	1.43	1.90	2.41	3.25
Area - permanent crops of pastures and fodder (ha)	100 (51200)	1.12	0.90	0.77	0.62

Indicator	2006	2007	2008	2009	2010
Area - permanent crops of orchards and grapevine (ha)	100 (294)	3.24	5.16	6.36	10.52
Spontaneous flora collection (ha)	100 (38700)	1.52	2.10	2.30	2.00

*Source: Own calculations based on MADR database(County Agricultural Departments)*

According to the data from MADR, in 2011 the number of organic operators increased fantastic being over 10.000 (<http://www.eco-ferma.ro/performantele-agriculturii-ecologice/>).

## 2. Organization

Organic operators (farmers) were registered at MADR and classified by three large categories of products: crop, livestock and beehive products. The farmers are organized either as independent producers, physical entities, or as family associations or commercial companies as legal entities under the form of limited liability companies or joint stock companies. Not all the counties are included in this evidence. Most organic farmers are from a few counties: Suceava (North), Mureș and Sibiu (Center), Tulcea and Constanța (South-Est).

Following the presentation of these statistical data, the organic farming could be considered as a dynamic sector in Romania (Voicilas,D.M., 2007), with an increasing trend in recent years. As a result, the organization of the marketing ([www.agricultura-ecologica.ro](http://www.agricultura-ecologica.ro)) of the organic products is an increasingly important element in this sector. The sale of organic products can take place directly from the farm, or through the traders registered at MADR. The organic products are found both in the large store network and in the small-specialized shops.

At the beginning of the year 2007 (Romanian accession into EU), only two shop networks were registered at MADR: the shop "BIOCOOP" (Sibiu) and the shop Naturalia ([www.naturalia.ro](http://www.naturalia.ro)), with units both in Bucharest and in the county Ilfov (Voluntari). After one year, there were 6 shops (MADR).

At the beginning of the year 2007, the following organizations were registered at MADR, with atributes or concerns in organic farming, rural development, environment protection and sustainable development: The Association for ecological agriculture "agri-eco", with the headquarters in Cluj Napoca, the professional Organization „Agroecologia” – Cluj Napoca, the Association of the bio-farmers in Romania „BIOTERRA” – Cluj’ county, the Romanian Association for Sustainable Agriculture – Călărași County, the Association „Terra Verde” – Bucharest, the Association of the Bio-poultry breeders in Romania – BIOAVIROM – Ilfov County, the Association for the organic farming development in Romania, "Ecofocus" – Bucharest, Ecorural – Bucharest, the Association for the Environmental Protection and ecological agriculture „TER” – Bucharest, the Foundation „Mama Terra” – Bucharest, „The National Association of the Agricultural Consultants” – Bucharest, the Academic Foundation for Rural Progress „TERRA NOSTRA” – Iași, „The Ecologist Society in Maramureș” – Baia Mare, „The Foundation for Rural Development in Romania” – Bucharest, „The Ecological Group for Cooperation Bucovina” – Suceava, the Foundation „Business School Mehedinți” – Drobeta Turnu Severin, the Society „Avram Iancu” – Cluj Napoca, the Foundation „The Operation Romanian Villages” – Bacău county, „The Ecological Club Transylvania” – Cluj Napoca, „The Romanian Rural Foundation” – Timișoara, „Bioclub Cluj” – Cluj Napoca, „the Group of Gardeners Biodynamics” – Târgu Mureș, „the Romanian Association for Applied Biofarming” – Arad county, „the Centre for Ecological Consulting Galați” – Galați, „the Association for Environmental and Nature Protection” – Târgu Mureș, the Foundation „Divers Eco” – Maramureș county, the Foundation „Noema Consulting” – Cluj Napoca, the Association „Albina” (the „Bee”) – Bucharest, the Association for Environment Protection and Preservation of Resources – Bucharest.

At the end of 2012, the list of the organizations in organic agriculture, rural development, environmental protection, and sustainable development contains 32 bodies. In the same time, there were already 25 shops registered (MADR).

Except for the processors that have their own presentation shops, not all shops respect the storage/handling/presentation rules for organic products. The organic products are found in the same place with the conventional products, they are handled and stored together. In a study conducted by the Expert Group company in 2007, it is also shown that on the domestic market there is confusion between “natural product” and “organic product” (most of them maintained by the producers of the former), which makes it more difficult to promote an organic product under the conditions of the price difference. The World Bank and the Ministry of Agriculture and Rural Development through the ASSP Program, also conducted the study within the project ExtEco - „Extension for Eco-Profit”.

### 3. Organic products trade

An important role in market promotion and obtaining new market shares and segments of consumers is represented by the marketing activity. The presentation of products, the beneficial effects upon the human body, the gains obtained by buying clean and healthy products, even though they are more expensive than the conventional products, as well as consumers growing aware of their importance, are the main concerns that the producers and sellers of organic products should have in their development policy. The participation in exhibitions, fairs and other national and international manifestations is a modality to present the organic products and to establish new contacts for marketing these products. It is only a promotion modality among several possibilities, with a special impact upon consumers.

The fact that the organic products have a market in Romania is proved by imports, which are doubling almost every year. In 2007, the market of organic products was estimated at 2.5 mil EUR (1 mil EUR more than in 2006, before accession). At that time, about 70% from the organic products on the market were from import. Meantime, the imports decreased and at the end of 2010 the exports were about 150 mil. Euro and imports were about 35 mil. Euro (<http://www.ecoferma.ro/performantele-agriculturii-ecologice/>).

The Expert Group study (2007) reveals that only 30% of the organic production is sold on the domestic market (the rest was exported). The main organic products sold through the organized commercial network were eggs and dairy products.

The sale on the domestic market is through the wholesale networks Metro, Selgros mainly by retail shops. The main stores that introduced organic products in their assortment of goods are: Carrefour, Cora, Gima, La Fourmi, Mega Image, Nic, Primavera, OK.

The Romanian organic products are mainly exported to Western Europe (Germany, Italy, Switzerland, Netherlands for example) and attempts are being made to penetrate the US market. The wild berries, either organic or non-organic, have a much higher export price, and the price is even higher if these are organically certified. Main exported products are: cereals, oilseeds and protein, berries, herbs, honey and sheep cheese.

The reaching of the export targets is linked to other objectives as well (on the short, medium and long-term), which can contribute to the improvement of the competitiveness of the Romanian organic sector in the next period:

- The increase in the number of operators in this sector, receiving financial support from the Romanian Government Programs;
- Increase of the role of the non-governmental organizations (NGOs) in this sector through programs for the development of trade with organic products;
- Increase in the number of exporters who are actively involved in programs for organic agricultural trade development in the less-favoured areas;
- Support provided to organic commercial farms, so as to be more active on the market;
- The association of the small organic farmers so as to co-operate in the marketing of organic products;
- The increase in the number of municipal and regional organizations directly involved in the implementation of the National Export Strategy in its initial stage;
- The increase in the number of local processing units and foreign direct investment projects;

- The increase of investments in related activities in rural areas;
- The increase in the number of employees in the exporting units which are implementing the organic farming regulations;
- The increase of investments in the activities related to exportable organic products from the less developed rural areas;
- The increase of the organic farm output;
- The increase in the number of new companies involved in export activities with primary and processed organic agricultural products;
- The increase in the number of optimal operation modules by the association of crop and livestock farms;
- The development of processing capacities for the organic farming sector;
- Capacity improvement in terms of products and value added;
- The development of services oriented towards the export of organic products;
- The diversification of the exportable cultivated species (for example: vegetables, fruits) and of the range of processed products (e.g: bakery and pastry products);
- Increase in the number of new approved investment projects.

## CONCLUSIONS

Unfortunately, not all the producers are satisfied with the evolution of this market and with the government's involvement in the activity to support organic farming. In the opinion of some farmers who had initiatives in this field, organic agriculture became a non-efficient business in Romania, not because the outlet is not large enough, but rather because the government has not shown interest in this activity so far; on the other hand, this activity was given as an example of opportunity to conquer the foreign markets. The lack of financial support from the state, in addition to the extreme weather phenomena in the last years, is the main factor which determines the producers to think giving up their business. In many reports made by the producers or in the communications at the scientific events organized by them, it is mentioned that farmers are confronted with the problem of higher production costs as well as with the problem of products distribution.

The problem of the ratio of the production cost to the price of the product is not the only problem for organic farmers. The consumer is interested more in the price than in the quality of the product, and this constrains the development of the sector.

As always happens in such conflicts, on the other side, of the state institutions, the announcements are optimistic, satisfactory, and even praiseworthy. All governmental statements and the official documents show the favourable evolution of this sector and government's active implication in its development. For example, the documents elaborated by Romania's Government in the last years regarding the strategy in this field in the future, comprise concrete references on the next steps and have clearly identified objectives. We can easily remember what was stated in the past, before accession: Romania has great opportunities for promoting and developing organic farming due to its large agricultural land area, i.e. 14.9 million ha and its non-polluted soils; the increase of organic farmers' participation to the economic events in the country and a broad (BioFach 2006). By the examination of the value chain and of the consumers' requirements on the world market, the following critical success factors could be identified: price, assortments, package, branding, and availability.

In conclusion, two factors are adjudged to be responsible for consumer demand to be concentrated in the most affluent countries of the world. The price premium of organic products restricts demand to countries where consumers have high purchasing power. This explains why most sales are in countries where there is a sizeable middle-class in the population. The second factor is education and more specifically a awareness of organic products. As consumers become more educated and informed of food issues, they are more inclined to buy organic products whether it is because of factors like food safety, concern for the environment, or health reasons.

As production of organic crops increases across the globe, regional markets are also expected to develop in which organic farmers will produce organic products for consumers in their region. This is expected to stimulate sales of organic products in many developing countries, especially in countries like Brazil, China, India, and South Africa where economic development is increasing at a rapid rate and a more educated and affluent middle-class of consumers is developing (Willer, H. and Yussefi, M. -Eds., 2004).

The main conclusions resulted from this analysis, as regards the ways, which can contribute, to the improvement of the competitiveness of the Romanian organic sector in the next period are, as follows: the increase of the number of operators in this sector, receiving financial support from the Romanian Government Programs; the association of the small organic farmers so as to co-operate in the marketing of organic products; an increase in the number of municipal and regional organizations directly involved in the implementation of the National Export Strategy in its initial stage; an increase in the number of foreign direct investment projects and investments in related activities in the rural area; an increase and diversification of the organic farm output; capacity improvement in terms of products and value added; the development of services.

The questions which still remain under discussion for specialist and policy makers: mass/conventional or niche products? If niche, which is competitive and must have support in Romania: organic products, nostalgic products/traditional products, MGOs or ... ?

## BIBLIOGRAPHY

Archer, C., (2013), *The Advantages of Niche Companies in Marketing*, Demand Media, from <http://smallbusiness.chron.com> (University of Arizona)

Voicilas, D. M. (2007), *Organic farming*, in Ioanel, I. (Ed.): *Non-conventional farming economics* (pag. 70 -125), Romanian Academy, Institute of Agricultural Economics, Terra Nostra Publishing House, ISBN 973-8432-75-8, 65-125, Iasi, Romania

Willer, H. and Yussefi, M. (Eds.) (2004), *The World of Organic Agriculture – Statistics and Emerging Trends*, 6<sup>th</sup> revised edition, ISBN 3-934055-33-8, International Federation of Organic Agriculture Movements, Bonn, Germany

Base de date:

Expert Group

INS Database

MADR Database

National Export Strategy for the period 2005-2009

World Bank-MADR Project ExtEco - „Extension for Eco-Profit”

Internet:

[http://en.wikipedia.org/wiki/Organic\\_food](http://en.wikipedia.org/wiki/Organic_food)

<http://www.businessdictionary.com/definition/competitiveness.html>

[www.truetobusiness.com](http://www.truetobusiness.com)

<http://www.eco-ferma.ro/performantele-agriculturii-ecologice/>

Work under:

**FP7 COMPETE Project** “*International comparisons of product supply chains in the agro-food sectors: determinants of their competitiveness and performance on EU and international markets*”, Grant Agreement No. 312029 (<http://compete-project.eu/>), with funding from the **European Community** and the Ministry of National Education from Romania through the Executive Unit for Funding Higher Education, Research, Development and Innovation, project coordinated by IAMO (Halle/Saale-Germany), partner Institute of Agricultural Economics-Romanian Academy (Team leader: D.M. Voicilas)



## DEGREE OF ZOOTECHNICS – BAROMETER OF ECONOMIC DEVELOPMENT IN THE WORLD COUNTRIES

EMILIAN MERCE, CRISTIAN CĂLIN MERCE, IULIA MUREȘAN<sup>1</sup>

**Abstract.** *The paper presents debates and analyses the causal relation between the level of economic development and the degree of development of the animal husbandry sector. There is a large variability in time and space at the level of the world's countries regarding this aspect. As a general trend it was observed in time an increase of the degree of development of the animal husbandry sector, with high differences among the countries being directly link to the level of development of each country. The sources of information used are the data base of FAO, world bank and EUROSTAT. There were collected data regarding the GDP per capita and the share of the value of animal husbandry production in the value of agricultural production. The data were analyzed for 14 countries from different geographical area. The main method of research and analysis was the index method. The influence of the economic development on the development of the degree of animal husbandry sector is revealed by using the regression and correlation method. The results prove that modern agriculture cannot exist in a rudimentary economy. The first step to the modernization of the agriculture consists in increasing the degree of development of the animal husbandry sector. at the same time the economic development level of a country is the consequence of development and uniform combination of the all branches of the economy (industry, transports, infrastructure, services etc.) all these determine the social structure of the country.*

**Key words:** *economic development, animal husbandry development, index, regression, correlation*

### INTRODUCTION

The degree of development of the animal husbandry sector is the result of the general development of the country. From this point of view there is a large difference from one country to another and from period of time to other. The level of economic development is also correlated with the social structure of the country. Nowhere in the world during the time was evolution not observed a healthy economy or a significant level of development of the animal husbandry sector if the social structure is a primitive one (a lot of peasants). As a general trend it can be underlined the increase of the degree of animal husbandry sector development being correlated with the level of economic development, but with high difference from one country to another and one region to another. The development of animal husbandry sector can be considerate the first step for the vertical development for both micro and macroeconomic level. The degree of development of the zoothenics is barometer for standard of leaving among the different countries of the world (Merce E. et al, 2010). The logical consequence is the increase of economic efficiency and life quality. During the last six decades in Europe, the annual consumption of bred decrease from 200 kg per capita almost 70 kg per capita. In the meanwhile the annual consumption of meat increase from 30 kg per capita to more than 70 kg per capita.

The role of the animals in the nation life is representative from the beginnings. Each nation valorized more or less the natural condition where was established. From this point of view is very relevant the statement of Hippolyte Taine about the Nordic nations: “the rain made the grass, the grass made the cow, the cow made milk-cheese-butter, and all these together with the beer made the efficient Nordic man.” Hence the world's economic distribution based on the animal husbandry development sector is the result of the natural conditions, on one hand, and on the way the man knew how to take advantage of them, on the other hand. The economy of the countries with primitive social structure (many peasants) for sure is not performing from economic point of view, and the agriculture is a subsistence one.

### MATERIAL AND METHOD

For a correct and fair research, the statistical data represents an important factor. The data base of FAO, WORLD BANK and EUROSTAT offer exact information about the degree of

<sup>1</sup> Prof. Dr. Emilian Merce; Lector Dr. Iulia Mureșan: Universitatea de Științe Agricole și Medicină Veterinară, Calea Mănăstur 3-5, Cluj-Napoca 400372, România, e-mail: [emerce@usamvcluj.ro](mailto:emerce@usamvcluj.ro); [ccmerce@yahoo.com](mailto:ccmerce@yahoo.com); [icmuresan@gmail.com](mailto:icmuresan@gmail.com).

economic development and about the current situation of the animal husbandry sector. For the presents paper data about the GDP per capita and the share of the animal production value in the total agricultural production value were collected. The sample is represented by 14 countries from different part of the world.

The main method of analysis is represented by the indices method. The main indicators which reflect the current economic situation and the degree of development of the animal husbandry sector were analyzed with the help of regression and correlation.

## RESULTS AND DISCUSSIONS

The analysis of the data at the level of the sample proves that there is a causality link between the economic development and degree of animal husbandry sector development. This a stochastic causal relationship influenced also by the random factors. Some exceptions, like the case of France, can be explained the economic and natural particularities which have deep roots in the history (table 1).

Table 1

The value of the total agricultural production, vegetable and animal production in the 14 countries

No.	Country	Sector	Mil. \$	%
1.	England	Vegetal	13700	43.6
		Animal	17727	56.4
		Total	31427	100.0
2.	Burundi	Vegetal	1928	92.4
		Animal	159	7.6
		Total	2087	100.0
3.	Cameron	Vegetal	9614	90.6
		Animal	996	9.4
		Total	10610	100.0
4.	Denmark	Vegetal	3230	30.8
		Animal	7244	69.2
		Total	10474	100.0
5.	Ethiopia	Vegetal	5232	65.2
		Animal	2792	14.8
		Total	8024	100.0
6.	France	Vegetal	48318	59.5
		Animal	32875	40.5
		Total	81193	100.0
7.	Ghana	Vegetal	12332	93.1
		Animal	916	6.9
		Total	13248	100.0
8.	Germany	Vegetal	26971	42.4
		Animal	36590	57.6
		Total	63561	100.0
9.	Nigeria	Vegetal	3029	63.4
		Animal	1748	36.6
		Total	4777	100.0
10.	Holland	Vegetal	6248	32.1
		Animal	13203	67.9
		Total	19451	100.0
11.	Poland	Vegetal	13693	50.5
		Animal	13403	49.5
		Total	27096	100.0
12.	Romania	Vegetal	15377	67.8
		Animal	7292	32.2
		Total	22669	100.0
13.	Spain	Vegetal	30739	65.6
		Animal	16140	34.4
		Total	46879	100.0
14.	Hungary	Vegetal	5886	65.5
		Animal	3107	34.5

No.	Country	Sector	Mil. \$	%
		Total	8993	100.0

Source: FAOSTAT | © FAO Statistics Division 2013 | 06 October 2013

For a numeric evaluation of the causality relation in Table 2 are presented the GDP per capita (thousand \$/capita) and the degree of development of the animal husbandry sector (%).

Table 2

Correlation between the economic development and the degree of development of the animal husbandry sector

Nr.	Country	GDP* thousands \$/capita - 2012 -	Degree of zootechnics development %
1.	Burundi	0.251	7.6
2.	Ethiopia	0.470	14.8
3.	Cameroon	1.151	9.4
4.	Nigeria	1.555	36.6
5.	Ghana	1.605	6.9
6.	Romania	7.943	32.2
7.	Hungary	12.622	34.5
8.	Poland	12.708	49.5
9.	Spain	29.195	34.4
10.	England	38.514	56.4
11.	France	39.772	40.5
12.	Germany	41.514	57.6
13.	Holland	46.054	67.9
14.	Denmark	56.210	69.2

Source: \*The World Bank Group, 2013.10.06

Using the option regression from the data analysis package in Excel was obtaining the following parameters of the regression line and the correlation coefficient (table 3).

Table 3

Regression and correlation line

Regression line	Coefficients
<b>a</b>	<b>17.92544</b>
<b>b</b>	<b>0.920501</b>
<b>Correlation coefficient</b>	<b>0.865415</b>
Determination coefficient	0.748943
Standard error	11.22449
The sample volume	14

Regression line:

$$\bar{y}(x) = 17.92 + 0.92x$$

At every 1000\$ GDP per capita the degree of animal husbandry development increases approximately by 1 percent. The causality relation between the economic development level and the degree of development animal husbandry level can be represented also by graphic. The adjusted value of the regression line based on the variance of GDP per capita can be observed in Table 4.

Table 4

X	0	10	20	30	40	50	60	70
Y	17.92	27.12	36.32	45.52	54.72	63.92	73.12	82.32

The causality relation between the economic development level and degree of development of the animal husbandry sector can be observed in figure 1.



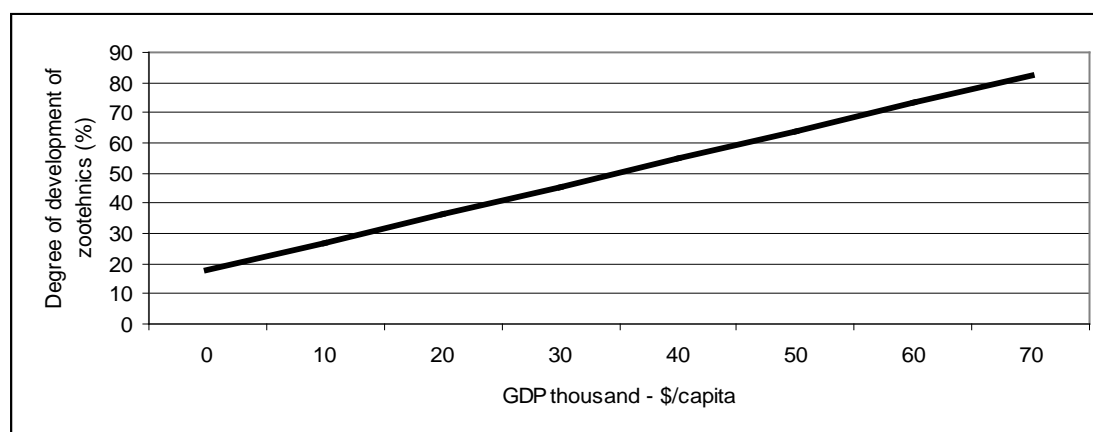


Fig. 1 – Evolution of the degree of zootechnics development based of the GDP per capita

The F test was use to find the significance of the correlation coefficient. It proves to be very significant (table 4).

Table 4

Variance	Degree of freedom	Sum of squares	Mean square	F	Significant F
Between groups	1	4510.162	4510.162	35.798	0.000064
Within groups	12	1511.871	125.989		
Total	13	6022.032			

The value of the correlation coefficient (0.8654) indicates an intense correlation, and the F test confirms that the correlation coefficient is very significant.

## CONCLUSIONS

1. The results prove that modern agriculture cannot exist in a rudimentary economy. The first step to the modernization of the agriculture consists in increasing the degree of development of the animal husbandry sector.
2. At the same time the economic development level of a country is the consequence of development and uniform combination of the all branches of the economy (industry, transports, infrastructure, services etc.) All these determine the social structure of the country.
3. The economy of the countries with primitive social structure (many peasants) for sure is not performing from economic point of view, and the agriculture is a subsistence one.
4. There is not anywhere in the world performing countries with a high share of peasants in the society. A typical example in this sense is the case of England which in 1901 had only 9% of the population occupied in agriculture. Romania even after the Second World Wear, in 1947, had 80% peasants (Merce E., 2011).
5. The advantage of the develop countries of the world is not due only to the evolution from the latest decades. The causes of these gaps are old and can be localized by time in the Renaissance.
6. To reinforce this fact it can be mention the fact that the first Cadastral Register (Doomsday Book) in England was realized in 1086, while in Romania not even today exists one.

## REFERENCES

1. Merce E., Ileana Andreica, F. H. Arion, Diana Dumitraș, Cristina Pocol (2010) – Managementul și gestiunea unităților economice cu profil agricol, Editura Digital Data, ISBN 978-973-776-869-8; 560 pagini; Cluj-Napoca;
2. Merce E. (2011) – TRANZIȚIA LA ROMÂNI, Editura Academiei Române, ISBN 978-973-27-2069-1, 124 pagini, București
3. \*\*\* FAOSTAT | © FAO Statistics Division 2013 | 06 October 2013
4. \*\*\* \*The World Bank Group, 2013.10.06
5. \*\*\* <http://www.colband.com.br/ativ/nete/cida/entr/4obim/link22h2.htm>; Hyppolit Taine – Detrminismo;

## DROUGHT MANAGEMENT IN THE AGRICULTURE OF DOBROGEA PROVINCE

LUP AUREL<sup>1</sup>, MIRON LILIANA<sup>2</sup>

**Abstract.** According to climate data Dobrogea is the warmest and the driest region of Romania. Due to climate, the productive potential of soils is poorly capitalized; productions depend mostly of the precipitation regime. The phenomenon is known for a long time, but the first steps to combat drought took just in the mid twentieth century when there was planted windbreak forest in the area Comorova and Ciocarlia - Cobadin. In the 50s of the twentieth century windbreak forest was planted on about 3,800 hectares that protected an agricultural area of over 75,000 ha. The latter these were cleared during 1962-1965, when work began planning for irrigation. In the period 1967-1989, we re equipped more than 420 thousand hectares representing over 82 % of the arable land of the county of Constanta and close to 160 thousand ha - about 48 % of the arable land of the county Tulcea. Due to improper operation yields were much lower than those projected. After 1990, facilities were destroyed and abandoned, so that in the recent years have been irrigated between 10, 000-20,000 ha, although meanwhile were performed numerous analyzes and studies of rehabilitation. The lack of a clear strategy in the field, lack of funding for rehabilitation and sometimes of the interest of farmers to irrigate - in years of abundant precipitation - lead to the conclusion of an uncertain future while irrigation in Dobrogea is the main factor that depends on achieving high and safe yields.

**Key words:** drought, irrigation, rehabilitation, systems

### INTRODUCTION

The presence of drought and irrigation need in Dobrogea has been reported since the mid-twentieth century by the agronomist Ion Ionescu de la Brad, who in the work „*Agricultural trip in Dobrogea Plain*” makes the following remark: ... generally all Dobrogea soils are light, dry, burning, the plants suffer more of water than nourishment ... (1).

Yet more than a century ago in Dobrogea irrigation was practiced on only 13,500 ha, of which 8,600 ha in Constanta County and 4,900 ha in Tulcea County, almost exclusively with vegetables (3).

The first method to combat drought was in the 1939-1944 planting of windbreak forest on the Stud domain from Mangalia and in the area Ciocarlia from Constanta County. The results were encouraging, production in protected areas being more than double compared to unprotected land. The results obtained, especially the catastrophic drought of 1945 -1947 years have prompted the government of that time to draw up a program of planting windbreak forests nationwide, of which about 116 000 ha in Dobrogea (Fig. 1).

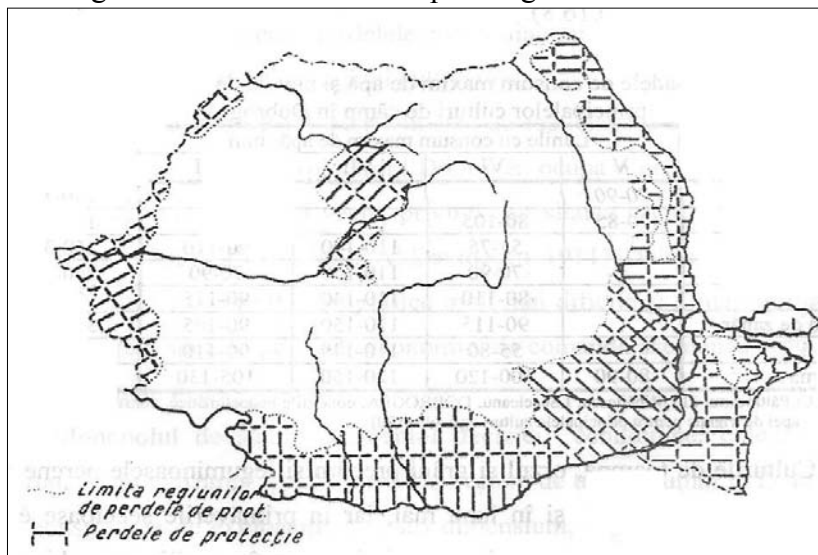


Fig.1. The territorial distribution and orientation of windbreak forests in Romania (after I.Z.Lupe and V.Jianu)

The program was not carried out, but in the period 1951-1954, were planted about 3,800 ha of windbreak forest in Constanta but were cleared after 10 years because they were diminishing the arable land, were delaying the spring works on the side protected, were hosts for insects and rodents, and especially puzzling the operation of another

<sup>1</sup> Academy of Scientists from Romania

<sup>2</sup> University „OVIDIUS” Constanța

program to combat drought - irrigation. This program of extending irrigation over large areas was started in the second half of the 60s (twentieth century) and continued until the end of 1989, when the area equipped for irrigation in Dobrogea reached 581 500 ha, of which 422 300 ha in Constanta County and 159 200 ha in Tulcea County.

The improper exploitation of perimeters landscaped had no l ed to achieve parameters of productivity and economic efficiency projected, and after 1989, destruction, abandonment, market economy, have reduced the effective irrigated area to 10-12 thousand ha. In the recent years many studies and rehabilitation programs have been developed.

## MATERIAL AND RESEARCH METHOD

There have been used as research material primarily statistical data on the evolution of surfaces equipped, costs and production results obtained on surfaces under irrigation. Along the way, numerous analyzes were performed on waters costs and its structure at water provider – the state. The agricultural units were analyzed irrigation costs, yield, and economic results. The method used is characteristic of economic research, data collection and selection, interpretation and conclusions release.

## RESULTS AND DISCUSSIONS

**1. Fighting drought with windbreak forest.** In the introduction to this material was mentioned that the first measures to combat drought in Dobrogea were the windbreak forest planting - a kind of selvages with large width, of acacia – in the south of Constanta in Comorova and Vișoara-Cobadin area. The results obtained on the protected areas are shown in Table 1.

Table 1. The influence of windbreak forests on crops in some cultures in Dobrogea during 1943-1947 (after I.Z.Lupe)

Culture	Period	Production in protected area		Average of area kg/ha	Gain beside the average of area	
		average	maximum		Kg/ha	%
Comorova (Constanța county)						
Autumn wheat	1943-1944	1.840	2.070	750	1.090	145,3
Spring barley	1946	2.700	2.910	600	2.100	250,0
Oat	1943-1945	2.144	2.487	733	1.411	192,5
Maize	1943	3.350	5.540	1.500	1.850	123,0
Ciocârlia (Constanța county)						
Autumn wheat	1947*)	600	-	33	567	1.718,0

<sup>\*)</sup> 1947 was one of the catastrophic years in terms of drought

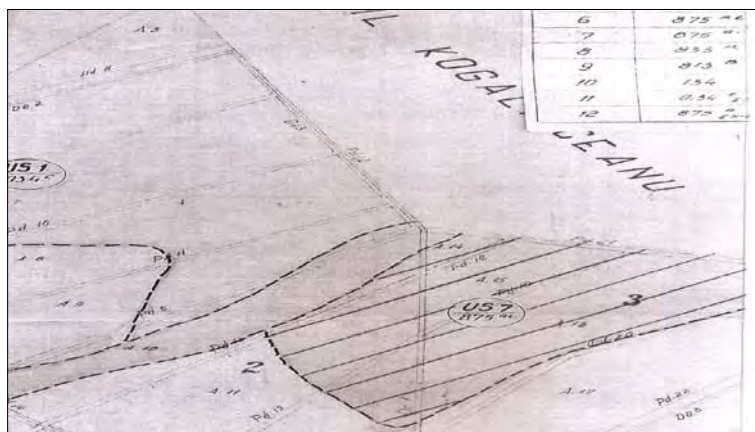


Fig.2. Location of windbreak forests on the territory of CAP Nisipari (Project of organizing territory of CAP Nisipari, Constanța County)

The beneficial effects of the 3,800 ha of windbreak forests planted during 1950 to 1954, have not been evaluated because after only 10 -12 years after planting began their clearing. One of the criticisms made of this planting scheme of windbreak forest that would protect an over approximately 75,000 hectares of arable land in Constanta County was that the distance between two windbreak

forests, on the contour line was only 200 m, which really would be hampered execution of

agrophytotechnical works (Fig. 2).

**2. Combating drought through irrigation.** The extent of works, arranged surfaces, construction and assembly, equipment, irrigation systems from Dobrogea were the largest investment objective in agriculture of the region. Evolution of irrigation facilities in the two counties - Constanta and Tulcea during 1960-1990 is presented in Table 2 and Figure 3.

To realize the size of these works we mention that in 1990, out of over 3,100 hectares equipped the whole country, almost 19.0% were in Dobrogea and only 13.6% in Constanta county, where 74.8 % of agricultural land and 82.5% of arable land were equipped for irrigation (only in Calarasi and Braila the share of equipped areas was higher but in completely different orographic conditions). The first arrangements were made in the late 50's.

Table 2. Evolution of the arrangements for irrigation in Dobrogea in the period 1960-1990

Specification	1960	1965	1970	1975	1980	1985	1990
Agricultural surface- thousand ha -							
Constanța county	8,6	9,1	62,7	199,4	339,5	393,7	422,3
Tulcea county	4,9	5,9	14,0	77,2	112,5	142,5	159,2
<i>Dobrogea</i>	<i>13,5</i>	<i>15,0</i>	<i>76,7</i>	<i>276,6</i>	<i>452,0</i>	<i>536,2</i>	<i>581,5</i>
Arable land - thousand ha -							
Constanța county	8,6	7,3	58,0	187,7	326,3	377,1	395,6
Tulcea county	4,9	5,8	11,6	75,6	108,0	137,3	153,8
<i>Dobrogea</i>	<i>13,5</i>	<i>13,1</i>	<i>69,6</i>	<i>263,3</i>	<i>434,3</i>	<i>514,3</i>	<i>549,4</i>

Source: Statistical Yearbooks of Romania. Data: DIF-RAIF

In Constanta County the first irrigation system with an area of 3,600 ha was built in area of municipalities Mircea Voda-Satul Nou and in Tulcea County was built about 1,200 hectares around the village Sarinasuf.

Arranging for irrigation of large areas of land in Dobrogea, was started later in 1968 -1969, when construction of the great complex of irrigation Carasu was built with an area of about 200,000 ha, which remains today one of the largest in country.

Since 1969, the first hydro technical system *Mihail Kogălniceanu* is put into operation in Constanta county, with an area of 24 075 ha equipped and the next year the system *Nicolae Bălcescu* also in Constanta County with 26,389 ha, so that at the end of 1970, the equipped agricultural

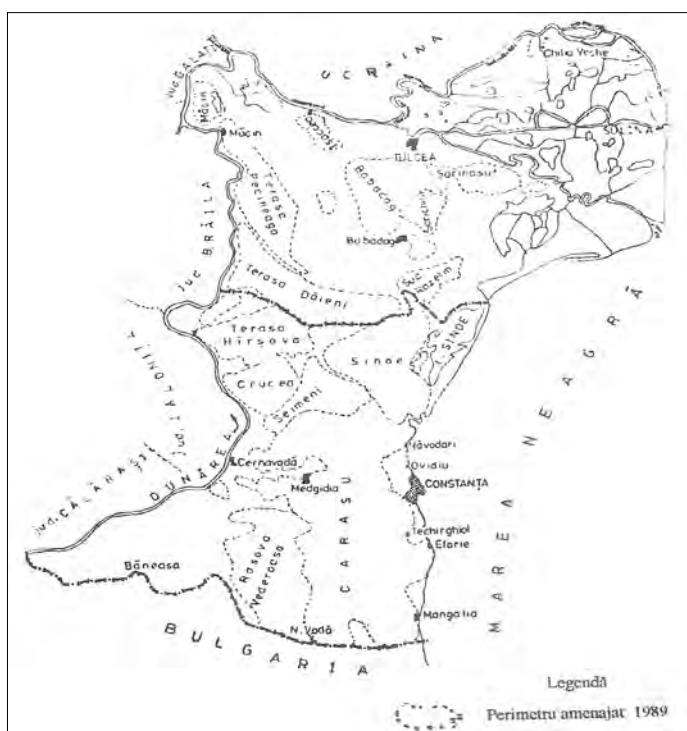


Fig.3. Arrangements for irrigation in Dobrogea, 1989 (after SNIF)

area reached at 62 700 ha in Constanta County and 14.0 thousand ha in Tulcea County.

The priority was granted to this area is justified by exceptional climatic conditions of Dobrogea as well as the economic development level of agricultural units which promised the operation of large surfaces equipped in conditions of efficiency. Only Carasu Complex from Constanta County, for example, whose technical-economic study (TES) date from 1967 represented an investment of over three billion lei, in those times prices. In commissioning this giant complex it represented, among others: 50 million cubic meters of excavated earth; 1050 km of supply and distribution channels; 420 km of reinforced concrete gutters; 2870 km of concrete or cement pipeline buried; 80 km of metal pipes; 87 pumping stations of various sizes, totalling an installed

capacity of 120 megawatts; more than 200 hydro technical works, bridges, dams, hydro technical nodes etc.

It is understood that such work represented not only a huge financial effort but also significant material and labor consumption. The Carasu complex built between 1969-1974, at a rhythm of arrangement of about 40,000 ha of land annually succeeded, in Constanta County during 1975-1977, the Sinoe system - 49.466 ha equipped; in 1976-1977 Topalu system - 12.052 ha equipped; in the period 1978-1982 Rasova- Vederova systems - 64.086 ha equipped; Terrace Hirsova - 31.037 ha equipped; Seimeni - 23.402 ha equipped. In Tulcea County, due to specific conditions, the arrangements were made on hydro systems with smaller areas. The largest hydro systems are: the complex Babadag - 25.446 ha; Daieni-Ostrov-Peceneaga - 23.837 ha; Peceneaga-Turcoaia-Macin - 19.924 ha; Beibugeac-Sarinasuf - 15.736 ha; South-Razelm - 13.498 ha.

What has characterized the irrigation development in Dobrogea was the speed with which the work took place. In just 10 years (1970-1980) was arranged in two counties an area of 342 943 ha representing 52.9% of their agricultural area or 26.7% of the total area of the country arranged in this period.

Constructive solutions respectively the type of arrangements have been found at that time in line with the technologies used in other countries, although then some of them (setting concrete troughs suspended; using thermal aggregates of pumping for large surfaces) have been found to be expensive and difficult to operate. Also had much insisted that about 1/3 of areas arranged to be irrigated by drainage, on furrows, that requires levelling the land, expensive and not recommended by soil scientists and agronomists. As a type of arrangement at the end of the 80's, the buried pipeline system was almost 3/4 of Constanta county equipped area and about 2/3 in Tulcea County. Sprinkler irrigation method based on pressurisation stations (PS) is the most widespread and the rain wings with manual move (RWMM) were almost exclusively in the cooperative sector of agriculture.

Dobrogea irrigation facilities were made with a particular investment effort. In Carasu irrigation complex from Constanta County, for example, for an average investment of 15,786 lei / ha, depending on the type of facility, the specific investment (on ha) ranged as follows: 20 078 lei / ha for the type sprinkler fitting with buried pipes and pressurization stations (PS), 17 055 lei / ha for irrigation with distribution network with open channels but mobile pumping units (MPU) or 15 236 lei / ha for distribution of water to plants, on furrows. Depending on the share of each type of fitting on the nine administrative systems of Carasu complex, the specific investment ranged between 13.793 lei / ha for Cumpăna system and 21 921 lei / ha for Basarabi system (A.Lup, 1997).

Meanwhile, the investment per unit of area (ha) increased much, both due to more difficult conditions (land less suitable for arrangements) and to rising prices of construction materials or equipment (cement, asbestos, pumps, irrigation equipment), workmanship.

Here, for example, is the specific investment in four hydraulic systems in Constanta for projects executed in two phases: projects in 1975 and extensions in 1989 (A.Lup, 1997).

- System Sinoe: project 1975, 15.687 lei/ha; extensions 1984: 53.950 lei/ha
- System Topalu: „ „ 16.942 „ „ „ 50.180 „
- System Hârşova: „ „ 16.942 „ „ „ 50.180 „
- System Topalu: „ „ 16.942 „ „ „ 50.180 „

The designers had a problem; the economic feasibility of projects should - according to the investment law<sup>3</sup> of the time - allow recovery of the investment from the additional net income in 10-12 years.

The problem was solving by projecting bigger and bigger yields per unit area (ha) (accepted by policy makers and supported by research in the field). For example, in the last years of the totalitarian regime, hydro technical projects were based on economic returns of 6,000 kg / ha wheat 10,000 kg / ha maize, 3000 kg / ha sunflower or soy in any agro-climatic zones.

<sup>3</sup> Law no.9/1980, of investments.

Regarding the cost of providing water, they varied widely depending on the functional and structural characteristics of each arrangement in part (pumping heights, type of equipment, transport distance) between 900-1500 lei / ha in recent years of the control economy. Mentioned that state subsidized the irrigation water costs over this period with 70-75%, and water was provided to the recipients at fixed rates of 18 lei/1.000 m<sup>3</sup> and a fixed fee on an equipped hectare between 138 lei / ha for field crops and 210 lei / ha for vegetables.

In the agricultural units a hectare irrigation costs grew from about 800 lei / ha in 1971 - 1975, to over 1,600 lei / ha in the period 1986-1989.

Regarding the economic aspects should be mentioned that water supplier - State - never recovered the full cost of water, and in turn, no production units have recovered additional expenses with irrigation (with some exceptions in some years, for some crops) due to lower yields per unit of area on land under irrigation.

Table 3. Evolution of average yields (kg / ha) of main crops in the system Carasu from Constanta County during 1966-1986

Crop	Sector	1966-1970	1973-1975	1981-1983	1984-1986	1984-1986 1966-1970 %
Wheat	I.A.S.	2 530	4 235	3 966	3 545	140,1
	C.A.P.	2 650	3 310	3 786	3 170	119,6
Maize	I.A.S.	3 916	4 631	4 294	4 975	126,9
	C.A.P.	3 818	1 866	4 831	4 785	125,3
Sun flower	I.A.S.	1 899	2 249	2 162	2 300	121,1
	C.A.P.	1 964	2 088	1 905	1 962	99,9
Soybean	I.A.S.	1 156	1 477	1 173	1 213	104,9
	C.A.P.	-	1 208	804	729	60,3

Source: A.Lup: *Agricultural Dobrogea from legend to...globalization*.

**3. The present and the perspective of irrigation in Dobrogea.** Unsatisfactory results obtained in poor operation of irrigation systems in Dobrogea in the planned economy period were due equally to their structural characteristics and faulty operation. The units with low pumping efficiency, higher pumping heights, especially impermeability of supply and distribution channels resulted in low yields and high water losses.

In this situation since 1990, rehabilitation studies were initiated, Carasu complex has been the subject of such a study conducted by a Romanian-French team for a period of three years. Lack of financial resources did not allow the implementation of this study and others conducted in the next 20 years.

An element of novelty appeared in 1999, when by the Ordinance no.147/1999 was regulated the establishing of the Association of Irrigation Water Users - WUA. According to this law have been established dozens of WUAs, both in Constanta County (44 WUAs covering an area of almost 100 hectares) and in Tulcea County. Establishment of WUAs and then Organisations of Irrigation Water Users OIWU not led as expected to increase irrigated areas.

In 2009, the Romanian Parliament appointed a commission of inquiry to investigate the situation in Romania of land improvements and propose solutions to improve the situation. With this occasion Dobrogea ANIF Branch presented a statement of hydro facilities and their status (Table 4).

Table 4. Situation of the hydro patrimony in Dobrogea in 2009

County	Total equipped surface ha	Of public utility ha	Of non public utility ha	In preservation ha	Decommissioned ha
Constanța	422452	106842	167387	117387	198223
Tulcea	160110	55469	93933	93933	10628
<i>Total branch ANIF</i>	582562	162391	211320	211320	208851

On this occasion it was proposed the rehabilitation for 2010, of an area of 43 366 ha , in Constanta county, with a volume of 40 million expense, returning 922.4 € / ha.

A final evaluation of a viability of irrigation systems in Dobrogea was presented by the consulting firm “*Fidman Merk at S.R.L.*” to the Presidential Commission for public policies on agricultural development in Romania. According to this assessment in Dobrogea were found viable in economic systems or parts of the old hydraulic systems totalling 74 216 ha, of which 54 727 ha in Constanta County and 19 489 ha in Tulcea.

Regarding rehabilitation and finally the irrigation of these areas it seems that policy makers took measures both in terms of infrastructure investment and the granting of facilities aimed at electricity price with high share in the cost structure of irrigation.

## CONCLUSIONS

1. Dobrogea is known as the driest region of Romania, with a total annual rainfall of 400-450 mm, distributed unevenly during the growing season. This feature limits the productive potential of soils medium to good.
2. The drought phenomenon has been reported with long ago, but concrete steps have been taken to combat until the mid twentieth century through the planting of protective forest in the central and southern region. The results were encouraging, but small protected area has not had a significant beneficial effect for the whole agricultural area.
3. In the period 1967-1989, in Dobrogea were arranged for irrigation large areas representing over 422 000 ha of agricultural land in the county of Constanta and 159 000 ha in Tulcea. Exploiting poor the equipped perimeters as associated with some infrastructure deficiencies have not led to technical and economic parameters of the project than in some years, to some agricultural units in some crops.
4. Destruction and then abandoning irrigation infrastructure, liquidation of large-scale farming, the market economy after 1990 had the effect of reducing irrigation activity until minor surface of 10,000-20,000 ha.
5. Instead, the rehabilitation studies, surveys, analysis and reorganizations, legislation, were continuing concerns without significant effects on irrigation, so that their future is still uncertain while the drought decreases yearly harvests.

## BIBLIOGRAPHY

1. Ionescu Ion de la Brad, 1968: *Opere alese* vol.I. Academiei RSR Publishing House, Bucharest.
2. Lup A., 1997: *Irigațiile în agricultura României*. Agris Publishing House, Bucharest
3. Lup A., 2003: *Dobrogea agricolă, de la legendă la ... globalizare*. Ex Ponto Publishing House, Constanța.
4. x x x: Statistical Yearbooks of Romania.

# ASPECTS OF CLIMATIC FACTORS AND THE NEED OF IRRIGATION. CASE STUDY – BRĂILA COUNTY

ELISABETA ROȘU<sup>1</sup>

**Abstract:** *Climate describes the temperature, precipitation and other weather condition. Climate modification by the progressive warming of the atmosphere resulting from the concerted action of several factors, both natural and anthropic favours the diminution of precipitations at soil level, corroborated with the increase of temperatures. The climate became a constraining factor in the growth and development of crops, its influence being pregnant both in the allocation and use of water resources in agriculture. The phenomena of dryness and drought represent a natural aspect of the continental climate that manifest in the South-East part of Romania. The present study refers to the influence of weather factors and the need of irrigation in the county Brăila.*

**Key words:** *climatic factors, soil, water resources, irrigations*

## INTRODUCTION

Irrigation is one of the important agro-technical measures that contribute to crop production prosperity, to higher yields and maximum profits.

The performant, competitive agriculture cannot be practiced in the absence of this production factor.

Among the factors that influence the need of crop irrigation an essential role is played by the climatic factors (temperature, rainfall, solar radiation, wind intensity) and soil.

## MATERIAL AND METHOD

The study was based on methods specific to selective research: identification of problem under research, delimitation of research framework, information collection, data processing, analysis and interpretation and drawing up the conclusions. The method used in this analysis is the aridity index by Em de Martonne.

The information sources that have been used are the official data and the data obtained from field surveys conducted under a research project.<sup>2</sup>

## RESULTS AND DISCUSSIONS

### 1. Geographical and climate data

The county Braila is located in the plain, in the south-eastern part of Romania, occupying a part of the lower Siret river plain, a part of the Baraganului Plain and small parts from the plain Salcioara and Buzăului Plain.

The county Braila has a continental temperate climate, at contact with the specific climate of the Danube river plain. Summers are hot and dry, and winters are cold with little snow. The rainfall features high variability in time and space, reflecting the continental climate type.

Moisture deficit mainly depends on air temperature, solar radiation and wind intensity.

The county Braila has average temperatures higher by 1.5°C compared to the rest of the Romanian Plain. The average annual air temperature in the period 2006-2012 had values over the annual average of the period 1975-2000, the highest values being found in the year 2007.

<sup>1</sup> Institute of Agricultural Economics, Romanian Academy, Calea 13 Septembrie no.13, Sector 5, Bucharest, betty\_rosu@yahoo.com

<sup>2</sup> FP-7 Project - Sustainable Irrigation Water Management and River - Basin Governance: Implementing User-Driven Services, (SIRIUS), 2010-2013



Tab. 1

Average annual air temperature (°C) in the period 2006-2012  
and average multi-annual temperature (°C) in the period 1975 – 2000

County	1975-2000 average	2006	2007	2008	2009	2010	2011	2012
Braila	10.7	11.2	12.5	12.1	12.0	11.6	11.3	11.2

Source: Rapoarte privind calitatea factorilor de mediu in judetul Braila, 2010-2012, Agenția pentru Protecția Mediului Braila

The maximum annual air temperature (41.1<sup>0</sup>C) was in the year 2007 in the month of August and de minimum air temperature (-22.6<sup>0</sup>C) was in the year 2010 in the month of January.

Tab. 2

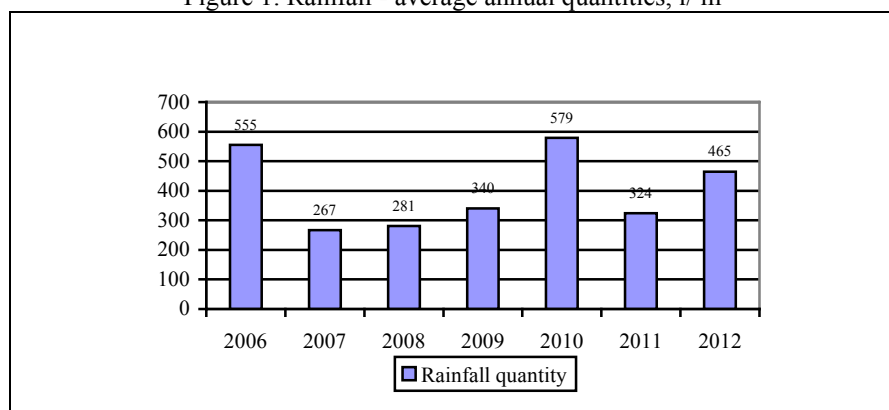
Maximum and minimum annual air temperature (°C)  
in the period 2006–2012 and their dates

Annual temperature	2006	2007	2008	2009	2010	2011	2012
Maximum	36.6 VIII	41.1 VII	38.5 VIII	38.0 VII	37.2 VIII	32.4 VII	33.1 VII
Minimum	-20.3 I	-12.0 II	-15.1 I	-16.9 XII	-22.6 I	-13.7 I	-14.3 XII

Source: Rapoarte privind calitatea factorilor de mediu in judetul Braila, 2010- 2012 Agenția pentru Protecția Mediului Braila

Precipitations are distributed uniformly making that all the vegetation period the factor water to be under the drought limit, more stressed in July and August. The average annual precipitations are reduced and have a torrential character in summer leading to the destruction of the crops on large areas. During summer there emerge long intervals of drought (60-90 days). Thus, at level of the county Braila the year 2007 was the most droughty, registering the lowest annual average of the precipitations (267 l/m<sup>2</sup>) while the year 2010 was the richest as regards the pluviometric regime (579 l/m<sup>2</sup>). The annual average necessary of precipitations for the county Braila is of 524.6 l/m<sup>2</sup>, this one being covered only in the years 2006 and 2010.

The moisture deficit in soil, in the period April – September, calculated as difference between evapotranspiration and rainfall is 300-350 mm/season. This deficit reveals the need of complementary irrigation of crops.

 Figure 1. Rainfall - average annual quantities, l/ m<sup>2</sup>


Source: Raport privind calitatea factorilor de mediu în județul Brăila, 2010- 2012, Agenția pentru Protecția Mediului Braila

The aridity index Em de Martonne was calculated using the annual average values of the temperature (T) and precipitations (P) on a 7 years period, reflecting suggestively enough the variation of the continentalism degree and of the favorability of the climatic conditions for the vegetal carpet.

The lowest values of the aridity index ( $<22$ ) are characteristic for the zones of maximum aridity (steppe) which correspond to the lowest annual level of precipitations ( $<450$  mm). Values of the index 22-24, which correspond to the temperate continental domain with aridity influences specific for the temperate continental domain with diminished aridity influences correspond to the silvo-steppe vegetal formations.

In the period 2006-2012, at the level of the Braila county, the aridity index calculated by the method Em de Martonne registered normal values in the years 2006 and 2010, in the rest of years registering very small values in ratio with the ideal value, thus the crops irrigation representing a necessary agrotechnical measure.

Tab.3

Aridity index at level of Braila county

Year	Annual average precipitations l/m <sup>2</sup>	Annual average temperatures °C	Aridity index
2006	555	11.2	26.1
2007	267	12.5	11.8
2008	281	12.1	12.7
2009	340	12.0	15.4
2010	579	11.6	26.8
2011	324	11.3	15.2
2012	465	11.2	21.9

Source: own calculation after method Em de Martonne

In the period 2006-2012 the annual relative humidity of air can reach over 72%, it exceeds 80% in winter, while in summer it reaches only 65%.

In Braila county the solar radiation has high values, averagely 125 kcal/cm<sup>2</sup>/year, linked to the duration of the sun shining which registers a number of 2200 h/year. Because of the long shiny days and of the high temperatures the saturation deficit increases much, fact which intensifies the evaporation process.

The wind blows in period autumn-spring mainly from the North and North-East direction, in the average speed being of 2.7-3.4 m/s. The high speed of the wind reduces much the humidity in the soil. The negative effect of the wind is felt especially in winter, when the snow is blown deeply, the crops being uncovered this way.

The maximum depth of freeze is of 0.85-0.90 m and the frequency of the frost days with temperatures smaller than 0 degrees is of over 95 days/year.

The annual rainfall amount does not cover the needs for obtaining high yields, and the water deficit must be covered by irrigations.

## 2. Land use

The soil is the main support to all the socio-economic activities and represents the environmental factor that is the most exposed to pollution.

Soil quality is determined by natural factors such as relief, climate, vegetation, time, as well as by anthropic factors. Thus, the agricultural practices that are not adapted to the environmental conditions, the treatments and fertilizer applications that did not respect the agro-pedological and agro-technical norms, the discharges of hazardous chemical substances, the storage of waste of all categories, represent anthropic factors that significantly and fast modify the quality of soils.

Tab. 4

Soil types characteristic to the county Braila, in the year 2012

Soil types	Area (ha)	Percentage (%)
Protisols	132090	34.1
Cernisols	202730	52.4
Hydrisols	36477	9.4
Salsodisols	15863	4.1
<b>Total</b>	<b>387160</b>	<b>100.00</b>

Source: Raport privind calitatea factorilor de mediu în județul Braila, 2012, Agenția pentru Protecția Mediului Braila

The soil and weather conditions from the county Braila determined the emergence and evolution of a various soil cover, where the chernozem soils prevail.

From the quality point of view the agricultural land areas in Braila county are inscribed in the II and III classes.

Tab. 5

Repartition of the land areas by quality classes in Braila county, 2011

- ha -

Nr. crt.		Quality classes of soils						Total (ha)
		I	II	III	IV	V	VI	
1.	Arable	23946	156385	114002	36522	18227	-	349089
2.	Pastures	-	621	13965	9751	8834	-	33171
3.	Vineyards	410	1555	1819	561	147	-	4492
4.	Orchards	2	242	357	39	-	-	640
	Total	24358	158803	130150	46873	27208	-	387392

Source: County Office for Pedological Studies, 2011

The soil quality is determined by natural factors as: relief, climate, vegetation, time, but also by anthropical factors. Thus, the agricultural practices not adapted to the environment conditions, the treatments and fertilizations made without a agro-pedological, a gro-techncial foundations, the depletion of dangerous chemical substances, the deposit of the wastes of all categories, represent anthropical factors which modify sensibly and rapidly the soil quality.

Tab.6

Land areas affected by different degradations processes

- ha -

Types of processes	Weak	Moderate	Strongly	Very strong	Total area
Salinized	48047	35732	35	6295	92109
Sodium accumulation	11058	-	-	7879	18937
Errosion	-	770	-	-	770
Humidity excess	-	10486	36477	-	46963
Total					158779

Source: Raport privind calitatea factorilor de mediu în județul Braila, 2011, Agenția pentru Protecția Mediului Braila

The salination process was affecting 92109 ha in the year 2011, and the humidity excess was affecting an area of 46963 ha. The two phenomena are the limitative elements especially active upon soil fertility.

In the county Braila, the agricultural land areas have the largest share in total land area, accounting for 81.43% in the year 2006 and 81.28% in the year 2010 of the total area of the county.

Tab.7

Distribution by land use categories in the period 2006-2012

Land use	Area (ha)						
	2006	2007	2008	2009	2010	2011	2012
Arable	349401	349830	353087	349089	350447	350447	350625
Pastures	33144	33274	28905	33171	31743	31733	31332
Vineyards	4825	4686	4840	4492	4519	4529	4545
Orchards	730	636	640	640	654	654	658
Agricultural total	388100	388428	387470	387392	387363	387363	387160
County total				476576			

Source: Raport privind calitatea factorilor de mediu în județul Brăila, 2012, Agenția pentru Protecția Mediului Brăila

In total agricultural land, arable land had the highest share (over 90%) throughout the investigated period.

### 3. Water resources

The county Braila has a significant surface water network and ground water reserves.

The surface water resources are the following:

- The Danube river, with 222.5 km length on the territory of Brăila county and an average transited water flow of 6200 m<sup>3</sup>/s, supplies water for irrigations, fisheries, industry and drinking water for the population;
- The Buzău river, with 207.0 km length on the territory of Brăila county and average transited water flow of 26.32 m<sup>3</sup>/s, supplies water for irrigations and industry;
- The Călmățui river transits Brăila county only between the localities Jugureanu and Gura Călmățui, with a length of 84 km, with an average transited water flow of 0.872 m<sup>3</sup>/s and supplies water only for irrigation purposes;
- The Siret river, with 55 km length and an average transited water flow of 220 m<sup>3</sup>/s supplies water for irrigations and fisheries;
- The Strachina river, an affluent of the Ialomița river, has a low number of local water uses.

The ground waters in Brăila county are phreatic waters located in the large river plains of the Danube, Siret, Buzău and Călmățui rivers, at a depth ranging from 0 m in the low river plains to 20 m in the fields covered with sands and depth waters located either in gravel or in sandy deposits, their depth ranging from 50 to 200 m.

In the year 2012, the usable water resource from the surface resources accounted for 62.9% of the theoretical water resource from the surface resource, and the usable ground water resource accounted for 29.4% of the theoretical ground water resource.

#### 4.4. Situation of land equipped with irrigation facilities

The irrigations system in the Braila county considered in the execution period (1967-1974), conceptually and constructively of a world level, was characterized by a series of particularities: size, construction solutions, water sources, the specific energy consumptions, the degree of finalizing the projects.

Thus, the irrigation systems and desiccations then were built in a much more different vision than the present requirements. There were built channels with very high lengths, the debits and the installed powers in the pumping stations and the costs associated to their functioning were enormous, and the numbers of the aggregates through water to be pumped for irrigations were impressive.

In the same vision also was the expansion of the agricultural area by desiccation of ponds and humid areas from which the water excess collected through desiccations channels to be eliminated also by pumping. These amendments constituted a major modification in a vulnerable space with adverse effects of climatic, hydrological, pedological and landscape nature.

Tab. 8

Situations of hydromeliorative amendments in Braila county, in the period 2007-2012

- ha -

	2007	2008	2009	2010	2011	2012
Total amendment area for irrigations	378469	378420	378420	378420	377077	377077
Total irrigated area with at least one watering	111776	90307	116342	53785	64598	...
Total amendment area for desiccation	268100	268100	268100	268100	268100	268100
Total amendment area for drainage	21923	21923	21923	21923	21923	21923

Source: INSSE- tempo online

In the period 2007 -2012 the total amendment area for irrigation diminished, the main reason being the degradation, amplified by the lack of necessary funds for the maintenance and surveillance of the existent installations.

The main causes of the non-application of the irrigations on the areas amended was the high costs of the energy and the lack of watering installation on the private land areas.

The land reclamation infrastructure (irrigations and drainage) of the investigated area consists of the following types of works: hydrotechnical constructions for irrigations and drainage,

irrigation and drainage channels, water pumping stations for irrigations and drainage, hydro-mechanical installations (pumping aggregates, electric equipment, feeding and discharge pipelines) for irrigation and drainage.

The total length of channels in the county Braila is 5,870.65 km, out of which 1,203.55 km are for irrigations and 4,667.1 km for drainage, with 598 pumping stations (461 for irrigations and 137 for drainage), with a total installed power of 387MW, i.e. 359.4MW for irrigations and 27.7MW for drainage. The total pumping capacity is 2068 m<sup>3</sup>/s for the whole system.

Irrigation is absolutely necessary in the conditions of the dry weather specific to the county Braila. Dryness was also favored by the increase of the demographic pressure and the climate changes.

The deviations from the optimum irrigation regime may have negative effects upon soil. Significant modifications may be produced due to the irrigation water quality, with the possible emergence of salinization and alkalization phenomena (in the situation of water containing salts), or texture modification (in case water contains alluvia).

## CONCLUSIONS

From the data on the climate in the investigated area, it results a significant moisture deficit in the vegetation period of crops, which needs to be compensated by irrigations. Irrigations in the county Braila became absolutely necessary in the conditions of the arid and dry weather.

The dry weather was also aggravated by the increase of the demographic pressure and of climate changes. The deviations from the optimum irrigation regime may have negative effects upon soil. Significant modifications may appear due to irrigation water quality, the emergence of salinization and alkalization phenomena being possible (in the situation of waters that contain salts), as well as texture modification (when the water contains alluvia in suspension).

At present, the irrigation facilities are far from being used at their full capacity. The diminution of effectively irrigated areas is the result of cumulated factors, among which the most important are the following: decreased interest in irrigations from the part of small farmers lacking financial means; the land reform that led to extremely fragmented agricultural land areas and numerous parcels; high costs of crop irrigation; frequent institutional reorganizations.

## BIBLIOGRAPHY

1. \*\*\* *Raport privind calitatea factorilor de mediu în județul Brăila, 2010, 2011, 2012* Agenția pentru Protecția Mediului Brăila
2. \*\*\* Directorate for Agriculture and Rural Development (DARD), Braila county
3. \*\*\* Consiliul Județean Braila, Planul de Amenajare a Teritoriului Zonal (P.A.T.Z.) Periburban al Municipiului Braila, 2010
4. Botzan M., (1972), *Bilanțul apei în solurile irigate*, Editura Academică, București
5. Grumeza N., Tușa C., (2000), *Consumul de apă și evoluția teritoriului amenajat pentru irigații în România*, Buletinul AGIR, nr.3, București
6. Luca E., Băduț V., Ciotlaus A., (2008), *Exploatarea sistemelor de îmbunătățiri funciare – irigații*, Editura Risoprint, Cluj-Napoca
7. Lup, A., (1997), *Irigațiile în agricultura României*, Editura Agris
8. Maxim A., (2008), *Ecologie generală și aplicată*, Editura Risoprint, Cluj-Napoca

# CONSERVATION OF INVERTEBRATES' BIODIVERSITY IN SOILS OF THE REPUBLIC OF MOLDOVA

IRINA SENICOVSCAIA<sup>1</sup>

**Abstract.** *The role of invertebrates and their contribution in functioning of soils is considered. The edaphic fauna of zonal untouched soils in natural ecosystems located in the different zones of the Republic of Moldova has been investigated. Soils of the natural ecosystems are the habitat and the source of the conservation and reproduction of the edaphic fauna. They represent themselves the standards of the biodiversity for soil invertebrates. The database of the invertebrates' diversity of virgin and fallow soils has a practical importance as the natural standard for the operative evaluation of degradation processes and ecological effectiveness of the land management. Agricultural practices with the involvement of areas with multiannual grasses in a crop rotation system created conditions for the improvement of the invertebrate's biodiversity in the chernozem which degraded as a result of a long-term arable use. The use of ryegrass and lucerne mixture during 3-5 years helps to restore the soil invertebrates at the expense of exudates contribution in the soil and roots of perennial crop residues. This procedure has promoted the revival of population of invertebrates. The number of invertebrates on average was 2.5 times higher compared with the control, the total biomass – by 1.6 times. This method is especially effective to restore the Lumbricidae family. Their number increased by 3.0 and biomass – by 2.0 times. The recovery rate of the population of Lumbricidae family reaches of 14.9 ex m<sup>-2</sup> per year. Invertebrates' diversity has been improved, the number of invertebrates' families increased from 2-4 to 5-6.*

**Key-words:** soil invertebrates, biodiversity, conservation, humus, perennial grasses

## INTRODUCTION

The primordial importance of the biodiversity for the environment maintaining stability and the stable development of communities is reflected in the Convention on Biological Diversity [9]. Invertebrates' diversity is one of the most important evaluation criteria of soil ecosystems [8, 12 and 14], resistance to different forms of degradation [11 and 13]. In some ecosystems, the local diversity of soil fauna may be more enormous, then the diversity of different groups of aboveground plants or animals [10]. Excessive reduction of the soil biodiversity, especially the loss of keystone species and/or species with unique functions may have some cascading ecological effects, which lead to the long-term deterioration of soil fertility and the loss of agricultural productive capacity [2 and 6]. Soil biodiversity also can have indirect effects as to whether soil functions as a carbon sink or source.

Soil invertebrates present an important trophic level in the ecological chain nutrition of the biocenosis. Invertebrates have a great importance for biological processes in soil, increase the fertility and humus formation by mechanical decomposition of plant residues and formation of water-stable soil structure [4, 5, 6, 7 and 11].

Indices of soil invertebrates are the global indicators of soil quality and sustainability of ecosystems. The preservation of soil ecosystem services largely depends upon the preservation of soil invertebrates. This may be achieved by using of environmentally friendly agricultural technologies based on the utilization of perennial grasses.

**The purpose of the research** was to investigate the invertebrates in different soils of natural ecosystems and to determine the influence of the perennial legume-cereal grass mixtures cultivation on the invertebrates' recovery process for the biodiversity conservation, improvement of the stability and environmental certifications of chernozems degraded as the result of the long-term agricultural utilization.

## MATERIAL AND METHODS

**Experimental sites and soils.** Our comparative study has been performed in different zones of the Republic of Moldova. The content, biomass, profile distributions and diversity of

<sup>1</sup> Assistant of Professor, Ph.D, "Nicolae Dima" Institute of Pedology, Agrochemistry and Soil Protection, Kishinev, Republic of Moldova, irina\_sen@mail.ru

invertebrates in zonal untouched soils in natural ecosystems were investigated. Investigations were performed on the typical, leached, ordinary, xerophyte-forest chernozem and the gray forest soil. Additionally, the state of invertebrates in the two zonal arable soils (leached and ordinary chernozem) was compared. Land management practices with the application of perennial grasses (ryegrass+lucerne) in the condition of long-term field experiments have been analyzed. Researches were carried out during the period between 2009 and 2012 years.

The first site was located in the center of the country, in the Ivanča village, Orhei region. The long-term arable soil with crop rotation without fertilizers (control), and grass mixtures (ryegrass and lucerne) cultivation was tested. Plots under mixtures of perennial grasses were founded in the autumn of 2007. The soils were the leached chernozem with humus content of 3.43 % and pH = 6.6 and the gray forest soil with humus content of 2.40 % and pH = 6.4 in the 0-25 cm layer.

The second site was located in the southern zone, in the Tartaul de Salchie village, Cahul region. These were the plots with long-term arable soil (control) and with the mixture of ryegrass and lucerne. Plots under mixtures of perennial grasses (ryegrass+lucerne) were founded in the spring of 2010 year. The soil was the ordinary chernozem with humus content of 3.16 % and pH = 7.1 in the 0-25 cm layer [3].

**Status of invertebrates.** The state of invertebrates was identified from test cuts by manually sampling the soil layers to the depth of soil fauna occurrence applying Gilyarov and Striganova's method [5]. The identification of invertebrate's diversity on the level of families and their classification according to nutrition were carried out with the implementation of Gilyarov and Striganova's method [5]. The zoological indices were evaluated statistically using the variation analysis.

**Soil chemical properties.** Organic C was analyzed by the dichromate oxidation method. The humus content was calculated using the coefficient of 1.724 [1]. Sampling was carried out per soil horizons and from 0 - 30 cm layer separately.

**Soil physical properties.** The structure-aggregate composition of the soil was determined by the method of Savinov, the bulk density was analyzed by the cylinders' method [15]. Sampling was carried out per soil horizons.

## RESULTS AND DISCUSSIONS

**Invertebrates in soils of the natural ecosystems.** The use of soils with the natural vegetation cover, which is in equilibrium with the environment, as a standard, offers the opportunity to assess the level of the resistance and quality of degraded soils. Virgin and fallow soils are the medium for conservation and reproduction of various species of invertebrates. Invertebrates of virgin and fallow soils exist in conditions of the high supply of organic matter and its conservation within the limits of the ecosystem. As a consequence, soils in conditions of the natural ecosystems are characterized by a higher abundance, biomass and diversity of soil invertebrates in comparison with arable soils [13].

Soils in natural ecosystems possess the favorable physical and chemical properties and they are the standard of the edaphic fauna's composition and activity. A good example of the soil-standard for soils located in the south of the country can be the xerophyte-forest chernozem. This chernozem has the high content of organic carbon in the top layer (6.27%) and the favorable physical status for the plant growth (Table 1). The xerophyte-forest chernozem is characterized by the high content of agronomic valuable aggregates, reaching 76.0% in the upper horizon; its structure coefficient is 3.2. In fact, the top layer of the soil-standard consists of a layer of coprolites of earthworms; it has an excellent water-stable structure.

The largest share of invertebrates in soils-standards (88.2-91.8%) and *Lumbricidae* family (77.8-78.7%) is concentrated in the 0-10 cm layer of soil and in the debris layer (Figure 1).

The soils of natural ecosystems are characterized by the highest diversity of invertebrates. The edaphic fauna in soils-standards is represented mainly by the *Lumbricidae* family (30.4-

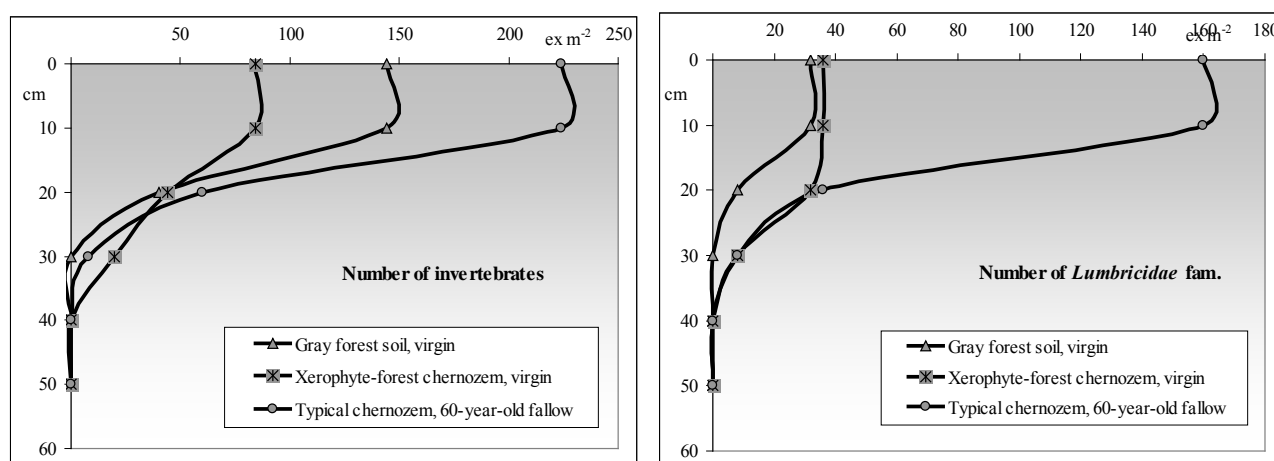
75.6%). In addition to earthworms, species from the families of *Formicidae*, *Glomeridae*, *Carabidae*, *Araneae*, *Cerambycidae*, *Apidae*, *Forficulidae*, *Coccinellidae* and other have been found in the soils of natural ecosystems (Table 2). The soil under the natural vegetation contains 5-12 families of invertebrates.

**Table 1. Physical and chemical properties of the xerophyte-forest chernozem (virgin land)**

Genetic horizon and depth, cm	Humus content, %	Organic C, %	Bulk density, g cm <sup>-3</sup>	Aggregates content (%) with the diameter (mm)			K <sub>s</sub> **
				>10	Σ 10-0.25	<0.25	
Ahd 0-10	10.80	6.27	1.00	$\frac{18.0^*}{9.8}$	$\frac{76.0}{76.0}$	$\frac{6.0}{14.2}$	3.2
Ah 10-61	4.45	2.59	1.21	$\frac{48.2}{0}$	$\frac{48.2}{73.8}$	$\frac{3.6}{26.2}$	0.9
ABh 61-80	2.81	1.63	1.20	$\frac{39.4}{0}$	$\frac{55.5}{56.4}$	$\frac{5.1}{43.6}$	1.2

\* numerator - dry sieving, denominator - wet sieving

\*\* structure coefficient



**Figure 1. The profile distribution of invertebrates in soils-standards**

The soils in the Forest Kodry Zone are characterized by the highest diversity of invertebrates compared to soils located in the Plain Steppe Zone. The virgin gray forest soil contains 12 families and 15 species of invertebrates, fallow leached chernozem – 10 families and 12 species of invertebrates. The smaller number of families and species were found in the soils at the south: the virgin xerophyte-forest chernozem contains 6 families and 7 species, the ordinary chernozem under fallow - 5 families and 5 species of invertebrates. The families of *Lumbricidae*, *Glomeridae* and *Formicidae* are present in all investigated soils. Species of *Pentatomidae* and *Pieridae* families are found only in the xerophyte-forest chernozem; *Araneae* – in the leached chernozem; *Annelidae* and *Geophilidae* – in the gray forest soil.

The following species have been detected in the virgin gray forest soil: *Lumbricus terrestris*, *Eisenia foetida*, *Glomeris marginata*, *Diplopoda* *D. B. lainville*, *Dorcadion fulvum*, *Eurygaster maura*, *Bombus terrestris*, *Carabus convexus*, *Scelopendra cingulata*, *Coccinella septempunctata*, *Galeruca tanacetii*, *Blaps mucronata*, *Formica rufa* et al. The leached chernozem is characterized by species of *Lumbricus terrestris*, *Glomeris marginata*, *Bombus terrestris*, *Carabus convexus*, *Aegosoma scabricornis*, *Diplopoda* *D. B. lainville*, *Forficula auricularia*, *Formica rufa*, *Theridium ovatum*, *Coccinella septempunctata*, *Harpalus hirtipes* et al. Species of *Lumbricus terrestris*, *Glomeris marginata*, *Diplopoda* *D. B. lainville*, *G. raphosoma lineatum*,



*Prionus coriarius*, *Pieris brassicae*, *Formica rufa* are dominated in the xerophyte-forest chernozem. The ordinary chernozem under fallow is characterized by the smaller number of species: *Lumbricus terrestris*, *Glomeris marginata*, *Forficula auricularia*, *Formica rufa*, *Crysomela violacea*.

**Table 2. Diversity of soil invertebrates in natural ecosystems in the Republic of Moldova (ex m<sup>-2</sup>)**

No	Family	Gray forest soil, virgin land	Leached chernozem, 40-60-year-old fallow land	Xerophyte-forest chernozem, virgin land	Ordinary chernozem, 55-year-old fallow land
1	<i>Lumbricidae</i>	38.4	20.5	78.3	340.2
2	<i>Glomeridae</i>	50.3	11.1	37.4	83.7
3	<i>Annelidae</i>	2.4	0	0	0
4	<i>Cerambycidae</i>	2.4	10.1	4.1	0
5	<i>Scutelleridae</i>	1.3	0	0	0
6	<i>Apidae</i>	1.4	6.9	0	0
7	<i>Carabidae</i>	2.0	4.0	0	0
8	<i>Geophilidae</i>	1.1	0	0	0
9	<i>Coccinellidae</i>	4.5	2.5	0	0
10	<i>Crysomelidae</i>	1.1	0	0	4.5
11	<i>Tenebrionidae</i>	1.1	6.9	0	0
12	<i>Forficulidae</i>	0	2.5	0	21.6
13	<i>Formicidae</i>	+++	+++	+++	+++
14	<i>Araneae</i>	0	2.5	0	0
15	<i>Pentatomidae</i>	0	0	4.1	0
16	<i>Pieridae</i>	0	0	4.1	0
Total		106.0	67.0	128.0	450.0

The greatest number in the total amount of invertebrates represents saprophages. They comprised 88.6% of the total number of invertebrates in the gray forest soil; 55.2% – in leached chernozem under fallow; 90.8% – in the xerophyte-forest chernozem; 94.2% – in the ordinary chernozem under fallow. The leached chernozem under fallow in comparison with other soils are characterized by the highest number of species which are the part of phytophages – 16.4%, zoophages – 7.4%, necrophages – 15.0%, predators – 6%. Groups of necrophages and zoophages were registered only in soils of the Forest Kodry Zone. The maximum number of invertebrates with the mixed type of nutrition were observed in the ordinary chernozem. Ecological pyramids were more stable in soils of the Forest Kodry Zone.

The share of earthworms in the total abundance of invertebrates constitutes of 35.3-75.9% and their biomass – 59.1-89.0% in the soils of natural ecosystems. It should be noted the tendency towards increasing the share of *Lumbricidae* family in the total number of invertebrates in the direction from the north to the south of the country. The weight of one exemplar of *Lumbricidae* family in chernozems constitutes 0.22-0.27 g, in the gray forest soil – 0.5 g (Figure 2).

The abundance of invertebrates in soils under the natural vegetation is provided by the high level of the organic matter content. The humus content (confidence intervals,  $P \leq 0.05$ ) constitutes: 4.0-5.7% in the gray forest soil, 4.9-5.1% in the typical chernozem, 3.7-4.6% in the leached chernozem and 3.8-4.0% in the ordinary chernozem.

The soil biota's composition in natural ecosystems is complex and diverse. Forests and field-protective belts are the medium for the conservation and restoration of the diversity and abundance of invertebrates. Therefore, the conservation of soil – standards in protected zones is important not only in terms of the protection of environment, but it has also significant scientific information.

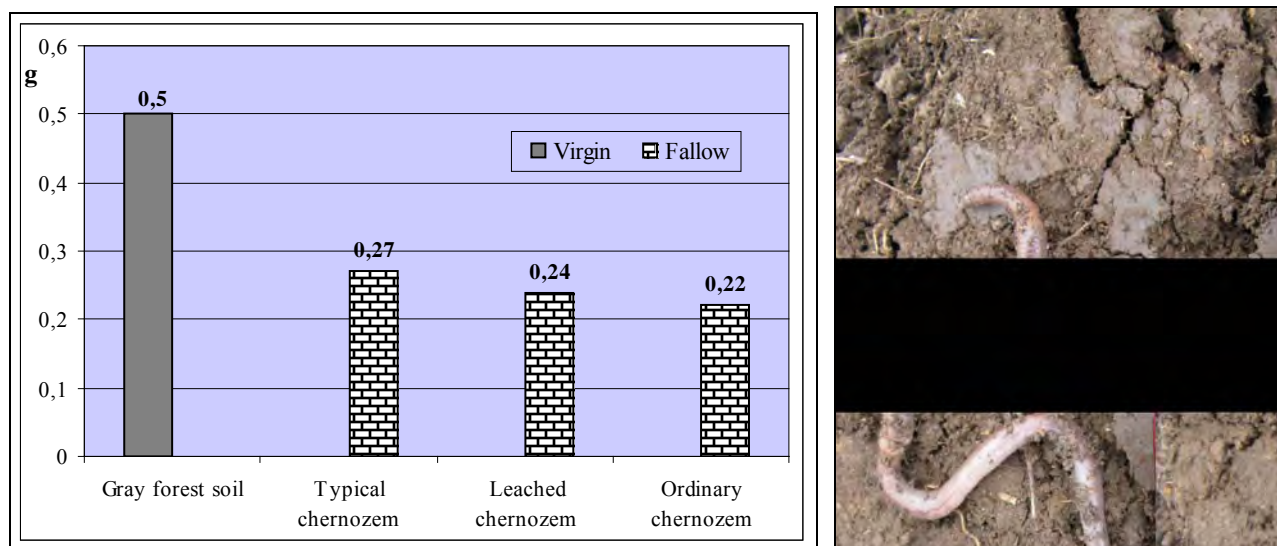


Figure 2. The average weight of 1 representative of the *Lumbricidae* family (n=3-32)

**The influence of perennial grasses on soil invertebrates.** The application of perennial legume-cereal grass mixtures led to the restoration of the total number of invertebrates and the *Lumbricidae* family. The post-restoration recovery of the invertebrate community is slow. The biomass of populations under grass mixture (1-2 year-old) was smaller than those under traditional arable management, but the number of invertebrates sometimes was significant. This demonstrates the reproduction of young invertebrates' populations and the occurrence of the initial stage of successional changes.

Statistically significant growth of zoological indicators has been registered after the third year of investigations on plots with grass mixtures of ryegrass and lucerne (Table 3). The number of invertebrates on average was 2.5 times higher in comparison with the control plot, the total biomass – 1.6 times respectively.

Table 3. Status of soil invertebrates under the application of perennial grasses (12.05. 2010)

Variant	Number of invertebrates, ex m <sup>-2</sup>		Biomass of invertebrates, g m <sup>-2</sup>	
	total	<i>Lumbricidae</i> fam.	total	<i>Lumbricidae</i> fam.
Gray forest soil				
Control plot (arable, winter wheat)	32.0	32.0	2.2	2.2
Ryegrass+lucerne (3-year-old)*	149.0	117.0	19.5	14.7
LSD 5%	105.5	75.0	15.6	12.3
Leached chernozem				
Control plot (arable, winter wheat)	40.0	28.0	5.2	2.8
Ryegrass+lucerne (3-year-old)*	128.0	104.0	28.4	22.3
LSD 5%	82.2	72.4	21.1	21.0

\* Plots under mixtures of perennial grasses were founded in the autumn of 2007

This method is especially effective for restoring the *Lumbricidae* family. Earthworm populations in the grass cultivation by ryegrass and lucerne during 3-5 years were significantly larger than those exposed to the arable management, both in terms of earthworm abundance and biomass. Their number in the leached chernozem increased by 3.0 and biomass – by 2.0 times. The

population growth over 5 years constitutes  $74.4 \text{ ex m}^{-2}$  ( $744.000 \text{ ex ha}^{-1}$ ) or  $14.9 \text{ ex m}^{-2}$  ( $149.000 \text{ ex ha}^{-1}$ ) annually.

The process of the recovery of the soil invertebrates' diversity and activity in arable lands has been slow. There was the gradual increase in the number of worms after 1-2 years of the cultivation of mixtures with ryegrass and lucerne, but significant changes in the diversity of invertebrates has been not fixed (Table 4). The significant presence of ants was registered on plots with perennial grasses.

**Table 4. Diversity of soil invertebrates in the ordinary chernozem under the grass mixtures cultivation**

Variant	Family	Number of invertebrates, ex m <sup>-2</sup>	
		families	total
17-18.05.2011			
Control (arable)	<i>Lumbricidae</i>	20.0	48.0
	<i>Geophilidae</i>	4.0	
	<i>Pieridae</i>	12.0	
	<i>Elateridae</i>	8.0	
	<i>Scarabaeidae (larvae)</i>	4.0	
Ryegrass+lucerne (1 years old)*	<i>Lumbricidae</i>	12.0	20.0
	<i>Elateridae</i>	4.0	
	<i>Pieridae</i>	4.0	
	<i>Enchytraeidae</i>	+	
	<i>Formicidae</i>	+++	
20.09.2011			
Control (arable)	<i>Lumbricidae</i>	8.0	16.0
	<i>Coccinelidae</i>	8.0	
Ryegrass+lucerne (1 years old)*	<i>Lumbricidae</i>	32.0	32.0
	<i>Formicidae</i>	+++	
24.04.2012			
Control (arable)	<i>Lumbricidae</i>	12.0	28.0
	<i>Apidae</i>	4.0	
	<i>Coccinelidae</i>	12.0	
Ryegrass+lucerne (2 years old)*	<i>Lumbricidae</i>	76.0	92.0
	<i>Scarabaeidae (larvae)</i>	4.0	
	<i>Pieridae</i>	4.0	
	<i>Carabidae</i>	4.0	
	<i>Formicidae</i>	+++	
	<i>Unidentified sp.</i>	4.0	

\* Plots under mixtures of perennial grasses were founded in the spring of 2010

The grass cultivated soil is characterized by the greater diversity of invertebrates after 3-5 years of growing ryegrass and lucerne. In addition to the *Lumbricidae* family, species of the *Formicidae*, *Glomeridae*, *Scarabaeidae*, *Elateridae*, *Geophilidae*, *Aranidae*, *Coccinelidae* and *Carabidae* families were found (Table 5). The abundant presence of the *Formicidae* family representatives is observed. In general, the soil under grass mixture with ryegrass and lucerne contains 5-6 families of invertebrates, while the soil under arable only 2-4 families of edaphic fauna.

**Table 5. Diversity of soil invertebrates in the leached chernozem in conditions of the application of mixtures with ryegrass and lucerne**

Variant	Family	Number of invertebrates, ex m <sup>-2</sup>	
		families	total
12.05.2010			
Control (arable)	<i>Lumbricidae</i>	28.0	40.0
	<i>Glomeridae</i>	4.0	
	<i>Tenebrionidae</i>	4.0	
	<i>Enchytraeidae</i>	4.0	
Ryegrass+lucerne (3 year old)*	<i>Lumbricidae</i>	104.0	128.0
	<i>Elateridae</i>	5.3	
	<i>Tenebrionidae</i>	10.7	
	<i>Coccinelidae</i>	2.7	
	<i>Pieridae</i>	5.3	
	<i>Formicidae</i>	+++	
13.09.2011			
Control (arable)	<i>Lumbricidae</i>	20.0	56.0
	<i>Glomeridae</i>	32.0	
	<i>Carabidae</i>	4.0	
Ryegrass+lucerne (4 year old)*	<i>Lumbricidae</i>	152.0	184.0
	<i>Glomeridae</i>	16.0	
	<i>Carabidae</i>	12.0	
	<i>Coccinelidae</i>	4.0	
	<i>Formicidae</i>	+++	
14.06.2012			
Control (arable)	<i>Lumbricidae</i>	44.0	60.0
	<i>Glomeridae</i>	8.0	
	<i>Coccinelidae</i>	8.0	
Ryegrass+lucerne (5 year old)*	<i>Lumbricidae</i>	84.0	100.0
	<i>Glomeridae</i>	4.0	
	<i>Coccinelidae</i>	8.0	
	<i>Carabidae</i>	4.0	
	<i>Formicidae</i>	+++	

\* Plots under mixtures of perennial grasses were founded in the autumn of 2007

*Lumbricus terrestris* and *Allolobophora terrestris* species are the most typical representatives of the *Lumbricidae* family in the chernozem under perennial grasses. Should be noted that the recovery rate of the *Lumbricidae* family consists of 14.9 worms m<sup>-2</sup> per year on plots under mixtures with ryegrass and lucerne after 3-5 years, whereas the regeneration of worms on soils under the natural recreation reaches only of 3.0-5.6 worms m<sup>-2</sup> per year.

In general, zoological parameters (by some indicators) have reached the level of soils under natural vegetation.

The humus content level was higher on plots under perennial grasses by 0.2-0.3 % in comparison with arable plots [3]. Thus, the farming system with the application of ryegrass and lucerne greatly improves the status of invertebrates and fertility of arable soils.

## CONCLUSIONS

The soils of the natural ecosystems are the habitat and the source of the conservation and reproduction of the edaphic fauna. They are the standards of the biodiversity for soil invertebrates. Saprophages constitute 88.6%–94.2% of the total abundance of invertebrates, their main biomass is

accumulated in the upper soil horizons. The families of *Lumbricidae*, *Glomeridae* and *Formicidae* are usually present in all investigated soils. *Pentatomidae*, *Pieridae* and *Araneae* families are rarely encountered. Soils in the Forest Kodry Zone are characterized by the highest diversity of invertebrates compared to soils located in the Plain Steppe Zone. On the whole 19 species of invertebrates (from them 11 rare species) have been identified in soils of this zone. 9 species of invertebrates (from them 4 rare species) have been detected in chernozems of the Plain Steppe Zone. A stable state of the soil invertebrates is provided by a topsoil humus content of 4.0-6.0 % and favorable physical properties of soils. The database of the invertebrates' diversity of virgin and fallow soils has a practical importance as the natural standard for the operative evaluation of degradation processes and ecological effectiveness of the land management.

The effective restoration of the biota in degraded arable chernozems occurs as a result of the cultivation of perennial grasses. Perennial grass mixtures with ryegrass and lucerne can be used in arable soils to create oases and migration corridors for the soil biota. The restoration of the lost components of the soil biota in the long-term arable chernozems is a long process. The reproduction of young populations of invertebrates in conditions of the application of perennial grasses during 1-2 years testifies the initial phase of the biota's succession. The use of the mixture of ryegrass and lucerne during 3-5 years has resulted to the growth of the number of invertebrates and *Lumbricidae* family by 2.5 and 3.0, to their biomass – by 1.6-2.0 times in comparison with the traditional arable management. Invertebrates' diversity has improved, the number of invertebrates' families increased from 2-4 to 5-6. The annual population growth of earthworms reaches of 14.9 ex m<sup>-2</sup>.

## BIBLIOGRAPHY

- [1]. Arinushkina, E.V. (1970). *Guide for chemical analysis of soils*. Moscow, Russia: MSU.
- [2]. Barrios, E. (2007). *Soil biota, ecosystem services and land productivity*. Ecological Economics, 64 (2), 269-285.
- [3]. Cerbari, V., Sorcan, V., Taranu, M., Bachean, I. (2012). *Remediation of the quality status and production capacity in ordinary chernozems in the south of Moldova under the influence of phyto-measures*. Mediul Ambient, 1(61), 38-43.
- [4]. Fragoso, C., Brown, G., Paton, J., Blanchart, E., Lavelle, P., Pashanasi, B., Senapati, B., Kumar, T. (1997). *Agricultural intensification, soil biodiversity and agroecosystem function in the tropics: the role of earthworms*. Applied Soil Ecology, 6 (1), 17-35.
- [5]. Gilyarov, M.S., Striganova, B.R. (Ed.). (1987). *Quantitative Methods in Soil Zoology*. Moscow, Russia: Nauka.
- [6]. Huhta, V. (2007). *The role of soil fauna in ecosystems: A historical review*, Pedobiologia, 50 (6) 489- 495.
- [7]. Jouquet, P., Dauber, J., Lagerlof, J.P. Lavelle, M. Lepage. (2006). *Soil invertebrates as ecosystem engineers: intended and accidental effects on soil and feedback loops*. Appl. Soil Ecol., 32:153-164.
- [8]. Lavelle, P., Decaëns, T., Aubert, M., Barot, S., Blouin, M., Bureau, F., Margerie, P., Mora, P., Rossi, J.-P. (2006). *Soil invertebrates and ecosystem services*. European Journal of Soil Biology, 42, 3-15.
- [9]. Naeem, S., Loreau, M., Inchausti, P. (2002). *Biodiversity and ecosystem functioning: the emergence of a synthetic ecological framework*, in: Loreau, M., Naeem, S., Inchausti, P. (Ed.), *Biodiversity and ecosystem functioning: synthesis and perspectives* (pp. 3-11). UK: Oxford University Press.
- [10]. Report of Millennium Ecosystem Assessment. (2005). *Ecosystems and Human Wellbeing: Synthesis*. World Resources Institute, Washington, DC. from <http://www.maweb.org/en/Reports.aspx#>.
- [11]. Schaefer, M., Schauer mann, J. (1990). *The soil fauna of beech forests: comparison between a mull and a moder soil*. Pedobiologia, Jena, 34, 299–314.
- [12]. Schwartz, M.W., Brigham, C.A., Hoeksema, J.D., Lyons, K.G., Mills, M.H., van Mantgem, P.J. (2000). *Linking biodiversity to ecosystem function: implications for conservation biology*. Ecologia, 122, 297-305.
- [13]. Senicovscaia, I. et al., 2012. *Methodological instructions on the assessment and increase of the soil biota stability in conditions of the degradation processes intensification*. Kishinev, Republica Moldova: Pontos.
- [14]. Swift, M., Izac, A.-M., van Noordwijk, M. (2004). *Biodiversity and ecosystem services in agricultural landscapes- are we asking the right questions?* Agriculture, ecosystems and environment, 104 (1), 113-134.
- [15]. Vadyunina, A.S., Korchagina, Z.A. (1973). *Methods of investigation of the physical properties of soils*. Moscow, Russia: Higher School.

# ECONOMIC AND ENVIRONMENTAL EFFICIENCY OF FERTILIZERS USE FOR ENHANCE THE FERTILITY OF DEGRADED SOILS IN THE REPUBLIC OF MOLDOVA

LEAH TAMARA, LEAH NICOLAI<sup>1</sup>

**Abstract.** *In recent decades, high fertility of soils in the Republic of Moldova are subjected to more intensive accelerated degradation due to anthropogenic activity. Situation created causing further intensive development of land desertification processes and leads to worsening of the ecological situation in the country. There are currently affected by degradation processes of different intensity 56.4 percent of agricultural land. One measure provides for local sources of organic fertilizers, along with the minerals. Agronomic, economic and ecological efficiency of fertilizers use in the agriculture of Moldova found that application of fertilizers has positive effects on soil fertility along with other measures to restore degraded soils.*

**Key words:** *economic efficiency, organic fertilizers, degraded soils, soil fertility*

## INTRODUCTION

The current state of arable soil fertility in the intensification of the degradation processes is the worst in the last 30-40 years. The annual loss of uncompensated humus from agricultural land after its mineralization exceeding the 700 kg/ha and the total deficit, given the erosion losses is equal to 1100 kg/year [5]. The main factors that conditioned the establishment of a negative balance of soil organic matter are: lack of crop rotation designed to conserve soil fertility, water erosion and using very small amounts of local organic fertilizer to fertilize the crops.

The current state of the actual fertility of the soil is unsatisfactory, and on approximately 10% of agricultural land - critical. In this scheme the nitric regime prevents expected harvests. The content of mobile phosphates is low and approaches to natural level. In the absence of fertilizers, phosphorus system degrades gradually over 5-6 years will also become a limiting factor [6].

Failure to comply the crop rotations, reducing the amount of organic fertilizers 20-30 times, the minerals - 15-20 times, the share of perennial grasses 5-6 times led to the formation of a negative balance of humus and nutritive elements in soils and their biological degradation.

Physical properties of soils determines to a large extent the level of fertility. Intensive use of agricultural land, extensive use of heavy machinery have led to worsening their quality.

The aim of this research consists in assessing the effectiveness of fertilizers on arable soil to restoring their degraded properties and fertility.

## MATERIAL AND METHODS

Agronomic effect was determined based on performance norms and technical recommendation of chemical and organic fertilizers in agriculture. Economic evaluation systems have undergone minimal and optimal fertilization of soils. Environmental assessment is a general aspect of the action of fertilizers on the environment. All measures agro-technical, agro-chemical and agro-biological are developed and aimed at ensuring the closed circuit of nutritive elements, especially nitrogen. Stabilization of organic matter in the soil can be ensured only by returning crop production, ancillary use manure, different organic composts, by increasing the share of perennial grasses in crop rotations.

<sup>1</sup> Dr.conf. Tamara Leah, Nicolai Leah, Institute of Soil Science, Agrochemistry and Soil Protection "Nicolae Dimo", Chisinau, Republic of Moldova, tamaraleah09@gmail.com

## RESULTS AND DISCUSSIONS

One of the measures to improve the fertility of arable soils is necessary to use all local resources of organic matter and nutrients, while and industrial fertilizers.

*Local sources of organic matter* and substances necessary for plant nutrition are plant debris left on the ground after harvest, organic fertilizers, livestock, various organogenic waste from processing industry of agricultural raw materials, urban household, etc. Plant debris that not removed from cultivated land (stubble and plant roots) return to soil only half of humus consumed by harvests and only partially of the nutrients used by plants. Completing an essential source of organic matter in soil is ancillary plant production. On irrigated soils as a source of accumulation of crop residues can serve intercropping (crop stubble).

Waste from livestock are the most important and widespread local source of organic matter and nutrients to restore the soil fertility and increase crop productivity. The content of organic matter and nutrients in livestock waste is summarily 6-7 million tons per year.

In order to protect the environment is necessary to apply the waste from manufacturing and urban household as fertilizers, including sludge from wastewater treatment, household waste, defecation sludge from sugar factories.

A significant potential source for restoring productivity and less productive soils are delluvial (cumulic) soils, which occupy 100 thousand ha. Suitability of delluvial soils as fertilizers are judged by the content of humus, phosphorus, potassium, trace elements, etc. The nutrient rich delluvial soils can be used to improve fertility of heavily eroded soils by adding land.

The country has over 3500 artificial water storage tanks, of which about 1200 are excessive siltation or damaged. Recent research conducted by the Institute for Soil Science, Agrochemistry and Soil Protection "Nicolae Dima" showed that sludge lake, in most cases, have a thickness of 2.5-3.5 m, contain from 2.5 to 5.5% of humus, and are more rich in mobile forms of phosphorus than soils affected by erosion, often surpassing in this respect and the whole soil profile. The most effective way of using sludge lake is mixing with organic waste. Rich mud is recommended for use by stripping soils with low productivity [1, 3].

The livestock wastewater containing a large amounts of nutrients, especially potassium and nitrogen in available forms to plants. Their application for crop fertilization requires a complex test to avoid the pollution of soil and agricultural production with harmful substances.

*Mineral fertilizers.* Current natural fertility of soils allows obtaining only 25.6 q/ha of winter wheat, 30.7 q/ha of maize, 14.7 q/ha of sunflower. According to regulations, the application of fertilizer in optimal dose contributes to increase yields to 35-45% [4].

The optimal system of fertilizer application is intended for higher agriculture (optimized crop rotation, soil conservation work, integrated plant protection, irrigation expansion, development of animal husbandry, modern technologies of plant cultivation). It is based on the associated application of organic fertilizers and minerals, the wider use of biological nitrogen. Optimal dose of fertilizers to fertilize main crops are geared towards achieving maximum profit on a unit of land.

The annual necessary of total fertilizers for agriculture of Moldova during 2010-2020 years and after 2020 year will be 236.7 thousand of active substances [2], including 99.9 thousand of nitrogen, 91.0 thousand of phosphorus and 45.8 thousand of potassium (table 1).

Table 1.

**The annual necessary of mineral fertilizers for optimal fertilization of crops in the years 2010-2020, thousand tons of active substances**

Branch, culture	Nitrogen (N)	Phosphorus (P <sub>2</sub> O <sub>5</sub> )	Potassium (K <sub>2</sub> O)	Total NPK
Rotation crops	82,3	69,9	28,4	180,6
Vegetables and potatoes	6,8	9,0	6,8	22,6
Vineyards fruitful	1,5	1,5	1,5	4,5
Orchards fruitful	2,0	2,0	2,0	6,0
New vineyards	0	2,1	2,1	4,2

Branch, culture	Nitrogen (N)	Phosphorus (P <sub>2</sub> O <sub>5</sub> )	Potassium (K <sub>2</sub> O)	Total NPK
New orchards	0	1,0	1,0	2,0
Irrigated land	6,3	4,6	3,1	14,0
Other crops	1,0	1,0	1,0	3,0
Total	99,9	91,1	45,9	236,9

Effective use of organic and industrial fertilizers issues was determined agronomical, economical and environmental.

**Agronomic efficiency** was determined on the base of norms and regulations on the use of mineral and organic fertilizers in agriculture [6-8]. As shown in Table 2 the increase harvest from application of 1 kg NPK are: 5.2 kg of winter wheat, 5.8 kg of maize grain, 2.9 kg of sunflower seed, 38.0 kg for sugar beet roots. Systematic use of fertilizers in crop rotations in different field soils increased crop yields. The minimum system of fertilizer application growth the rate harvest for cereal crops is 8-13%, 11 to 16% for industrial crops, 18 to 28% for potatoes and vegetable crops.

Table 2.

**Normative regarding mineral fertilizers efficiency in Republic of Moldova**

Crops	Dose of fertilizers, kg/ha a.s.				Yield of the NPK, q/ha	Growth yields of NPK, q/ha	Growth yields of 1 kg NPK, kg
	total	inclusive					
		N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O			
Winter wheat without irrigation	228	96	74	58	37,3	11,8	5,2
Winter wheat with irrigation	212	103	80	29	51,9	13,9	6,3
maize silage	209	90	80	39	317	97	46,4
Perennial grasses with irrigation	230	30	120	80	102,9	50,2	21,5
Fruit trees without irrigation	238	80	79	79	241	61	25,6
Green peas with irrigation	208	90	84	34	146	43	20,7
Potatoes without irrigation	236	77	77	82	123	28	11,9
Potatoes with irrigation	247	92	99	56	200	88	35,6
Legumes	280	113	110	57	425	191	68,2
Sunflower	180	60	61	59	20,2	5,2	2,9
Tobaccos	240	60	94	86	25,9	8,4	3,5
Winter barley	180	60	60	60	33,4	10,7	5,9
Spring Barley	180	60	60	60	32,1	9,7	5,4
Maize	240	112	70	58	54,0	14,0	5,8
Maize by irrigation	270	134	76	60	78,6	22,2	8,2
Peas	112	22	57	33	21,9	3,9	3,5
Sugar beet without irrigation	359	131	124	104	348	138	38,0
Vineyards without irrigation	222	62	75	85	126	23	10,4

Implementation of the optimal system of mineral fertilization leads to higher grain yields by 23-26%, 23-42% - technical, 23-37% - vegetables and potatoes. Soil fertilization ensures an optimal dose increase the production of winter wheat 348 thousand tons, maize – 275 thousand tons, sunflower - 62 thousand tons, sugar beet – 548 thousand tons [6, 7].

**Economic efficiency.** Economic evaluation systems have undergone minimal and optimal fertilization system. The first phase is proposed fertilization of crops in minimal doses (NPK-60 kg/ha) on an area of 1 million 524 thousand ha. To purchase fertilizers would be needed annually about 633 million MDL (lei). Every dollar invested will recover 2.33 MDL and total net gain obtained harvest will be about 840 million MDL annually.

Through a very high economic efficiency will highlight: vegetables, potatoes, tobacco and vines. The lowest recorded yield is for sunflowers. From the economic analysis results, the fertilization of agricultural crops even in minimal doses is rentable (averaging 132% for the total agricultural area).

Optimal fertilization is expected to be applied after 2020 year on the 1 million 671 thousand ha. Fertilizer costs will be about 1 billion 374 million lei and total net income of the entire



area is estimated at 1 billion 280 million MDL annually. Every MDL invested will be recovered by 1.95 MDL. Profitability of fertilizer use in recommended doses will be comparatively low (95%) than the minimum system, but rather high economic level. Vegetables, potatoes and vines in this system will have a very high efficiency. Profitability of winter wheat is 39%, corn - 26%, and sugar beet - 81%. Other crops will have a relatively low yield.

In the irrigation condition is programmed to fertilize with optimum dose the 93.5 thousand ha annually. It will fertilize winter wheat, maize, potatoes and vegetables. Fertilizers cost will be 142 million MDL annually. Recovery of costs for fertilizers with the cost of crop growth is high - 5.51 MDL. Annual net income from 1 ha will reach 6848 lei, and the entire area fertilized - 640 million lei. Profitability consists 451% and is within the range obtained in the intensive chemicalization period on the irrigated lands [8].

Economic and agronomic evaluation of proposed fertilization systems in different national programs developed and approved, allows to forecast a high economic efficiency of application of mineral fertilizers in agriculture of Moldova. Investing in buying and applying fertilizers is estimated at about 630 million to 1 billion 500 million MDL annually for the minimum and optimum system properly. Annual net income that will create about 840 million to 1 billion 750 million lei. Every lei invested will recover by 1.9 to 2.3 additional agricultural production. Global agricultural output will increase by approximately 30-35% compared to the current one.

***Environmental effectiveness.*** Forming a equilibrated or positive balance of nutrients reduces chemical degradation processes of soil and humus decreases by 20-30%.

Irrational use of chemical fertilizers in agriculture and their application in large doses is necessarily accompanied by negative consequences on the environment. They relate to soil, plant and water sources with chemicals. The main chemical pollution are nitrogen compounds, in decreasing order, chlorine, fluoride, heavy metals, etc. The general requirements to control and environmental protection are set out in the standards and norms which is required to meet.

All measures agro-technical, agro-chemical and agro-biological are geared towards ensuring closed circuit of nutritive elements and especially nitrogen, which has a very high mobility. Stabilization of organic matter in the soil can be ensured only by returning the full volume of production auxiliary, manure use, different organic composts and last but not least, perennial grasses in crop rotation rate hike. Stabilization or increasing the humus content in the soils contributes to the accumulation of nitrogen in organic form inorganic compounds account.

Every chemical fertilizer has its own environmental specific. Phosphate fertilizers are the most harmless. Their systematic application does not lead to migration of phosphates in the soil profile or groundwater pollution. Potassium compounds also are characterized by limited mobility. However, the main fertilizer potassium (KCl) contains about half of chloride ions. Chlorides easily washed, polluting the soil profile and groundwaters. To prevent environmental pollution with chlorine components is proposed to use the local maximum and minimum quantities of fertilizers chemical ones. When using chemical fertilizers priority must be complex fertilizers, in which potassium continues without concern for environmental pollution.

The biggest danger to the environment and human health posed nitrogen fertilizers. Given these fertilizers harm for the environment, mineral nitrogen doses recommended for use in agriculture of Moldova are 1.5-2 times lower as in countries with developed agriculture.

Minimal and moderate doses of nitrogen fertilizers applied in accordance with the recommendations in force and their phasial incorporation in 2-3 reprises not lead to environmental pollution and agricultural production by nitrates. Currently the focus is on maximizing the use of biological nitrogen (soil incorporation of crop residues and local fertilizers and use of atmospheric nitrogen by leguminous crops). The share of mineral nitrogen leached from soil root layer is 10-15%. To assess the degree of pollution of the soil with nutrients, development the forecast of measures to reduce environmental pollution by harmful substances necessary to perform agrochemical monitoring by soil agrochemical mapping of all agricultural land once in 10 years and the annual operational mapping on the stationary polygons in each area.

Minimum, moderate and optimal doses of fertilizers proposed for application in Moldovan agriculture poses no danger to the environment. It should be noted in the currently conditions are farms that after economic status applying the moderate and optimal fertilization of the main crops obtaining adequate yields.

Balanced ecological functioning of agro ecosystems under irrigation is entirely determined by the interaction of natural and anthropogenic factors. The main anthropogenic factors with negative implications on the environment and irrigation facilities in neighboring areas are:

- Large application of the irrigation rules and creating irrigational percolation regime;
- Excessive agricultural traffic aggregates and machines, and secondary soil compaction;
- Irrigational erosion;
- Reduced rate or the lack of perennial grasses in irrigated crop rotation;
- Applying minimal amounts of organic fertilizers and crop residues;
- Use of water with unsatisfactory quality indices.

In the Republic of Moldova a major threat to one of the main components of the environment - soil, presents the use of the water with high mineralization. Based on the criteria for assessing the quality of surface waters was found that only trans-boundary sources (Danube, Dniester, Prut) can be used without danger of soil degradation. Inland rivers are characterized by satisfactory qualitative indices, predominantly in the upper sector. Also, do not meet the use require water in most reservoirs (65%).

The use in irrigation, in particular the local water with a high degree of mineralization and alkalinity causing negative changes, often irreversible, of the soil characteristics. This is manifested by salinization and secondary alkalization, crust irrigation or compacted horizon, structure degradation and lacunar space reduction.

To prevent degradation of irrigated soils, especially chernozems is necessary:

- Application of complementary irrigation;
- Minimizing traffic through the combination of farming;
- Increase the share of perennial grasses to 20-25%;
- Management of organic fertilizer in an amount of 10 to 12 t/ha per year;
- Water quality testing especially at the local irrigation;
- Performance monitoring soil quality status in the irrigation facilities.

Implementation of measures will ensure the prevention of the degradation of irrigated soil, planned harvests and environmental protection.

## CONCLUSIONS

Socio-economic development of the Republic of Moldova is possible only through long-term maintenance of agricultural production capacity of soils and forestry towards preventing and combating degradation processes. The magnitude of the current crisis in agricultural production and its interaction with macroeconomic processes requires an integrated approach to protection, balanced and sustainable land use.

Economic efficiency of fertilizers and nutrient balance was calculated based on soil fertilization system: minimal and optimal for North, Central and South zones of Moldova. The fertilizer minimum system, with average dose in rotation  $N_{30}P_{20}K_{15}$  kg/ha, provides a negative balance 36-38 kg/ha of nitrogen, 27-34 kg/ha of phosphorus and a deep negative balance of potassium.

Optimal fertilization in the North zone with an average dose of 5 t/ha manure and  $N_{60}P_{50}K_{20}$  ensures not only the high productivity of crops, but also an almost equilibrated balance of nitrogen, positive balance for phosphorus (+18-19) kg/ha and negative for potassium.

In the Central zone the optimum fertilization system (4 t/ha manure and  $N_{54}P_{45}K_{18}$  kg/ha per average rotation), provides deficit easy balance of 26 kg/ha of nitrogen, positive (15 kg/ha) of phosphorus and negatively of potassium.

In the South zone the application of 4 tons/ha of manure and  $N_{47}P_{43}K_{18}$  ensures the equilibrated balance of nitrogen (-10 kg/ha), phosphorus (+4 kg/ha), negative balance of potassium.

Thus, the optimal system of fertilization of crops meet the requirements of maintaining the economic and environmental balance in the soil of nutrients, stabilization and reproduction of soil fertility.

## REFERENCES

1. **Donos, A.** (2009). *Evoluția bilanțului de macro-elemente nutritive în solurile Republicii Moldova*. Știința agricolă, nr.2, p. 8-12.
2. **Leah, T.** (2012a). *Current ecological issues of soil resources of the Republic of Moldova and their solutions*. Охрана био-ноосферы. Эниология. Нетрадиционное растениеводство. Экология и медицина». Alushta/Симферополь. КМИНПЭЗ, p. 85-89. ISBN 978-966-366-581-8.
3. **Leah, T.** (2012b). *Status of Soil Fertility of the Republic of Moldova in Conditions of Intensification of Degradation Processes*. Prospects for the 3rd Millennium Agriculture. Cluj-Napoca. Bulletin UASVM: Agriculture Vol.69 (1). P.30-38. Print ISSN 1843-5246; Electronic ISSN 1843-5386.
4. **Лях, Т. & Лях, Н.** (2012). Современное состояние питательных режимов и баланс элементов в почвах республики Молдова. Почвы Азербайджана: генезис, география, мелиорация, рациональное использование и экология», Баку-Gabala 2012, Azerb. Сборник материалов. Ч. II. ISSN 2222-7882, ISBN 978-99-52-453-37-7. XII ТОМ. Баку «ЭЛМ», p.783-785.
5. *Monitoringul calității solurilor Republicii Moldova* (baza de date, concluzii, prognoze, recomandări). (2010). Coord.ed.V.Cerbari.Ch.: "Pontos", p.18-24. ISBN 978-9975-51-138-4.
6. *Programul Complex de valorificare a terenurilor degradate și sporire a fertilității solurilor*. (2004). Partea II. Sporirea fertilității solurilor. Ch.: Pontos, 128 p.
7. *Programul National Complex de Sporire a Fertilității Solului în anii 2001-2020*. (2001). Ch.: Pontos, p.48-52.
8. *Sistemul Informațional privind calitatea învelișului de sol al Republicii Moldova*. (2000) Ch.: Pontos, p.69-85.

# PRODUCTIVITY GAPS ALONG THE MILK CHAIN IN ROMANIA – COMPARISONS WITH THE EU-27 MEMBER STATES

MARIANA GRODEA<sup>1</sup>

**Abstract.** *Taking into consideration the new Common Agricultural Policy (2014 -2020, for the milk sector, which will have as main component the milk quota removal after 2014, the present paper makes a comparative analysis of the indicators from the milk chain links (agriculture, processing, trade, consumption) from Romania and the EU-27 member states in the period 2009-2012, in order to reveal the performance level and Romania's position among these European countries, as well as the modalities to narrow the productivity gaps along the Romanian milk chain compared to the European Union, having in view the domestic supply improvement and meeting the consumers' needs. In this context, an investigation was made by each link in the chain, at the level of milk production, raw milk collection for processing, milk processing, distribution and consumption, in close connection with milk quality and price evolution; certain variants and measures were designed to narrow the gaps of productivity and institutional organization of the milk chain in Romania.*

**Key words:** cow herds, milk production, dairy cow farm size, prices, quality

## INTRODUCTION

The milk sector in Romania is characterized by a low integration of players in the chain, the main causes being the following: low attractiveness of association for milk producers, which results in an excessive fragmentation of supply and the diminution of farmers' bargaining power with processors implicitly, lack of market information, mainly in the case of medium and small-sized operators, who often make decisions unknowingly; this situation brings about losses at all levels, with a significant competitiveness diminution.

That is why the associative organization forms can be considered competitive structures that encourage milk sector modernization and can improve the marketing of dairy products, by the fact that they make it possible for a large number of small producers to actively and efficiently participate to the economic process, narrowing the productivity gaps along the milk chain between Romania and the remaining EU-27 member states.

## MATERIAL AND METHODS

In order to capture the main aspects concerning the national milk market, the following information was used: the national data supplied by the National Institute for Statistics (NIS), through the official publication "Romania's Statistical Yearbook", as well as the database Tempo-online - INS, which were subsequently processed, and the information from MARD, ANSVSA. The aspects regarding the evolution and the quantitative and qualitative modifications on the European and world milk market had as information source the reports and international studies elaborated by the European Commission, the data from FAOSTAT Agriculture and EUROSTAT publications. The information supplied by the previously mentioned institutions has its own advantages, enabling comparisons by different regions and across Romania.

The utilized method was the comparative analysis of certain sets of indicators specific to each link in the chain. The set of indicators used for the analysis of the first link of the chain refers to the following: evolution of dairy cow herds, of their yields, average size of dairy farms. The second stage of the chain is investigated from the perspective of the following indicators: collected milk production out of total production by the processing dairy factories, raw milk quality, raw milk procurement price, number of enterprises in the milk industry, added value per employee in milk industry. The indicators on the trade with dairy products refer to the obtained production and the trade between the EU-27 member states.

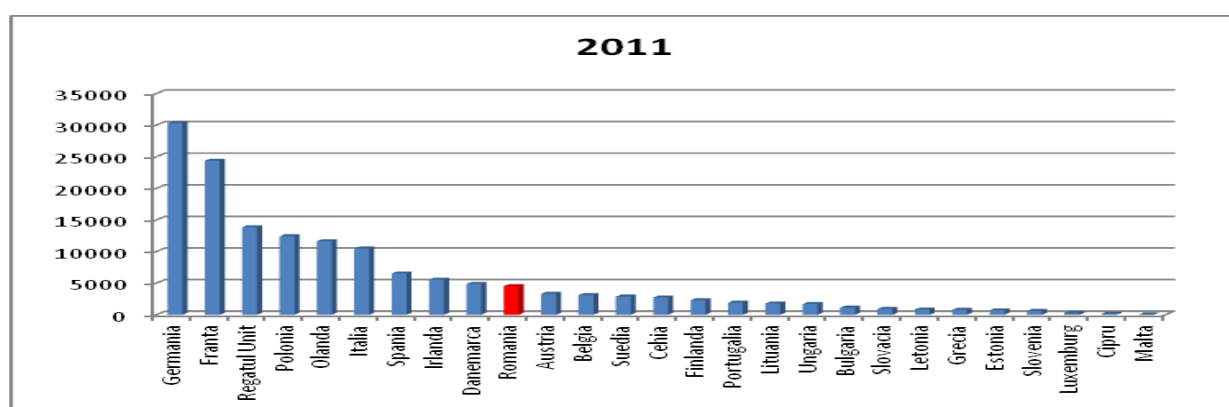
<sup>1</sup> Dr. C SIII M ARIANA GRODEA, Institute of Agricultural Economics, INCE, the Romanian Academy, Calea 13 Septembrie no. 13, sector 5, Bucharest, phone/fax:021/3182411; e-mail: marianagrodea@yahoo.com

## RESULTS AND DISCUSSIONS

This section presents the results of the comparative analysis, in the period 2009-2012, of the indicators from the milk chain links (agriculture, processing, trade, consumption) from Romania and the EU-27 member states, based on the presented methodology, as well as of the variants and modalities to narrow the productivity gaps between the Romanian milk chain and that of the other EU countries.

Although Romania is on the tenth position among the EU-27 cow milk producing countries, from the point of view of milk production evolution in the period 2009-2011, it has the strongest decline (-682 thousand tons), being on the last place in the case of this indicator (Figure 1).

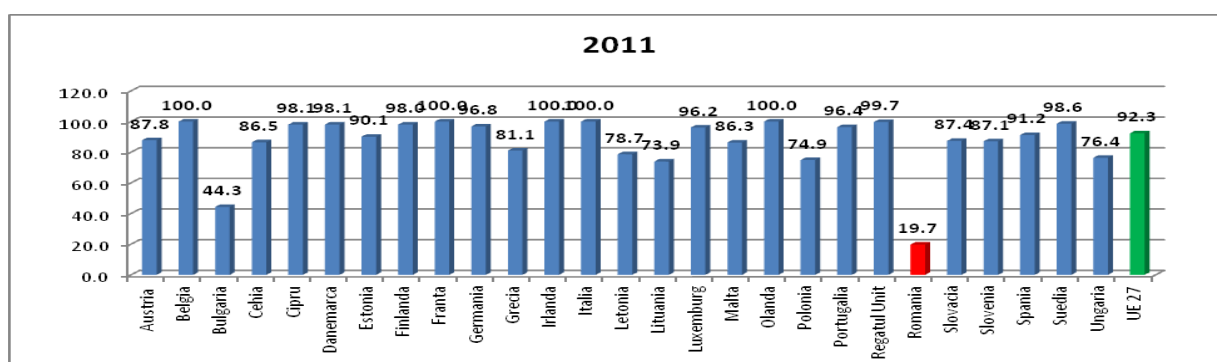
Fig. 1. Total cow milk production in the European Union-27– thousand tons



Source: www.fao.org – FAOSTAT Agriculture

As regards the share of milk deliveries in total obtained milk production, in the year 2011, it is mentioned that compared to the European average of 92.3%, the great majority of the European countries deliver milk to processing in percentages ranging from 87 to 100%. Bulgaria (44.3%) and Romania (19.7%) represent an exception. Romania lies on the last position following the analysis of this indicator (Figure 2).

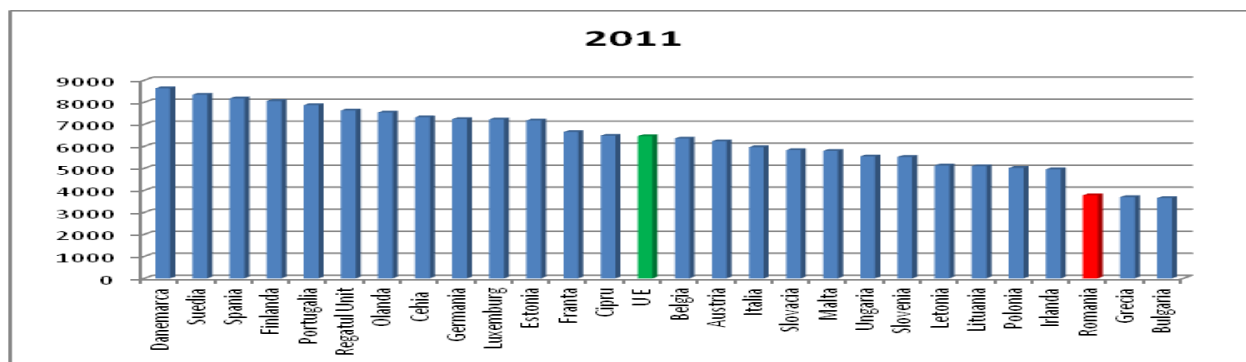
Fig. 2. Share of milk deliveries in total cow milk production in the EU-27 member states, in the year 2011 (%)



Source: Eurostat

The average yield/cow head features great differences across the European countries. Thus, the highest yields in the year 2011 were found in Denmark (8636 kg/cow head), Sweden (8341 kg/cow head), Spain (8174 kg/cow head) and Finland (8058 kg/cow head). At the opposite pole we can find countries like Bulgaria (3653 kg/cow head), Greece (3691 kg/cow head) and Romania (3776 kg/cow head). (Figure 3).

Fig. 3. Average cow milk yields in the EU-27 member states– kg/head



Source: www.fao.org – FAOSTAT Agriculture

Both the quality and the quantity of milk are affected by the high fragmentation of production, as 59 % of the total cow herds in Romania are found on very small-sized units of 1-2 heads. Thus, out of the 761528 holdings whose average yield was 1.83 heads in 2010, only 20-22% deliver milk to the processing factories. In these conditions, an adequate selection work and the application of modern technologies are almost impossible. For comparison, the average size of dairy farms in several European countries is the following: Hungary – 22 heads (EUROSTAT 2010), Germany – 40.7 heads (EUROSTAT 2010), Slovakia – 183 heads (“An Assessment of the Competitiveness of the Dairy Food Chain in Slovakia”), Slovenia – 12.5 heads (EUROSTAT 2010).

As regards **raw milk collection** for processing, it can be mentioned that an analysis by the two collection sources revealed the increase of imported raw milk from 3.6% in the year 2007 to 8.2% in 2011, to the detriment of milk collection on the holdings and milk collection centers in the country.

As regards the **raw milk quality**, from the market analysis conducted by ANSVSA, it results that at the end of the year 2011, the percentage of conform milk corresponding to the EU standards, delivered to processing units, was 80%. At the same time, the study also mentions that the conform milk percentage is higher in the case when milk is collected directly from farmers and it is lower when the milk is taken over from a collection center; out of this reason, the prices offered by the processors are different in the case of conform and non-conform milk. From this point of view, the ANSVSA specialists asked for and obtained the approval of the European Commission for the prolongation of the transition period in order to improve raw milk quality until December 31.2013.

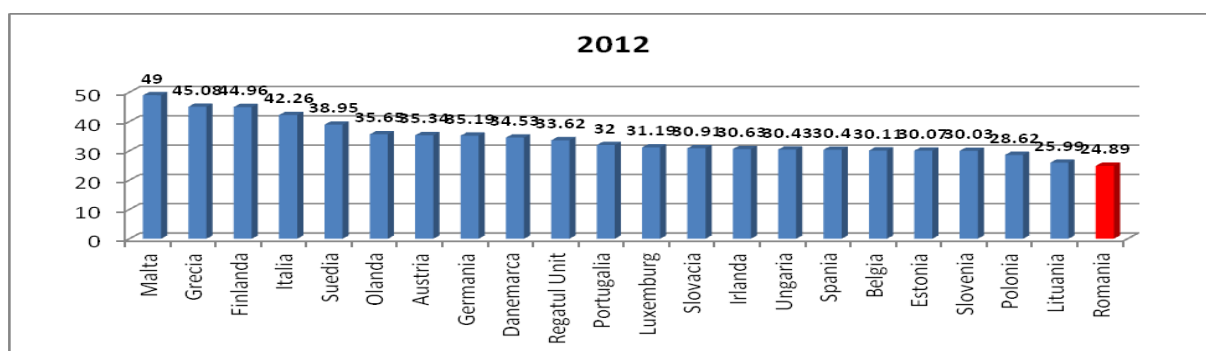
**Milk industry** went through an extremely difficult period caused by several factors: prolonged economic crisis, diminution of sales under the background of purchasing power diminution, the unprecedented increase in the price of utilities, the black market that reached 60% of total and the aflatoxin scandal that began in early March 2013. The aflatoxin scandal determined an unprecedented diminution of milk and dairy consumption, the figures supplied by the officials at that time ranging from 45% (APRIL) to 20% (Ministry of Agriculture). According to the Romanian Employers’ Association in Milk Industry, the small and medium-sized producing companies mostly suffered, as they did not have an outlet for their products any more: the retailers ordered less, and certain buyers of the large trade networks preferred to import finite products.

The **consumption** decline is also the result of the loss of the habit to drink milk on a daily basis. A study by Euromonitor conducted in 2010 reveals that Romania is among the last countries in Europe as regards milk consumption per capita, followed only by Slovakia and Bulgaria. Thus, in the year 2010, milk consumption per capita in Romania reached 36 liters (equivalent of about 100 ml/day), compared to the European average of 64-65 liters in countries like Switzerland, Netherlands, Belgium, Slovenia or Serbia. In the nutritionists’ opinion, the recommended daily milk consumption is 250 ml/day, which is twice as high compared to the present milk consumption per capita in Romania.

According to a study of the company Tetra Pak, while the consumption of other categories of liquid dairy products continue to increase at an average yearly rate estimated at 6.9% in the period 2011-2015, milk consumption will continue to decrease at an average yearly rate of 4.9%. This diminution of milk consumption is largely determined by the diminution of unpacked (unprocessed) milk consumption. Although the packed milk will continue to increase at a yearly average rate of 2.8% in the period 2011-2015 (the UHT milk has an average yearly increase of 3.9%), this increase will not compensate the massive diminution of unprocessed milk quantities.

In Romania, although the **raw milk price** in the year 2012 was the lowest in the EU-27 countries (24.89 euro/100 kg), this is mainly dictated by the evolution of neighbour markets – Hungary, Poland, and Slovakia – as the main sources for covering the national deficit (Figure 4).

Fig. 4. Raw milk procurement price in the EU-27 member states (euro/100 kg)



Source: Eurostat

In Romania, the **import** of dairy products was worth 130-140 million euro in 2010, while **exports** reached about 40 million euro, with an increasing trend.

In the case of cheese and curd, the imports reached 2000 tons, worth 70 million euro, while the exported quantities were larger, i.e. about 2700 tons, with a value of only 15 million euro, which reveals that the exports consisted of raw products, curds, and quality finite products were imported instead. In quantitative terms, the imports followed an increasing trend, from 4365 thousand hl of milk in 2007, to 5771 thousand hl in 2011, while exports doubled, to reach 2234 thousand hl in 2011.

## CONCLUSIONS

### Romania after the removal of milk quotas – modalities to bridge up the productivity gaps

The milk sector in Romania presents significant discrepancies in terms of productivity compared to EU-27. This can be explained both by the internal structure of the Romanian dairy farms (small size, high fragmentation), inadequate or defective use of production factors (human resources included), and by the existing deficient institutional framework and infrastructure. Although Romania is on the 7<sup>th</sup> position among the EU-27 countries with regard to the dairy cow herds, the average yields are quite modest (3776 kg/cow head), Romania being among the last countries on the list, only before Greece and Bulgaria.

The milk sector performance is seriously affected by the high fragmentation. Thus, in the year 2010, 59 % of the total dairy cow herds were found on very small-sized holdings of 1-2 heads, while the total number of holdings was 761528, with an average size of 1.83 heads/farm. Although a diminution by 28% of the number of holdings was noticed as compared to 2007, the number of non-performant small-sized holdings remains very high, which reveals the persisting subsistence and semi-subsistence phenomenon in the milk sector in Romania, which is the main factor that hinders competitiveness increase. However, as a positive fact, we can notice the percentage diminution of holdings with 1-2 cow heads in total holdings (from 92% in 2007 to 87.27% in 2010),



simultaneously with the increase in percentage of the holdings with 3-5 heads (from 6.3% in 2007 to 10.14% in 2010). The holdings with 51-100 cow heads and over 100 heads, which we consider commercial or potentially commercial, account for only 0.11 %, having 6.25% of the total dairy cow herds.

From this point of view, due to the weak competitiveness of the Romanian dairy farmers compared to the farms from the developed countries, it is estimated that after the milk quota removal, many farmers with 2-3 cow heads/farm will disappear from the Romanian market, as December 31, 2013 means the end of the term for non-conform milk processing.

One of the main conclusions is that farm size is an important factor in profit maximization. That is why a support measure for the Romanian farmers after 2015, through the "Milk Package", would be to **encourage the farms with at least 50 cows, with land into ownership, by projects with financial support**, on the example of certain countries like Netherlands, Belgium, which massively invest in dairy farm revamping, so that these can increase their animal herds up to 10 times, towards 3000 heads. One of the reasons for this is the fact that the farms smaller than 50 cow heads cannot supply sufficiently large milk quantities to processors so that to find a buyer for their production, not to speak about the capacity to bargain good prices and make a profit.

At the same time, another measure from the "Milk Package" envisages **strengthening the role of contracts**. In the milk and dairy sector, in order to ensure that the respective contracts are conform to certain adequate minimum standards and to guarantee the good operation of the domestic market and of the common market organization, it is necessary to establish certain basic conditions at EU level for the utilization of these contracts. As the status of certain dairy product cooperatives can already include rules with similar effect, these cooperatives must be exempted, for simplification purpose, from the obligation to conclude contracts. In order to ensure the effectiveness of such scheme, this has to be also applied in the case when the intermediaries (collectors<sup>2</sup>) collect the milk from farmers for delivery to processors. In this case, the contract must comply with the following: to be concluded before the delivery, to be under written form and contain the price due for delivery, which can be a fixed price and indicated in the contract and/or may vary according to certain specific clauses, namely the market situation evolution, estimated on the basis of market indicators, the delivered volume and quality or composition of delivered raw milk. The following must be also specified, namely: the volume that can be and/or is to be delivered, the calendar of deliveries and validity period of contract.

## BIBLIOGRAPHY

1. Păun Ion Otiman (coordonator) (2011), *Alternativele economiei rurale a României: Dezvoltarea agriculturii sau insecuritate alimentară și deșertificare rurală severă*, Editura Academiei Române
2. Zahiu, L., Toma, E., Alexandri, C., Dachin, A., (2010), *Agricultura în economia românească – între așteptări și realități*, Editura CERES
3. \*\*\* Anuarele Statistice ale României 2007-2011, Institutul Național de Statistică
4. \*\*\* Efectivele de animale și producția animală obținută 2007-20112, Institutul Național de Statistică
5. \*\*\* [www.infolapte.ro/noutati57.html](http://www.infolapte.ro/noutati57.html)
6. \*\*\* <http://ec.europa.eu/agriculture/>
7. \*\*\* Coordonate ale nivelului de trai în România. Veniturile și consumul populației în perioada 2007-2011, Institutul Național de Statistică
8. \* \* \* Bulletin of the International Dairy Federation „The World Dairy Situation - 2011”
9. \* \* \* [www.fas.usda.gov/Romania](http://www.fas.usda.gov/Romania) Dairy and Products, 2012
10. \*\*\* EU dairy farms report 2011, base don FADN data, European Commission
11. \*\*\* <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>
12. \*\*\* [www.fao.org](http://www.fao.org)
13. \*\*\* Food: from farm to fork statistics, 2011, Eurostat, European Commission

<sup>2</sup> "collector" means an enterprise that transports the raw milk from a producer or from another collector to a raw milk processor or to another collector, in which case the raw milk ownership is transferred each time.



## PROFITABILITY AND STANDARD GROSS MARGIN AT SHEEP

IURCHEVICI LIDIA<sup>1</sup>

**Abstract.** *In Romania, must pay a particular attention to adapt the systems of sheep breeding and exploitation with the EU requirements. At the same time, it is necessary to protect and stimulate those characteristics of growing and exploitation of sheep that have competitive advantages on the quality of products obtained. It is important that the technological solutions adopted in the growing and exploitation of sheep to answer all product quality requirements, at European standards. The main objective of this paper is to provide technical - economic solution for sheep breeding to achieve a rate of return that would allow farmers to continue production activity in terms of economic efficiency. To facilitate analysis of the economic results obtained in the farming carried out and the structural characteristics of farms in our country, it is necessary to apply the Community methodology for determining the standard gross margin (SGM), as scientific support for technical - economic orientation.*

**Keywords:** *sheep, economic efficiency, costs, standard gross margin*

### INTRODUCTION

The raising of sheep has a tradition of years in our country. This species harnesses best the pastures and meadows, of which the largest part is situated in the mountain areas. It is a species with a well defined morphological features and a great power of adaptability to environmental factors. In our country, the growth and exploitation of sheep knows an upward development due to their valuable biological and economical particularities through the specialization of breeds for milk and meat. Also, meeting the milk requirements to produce a wide assortment of cheeses, in which the improved breeds are predominant and where there is already installed an old tradition for these products, it is another imperative in the development of this business.

Sheep, due to their number and property of quick breeding, higher production potential and lower costs of investment, maintenance and marketing of the products, they represent an economic opportunity.

### MATERIAL AND METHOD

The paper is based on a study concerning the breeding of sheep for milk and meat in an intensive system. The methodology for determining the cost of production is based on a number of technological features such as: for milk, the average production of 75 l liters/cap, and for meat an average daily gain of 200g/day, specific consumption 7,46 NU/kg gain, delivery weight 35 kg.

A special importance that the actual determination of the cost of production assumes is demonstrated by the need to ensure the recovery of the economically justified production costs but also the obtaining profit.

### RESULTS AND DISCUSSION

Due to its characteristics, the ovine species presents many advantages, both economic and social:

- This species adapts very well to all environmental conditions those being not pretentious nor food nor climate.
- The ovine contribute in an important measure to the improvement of vegetable production and to its increase of profitability.
- Sheep capitalizes economically different products (straw, stalks, haulm, chaff).
- Also contribute to raising the soil fertility, to the enhance of vegetable production, to the correction of grassland flora and 2-3 times increase of green mass production, by natural fertilizer, the manure representing a very good fertilizer.

<sup>1</sup> Scientific Researcher III, Iurchevici Lidia – I.C.E.A.D.R.-A.S.A.S., e-mail:lidia\_iur@yahoo.com

The production costs were determined based on the production technologies, each item of expense is rounded according to the average production, specific consumption period of exploitation, for the both breeding systems.

In determining the cost of production of the main livestock products, it starts from the size and structure of the direct allocation of human and material resources required for the smooth production processes.

### The calculation of total expenditures

The total expenses include:

- Variable expenses
- Fixed expenses

The main variable costs are:

1. Expenses with animal feed
2. Expenses with biological material
3. Expenses with electrical energy
4. Expenses with drugs and sanitary materials
5. Other material expenses
6. Expenses with supplies.

Feeding expenses is based on average daily intake, respectively fodder varieties included in the ration, the duration of maintenance, the delivery prices related to each type of ration and represents 72.7% of the total expenditure on milk, and for meat the feeding expenses represents 46.2% of the total expenditures (Table 1).

The expenses with biological material represent 4.4 % from the total expenditure for the sheep milk, and 38% for the fattening lambs.

The remaining costs of 22.9% respective 15.8% are energy and fuel costs, medicines costs, other material costs, supply and livestock insurance costs.

The main fix costs are:

1. Permanent expenditure on workforce
2. General expenditure
3. Interest on loans
4. Depreciation expense

Table 1. Main economic indicators

Specification	U.M.	Sheep milk 75 l/sheep Lei/l	Lamb meat 200g/day Lei/kg
Variable costs	Lei/kg	6,533	7,325
Fix costs	Lei/kg	0,713	0,455
Total production costs	Lei/kg	7,246	7,781
Costs for the main production (cost of production)	Lei/kg	3,246	7,209
Purchase price	Lei/kg	3,533	8,286
Rate of profit	%	8,8	15

### ANALYSIS OF ECONOMIC EFFICIENCY - SHEEP MILK

Income: the value of the total income is higher with 4% than the total expenditures.

Variable costs: represent 89% from the total expenditure, and within these, the largest share, of 78,5% hold the feed costs.

The cost per unit of product: is identified with the main product and expenditure and it is of 2,73 lei/liter.

The average selling price per unit of product: is the indicator by which total revenues were estimated and is 3 lei/liter.

Gross profit: 0,268 lei/liter respective 20,1 lei/head.

Sheep milk product: was estimated a 9,8 % profitability.

Labor productivity: for 1 liter of milk, labor time expended is 0,10 man-hours and labor productivity in terms of value is 30 lei/h/man.

Staff costs: at 1000 lei main production we have the amount of 177.78 lei.

The security index of the sheep milk production, for an average product of 75 liters is 57%. This negative value shows a sharp insecurity of the main product (milk). The value of the secondary production (280 lei/head) made out of lamb value, wool, reform and manure compensates the total production costs, so that in the end it is able to get profit. Otherwise, exploiting only sheep milk production is unprofitable.

### Determining breakeven

Simulations of possible scenarios

Nr. crt.	Indicators	Values	%	Breakeven RE=0	Obtainable result when increase the production by 20%	Obtainable results when decrease the value of production by 20%	Maintaining the initial result when fix costs are reduced by 10%
0	1	2	3	4	5	6	7
1	Value of the total production	505,0	100	366,43	606	404	468,45
2	Variable costs	432,5	85,64	324,08	519	346	401,18
3	Margin over variable costs	72,5	14,36	52,35	87	58	67,27
4	Fixed expenses	52,35		52,35	52,35	52,35	47,12
5	Gross returns	20,15		0	34,65	5,65	20,15

Breakeven of young sheep meat with an average production of 75l is 366,43 lei, value expressed and 122,14l expressed in physical units. Thus, the average production counts fall far below breakeven. If the total production (which includes secondary production value) increases by 20%, gross profit increases by 71,9 %. The price at the farm gate can vary from 2,4 lei/l, if the value of the production is reduced by 20% and 3,6lei /l when the value of the production increased by 20 %. It is estimated that sheep milk product situation is deeply unstable when the income is only from selling milk, as the main production value is below the yield by 63%.

### ANALYSIS OF ECONOMIC EFFICIENCY - YOUNG SHEEP MEAT

Income: the value of the total income is higher with 28,82% then the total expenditure.

Variable costs: represent 94,15 % from the total expenditure, and within these, the largest share, of 49,1% hold the feed costs.

The cost per unit of product: is identified with the main product and expenditure and it is of 7,209 lei/kg.

The average selling price per unit of product: is the indicator by which total revenues were estimated and is 8,286.

Gross profit: 1,077 lei/kg respective 37,68 lei/head.

Sheep milk product: was estimated a 14,9 % profitability.

Labor productivity: for 1 kg of meat, labor time expended is 0,05 man-hours and labor productivity in terms of value is 165,72 lei/h/man.

Staff costs: at 1000 lei main production we have the amount of 30,97 lei.

The security index of the young sheep meat production, for an average product of 200 g/head is 68 %.

### Determining breakeven

Simulations of possible scenarios

Nr. crt.	Indicators	Values	%	Breakeven RE=0	Obtainable result when increase the production by 20%	Obtainable results when decrease the value of production by 20%	Maintaining the initial result when fix costs are reduced by 10%
0	1	2	3	4	5	6	7
1	Value of the total production	310,00	100	92,14	372	248	300,81
2	Variable costs	256,38	82,7	76,21	307,64	205,10	248,77
3	Margin over variable costs	53,63	17,3	15,93	64,36	42,9	52,04
4	Fixed expenses	15,93		15,93	15,93	15,93	14,34
5	Gross returns	37,70		0	48,43	26,97	37,70

Breakeven of young sheep meat with an average production of 200g/day is 92,14 lei, value expressed and 11,12 kg expressed in physical units. If the production output increases with 20 %, the gross profit will increase with 28,5 %. The price at the farm gate can vary from 7,08 lei/kg, if the value of the production is reduced by 20 % and 10,63 lei /kg when the value of the production increased by 20 %. It is estimated that the situation of young sheep production is comfortable, as the breakeven output value exceeds with 70%.

## CONCLUSIONS

Profitability of sheep farming depends on several factors:

- Scheduling births
- High prolificacy, respective a number of lambs per one hundred of sheep between 105 and 125
- Economic life quit good, between 6-7 years
- Increasing the number of staff
- Getting lambs from own breeding
- Seasonality of meat consumption
- The purchase price of gain

The profit earned is influenced by the number of farmed animals, which is why today the trend is to build large farms.

## BIBLIOGRAPHY

1. National Agency for Agricultural Consulting, (2007), *Model Project* – Sheep Farm, Sibiu;
2. G. Burlacu, (2004), *Guide for sheep fodder ratios*, Bucharest;
3. The Research Institute for Agriculture Economy and Rural Development, (2012-2013), *ADER 2.1.1 Project - Determining the economic indicators of production technologies for vegetal and animal products in order to increase the environmental performance (costs, productivity, profitability, gross margin)*, Bucharest;
4. The Research Institute for Agriculture Economy and Rural Development, (2010), *6.2.3 Project – Technical-economic substantiation of production technologies, determining costs, estimate prices and the degree of profitability for vegetal and animal products*, Bucharest;
5. [www.revista-ferma.ro](http://www.revista-ferma.ro)
6. V.Taftă, (2008), *Raising sheep and goats*, Bucharest.

## WORLDWIDE TRENDS AND ORIENTATIONS OF RAISING GOATS

CHETROIU RODICA<sup>1</sup>, CĂLIN ION<sup>2</sup>, NICULESCU GEORGETA CARMEN<sup>3</sup>

**Abstract:** *Worldwide, raising goats had generally an ascending trend, both in terms of stocks and the production level. Thus, according to FAO statistics, in 2011 there were over 875.5 million heads of goats. The largest number of goats was in the year 2011 in Asia - over 539 million heads, representing 61.6% of the total, followed by Africa with over 276 million heads, holding a share of 31.6% of livestock globally. At European level, in 2011, the largest goat populations were in Greece and Romania ranks the fifth continental level, with about 1.24 million heads. If in 2000 the production of goat milk globally was 12.78 million tons, in 2011 it reached an amount of 15.86 million tons, registering a growth rate of over 24%. The general trends of goat production systems are increasing size of farms, while reducing their number, decreasing pastoral practices in the milk production, enlarging the stocks of major milk producing breeds and increasing the number of projects for the conservation of local breeds.*

**Keywords:** goats, trends, heads, milk, production

### INTRODUCTION

Currently worldwide, raising goats sector tends to become increasingly important for the national economies, being even a factor of economic development, particularly for rural areas. In all countries, due to accelerated increasing of human population number, resorts to more efficient exploitation of animal resources, applying more efficient technologies for breeding and exploitation of zootechnical interest animals.

Research conducted is consistent with the trends of growing and exploitation goats, meaning increasing number of flocks and demand increasingly higher for products of this species, worldwide.

### MATERIAL AND METHODS

The paper is based on centralization, statistical processing and analysis of data on global goat population, their productions and study of various breeding systems characteristics, as well as their trends.

### RESULTS AND DISCUSSIONS

Worldwide, raising goats has been generally upward trend, both in terms of the stock and the production level. Thus, according to FAO statistics, in 2011 there were over 875.5 million heads of goats.

Table 1 shows that the largest number of goats were, in the year 2011, in Asia - over 539 million heads, representing 61.6% of the total, followed by Africa with over 276 million heads, holding a share of 31.6% of global livestock. Europe is in the fourth place, with only 0.56% of the total number of goats.

<sup>1</sup>PhD Candidate - University of Agronomic Sciences and Veterinary Medicine Bucharest, 59 Mărăști Bvd, sector 1, e-mail: rodigeo7@yahoo.com

<sup>2</sup>Prof. PhD. - Universitatea de Științe Agronomice și Medicină Veterinară București, 59 Mărăști Bvd, sector 1, e-mail: icalin63@yahoo.com

<sup>3</sup>PhD Candidate - University of Agronomic Sciences and Veterinary Medicine Bucharest, 59 Mărăști Bvd, sector 1, e-mail: karmen7micci@yahoo.com

Table 1 The evolution of the worldwide goat population, by continents (thousand heads)

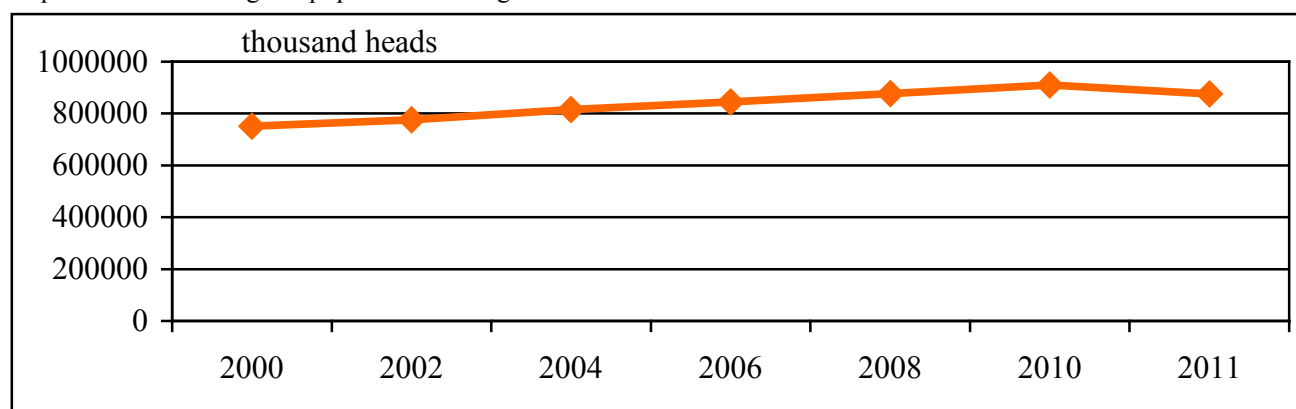
Continent	2000	2002	2004	2006	2008	2010	2011	2011 compared to 2000 %
Africa	236624	254741	272066	284980	301222	312448	276684	+16,93
America	34935	36187	37088	38067	37507	37595	37678	+7,85
Asia	458521	463395	484398	499138	516925	537766	539178	+17,60
Europa	18941	18214	18635	17886	17819	17115	17072	-9,87
Oceania	2396	3219	3372	4197	3618	4923	4917	+105,22
<b>TOTAL</b>	<b>751417</b>	<b>775756</b>	<b>815559</b>	<b>844268</b>	<b>877091</b>	<b>909847</b>	<b>875529</b>	<b>+16,52</b>

Source: FAOSTAT

Compared to 2000, in 2011, worldwide, there is an increase of 16.52%. Among continents, Oceania marks the highest growth rate of 105.22%, doubling its herds, significantly, given that it ranks last in the number of heads. In Europe, however, the goat population fell to 9.87% during the analyzed period. The evolution of the goat population globally during 2000 - 2011 is shown in Graphic 1.

Worldwide, in 2011, the country with the largest goat population was China, with over 142 million head, followed by Pakistan, with about 61.4 million heads and Nigeria, with 57, 3 million heads.

Graphic 1. Worldwide goats populations during 2000-2011



Data source: FAOSTAT

The top eight countries in the world with the biggest goat population is shown in Table 2.:

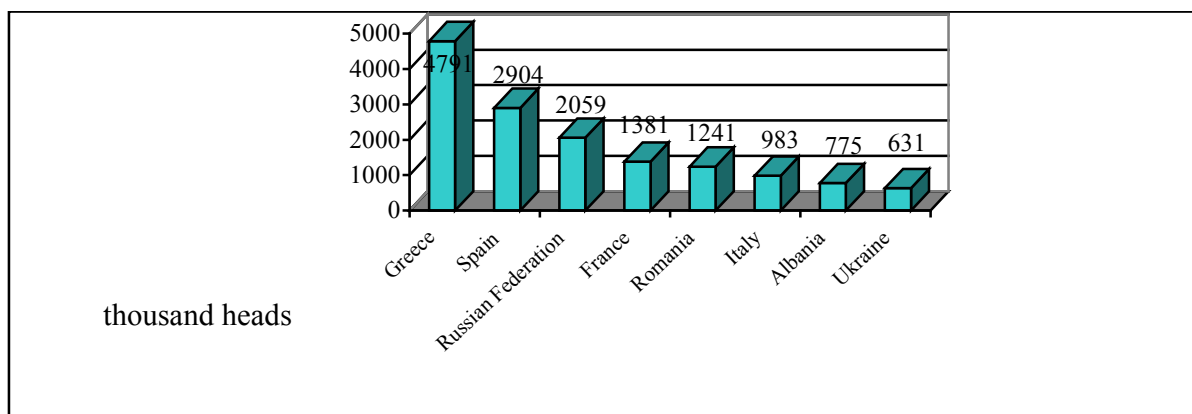
Table 2. Countries with the largest goat population in 2011

Specification	China	Pakistan	Nigeria	Bangladesh	Iran	Ethiopia	Indonezia	Mali
Number (thousand heads)	142230	61480	57300	50500	23500	22787	17483	17349
% of the total	18,9	8,2	7,6	6,7	3,1	3,0	2,3	2,3

Source: FAOSTAT

According to FAO, in Europe, in 2011, the largest goat populations were in Greece (4.791 million head), followed by Spain (2.904 million head), Russian Federation (2.059 million head) and France (1.381 million heads), as shown in Graphic 2:

Graphic 2. European countries top regarding the goat population in 2011



Source: FAOSTAT

According to the same statistical sources, worldwide production of goat's milk was situated, in the period studied, on an ascending curve, except in 2011 when there was a decrease. Thus, if in 2000 the production of goat milk globally was 12.78 million tons, in 2011 it reached an amount of 15.86 million tons, registering a growth rate of over 24%. (Table 3.)

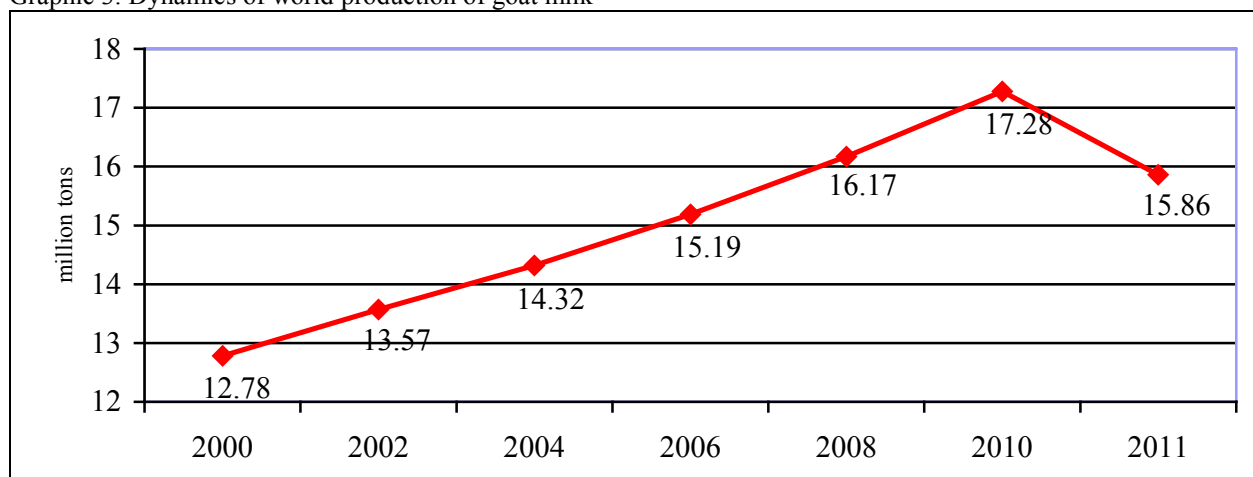
Table 3. The evolution of goat milk world production, by continents (thousand tons)

Continent	2000	2002	2004	2006	2008	2010	2011	2011 compared to 2000 %
Africa	2735	2850	3316	3586	3692	4070	2579	-5,70
America	505	524	541	552	566	589	590	+16,83
Asia	6949	7514	7794	8369	9275	9905	10021	+44,21
Europa	2588	2683	2665	2678	2641	2715	2665	+2,98
Oceania	0,028	0,037	0,042	0,043	0,042	0,042	0,042	+50,0
<b>TOTAL</b>	<b>12777</b>	<b>13571</b>	<b>14316</b>	<b>15185</b>	<b>16174</b>	<b>17279</b>	<b>15855</b>	<b>+24,09</b>

Source: FAOSTAT

This evolution is shown in the Graphic 3.

Graphic 3. Dynamics of world production of goat milk



Source: FAOSTAT

Analyzing the Table 3, it is found that Asia occupies constantly the first place in the world production of goat milk, accounting in 2011, 63.20% of the total, followed by Europe with 16.81% and Africa with 16.27%. Among continents, the highest growth rates in the analyzed interval belong

to Oceania (+50%) and Asia (+44.21%), as opposed to Africa, where the goat milk production decreased by 5.7% in 2011, compared to 2000.

Ranking at country level, the first major goat milk producer, throughout the period under study, is India, which, according to FAO statistics, recorded in 2011, a production of 4.594 million tons, ie 28.98% of the world production. This is followed by Bangladesh, with 2.496 million tons (15.74% of total). (Table 4.)

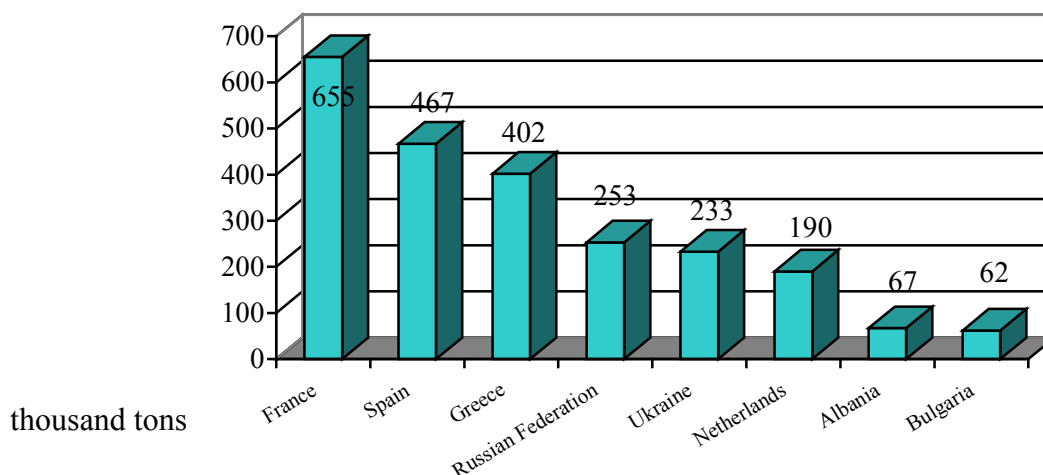
Table 4. Countries with the largest goat milk production in 2011

Specification	India	Bangladesh	Pakistan	Mali	France	Spain	Somalia	Greece
Goat milk production (thousand tons)	4594	2496	759	703	657	540	501	402
% of the world production	28,98	15,74	4,79	4,43	4,14	3,41	3,19	2,54

Source: FAOSTAT

According to the same source of statistical data, among European countries producing goat milk is, in 2011, France, with over 655 000 tons, followed by Spain, with 467 thousand tons and Greece, with more than 402 000 tons. (Graphic 4.)

Graphic 4. The top of the first eight European countries regarding goat milk production in 2011

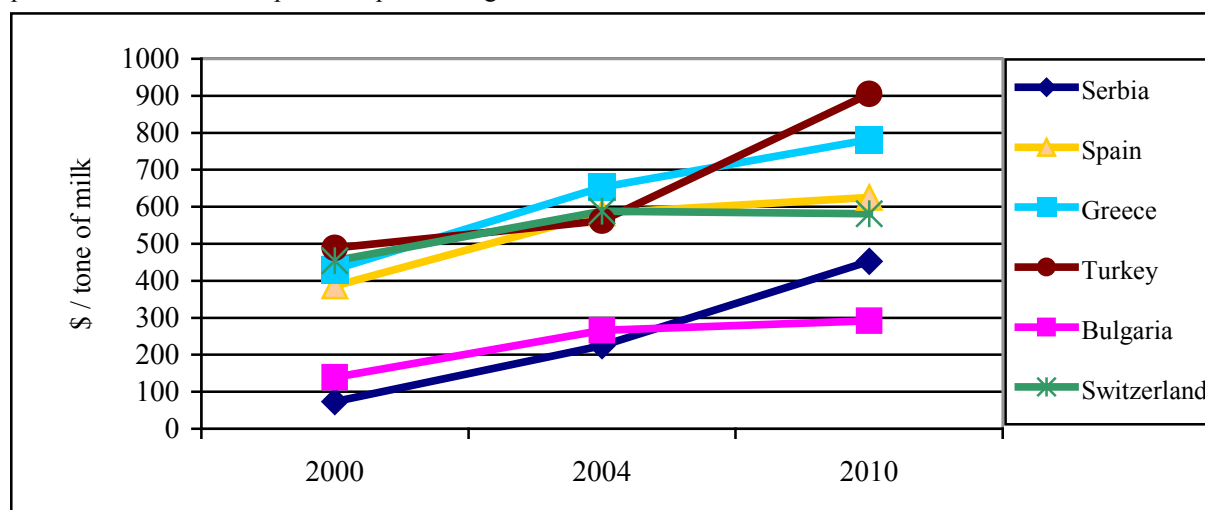


Source: FAOSTAT

Goat farms in Europe deliver milk and cheese from goat's milk to European markets and North America [8]. Regarding the producer price of goat milk, according to FAO statistics, worldwide there is a great variety: for example, in 2000, the lowest price was registered in Serbia, only 73.3 \$ / tone of milk and the maximum - in Singapore (3773.5 \$ / tone of milk). Note that this country was also maintained in 2010 world ranking, with the price of 6433.8 \$ / tone of milk. Price evolution illustrated in Graphic 5, shows substantial increases in the years 2000 to 2010, reaching even 6 times more at the end of the study compared to the beginning of the interval (Serbia).



Graphic 5. The evolution of producer prices for goat milk



Source: FAOSTAT

In India - the largest global goat milk producer, the consumption takes place mainly at the local level, unlike France, which is the largest goat milk producer in Europe, where there is an important economic sector of goat growing and exploitation, in which more than 90 % of their milk is processed and marketed as cheese. Competitiveness and profitability of goat milk on the world market are closely linked with seasonal production, livestock and productivity.

Over two thirds of the goats are grown in tropical and subtropical areas of the world, but yields from these are much lower compared to that of goats in temperate regions. This is due to poor feeding conditions and exploitation of less productive breeds [6].

Regarding the evolution of world production of goat meat, this had a steady upward trend in the period 2000-2010, after that, in 2011 it was followed by a slight decrease (Table 5).

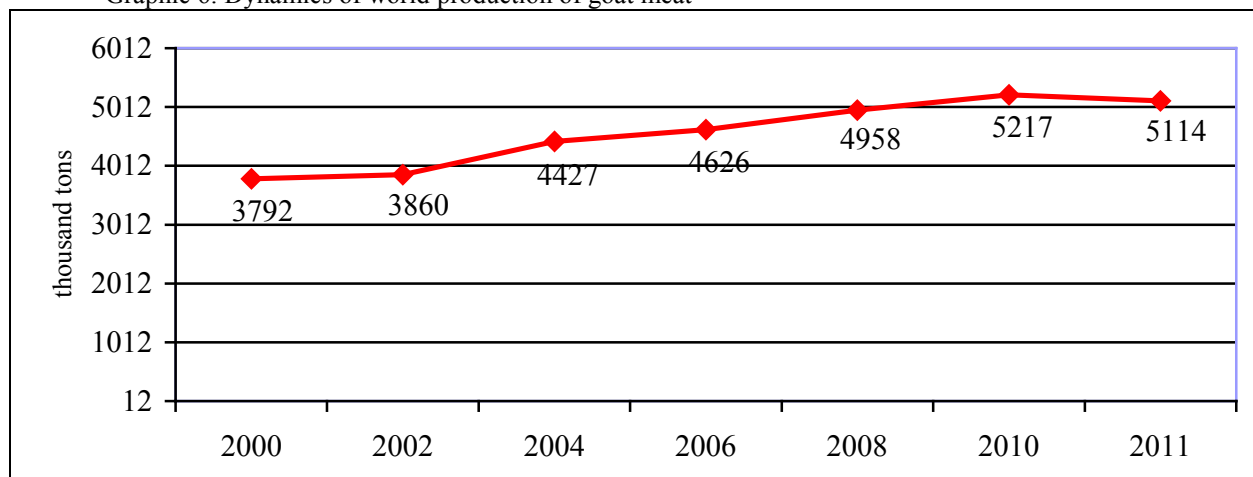
Table 5. Evolution of the world goat meat production, by continents (thousands tons)

Continent	2000	2002	2004	2006	2008	2010	2011	2011 compared to 2000 %
Africa	912	989	1034	1116	1202	1253	1133	+24,23
America	122	125	125	127	130	129	129	+5,70
Asia	2620	2607	3113	3233	3479	3676	3693	+40,95
Europe	125	122	136	126	127	133	132	+5,60
Oceania	13	17	19	24	20	26	27	+107,69
<b>TOTAL</b>	<b>3792</b>	<b>3860</b>	<b>4427</b>	<b>4626</b>	<b>4958</b>	<b>5217</b>	<b>5114</b>	<b>+34,86</b>

Source: FAOSTAT

At continental level, on the first place is Asia, which holds between 69-72% of the total world production of goat meat, followed by Africa, and Europe produces only 2.5 to 3.3 % of the total. Oceania is the last in this regard, but has the largest increase in the period studied, with more than 107% , while Europe and America record the lowest growth rates, 5.6% and 5.7% . Worldwide, in 2011 was produced a quantity of goat meat by over a third more than in 2000 (34.86%). This trend is shown in Graphic 6.

Graphic 6. Dynamics of world production of goat meat



Source: FAOSTAT

World production of goat skins also recorded an upward trend, with growth of 31.41% in 2011 compared to 2000. On the first place is Asia, with over 75% of the total, Europe produces only between 2-2.5% of the world's skins. (Table 6)

Table 6. Evolution of the world goat skins production, by continents (thousand tons)

Continent	2000	2002	2004	2006	2008	2010	2011	2011 compared to 2000 %
Africa	166	181	190	210	223	234	193	+16,26
America	23	23	23	23	23	23	23	0,00
Asia	651	646	782	770	842	869	891	+36,87
Europa	22	23	25	23	22	23	23	+4,50
Oceania	4	5	6	7	6	8	8	+100,00
<b>TOTAL</b>	<b>866</b>	<b>878</b>	<b>1026</b>	<b>1033</b>	<b>1116</b>	<b>1157</b>	<b>1138</b>	<b>+31,41</b>

Source: FAOSTAT

Of the 570 breeds of goats worldwide, only 69 are uniquely specialized to the production of milk. In those 69 breeds, 36 (approximately 52%) are from Europe, 25 breeds (37%) in Asia and 8 breeds (11%) in Africa. Most breeds, however, have dual specialization, being exploited both for meat and for milk production at a medium to low level [2]. Tafta V. (2002) shows that, taking into account the biological and productive valuable particularities; goats are receiving increasing attention in both developing and developed countries, where the predominant are improved and developed breeds. Regarding production of milk is considered that the group of Swiss, Spanish, French and English are the most valuable goats.

Unfortunately, stereotypes, mainly related to poor social conditions, led to the formation of a negative opinion on the need to grow goats. But due to health problems, such as those related to children's allergies to the proteins in cow's milk, goat milk interest grew and contributed to the growth of goat's development [5].

## CONCLUSIONS

The current situation regarding goat farming systems and global diversity are the result of evolution and their changes in the last 50 years, development of markets for products from goat's milk, on the one hand and consumer attitudes, on the other hand [3].

Goat farming systems are diverse, both intensive and semi-intensive and extensive, reflecting the ability of these animals to adapt to a wide range of environmental conditions. A simplified description of the different operating systems, based on eco-regional criteria, shows that

both loose housing - feeding with forage crops or on cultivated pastures and grazing meadows, or on areas that are not part of the agriculture circuit are practiced[1].

Research on goat farms show general trends in their production systems: increasing size of farms, while reducing their number, streamlining food behaviors and decrease pastoral practices in milk production, widening the numbers of major dairy breeds and increase number of projects for the conservation of local breeds.

## BIBLIOGRAPHY

1. Beaufoy G., Bignal E., Poux X., Romain B., 2009 - *Les systèmes ovins et caprins de l'Union Européenne : implications pour l'environnement* in Pacheco F. (ed.), Morand-Fehr P. (ed.). *Changes in sheep and goat farming systems at the beginning of the 21st century: research, tools, methods and initiatives in favour of a sustainable development* Zaragoza: C IHEAM / D RAP-Norte / FAO Options Méditerranéennes: Série A. Séminaires Méditerranéens; n. 9;
2. Devendra C., Haenlein G.F.W., 2011 - *Animals that produce dairy foods | Goat breeds, Encyclopedia of Dairy Sciences (Second Edition)*;
3. Dubeuf J.-P., Le Jaouen J.-C., 2006 - *Changes in goat production systems in Europe and interrelations with the dairy goat industry and European regulations*, Proceeding of The International Symposium "Goat farming in Central and Eastern European countries: present and future", Constanța;
4. <http://www.fao.org/corp/statistics/en/>;
5. Niznikowski R., Strzelec Ewa, Popielarczyk D., 2006, - *Present policies for strategy of goat farming in Central and Eastern Europe*, Proceeding of The International Symposium "Goat farming in Central and Eastern European countries: present and future", Constanța;
6. Späth H., Thume O., 2008 - *Raising goats*, M.A.S.T. Publishing, Bucharest;
7. Taftă V., 2002 - *Goats production and reproduction*, Ceres Publishing, Bucharest;
8. Zamfirescu Stela, 2009 - *News in goats raising*, Ex Ponto Publishing, Constanța.

## COMPARATIVE STUDY ON THE QUALITY AND FOOD SAFETY

PAULA – ANGELA VIDRAȘCU<sup>1</sup>

**Abstract.** *The issues addressed in this paper makes a significant contribution to solving the complexity irregularities occurred in the development of environmental achievements. Quality and food safety is now a consumer law that directly reflects the quality of life. So this topic gives a particular importance to the work of the bodies created to defend the interests of all consumers. This study has an important role both in the short and long term through proper understanding of the terms of quality and food safety and implementation of strict hygienic-sanitary rules. The essential aim of this article is the integration of environmental awareness, which can stop the degradation and disappearance of the planet. Thus through the implementation of the adoption and application of strict orders regarding compliance with hygienic-sanitary rules can result in increased development and maintenance of environmental performance in a competitive economy. Quality is and will always be a very important competitive factor.*

**Key words :** *Food quality, food safety, ecological success, eating behavior, sustainable development.*

### INTRODUCTION

Currently the main impediment competitiveness means solving problems related to the environment. Performance concept has evolved into a comprehensive approach including financial aspects and non-financial aspects, which mainly refers to the elements of social responsibility. Previously, on the foreground is the financial performance, but now economic entities have realized that future successes, motivation is what today, in the context of sustainable development of society, we call the global performance. This involves aggregation of economic performance, social and environmental.

Intensifying environmental problems increasingly causes more uncertainty.

Companies provide increasingly more interest on the realisation and demonstrating environmental performance by controlling the impacts of healthy activities, products and services and their impacts on the environment. They performed "audits" to assess their environmental performance. Unfortunately, these alone audits are insufficient to ensure that the organization meets its performance in the future and meet legal requirements. Environmental Management standards (such as EMAS and ISO 14000 series of standards) represents an adequate benchmark after which organisations and companies can measure their performance.

At the same time, public opinion has become increasingly more concerned about environmental issues, which are often reflected in the behaviour of consumers, who express interest in products that are not harmful to the environment. In this way arose Ecolabel providing information about environmental impact, promoting low impact products.

### MATERIAL AND METHODS

The materials used in this research are making direct reference to the study of literature and related data processing as a result of the research carried out. At the same time I processed the data obtained from the actual existence of networking to consumers in our country, EU countries and a study conducted in America concerning genetically modified organisms, through which we debated the pros and cons that can be detached as a result of the field of study.

<sup>1</sup> Asis. U niv. Drd. Paula – Angela Vidrașcu, Academia de Studii Economice – „Contabilitate”, București, vidrascupaulaangela@yahoo.com

Thus have been completed, understood and processed on European regulations concerning the quality and safety of food but also the strict rules of sanitary-hygienic use which further add to the quality of life of all living beings in the environment.

## RESULTS AND DISCUSSIONS

**Food quality** encompasses all properties they own food in accordance with current regulations and consumer needs and requirements.<sup>2</sup>

Hygienic quality of food is achieved if the following rules are being respected such as:

- ✓ The use of fresh raw materials;
- ✓ Applying heat treatment to inactivate anti-nutritive substances;
- ✓ Minimal processing so that it can be avoided the formation of harmful substances and to maintain the quality of nutrients and biologically active substances;
- ✓ Properly stored to avoid microbiological spoilage;
- ✓ The use of additives to the destination and accurate doses;
- ✓ The practice rational and strictly controlled fertilizers, pesticides and antibiotics;
- ✓ Maintain perfect hygiene processing units in storage for machinery, equipment and working tools;
- ✓ Consumer education related to compliance with the rules of hygiene during food preparation and storage of products.

**Food safety** is an essential element of food security and human nutrition refers to the three characteristics that must satisfy a food.

Thus a food must have the following traits:

- a. To have intrinsic nutritional value;
- b. To have a high nutritional value as bioavailable;
- c. Hold hygienic qualities.

**Nutritional value** means the quantity and quality of protein, fat and carbohydrates, in a word, energy suppliers. These nutrients provide the body with the following functions:

- ✓ Provides energy to the body and provides nutritional requirements of it;
- ✓ Own plastic role, physiological and physico-chemical;
- ✓ They are essential to life acting at the cellular level to support the development and maintenance of normal body health.

**Bioavailability** means the way that food nutrients, biomineralele, vitamins and biologically active substances are used by humans. This feature can be supported by:

- ✓ The level of nutrients and biologically active substances existing intestinal tract level capable of being absorbed by the body;
- ✓ The absorption of substances for digestion;
- ✓ The amount of substances retained by the body.

However there are a number of factors that can have a high influence on this trait. Thus we find:

- ✓ Physiological condition of the body;
- ✓ Nature of produce;
- ✓ The presence of anti-nutritive substances;
- ✓ Raw material processing method;
- ✓ Type interactions synergism, antagonism or association between nutrients and biominerals or nutrients and vitamins.

<sup>2</sup> Burghilea, C. (2010), *Securitatea și protecția consumatorului*, Revista Amfiteatru Economic, ASE București, Facultatea de Comerț, Anul XII, Iunie 2010, Nr. 28, ISSN 1582-9146, pp. 476-489

**Hygienic quality** of a food may be influenced by:

- a) Nature toxic substances in raw materials or finished products (alkaloids, biogenic amines, etc.)
- b) Anti-nutritive substances of agricultural raw materials (haemagglutinin or lectins, trypsin inhibitors, antivitamin, antimineral, blockers of various enzymes, etc.)
- c) Additives used in food production without the legislation in force related destination, dosage etc.
- d) Chemical contaminants such as heavy metals, pesticides, mycotoxins;
- e) Chemicals that may arise as a result of processing the type of nitrosamines, polycyclic aromatic hydrocarbons or polymers thermal oxidation of fats;
- f) Substances that can migrate into food from plastic packaging (pigments, stabilizers, monomers with reduced Molecule etc.);
- g) Pathogens that can cause infections due to poisoning by these organisms multiply in the human body;
- h) Biological agents that can infect foods (vermin, insects, protozoa, larvae etc.).
- i) Viruses that can contaminate raw materials and products of plant and animal origin.

Studying the "World Declaration on Nutrition" (FAO / WHO, Rome, 1992) and the "Declaration on World Food Security" (FAO / WHO, 1996), we see that food security situation arises where any time all men have physical access and economic access to reliable and nutritious food that meets the needs of the human body so that they can lead a healthy life.<sup>3</sup>

Food security has become a highly publicized issue both locally and internationally. It also should be noted that Earth's population nutrition international expansion is a concern to WHO (World Health Organization), FAO (Food and Agriculture Organization), the Codex Alimentarius Commission, etc. .

Food security in the entire world can be assured of domestic resources through its policies of each country.

Generally food security means "the right to eat." Following the study symposium on "Sustainable Food Security for All by 2020" in Bonn we define a number of key features security on food security, as follows:

- ✓ cleaning water sources;
- ✓ promoting agriculture and rural development;
- ✓ development of agricultural research in order to promote new technologies of modern agricultural
- ✓ improve the management of natural resources;
- ✓ promoting sustainable development in disadvantaged areas;
- ✓ supporting a healthy national and international trade and macroeconomic policies;
- ✓ making globalization to the poor.

Food safety is an essential element of food security and human nutrition, which must possess the following characteristics: to have intrinsic nutritional value, nutritional value as high bioavailable and always hygienic qualities.

Practicing a European food safety system requires legislative development of the field, and different actions in order to:

<sup>3</sup> Mărcuță, L., Mărcuță, A., Tindeche, C. (2013), *Analysis of Romanian GDP during crisis, 20th International Economic Conference - IECS 2013*, „Post Crisis Economy: Challenges and opportunities”, Sibiu, România

✓ Ensure the practice of management and control systems effective and efficient in terms of food safety and quality and animal health and nutrition and plant health within EU countries and non-EU countries that export food to the EU and are evaluated according to EU standards related field of study.

✓ A properly manage international relations with countries outside the EU and other international organizations regarding the safety of food, their quality and other associations.

✓ A managing relations with the European Food Safety Authority - European Food Safety Authority (EFSA) and ensure prevention of potential risks.

The United States believes European regulation as limiting imports and cultivation of genetically modified organisms (GMO) - is "cumbersome and unworkable".

U.S. and EU are about to launch negotiations to create a vast free trade area, but the discussions are likely to block the issue of genetically modified crops and products. Such products approved in the U.S. are strictly regulated in Europe, where only two genetically modified seed culture is authorized.<sup>4</sup>

Note that there are both pros and cons. Thus a U.S. trade representative supports the view that governments continue to impose discriminatory measures or useless on U.S. agricultural exports. Basically these impediments would affect American farmers but blocks and consumers around the world to access U.S. agricultural products, which that person considers to be reliable and of good quality even if GM yet.

Such products approved in the U.S. are strictly regulated in Europe, where only two genetically modified seed culture is authorized.

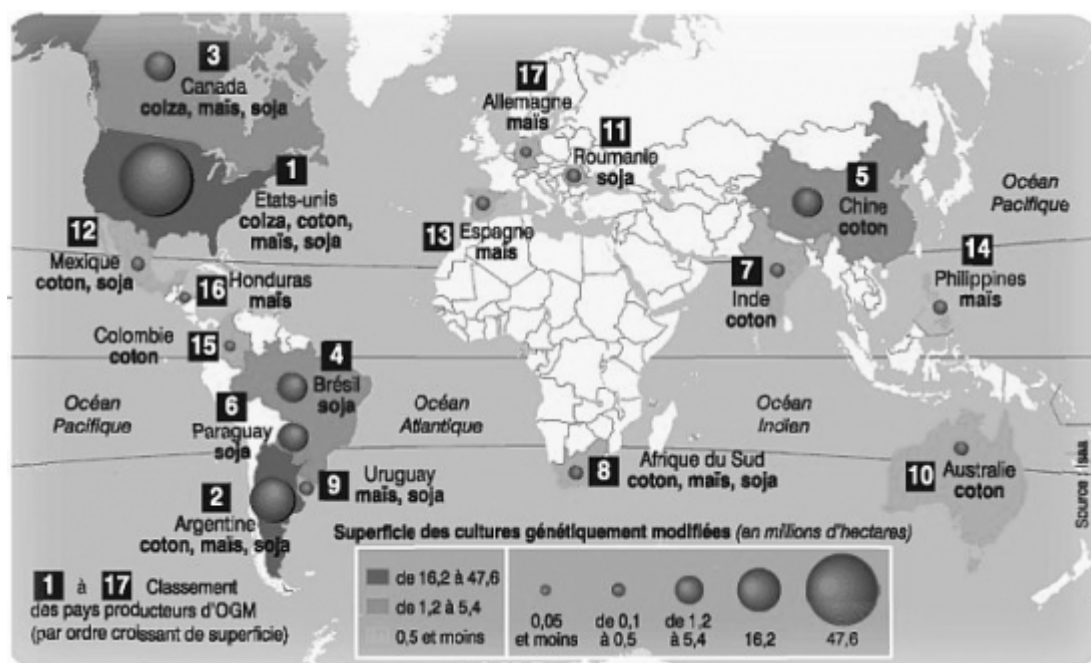


Figure No. 1. Examples of GM crops

Source: [www.antena3.ro](http://www.antena3.ro) (Processed data for a report conducted by Television Antena 3, Bucharest, Romania)

<sup>4</sup> Gheorghiu, A., Gheorghiu, A., Spânulescu, I. (2009), *Target market risk evaluation*, Proceedings of the International Conference on Econophysics, New Economics & Complexity - ENEC-2009, Editura Victor, București, ISSN 2065-2550, p. 113

## CONCLUSIONS

The concept of the food safety (from the qualitative point of view) and healthy, wholesome comprises a variety of elements. We are talking about a food that contains all nutrients and biologically active substances of which man needs for maintaining health and preventing the occurrence of chronic diseases in addition, talking about a food without pesticides, toxins, chemical contaminants, physical contaminants and pathogens such as bacteria and viruses that can cause disease.

According to the EU and the World Health Organization, quality and food safety must be based on the efforts of all those involved in the complex process that starts with their origin and ends with the moment you arrive on the table.

This topic is timely and will remain in a continuing debate both pro and cons of different ways it affects individuals and creatures across the globe and the quality of environment, quality of life in one word.

## BIBLIOGRAPHY

1. Burghilea, C. (2010), *Securitatea și protecția consumatorului*, Revista Amfiteatru Economic, ASE București, Facultatea de Comerț, Anul XII, Iunie 2010, Nr. 28, ISSN 1582-9146, pp. 476-489
2. Gheorghiu, A., Gheorghiu, A., Spânulescu, I. (2009), *Target market risk evaluation*, Proceedings of the International Conference on Econophysics, New Economics & Complexity - ENEC-2009, Editura Victor, București, ISSN 2065-2550, p. 113
3. Mărcuță, L., Mărcuță, A., Tindeche, C. (2013), *Analysis of Romanian GDP during crisis, 20th International Economic Conference - IECS 2013*, „Post Crisis Economy: Challenges and opportunities”, Sibiu, România
4. [www.agerpres.ro](http://www.agerpres.ro)
5. [www.antena3.ro](http://www.antena3.ro)
6. [www.bioresurse.ro](http://www.bioresurse.ro)
7. [www.marketwatch.ro](http://www.marketwatch.ro)



# MONITORING AGRICULTURAL PLANTATIONS WITH REMOTE SENSING IMAGERY

SLAVE CAMELIA<sup>1</sup>, ROTMAN ANCA<sup>2</sup>

**Abstract.** *In agriculture, a major benefit of satellite registrations crop is forecast problem by following up the development of crops in certain phenological stages. Then, the registration of pest attacks made possible intervention in the early stages of this phenomenon. Development of the Earth's surface registration techniques in different spectral bands, specialized for certain components of the environment. Such as those of the last LANDSAT and SPOT satellites were able to follow some aspects of forestry and agriculture.*

**Key words:** *Agriculture, agricultural plantations remote sensing spectral bands, vegetation*

## INTRODUCTION

Remote sensing refers to the registration activities, observation and perception of distant objects or phenomena. In remote sensing, sensors are not in direct contact with objects or phenomena observed. Electromagnetic radiation is normally used as a carrier of information in remote sensing. Product sensing system is usually an image representing the scene observed. An important step is the image analysis and interpretation necessary to extract useful information from the image. In a narrower sense, remote sensing refers to the science and technology necessary for acquiring information about the Earth's surface (eg, the earth's surface, oceans and atmosphere) using sensors on board of vehicles (airplanes or balloons) or space (satellites and space shuttles) platforms. Depending on the scope, remote sensing can be divided into

- (1) Remote sensing satellite (when used satellite platforms)
- (2) Photography and Photogrammetry (when used to capture visible light images)
- (3) Thermal remote sensing (when used infrared spectrum)
- (4) Remote sensing using radar (when using microwaves), and
- (5) LIDAR (laser pulses are used when they are transmitted to the ground and the distance between the sensor and the ground is measured based on the return time of each pulse).

## MATERIALS AND METHODS

The spectral response of vegetation is identified by the reflectance's spectral curve and depends on the health of the vegetation. The curve has an allure that has maximum and minimum. Minima in the visible portion of the spectrum are due to the chlorophyll pigments in leaves. The chlorophyll absorbs energy in the wavelength range 0.45 to 0.67  $\mu\text{m}$ . Therefore vegetation health is perceived as green. Vegetation absorbs blue and red rays and reflects them on the green.

The reflection is performed in the wavelengths' band of nearby infrared from 0.69 to 1.3  $\mu\text{m}$ . During this time plants reflects 40-50% of the incident energy on them. Foliage reflectance is achieved in the range of 0.7 to 1.3  $\mu\text{m}$ , and depends on the internal structure of the leaf. Measurement of reflectance in this range allows the identification of different species of plants. The absorption and reflectance of plants in the visible and infrared range depend on the chlorophyll content, the amount of water and surface morphology of the plant. These spectral properties are expressed in the form of vegetation proper index VNIR (visible and near infrared (Fig. 1). Spectral reflectance of vegetation increases very steeply as the wavelength increases above 0.7  $\mu\text{m}$  and 0.75  $\mu\text{m}$ . This change in spectral reflectance is called feeding edge (Elachi and Jakob, 2006).

<sup>1</sup> Slave Camelia sef lucrari dr. ing, University of Agronomic Sciences and Veterinary Medicine - Bucharest Romania, [camellia\\_slave@yahoo.com](mailto:camellia_slave@yahoo.com)

<sup>2</sup> Rotman Anca lector dr, University of Agronomic Sciences and Veterinary Medicine - Bucharest Romania

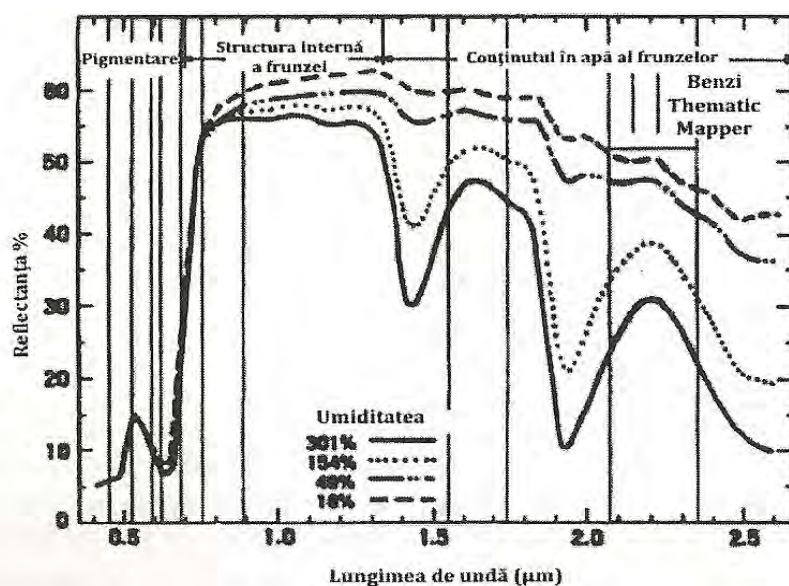


Fig 1 Spectral reflectance curve by wave length

Landsat satellite images. Landsat 7 functions from the date of 15<sup>th</sup> April 1999. The Satellite's system of sensors and images' quality were improved. On this mission were kept the bands: 1 to 4.5 and 7.

The ETM (Enhanced Thematic Mapper) included a new panchromatic band with a greater width, containing a part of the visible spectrum (especially green and red) and near-infrared part of. Its spatial resolution is 14.25 inches (15cm). Thermal infrared 6 band was improved by doubling the spatial resolution from 58.5 cm to 60 cm.

All of these eight images are converted into 8-bit system, this allows a number of digital processing operations. The system also includes the "dual-mode solar calibration" in line with internal calibration lamp. This led to a radiometric calibration accurate to 5%.

Satellite sources are qualitative. By making a combination of Panchromatic type using the panchromatic and a combination of three bands. These have as results natural colours or false colours images with a resolution of 15 cm (Lillesand, 2004).

The geographic interpretation of Landsat satellite sources. I have chosen Mostiștea Valley micro-region.

Mostiștea Valley micro-region is located in the north-western region of the Calarasi district, near by Ilfov district.

The geographic coordinates of the area are given by Tamadaul Mare village which is the northern part of the micro-region, located on the 26° 57' west longitude meridian and the 44° 47' parallel and the southernmost part determined by Frăsinet village coordinates, located on the 26° 44' west longitude meridian and the 44° 15' north latitude parallel. The micro-region is about halfway between Bucharest and Calarasi.

The facts were obtained from USGS for year 1991 and 2011.

The interpretation involves the analysis of spectral bands individually and compared to Mostiștea micro-region.

The purpose is related to the choice of the relevant tape and combination bands in the overall analysis of the landscape or the level of components such as plants, water, settlements and land use.

The combination of 1-2-3 bands includes the following bands (blue, green, red) (Fig 2 and Fig 3). Therefore, it results a combination called also in natural colours. Band 1 (blue) allows highlighting vegetation. Band 2, in this band is the best chlorophyll spectral response from vegetation. Band 3 of the visible spectrum is red.

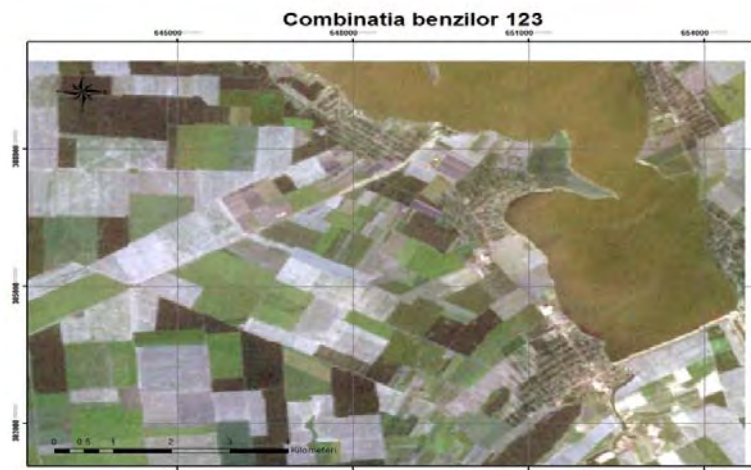


Fig 2 Combination of bands 123 in year 1991

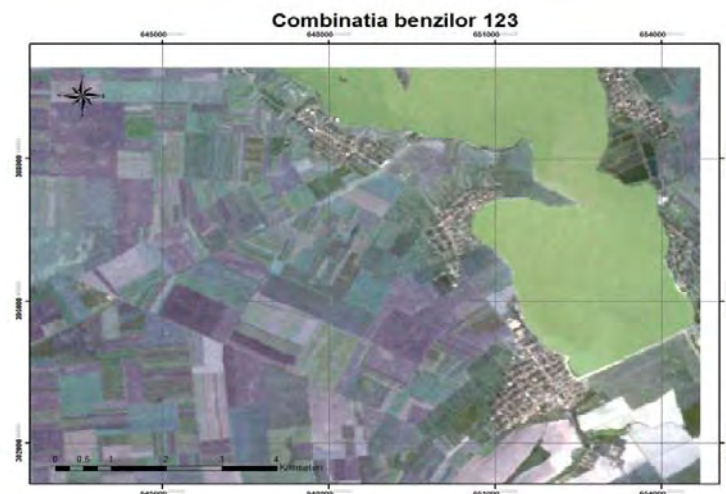


Fig 3. Combination of bands 123 in year 2011

The combination of 2-3-4 bands. This combination involves the placing nearby infrared. The nearby infrared vegetation response can provide information about the status of vegetation.

The image's analysis provides information on: - the separation of green fields land without vegetation (Fig. 4 and Fig 5 )

There is seen clearly delimited the lake area as an effect of the nearby infrared band in which the radiation is absorbed by water to surface.

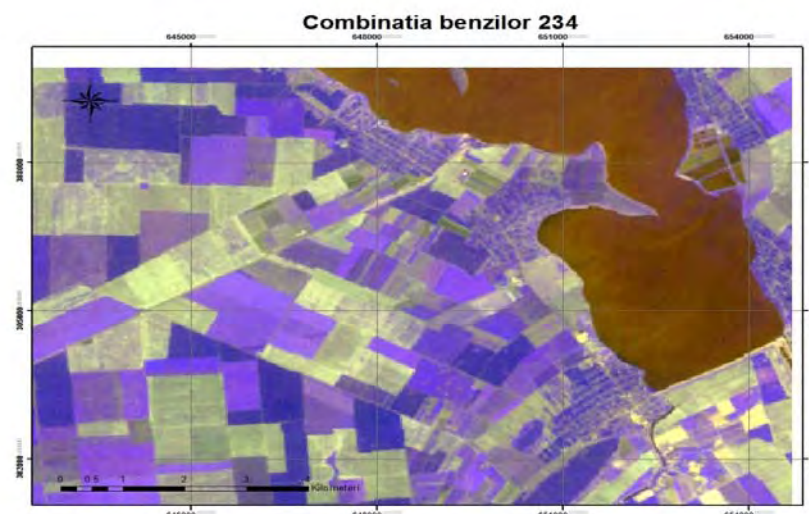


Fig 4 Combination of bands 234 in year 1991



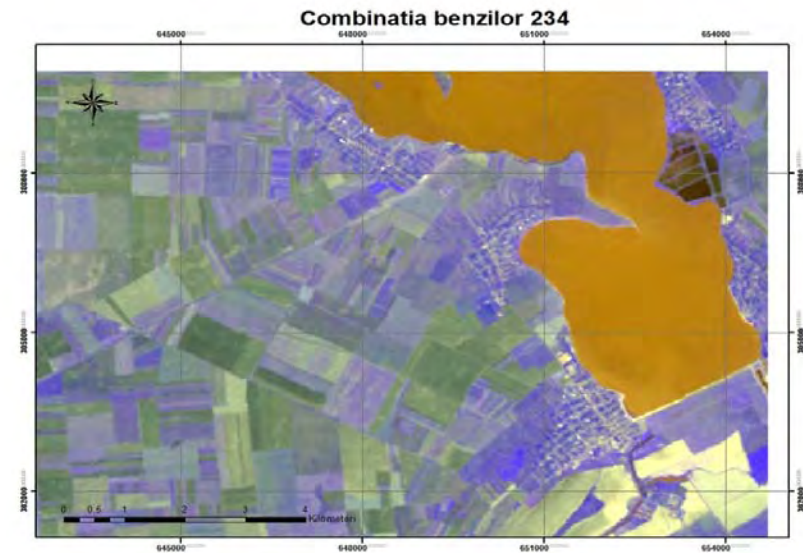


Fig 5 Combination of bands 234 in year 2011

The combination of 4-5-3 bands. In this combination we have two infrared bands, and in this combination the spectral signature of vegetation is strong.

The combination of the signal is the best for identifying the vegetation (Fig 6 and Fig 7).

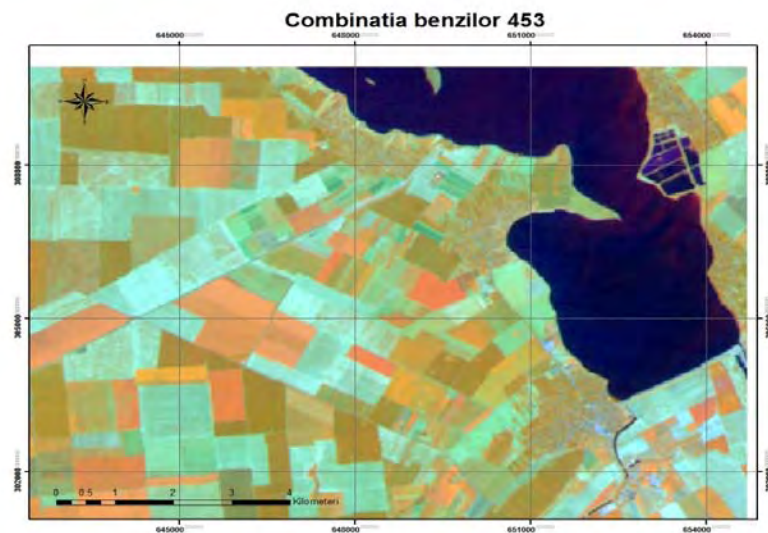


Fig 6 Combination of bands 453 in year 2011

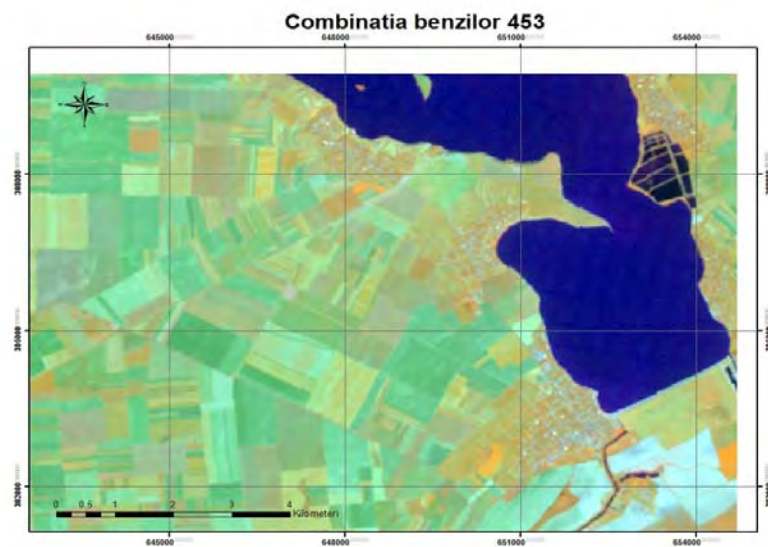


Fig 7 Combination of bands 453 in year 2011

**Histogram** The expression of the image's contrast results from the distribution percentage method of the spectral value or the numbers assigned to the pixels, which form the spectral satellite image for each spectral band separately. The graphic is represented by a rectangular axes system, which characterizes each spectral band image level. Histogram analysis shows a maximum concentration of dark pixels in the image. An image has a unique histogram but the reverse is not true in general since a histogram contains only radiometric and no spatial information. A point of some importance is that the histogram can be viewed as a discrete probability distribution since the relative height of a particular bar, normalised by the total number of pixels in the image segment, and indicates the chance of finding a pixel with that particular brightness value somewhere in the image (J. Richards and Xiuping Jia, 2006).

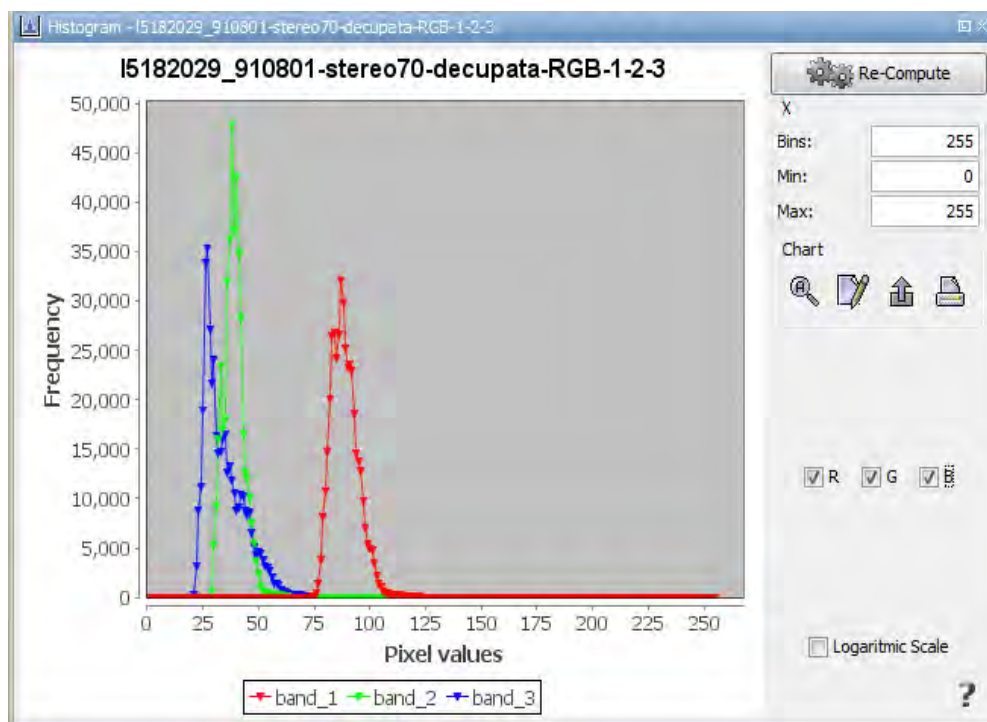


Fig 8. Histogram RGB 123

Also for comparison the Mostistea surface we used and satellite remote sensing imagery provided by SPOT in 2007 (Fig.9).

The current plans for SPOT – 5 envision the replacement of the SPOT – 4 HRVIR systems with high resolution (HRG) instruments. These system are designed to provide higher spatial resolution ( 5m, instead of 10m ) in panchromatic mode; 10m ( instead of 20m ) resolution in the green, red, and near – IR bands; with 20 m resolution maintained in the mid – IR band due to limitations imposed by the geometry of CCD sensors used in this band. The panchromatic band used will return to the spectral range employed in SPOT – 1, 2 and 3 (0.51 – 0.73  $\mu\text{m}$  ). Also envisioned is the provision of resolution panchromatic data by combining two 5-m resolution images shifted along track and sampled every 2.5 m.

It is also envisioned that SPOT – 5 will incorporate envisioned that SOPT – 5 will incorporate a high resolution stereoscopic (HRS) instrument. The HRS instrument will incorporate fore and aft stereo data collection and facilitate the preparation of digital elevation models (DEMs) at a resolution of 10 m on a global

The use of SPOT HRV and HRVIR data for various interpretative purposes is facilitated by systems combination of multispectral sensing with moderate spatial resolution, high geometric fidelity and the provision for multirate and stereo imaging.

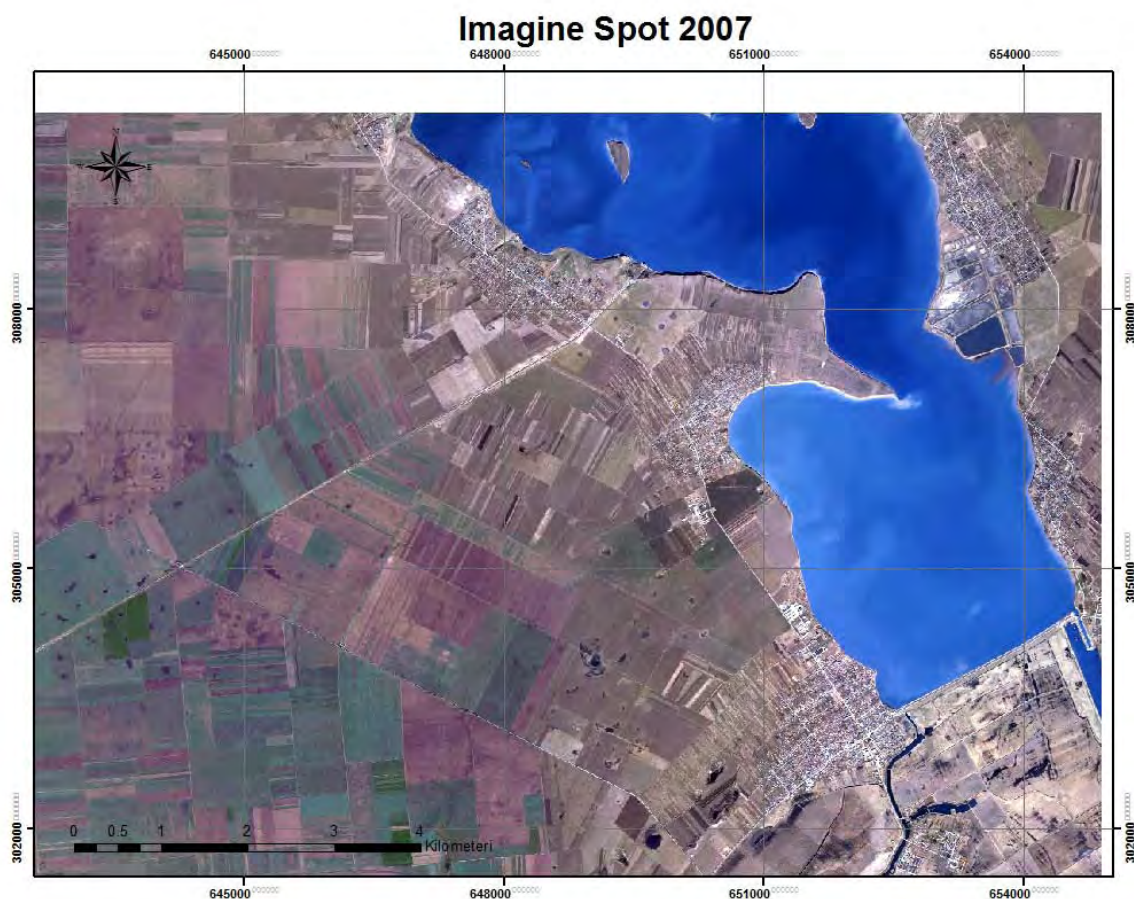


Fig 9. Spot images in 2007 Mostistea area

## CONCLUSIONS

Within this framework were three combinations of spectral bands analyzed for studying vegetation. The optimal combination was made so that the spectral behaviour of the studied area. The bands choice must be made depending of the soil type, climate and vegetation.

In combination 1-2-3 is observed that the separation of vegetation is very poor.

In combination 2-3-4 is the infrared band and we can separate green fields depending on the type of vegetation which covering the land.

Combination 4-5-7 shows the best combination of existing differences in the studied crops in area Mostistea.

To study terrestrial phenomena are chosen images under favourable weather conditions without clouds. The visual interception for assessing crops status is more difficult than intercepting the visual image of the crops type. It is also difficult to identify the different effects produced by disease, insects' attacks, and nutrient deficiency because of the variety of plants, plant maturity, the rate of planting soil or various colors. Some problems of interpretation may arise after dry periods, so interpretation must be done on images that are acquired in a short time after rain.

## REFERENCES

1. Elachi C and Zyl van Jakob (2006) – *Introduction to the physics and techniques of remote sensing* – 2th edition , John Wiley and Sons New York
2. Richards John and Xiuping Jia (2006)- *Remote Sensing Digital Image Analysis – An Introduction* 4<sup>th</sup> edition, Edition Springer Berlin
3. Lillesand Th, (2004) – *Remote sensing and image interpretation* , 4<sup>th</sup> edition, John Wiley, New York



# SOME ELEMENTS OF ECONOMIC EFFICIENCY OF BIOLOGICAL TREATMENT TO COMBAT CORN BORER (*OSTRINIA NUBILALIS* HBN) IN THE CONDITIONS OF TRANSYLVANIA

FELICIA MUREȘANU<sup>1</sup>, VOICHIȚA HAȘ<sup>2</sup>, MIRCEA IGNEA<sup>3</sup>

**Abstract:** The paper is a synthesis of the results obtained during 1998-2010, on the effectiveness of biological (*Trichogramma* spp.) and chemical treatments (different insecticides) in reducing the attack of *Ostrinia nubilalis* Hbn. to the corn genotypes created at The Agricultural Research and Development Station Turda. Among *Trichogramma* species used, a good efficacy in reducing attack of *Ostrinia nubilalis* was presented by *T. maidis* (80.0 %) and *T. evanescens* (78.0 %) - 3 applications. The applications with these species of *Trichogramma* to maize crops should be done at a distance of 6-7 m / row and between rows, in order to allow a uniform dispersion and a high degree of parasitizing eggs of corn borer. The biological treatments with *T. maidis* made to corn hybrids created at SCDA Turda, had reduced significantly the corn borer attack, recording production increases from 4.0 to 11.0 %. The basic conditions for achieving high efficiency in reducing the attack of *Ostrinia nubilalis*, with *Trichogramma* spp. are: conducting applications at optimal moment and ensuring optimum densities correlated with the density of the pest and chemicals used (*Decis Mega 50 EW*, *Calypso 480 SC*) had reduced the attack frequency significantly and very significantly, their efficacy in this regard was between 87-90 %. From the analysis performed through the economic effect of biological and chemical treatments to combat corn borer (*Ostrinia nubilalis*) resulted certain economic advantages using the method of biological control with *Trichogramma* spp., both in terms of reducing costs per hectare and the production growth produced. Thus, the species of this entomophage used, *Trichogramma* spp., constitutes in a way a "new generation of biological insecticides", that does not pollute and is used to combat the over 500 species of pests in the order *Lepidoptera*.

**Key words:** *Trichogramma* spp., *Ostrinia nubilalis* Hbn., biological treatments, economic efficiency.

## INTRODUCTION

In the maize crop, due to not complying with the crop hygiene measures, application of incomplete or incorrect crop technologies, it creates optimal conditions for maintaining of an old pest, but in actuality, corn borer (*Ostrinia nubilalis* Hbn.) in crops over the economic limit of damage. In the recent years, an increasing of population of this pest occurred, recording in many areas of Transylvania (west, northwest, centre of the country), an attack from 27.1 to 97.3%, which resulted in direct damages, by significantly reducing of the productive potential, and indirect, by breaking and fall of plants, appearing diseases as: Fusarium, blight and mechanical harvesting is performed with great difficulty; this information has been received from the farmers in those areas.

To combat this pest, or reduce pest populations below the economic threshold of damage (ETD), "the integrated management of plant protection" must accompany us, which means: selective methods of protection, increasing the role of agro-technical and biological measures, permanent control of hazardous agents and keeping them under ETD, environmental protection and conservation of biodiversity in nature. Under the pressure of pollutants, not complying with the crop hygiene measures, the integrated control concept is required, consisting, in this case, in using of *Trichogramma* spp. (MUREȘAN, 2000; 2001; ÖZTEMİZ et al., 2001 FURLAN, 2001) and of different selective products for useful fauna (PONS et al., 2000; VOS, 2004). This paper is a synthesis of the results obtained in a long time period (1998-2005), on the effectiveness of biological (*Trichogramma* spp., biological products) and chemical treatments (different insecticides) in reducing attack of *Ostrinia nubilalis* Hbn. to corn genotypes created at SCDA Turda.

<sup>1</sup>PhD Eng. MUREȘANU Felicia, SR I, Agricultural Research and Development Station Turda, e-mail: [diabrotica22@yahoo.com](mailto:diabrotica22@yahoo.com)

<sup>2</sup>PhD Eng. HAȘ Voichița, SR II, Agricultural Research and Development Station Turda

<sup>3</sup>Eng. IGNEA Mircea, SR III, Agricultural Research and Development Station Turda

## MATERIAL AND METHOD

At SCDA Turda in interdisciplinary collaboration between breeders and entomologists have been addressed a number of researches on the behaviour of various corn hybrids at borer attack, in the crop of genetic improvement (GIs), contest comparative crops (CCC) and orientation comparative crops (OCC).

Studies and research carried at SCDA Turda referred to:

- the influence of biological treatments with *Trichogramma maidis* on the attack of *Ostrinia nubilalis* and production of maize genotypes created at SCDA Turda; were used 10 corn hybrids (Elan, Turda 200, Turda 200 Plus, Turda Super, Turda SU182, Turda SU 210, TurdaMold.188, Turda Favorit, Turda 165, Turda 201) in three repetitions, each with two variants: untreated control and three applications with *T.maidis*, dose of 200 000 pieces / ha, administrated fractionated (50 000 + 100 000 + 50 000; a variant size was 14 square meters.;

- efficacy of the biological and chemical treatments in reducing the attack of *Ostrinia nubilalis* Hbn; for this aspect, the experiment consisted of 6 variants in 3 repetitions, according to the method of randomized blocks, the variant size being 14-square meters; the biological treatments were carried out with *T.maidis*, *T. evanescens*, *T. dendrolimi*, the launching dose being 200 thousand pieces / ha, divided doses: first release -50 000, the second - 100 000 and the third -50 000 pieces / ha; the chemicals with the products Decis Mega 50 EW in dose of 0.25 l / ha and Calypso 480 SC in dose of 0.15 l / ha.

Both chemical and biological treatments have been applied starting with the occurring of the first adults of corn borer registered at sex pheromone traps, repeating every 8 days. The observations made have been related to the frequency of the attack of *Ostrinia nubilalis* and production obtained, which were carried out at harvest.

Calculation methods used were: chi-square test (X<sup>2</sup>) and analysis of variance. *Trichogramma spp.* biological treatments were analyzed in terms of their economic effect compared with chemical treatments with the product Calypso 480 SC.

## RESULTS AND DISCUSSIONS

At the 10 maize hybrids created at Turda, after 3 applications with *Trichogramma maidis*, the corn borer attack was significantly and very significantly reduced, depending on the hybrid tolerance to pests (Fig. 1). Reducing attacks, were obtained significant production increases (Elan, Turda 200, Turda 165), distinctly significant (Turda SU 182, Turda 201) and very significant at Turda SU210 and Turda Favorit. (Fig. 2).

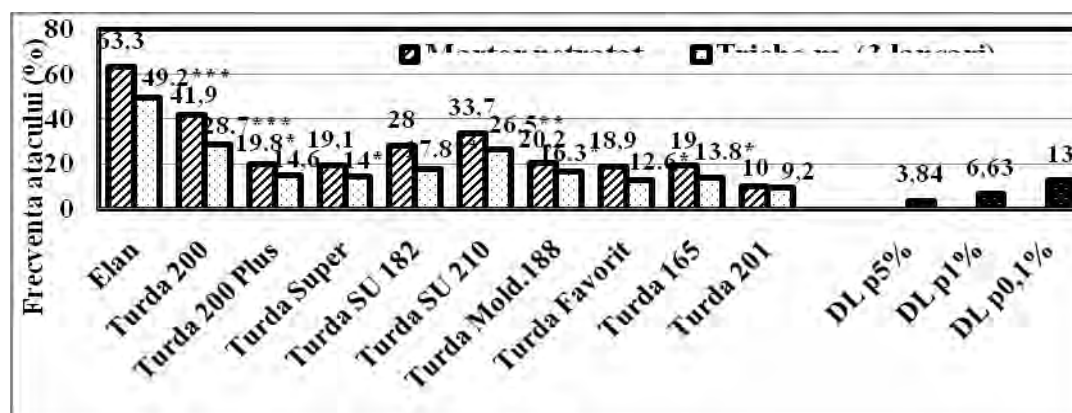


Fig. 1. The effect of treatments with *Trichogramma maidis* on the frequency of the attack of *Ostrinia nubilalis* Hbn. at maize genotypes created at SCDA Turda



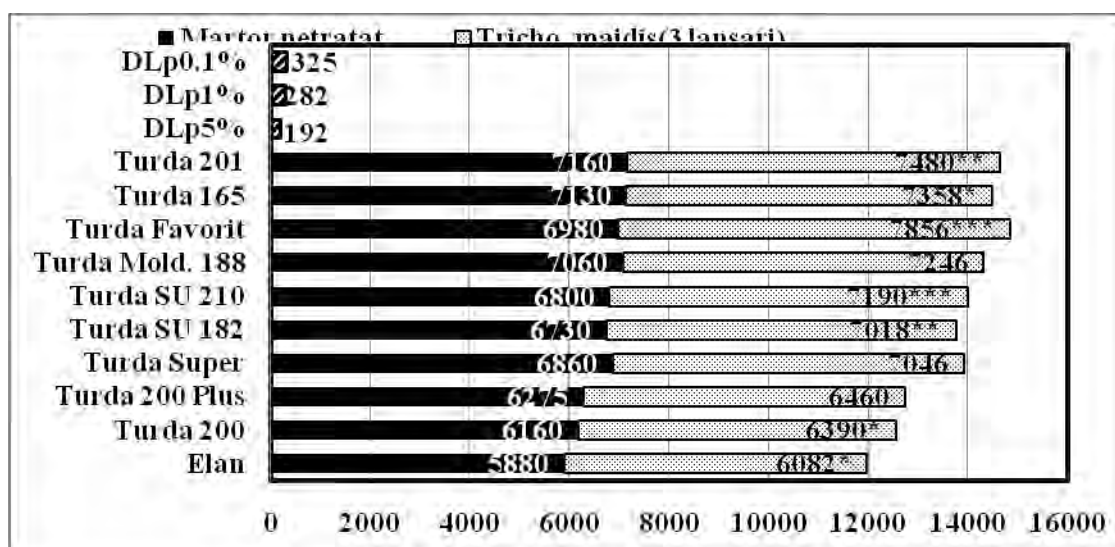


Fig. 2 The effect of treatments with *Trichogramma maidis* on the production obtained at maize genotypes created at SCDA Turda

The corn borer attack was significantly and very significantly reduced also after chemical treatments with the products Decis Mega 50 EW and Calypso 480 SC (from 59.6% at untreated control to 39.5 and 33.4% respectively). Very significant reduction was recorded at the biological treatments with the three species of *Trichogramma*: *T. maidis* very significant, *T. evanescens* distinct significant and *T. dendrolimi* distinct significant, depending on the species of *Trichogramma* specific for the pest to be controlled; in our case for the corn borer - *Ostrinia nubilalis*, *T. maidis* then *T. evanescens* were more appropriate.

Reducing the attack was confirmed by reducing the length of galleries from plants, which in the case of treatments with *T. maidis* were very significantly reduced (from 9.5 cm to 2.7 cm), the non-existence proof of corn borer larvae, the egg being parasitized by the parasite before the larvae hatching. (Fig.3). Production increases were obtained in the variants treated with Decis Mega 50 WG product (0.25 l / ha) and Calypso 480 SC (0.15 l / ha), significant and very significant, compared to the untreated control (2, 6 to 7.0%). (Figure 4).

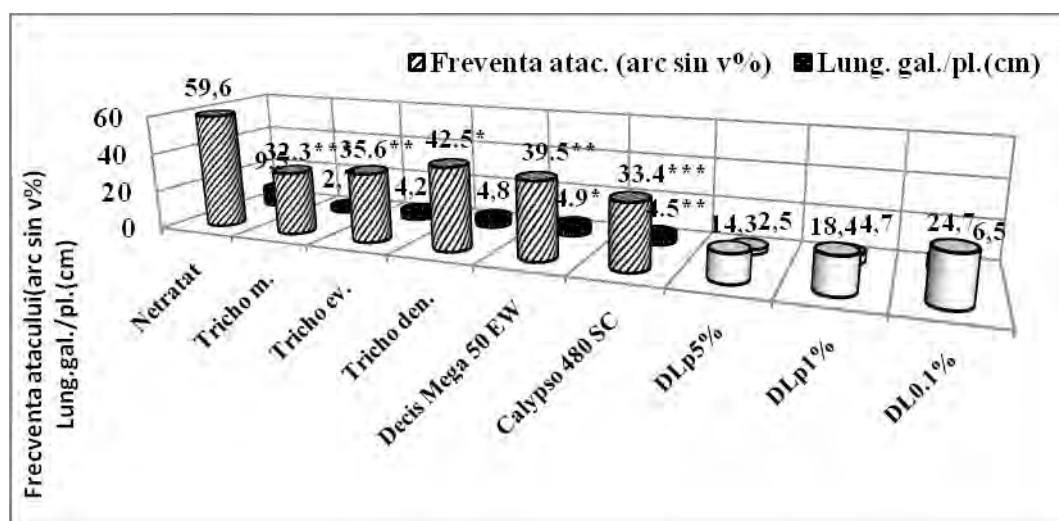


Fig. 3 The influence of biologic and chemical treatments on the attack frequency (%) of *Ostrinia nubilalis* Hbn. and of the lengths of galleries (cm) in the corn plants

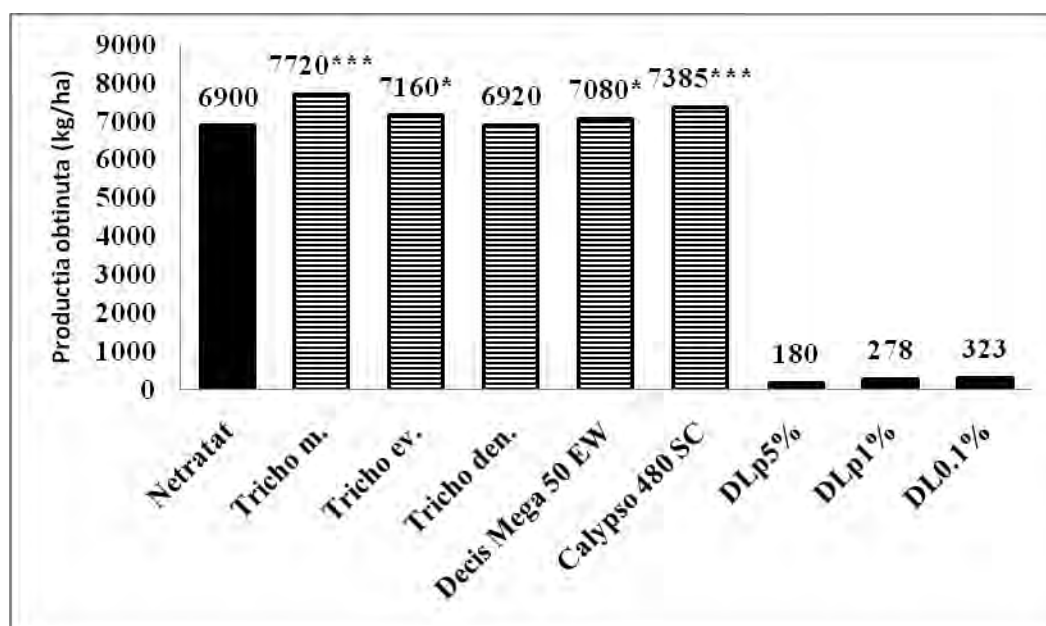


Fig.4. The effect of biological and chemical treatments on the production obtained (kg/ha) at SCDA Turda

From the economic calculation made based on the results obtained in maize crop experiences with the method of biological control, the parasite *Trichogramma spp.* and the chemical method with the insecticide Calypso 480 SC, at cost of 2012, resulted in certain economic advantages in using the method of biological control, both in terms of reducing costs per hectare and production of the production growth realized. Thus, total expenditures incurred by biological treatment were 1.124 lei / ha, representing 51.3% compared to chemical treatment, the costs for this treatment being 2.190 lei / ha. (Table 1).

Table 1

Costs with the method of combating per hectare / variants

Method of combating	Expenses/ha/technological sequence			Total lei	
	Mechanized works (lei)	Manual works (lei)	Materials and supplies (lei)		
Biological	-	198	926	1.124	-
Chemical	328	62	1800	2.190	1.066

Also, the effect of biological control to combat corn borer, materializes through the achieved production growth, compared to chemical control; this production increase obtained is justified compared to chemical treatment with the insecticide mentioned, because the pest does not reach in the corn stalk and / or cob, because the parasite *Trichogramma* destroys the pest egg before the larvae hatch and enter the corn plant. (Table 2).

Table 2

The effect of treatments on the grains production for an average production of 4000 kg/ha

Method of combating	Production gain (%)	Returns in absolute production gain (kg/ha)	Average absolute production gain obtained (kg/ha)		Average value of the production gain obtained (lei/ha)	
Biological	3,2 – 12,5	228-876	552	220	6.072	2.420
Chemical	2,6 -7,0	180-485	332	-	3.652	-

According to calculations resulted that by the biological treatment, the quantity and value of production obtained is superior to that obtained by chemical treatment, which is materialized by

220kg/ha, ie 2,420 lei / ha; is recommended to use entomophagous treatment where possible, resulting in certain economic benefits and more.

## CONCLUSIONS

Among the species *Trichogramma* used, a good efficiency in reducing the attack of *Ostrinia nubilalis* was presented by *T. maidis* (80.0%), followed by *T. evanescens* (78.0%) - 3 applications. The applications with entomophagous in the maize crops should be carried out at a distance up to 8 m / row to enable an uniform dispersion and a high degree of pest.

- Biological treatments with *T.maidis* performed at the corn hybrids created at SCDA Turda, have reduced very significantly the corn borer attack, recording production increases from 3.2 to 12.5% at most hybrids, and after chemical treatments with the products mentioned the production increases were significant, but with lower values (2.6-7.0%) than after biological treatments.

- Basic conditions for achieving high efficiency in reducing *Ostrinia nubilalis* attack, with biological method, respectively *Trichogramma spp.* are: currently conducting applications at the proper moment and ensuring optimum densities correlated with the density of the pest.

- The total expenditures incurred by biological treatment were reduced very significantly compared to those with chemical treatment, resulting also that, by the biological treatment, the quantity, quality and production value obtained is greater than that obtained by chemical treatment; besides the economic benefits, the application of entomophagous in different agro biocenosis for 3-4 consecutive years, lead to their accumulation in those agrobiocenosis, thus changing the ratio with the pests to combat in their favour, managing that populations pest to be controlled and kept below the economic threshold of damage.

## BIBLIOGRAPHY

1. FURLAN, L.,GIROLAMI, V., PAVONIA,A.,BIANCHI,M.( 2001).*Ostrinia nubilalis* population leveles in North Eastern
2. Italy: long period data and practical considerations. Proceedings of the XXI IWGO Conference and of the VIII
3. DSM,(21),365,Venice, Italy.
4. MUREŞAN Felicia.( 2000). Investigations the efficacy of biological and chemical methods against the pests of maize with reference to ECB (*Ostrinia nubilalis* Hbn.) in Western of Transylvania. Proceedings of the VII the European Congres of qaaDSM, (8),335, Venice, Italy.
5. ÖZTEMİZ, S., KORNOSOR,S.( 2001). The effect of different irrigation system on inundative release of *T. evanescens* Westwood (*Hymenoptera: Trichogrammatidae*) against *O. nubilalis* Hubner (*Lepidoptera: Pyralidae*) in the Mediterranean Region of Turkey. Proceedings of the XXI IWGO Conference and of the VIII DSM, (8),333, Venice, Italy.
6. PONS, X., EIZAGUIRE, M.( 2000). IPM on maize and winter cereals in the North – Eastern Spain.Proceedings of the VII
7. the European Congres of Entomology,97), 202, Salonic, Greece.
8. VOS, J.( 2004 ). IPM knowledge transfer-current developments and needs in farmer training for IPM implementation. Abstract-IWGO and DSM Conference, (2),64, Engelberg, Switzerland.

# THE INFLUENCE OF SOME TECHNOLOGICAL FACTORS ON PRODUCTION OBTAINED FROM THE AUTUMN WHEAT GROWN IN THE SYSTEM WITH MINIMUM SOIL WORKS AND THE ECONOMIC EFFICIENCY OF CROP TECHNOLOGIES

MIRCEA IGNEA<sup>1</sup>, FELICIA MUREȘANU<sup>2</sup>, FELICIA CHEȚAN<sup>3</sup>

**Abstract:** *This paper aims to address the problem of achieving autumn wheat production and how technological factors influence the realization of production. It was considered choosing the most efficient technological variants of crop. To this scope we compared, in the experiment, the conventional soil works system (with ploughing, seedbed preparation, fertilizing, seeding) and soil minimum works system or conservative works system. The results led us to conclude that the highest yields are obtained in the conservative system of works, economically feasible yields and that are obtained using a minimum works technology, in which the crop protection is ensured by seed treatment, 2 or 3 treatments per vegetation when productions of 4500-5000 kg / ha are obtained, with reduced expenditures by 9.3 -16.2%, compared to conventional technology.*

**Key words:** *soil minimum works system, conservative agriculture, sustainable agriculture, cultivation technology, autumn wheat.*

## INTRODUCTION

The soil minimum work systems have become in the last twenty years a constant concern in Romanian agriculture they could be a viable alternative to sustainable farming system. Currently, the conservative works define extremely varied processes (Gush et al., 2008). Between classical or conventional farming system (with ploughing, seedbed processing, sowing) and conservative farming system (no tillage) where intervention on soil is minimal, there is a lot of tillage methods specific to certain conditions work, endowment with equipments or even tradition, all aimed at preserving soil characteristics.

For this reason it was considered necessary to study comparatively the conventional crop system of autumn wheat with minimal tillage system, in the situation of fertilization differentiated, complex treatments with fungicides, insecticides and foliar fertilizers, under a five-year experiment. The advantages of this culture system are: reducing or even eliminating soil degradation, increased soil fertility, better soil water management, reducing production costs. Principled in the conservative technology (no tillage) do not interfere with the soil starting with precursory crop harvesting until sowing the next crop, thus the soil is kept covered all year round; the winter rug made naturally from precursory plants debris and weeds from spontaneous flora has the role to protect the soil of water or wind erosion or by thaw and snowmelt during the winter.

The winter protector rug can be destroyed after by herbicides. This mode of intervention is the best environmental option for annual crops. (CARLIER et al., 2006). Integrated control of weeds, pests and diseases is made primarily with pesticides with low environmental impact. (NAGY, 2007).

This paper focuses on how technological factors contribute to the achievement of production and economic efficiency of the technologies used, the problem being studied in a complex experiment, in five years of study.

---

<sup>1</sup> Eng. Ignea Mircea, SR III, AGRICULTURAL RESEARCH AND DEVELOPMENT STATION TURDA; mircea.ignea@yahoo.com

<sup>2</sup> PhD Eng. Mureșanu Felicia, SR I, AGRICULTURAL RESEARCH AND DEVELOPMENT STATION TURDA

<sup>3</sup> PhD Candidate Eng. Chețan Felicia, SR, AGRICULTURAL RESEARCH AND DEVELOPMENT STATION TURDA

## MATERIAL AND METHOD

The experiment conceived and conducted to S.C.D.A. Turda includes two ways of soil works, a conventional classical system (with ploughing, soil preparation, fertilization and seeding) in parallel with the conservative ("no tillage" with seeding directly into precursory crop stubble), in a crop rotation of three years, in wheat-soybean-corn rotation with experimental versions that include technological measures that contribute to vegetation control of the experiment plants, namely: fertilization and treatments. It was cultivated the wheat variety Ariesan (created at SCDA Turda), which although is not a very new variety, had good reputation in conditions of production and has a slight genetic polymorphism, which makes it easily adaptable to harsh conditions of raw land cultivation.

The experiment was performed in three repetitions; was seeded at 18 cm spacing and seeding depth set at 5.5 cm. The seed was treated with fungicides Yunta 246 FS: 2 l / t.

Experimental factors:

1. A – the soil tillage system - two gradations (A1-conventional tillage system; A2 - "no tillage" system)
2. B - experimental years - 5 gradations (B1-2008; B2-2009; B3-2010; B4-2011; B5-2012)
3. C - fertilization system - two gradations (C1- fertilization simultaneous with seeding with N40P40; C2 - basic fertilization simultaneous with seeding with N40P40 + N50P30 at the resumption of vegetation)
4. D – the treatments system - 4 gradations. (Table 1)

Weather conditions in the years subject to experimenting:

Generally, monthly temperatures were higher than the multi-annual averages during the wheat vegetation. Only in 2008 was closer to a normal year though temperatures were higher during the wheat vegetation in 2008, also. The monthly temperatures, expressed through multi-annual averages were higher in the most months of the vegetation period of wheat. The heat also (above 32°C) had an important role in lowering production these being of 25 days in 2012.

In terms of precipitation in 2008, a normal year, 2009 was an exceptionally dry year and 2010 was very rainy. They have been followed by 2011, a dry year with a drought that installed in August 2011 and lasted until the end of 2012. In 2012, the wheat has hardly sprouted in March due to soil drought from the fall of 2011, followed by powerful snowing that lasted until March 2012. Generally in the summer months was installed a strong soil drought, which along with high temperatures led, in most of the five years studied, to the forced ripening.

From Table 1 it can be seen that at the experiment design was preferred a large number of treatments, for covering against pests that over-winter in soil and keeping into account that chemical treatments are the only way to control pests of the crops seeded in conservative system.

It also observes that the recipes used in treatment are complex ("tank mix") in order to combat in complex diseases, weeds and pests. The fact that is referred to the most complex treatment scheme, it was conceived with the idea to get comparable production and in the technologies with fewer treatments.

The foliar fertilizer present in each treatment was introduced in order to give plant nutrient supplements to be able to develop in the most adverse conditions of crop.

Table 1. Complex treatments applied at the autumn wheat in experiment

Phenophase/ Variant	At the resumption of vegetation (treatment 1)	Phenophase of twinning ending (treatment 2)	Phenophase of bellows (treatment 3)	Phenophase of flowering (treatment 4)
<b>D1 (4 treatments)</b>	Foliar fertilizer Agrofeed 5 kg/ha Insecticide Calypso0.1l/ha	Foliar fertilizer Agrofeed 5 kg/ha Fungicide Falcon 0.6 l/ha Herbicide Sekator 0.135 kg/ha + Esteron 0.5 l/ha + SDMA 1l/ha	Foliar fertilizer Agrofeed 5 kg/ha Insecticide Calypso 0.1l/ha Fungicide Falcon 0.6 l/ha Adjuvant Trend 0.3 l/ha	Foliar fertilizer Agrofeed 5 kg/ha Insecticide Calypso 0.1l/ha Fungicide Falcon 0.6 l/ha Adjuvant Trend 0.3 l/ha
<b>D2 (3 treatments)</b>	-	Foliar fertilizer Agrofeed 5 kg/ha Insecticide Calypso0.1l/ha Herbicide Sekator 0.135 kg/ha + Esteron 0.5 l/ha+SDMA 1l/ha	Foliar fertilizer Agrofeed 5 kg/ha Insecticide Calypso 0.1 l/ha Fungicide Falcon 0.6 l/ha Adjuvant Trend 0.3 l/ha	Foliar fertilizer Agrofeed 5 kg/ha Insecticide Calypso 0.1l/ha Fungicide Falcon 0.6 l/ha Adjuvant Trend 0.3 l/ha
<b>D3 (2 treatments)</b>	-	Foliar fertilizer Agrofeed 5 kg/ha Insecticide Calypso 0.1l/ha Herbicide Sekator 0.135 kg/ha + Esteron 0.5 l/ha+SDMA 1 l/ha	Foliar fertilizer Agrofeed 5 kg/ha Insecticide Calypso 0.1l/ha Fungicide Falcon 0.6 l/ha Adjuvant Trend 0.3 l/ha	-
<b>D4 (2 treatments)</b>	-	Foliar fertilizer Agrofeed 5 kg/ha Insecticide Calypso0.1l/ha Fungicide Falcon 0.6 l/ha Herbicide Sekator 0.135 kg/ha + Esteron 0.5 l/ha+ SDMA 1l/ha	-	Foliar fertilizer Agrofeed 5 kg/ha Insecticide Calypso 0.1l/ha Fungicide Falcon 0.6 l/ha Adjuvant Trend 0.3 l/ha

## RESULTS AND DISCUSSIONS

 Table 2. The influence of soil work system on production capacity  
at autumn wheat. ( SCDA Turda, 2008 – 2012 )

Factor	Production (Kg/ha)	Relative production (%)	Differences	Signification
<b>A : Soil work system</b>				
A1: conventional with ploughing	4247	100.0	0	mt
A2 : conservative: no tillage	4581	107.9	334	*
DL 5%	239			
DL 1%	551			
DL 0.1 %	1753			

From Table 2 it observed that the influence of conservative soil works system brings a production increase of 334 kg / ha, significant production increase, which allow us to believe that it is due to a better preservation of water in uncultivated soil and covered throughout the year with vegetation or plant debris.

Table 3. The influence of the experimental years on the production capacity of autumn wheat ( SCDA Turda, 2008 – 2012 )

Factor	Production (Kg/ha)	Relative production (%)	Differences	Signification
2008	5007	100.0	0	mt.
2009	3110	62.1	-1897	ooo
2010	4483	89.5	-523	oo
2011	4544	90.8	-462	o
2012	4927	98.4	-79	-
DL 5%		374		
DL 1%		515		
DL 0.1 %		709		

From Table 3 is noticed that the closest to normal year in Turda, considered as control, was 2008 and the yields obtained in all other years are lower with values from -1897 kg / ha in the atypical year 2009 until -79 kg / ha in 2012, when although the wheat has sprouted later, though rains in April and May helped to recover, the production being around the control value.

The influence of fertilization in the conservative tillage system reflected in the productions made, shows us that the phased fertilization represents, beside the basic one, a crucial factor in achieving a production increase of 733 kg / ha and that of statistically is very significant. (Table 4).

Table 4. The influence of fertilization on the production capacity of the autumn wheat ( SCDA Turda, 2008 – 2012)

Factor	Production (Kg/ha)	Relative production (%)	Differences	Signification
C1:N40P40 simultaneous with seeding	4048	100.0	0	-
C2: N40P40 simultaneous with seeding + N50P30 at the resumption of vegetation	4780	118.1	733	***
DL 5%		125		
DL 1%		170		
DL 0.1 %		230		

Table 5. The influence of treatments on vegetation in the two crop systems on the production capacity at the autumn wheat ( SCDA Turda, 2008 – 2012 )

Soil work system	Treatments	Production (Kg/ha)	Relative production (%)	Differences	Signification
A1:Conventional	D1	4332	100.0	0	mt
A2 :With minimum works	D1	4601	106.2	268	-
A1:Conventional	D2	4238	100.0	0	mt
A2 : With minimum works	D2	4613	108.8	375	*
A1:Conventional	D3	4203	100.0	0	mt
A2 : With minimum works	D3	4521	107.5	317	*
A1:Conventional	D4	4215	100.0	0	mt
A2 : With minimum works	D4	4590	108.9	376	*
DL 5%				269	
DL 1%				487	
DL 0.1%				1209	

Table 6. Crop technologies of the autumn wheat from experiment

Technology				conventional		conservative	
No	Work	Aggregate	MU	Np (UM/sch)	Nc (l/UM)	Np (UM/sch)	Nc (l/UM)
1	Harvesting soybean with chopping and spreading on the ground (preceding crop)	CASE IH 1680 AF	ha	15,0	21,0	15.0	21.0
2	Ploughing at 22 – 25 cm	John Deere 6620 SE + MULTI MASTER 125 T	ha	5,0	24,0	5.0	24.0
3	Basis fertilization	U650 + MA 3,5	ha	26,0	1,3	-	-
4	Disking the soil	U650 + GDU 3,4	ha	4.8	14.4	-	-
5	Working soil simultaneously with sowing	John Deere 6620 SE + HRB 403 D + GC 2	ha	9,0	9,0	-	-
6.	Direct seeding simultaneously with fertilization	John Deere 6620 SE + Gaspardo Directa 400	ha	-	-	15.0	8.0
7	Rolling the sown field	L 445 + 3 TN – 5,3	ha	15.0	2,5	-	-
8	Phased fertilization at the resumption of vegetation	U650 + MA – 3,5	ha	26,0	1,3	26.0	1.3
9	Making treatment at the resumption vegetation	L 445+ EEP 500	ha	-	-	13.0	1.6
10	Herbicide simultaneously with treatment at the phenophase of twinning ending	L 445+ EEP 500	ha	13,0	1,6	13.0	1.6
11	Making treatment in phenophase of bellows	L 455 + EEP 500	ha	13,0	1,6	13.0	1.6
12	Making treatment in phenophase of starting flowering	L 455 + EEP 500	ha	-	-	13.0	1.6
11	Harvesting wheat crop with chopping and spreading on soil	CASE IH 1680 AF	ha	20,0	19,0	20,0	19,0
12	Transport of main product	U650+ RM2	ore	8	5,3	8	5,3

We see that in case on vegetation treatments applied in conservation tillage system, the differences are significant when apply 3 and 2 treatments, the production increases being 317 kg / ha, until 376 kg / h. Combating pests and diseases was made at the right time of most powerful attack of these pests. Applying the herbicides is made when weeds are in the rosette stage, optimal for destruction. (Table 5).



To establish the comparative economic efficiency of both work technologies were reported costs to 1 ha worked in the two technologies. Have considering all treatments performed and calculated at 2012 prices of the products excluding VAT, expressing the tabular form for various technological options. (Table 6).

Working technologies are presented in Table 6.

From calculation of technologies values using 2, 3 and 4 treatments can be obtained the values from Table 7:

Table 7. Centralizing table

No.	Technological variant	No. of treatment	Value(lei)	%	Economy (%)
1.	Conventional technology	2	2097.06	100	-
2.	Technology with reduced works 1	4	2062.10	98.3	1.7
3.	Technology with reduced works 2	3	1901.53	90.7	9.3
4.	Technology with reduced works 3	2	1757.85	83.8	16.2
<b>Prices on expenditures categories</b>					
1.	Materials	Conventional technology	1755.82	100	-
		Technology with reduced works 2	1729.80	98.52	1.5
		Technology with reduced works 3	1753.92	89.6	10.4
2.	Workmanship	Conventional technology	204.74	100	-
		Technology with reduced works 2	93.70	45.8	54.2
		Technology with reduced works 3	88.98	43.5	56.5
3.	Fuel	Conventional technology	443.64	100	-
		Technology with reduced works 2	267.70	60	40
		Technology with reduced works 3	26+1.72	59	41

As seen the cost reduction of technologies used has as its source the removal of technology elements with minimal tillage system. In choosing one of the technologies studied with reduced work must choose a way of balance between output and afferent costs. Reducing expenses by 9.3-16.2% compared to conventional technology, should be consistent with maximizing the production version ie 3 and 2 vegetation treatments, technologies in that the production increase amounts to 376 kg / ha.

## CONCLUSIONS

1. Experiencing the wheat crop in two tillage systems: one conventional with ploughing, preparing seedbed, fertilized and seeding and the other one with direct seeding in the precursory crop stubble simultaneously with fertilization show us that can get almost equal productions. Slightly higher yields obtained without tillage system is due to maintaining longer the humidity level in the soil.

2. The conservative system of soil working brings a significant production increase of 334 kg / ha. The experiment being conducted for a period of five years, it appears that the influence of experimental years is very significant. It also has a great influence the fertilization system.

3. The values of mechanical technologies are substantially equal, if we refer to the technologies applied in the conservative system of works; also observe that the classical system is significantly more expensive than conservative. It also observed that there is, as price, a difference between the applied technology with 3 and 2 treatments, respectively, with a price reduction in the favour of that with 2 treatments, this due to fewer crossings and reduced material costs.

4. Cost reduction is significant up to 16.2% on total technology. The most significant reducing of fuel up to 41% and with labour up to 56.5%, these reductions being due to reduced number of mechanical works.

5. Correlating economic data with yields obtained, we can conclude that to have a good and healthy production, our opinion is the use of technological variant with 2 fertilizations and 3 or 2 treatments, depending on the year of crop and abandoning traditional technology, with the condition of strict crop rotation.

6. Depending on the requirements of agricultural year, the system of conservative agriculture keeps the soil properties, restores natural fertility and enhances water regime of soil; mulch on the soil surface protects the soil, and in the transformation process under the action of micro-and macro-organisms in the soil helps improve the soil structure (hydro-stable macro-aggregates content increases) and weed growth is slowed.

## BIBLIOGRAPHY

1. Carlier L., Vlahova Mariana, Rotar I. (2006). Reduction of soil erozion and soil carbon and nutrients losses by „reduced tillage” cultivation in arrable land. Buletinul USAMV, Cluj-Napoca, (62), 14-21
2. Guş P., Rusu T.(2008). Sisteme de lucrări minime ale solului. The V-th symposium with international participation, Risoprint Publishing House, Cluj-Napoca.(6),32-36
3. Guş P., Rusu T., Ileana Bogdan. (2003). Sisteme convenţionale şi neconvenţionale de lucrare a solului, Risoprint Publishing House, Cluj-Napoca.24-28
4. Nagy Elena, C. Nagy(2008). Influenţa tratamentelor cu fungicide asupra producţiei şi calităţii la grâu, în sistemul de agricultură cu lucrări conservative, in Buletinul Informativ al SCDA Turda: « Agricultura Transilvană » , (13),52-57, Ela Design-SRL Publishing House – Turda.

# THE PIONEERS OF THE GREEN REVOLUTION AS FORERUNNERS OF TODAY'S ECOLOGICAL AND BIOTECHNOLOGICAL REVOLUTIONS

CODRIN ȚAPU<sup>1</sup>

**Abstract:** *This paper presents the milestones of the Green Revolution, outlining its role in the development of today's sustainable and biotechnological agriculture, as well as Romanian contribution. In order to do this we used the material found in papers and books on the research in agriculture from the 1940s to the late 1980s. Current sustainable agriculture and biotechnological advancement, including the creation of genetically modified organisms could never have been possible without the Green Revolution. Reducing the height of the stalk allowed the production of high-yielding cultivars that now are and will be used and modified with genetic engineering methods in the context of a sustainable agriculture. We conclude the paper with proposing a model for the New "Really Green" Revolution.*

**Key words :** green revolution, ecology, biotechnology, plant breeding

## INTRODUCTION

The Green Revolution refers to a series of research, development, and technology transfer initiatives, occurring between the 1940s and the late 1970s, that increased agriculture production around the world, beginning most markedly in the late 1960s. It forms a part of the 'neo-colonial' system of agriculture wherein agriculture was viewed as more of a commercial sector than a subsistence one [1].

The initiatives, led by the American agronomist **Norman Borlaug** (1914–2009) – *fig. 1*, the "Father of the Green Revolution" credited with saving over a billion people from starvation, involved the development of high-yielding varieties of cereal grains, expansion of irrigation infrastructure, modernization of management techniques, distribution of hybridized seeds, synthetic fertilizers, and pesticides to farmers.

Apparently, there is a contradiction between an intensive agriculture intended to feed millions of people, like the one proposed by the Green Revolution, and an extensive agriculture imposed by the principle of sustainable development. But there is not.

Paradoxically, genetic engineering provides the means to increase production without spoiling soil or polluting it with chemicals.

That is why we think that now is the time for a Second Green revolution, a "Really Green" Revolution, which needs to be both quantitative and qualitative, providing plenty of healthy food for the world's increasing population, while preserving their environment. As Borlaug put it, you can't build a peaceful world on empty stomachs.

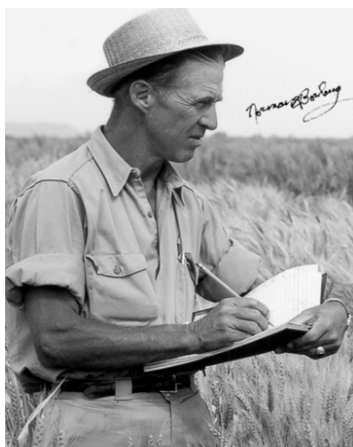


Fig. 1. **Norman Borlaug** (picture in the public domain)

<sup>1</sup> Faculty of Management, Economical Engineering in Agriculture and Rural Development, Bucharest, Romania, phone/fax: 00 40 744 6474 10; email: [tapucodrin@yahoo.com](mailto:tapucodrin@yahoo.com)

## MATERIALS AND METHODS

This paper presents the milestones of the Green Revolution, outlining its role in the development of today's sustainable and biotechnological agriculture. In order to do this we used the material found in papers and books on the research in agriculture from the 1940s to the late 1980s.

## RESULTS AND DISCUSSIONS

### The Green Revolution in common wheat

**Cecil Salmon** (1885–1975), an American biologist working in post-World War II Japan, collected 16 varieties of wheat, including one called “Norin 10”, which was very short, thus less likely to suffer wind damage. Salmon sent it to the American agronomist **Orville Vogel** (1907–1991) – *fig. 2* in Washington in 1949. Vogel began crossing Norin 10 with other wheats to make new short-strawed varieties. Vogel led the team that developed Gaines, the first of several new varieties that produced 25 percent higher yields than the varieties they replaced. Vogel shared his germplasm with Norman Borlaug, who later received the 1970 Nobel Peace Prize for his role in the “green revolution.” Borlaug publicly acknowledged Vogel’s contributions to his research [2].



Fig. 2. **Orville Vogel** (picture in the public domain)

Dwarfing is an important agronomic quality for wheat; dwarf plants produce thick stems. The cultivars Borlaug worked with had tall, thin stalks. Taller wheat grasses better compete for sunlight, but tend to collapse under the weight of the extra grain—a trait called lodging—from the rapid growth spurts induced by nitrogen fertilizer Borlaug used in the poor soil. To prevent this, he bred wheat to favor shorter, stronger stalks that could better support larger seed heads. In 1953, he acquired a Japanese dwarf variety of wheat called Norin 10 developed by Orville Vogel, that had been crossed with a high-yielding American cultivar called Brevor 14 [20]. Norin 10/Brevor is semi-dwarf (one-half to two-thirds the height of standard varieties) and produces more stalks and thus more heads of grain per plant. Also, larger amounts of assimilate were partitioned into the actual grains, further increasing the yield. Borlaug crossedbred the semi-dwarf Norin 10/Brevor cultivar with his disease-resistant cultivars to produce wheat varieties that were adapted to tropical and sub-tropical climates [2].

Borlaug's new semi-dwarf, disease-resistant varieties, called Pitic 62 and Penjamo 62, changed the potential yield of spring wheat dramatically. By 1963, 95 % of Mexico's wheat crops used the semi-dwarf varieties developed by Borlaug. That year, the harvest was six times larger than in 1944, the year Borlaug arrived in Mexico. Mexico had become fully self-sufficient in wheat production, and a net exporter of wheat [2]. Four other high yield varieties were also released, in 1964: Lerma Rojo 64, Siete Cerros, Sonora 64, and Super X.

### The Green Revolution in durum wheat

Proving the possibility of obtaining high yield cultivars from parents with low productivity

(through heterosis), [3] between 1967 and 1989, the Romanian agronomist **Zoe Țapu** (1934–2013) – *fig. 3*, working at the National Agricultural Research and Development Institute in Fundulea, developed a research program for improving winter durum wheat, in order to obtain cultivars with fall resistance and high yield, using height-reduction genes from summer durum developed at the International Maize and Wheat Improvement Center (CIMMYT) in Mexico [4][5][6].



Fig. 3. **Zoe Țapu** (picture in the public domain)

In order to achieve that, she used dwarf plants from CIMMYT, which survived to a mild winter, back-crossing them with Romanian durum wheat varieties. Repeated selection for cold resistance of semi-dwarf variants led to the creation of the first semi-dwarf winter durum wheat varieties, Topaz (1977) and Rodur (1984) [7]. This original type of wheat set the ground for further progress in durum wheat breeding in many countries.

### **Directions of the New Green Revolution**

Based on the experience of the past Green Revolution, and taking into account the advances in Biotechnology and ecology, we think that the New Green Revolution should include the following areas:

\* **Transgenic crops** is an emerging topic that has escaped science to be now a major social, economical and political issue. As a consequence, transgenic crops is a well-suited research topic for agronomists that use sociology and economics. Like all major scientific breakthroughs, there are many arguments in favor of genetically modified organisms and many arguments against their use.

\* **Adapting crops to climate change.** Developing later-maturing cultivars could greatly increase yields of maize and sorghum, because of the major effects of climate change on agriculture, that have led to shortening of the growing season in the south with higher risk of frost damage, a higher yield variability due to extreme climate events, and an increase of 50-70% of water demand in Mediterranean areas.

**Polyculture**, though it often requires more labor, has several advantages over monoculture:

- The diversity of crops avoids the susceptibility of monocultures to disease. For example, a study in China reported in *Nature* showed that planting several varieties of rice in the same field increased yields by 89%, largely because of a dramatic (94%) decrease in the incidence of disease, which made pesticides redundant.
- The greater variety of crops provides habitat for more species, increasing local biodiversity. This is one example of reconciliation ecology, or accommodating biodiversity within human

landscapes. It is also a function of a biological pest control program.

### **\*Water management**

\* Internal renewable water resources. This is the average annual flow of rivers and groundwater generated from endogenous precipitation, after ensuring that there is no double counting. It represents the maximum amount of water resource produced within the boundaries of a country. This value, which is expressed as an average on a yearly basis, is invariant in time (except in the case of proved climate change). The indicator can be expressed in three different units: in absolute terms ( $\text{km}^3/\text{yr}$ ), in  $\text{mm}/\text{yr}$  (it is a measure of the humidity of the country), and as a function of population ( $\text{m}^3/\text{person per yr}$ ).

\* Global renewable water resources. This is the sum of internal renewable water resources and incoming flow originating outside the country. Unlike internal resources, this value can vary with time if upstream development reduces water availability at the border. Treaties ensuring a specific flow to be reserved from upstream to downstream countries may be taken into account in the computation of global water resources in both countries.

\* Dependency ratio. This is the proportion of the global renewable water resources originating outside the country, expressed in percentage. It is an expression of the level to which the water resources of a country depend on neighbouring countries.

\* Water withdrawal. In view of the limitations described above, only gross water withdrawal can be computed systematically on a country basis as a measure of water use. Absolute or per-person value of yearly water withdrawal gives a measure of the importance of water in the country's economy. When expressed in percentage of water resources, it shows the degree of pressure on water resources. A rough estimate shows that if water withdrawal exceeds a quarter of global renewable water resources of a country, water can be considered a limiting factor to development and, reciprocally, the pressure on water resources can have a direct impact on all sectors, from agriculture to environment and fisheries.

### **\*The new soil management**

Some Soil Management techniques

1.No-till farming: a way of growing crops from year to year without disturbing the soil through tillage.

2.Keyline design: a system of amplified contour ripping to control rainfall run off and enable fast flood irrigation of undulating land without the need for terracing

3.Growing wind breaks to hold the soil

4.Incorporating organic matter back into fields

5.Stop using chemical fertilizers (which contain salt)

6.Protecting soil from water runoff

Possible alternative sources of nitrogen that would, in principle, be available indefinitely, include:

1.recycling crop waste and livestock or treated human manure

2.growing legume crops and forages such as peanuts or alfalfa that form symbioses with nitrogen-fixing bacteria called rhizobia

3.industrial production of nitrogen by the Haber Process uses hydrogen, which is currently derived from natural gas, (but this hydrogen could instead be made by electrolysis of water using electricity (perhaps from solar cells or windmills)) or

4.genetically engineering (non-legume) crops to form nitrogen-fixing symbioses or fix nitrogen without microbial symbionts.

**\*Protecting biodiversity.** Biodiversity loss due to industrial agriculture is a major threat to sustainable agriculture. For example, the number of bees has decreased, as they are essential to the reproduction of some crops such as blueberries. Higher biodiversity also means to control crop disease because pathogens and natural antagonists are better balanced.

**\*Alternative farming systems** involve mixing plants, as in intercropping and agroforestry. The benefits are higher overall productivity, better pest control and better ecological services. To reduce the weed seed bank rotations that include crops with different life cycles such as wheat-maize and winter wheat-sugar beet are necessary. To design and evaluate innovative cropping systems on a medium and long term basis, new methods are required combining simulation and field experimentation.

**Urban farming** is the process of growing and distributing food, as well as raising animals, in and around a city or in urban area. According to the RUAF Foundation, urban farming is different from rural agriculture because "it is integrated into the urban economic and ecological system: urban agriculture is embedded in -and interacting with- the urban ecosystem. Such linkages include the use of urban residents as labourers, use of typical urban resources (like organic waste as compost and urban wastewater for irrigation), direct links with urban consumers, direct impacts on urban ecology (positive and negative), being part of the urban food system, competing for land with other urban functions, being influenced by urban policies and plans, etc". There are many motivations behind urban agriculture, but in the context of creating a sustainable city, this method of food cultivation saves energy in food transportation and saves costs. In order for urban farming to be a successful method of sustainable food growth, cities must allocate a common area for community gardens or farms, as well as a common area for a farmers market in which the foodstuffs grown within the city can be sold to the residents of the urban system

**Vertical farming** is cultivating plant or animal life within a skyscraper greenhouse or on vertically inclined surfaces. The idea of a vertical farm has existed at least since the Hanging Gardens of Babylon. The modern idea of vertical farming uses techniques similar to glass houses, where natural sunlight can be augmented with artificial lighting.

**Ecovillages** are communities whose goal is to become more socially, economically and ecologically sustainable. Ecovillagers are united by shared ecological, social-economical and cultural-spiritual values. They seek alternatives to ecologically destructive electrical, water, transportation, and waste-treatment systems, as well as the larger social systems that mirror and support them

1. They are not government-sponsored projects, but grassroots initiatives.
2. Their residents value and practice community living.
3. Their residents are not overly dependent on government, corporate or other centralized sources for water, food, shelter, power and other basic necessities. Rather, they attempt to provide these resources themselves.
4. Their residents have a strong sense of shared values, often characterized in spiritual terms.
5. They often serve as research and demonstration sites, offering educational experiences for others.

**Eco-cities** are cities designed with consideration of the environmental inhabited by people dedicated to minimization of required inputs of energy, water and food, and waste output of heat, air pollution – CO<sub>2</sub>, methane, and water pollution. They are cities with no cars, with many parks, and large pedestrian areas.

## CONCLUSIONS

Current sustainable agriculture and biotechnological advancements, including the creation of genetically modified organisms could never have been possible without the Green Revolution. Reducing the height of the stalk and increasing pest resistance allowed the production of high-yielding cultivars that now are used and modified with genetic engineering methods in the context of a sustainable agriculture.

Along with United States agricultural scientists as Borlaug, Vogel, and Salmon, Romania had an important contribution to the Green Revolution through Zoe Tapu, who extended it to durum

wheat, with its high nutritive value in the form of pasta and good quality bread.

High-yielding varieties of durum wheat developed also using genetic modification technologies can thus be a solution of feeding millions, in the context of a sustainable agriculture.

We think that now is the time for a Second Green revolution, a “Really Green” Revolution, which needs to be both quantitative and qualitative, providing plenty of healthy food for the world's increasing population, while preserving their environment, and, in this paper, we proposed a model to this effect.

Studying the methods and work of the personalities of the past can only be to the benefit of a new agriculture designed for future generations.

## BIBLIOGRAPHY

- [1] \*\*\*"In Memoriam". Ferma 3, 2013, (118): 78. March 2013.
- [2] INCDA Fundulea - Câteva din rezultate: ameliorași genetică Retrieved 12-11-2013 from <http://www.incda-fundulea.ro/50ani/rezgen.html>
- Ceapoiu, N. (red.) (1984) *Grîul*, Ed. Academiei, p. 241
- [3] Săulescu N.N. (2003). *The Romanian durum breeding program*. In Conxita Royo and Natale Di Fonzo (Eds.) *Durum Wheat Breeding: Current Approaches and Future Strategies*, The Haworth Press, Inc., New York: 907-920.
- [4] Săulescu N. N., Ittu G., Ittu Mariana, Mustaș P. (2007) *Cinci de cenii de ameliorare a grâului la Fundulea*, Romanian Agricultural Research 24:22
- [5] Voolston J. E. *Wheat, barley, and triticale cultivars: A list of publications in which national scientists have noted the cooperation or germplasm they received from CIMMYT*, CIMMYT, 1997, p. 78
- [6] V. IONESCU-SISEȘTI. "Performance of some new winter wheat lines in comparative irrigated and non-irrigated trials." *Lucrări științifice: Agronomie* 17 (1977): 14.
- [7] Verzea M. (2007) *Fifty years of breeding in field crops at NARDI Fundulea, Romania*, Romanian Agricultural Research 24 :22



## ORGANIC FARMING IN THE CONTEXT OF THE BIOECONOMY

COFAS ELENA<sup>1</sup>, VLAD MIHAELA CRISTINA<sup>2</sup>, BEREVOIANU ROZI LILIANA<sup>3</sup>

**Abstract:** *The concept of "bioeconomy" or "green economy" is currently highly debated because it is considered to be essential for the future of the world economy. This concept seeks to find both practical solutions applicable in international affairs development environment and long-term alternatives in order to improve the quality of life and eliminate possible impoverishment of the population, due to problems of crisis you no longer are multiple solution. To have a sustainable economic development requires a joint effort between the public and private sectors, in order to separate economic growth from excessive use of resources, the main objective quality of life along with reducing the environmental and social deficit. The transition to bio-based economy implies the practice of investment policies and the connection between economic development, biodiversity, ecosystems, climate change, health and welfare in the medium and long term. These premises must be connected together to achieve sustainable development - considered the resumption of economic growth globally.*

**Keywords:** *bioeconomy, environment, agriculture, ecology, sustainable*

### INTRODUCTION

Bioeconomy is a concept that initially was discussed in specialized environments with reference to environmental management, but increasingly through sustainable development in international affairs and political discourses on environment and development. This new concern has been fueled by disillusionment caused by the malfunctioning of markets, the recent crises, particularly economic and financial crisis of 2008. But at the same time, the international community is concerned about looking for a new way forward and economic development that material wealth this not necessarily ensured by increasing environmental risks by widening social disparities and resource depletion (3). The transition to a "green economy" implies a proper concern based on knowledge, research and innovation to create a favorable framework meant to promote long-term sustainable development.

### MATERIAL AND METHODS

Bioeconomy - as independent science - science can be considered a border at the confluence of economy and ecology. One of the views of the bioeconomy is that the life of humanity can be analyzed as follows:

I. the sum of the elements of the natural environment with which one may contact the mere fact of living through knowledge or through direct action or

II. the sum of the elements that make up the social, regarded as a structure of relationships established between people in the complex process of social integration.

Current environmental problems due to the fact that the man involved - its relationship with the natural environment - laws governing economic relations between people, which put him in great contradiction with the environment. Although all laws are important bio-economy through the contribution they bring quality of life, the fundamental law of the bioeconomy is to provide a high quality living environment of mankind.

In the living environment representation lies a natural component that contains material elements of extreme importance to human existence and an artificial component, which favor - at the expense of the natural environment - was the source of imbalances recorded today scale planetary ecosphere (2).

<sup>1</sup>Lecturer doctor Cofas Elena, Faculty of Management, Economical Engineering in Agriculture and Rural Development, Bucharest, Romania, phone/fax: 00 40 744 6474 10, cofasela@yahoo.com

<sup>2</sup> Scientific Researcher III, Phd. Ec. Vlad Mihaela Cristina, I.C.E.A.D.R.-A.S.A.S., e-mail: cristina.vlad@iceadr.ro

<sup>3</sup> Scientific Researcher II, Dr. Berevoianu Rozi Liliana, I.C.E.A.D.R.-A.S.A.S., e-mail: berevoianu.rozi@iceadr.ro

By breaking down the elements of the living environment of people, they may be associated in three groups:

A. *Natural environment* (MN), which includes:

1. richness and biodiversity of the natural environment (BMN)
2. aesthetic satisfaction and comfort offered by the natural environment (CMN)
3. scientific developments arising from the natural environment (SMN).

B. *Manmade environment*(MA), which includes:

1. wealth of useful artifacts created by humans (BMA)
2. aesthetic satisfaction and comfort offered by the manmade (CMA)
3. scientific developments related to the Manmade (SMA)

C. *Social environment* (MS), which includes:

1. rich social ties that integrates human being (BMS)
2. degree of comfort and safety offered by the social environment (CMS)
3. scientific developments related to social environment (SMS)

By adding elements outlined above three relationships that define human living environment:

$$MN = BMN + CMN + SMN$$

$$MA = BMA + CMA + SMA$$

$$MS = BMS + CMS + SMS$$

## RESULTS AND DISCUSSIONS

In recent years, the idea of "bioeconomy" has been widely discussed by specialists not only green, but came increasingly sustainable development in international affairs and political discourses on Environment and Development. Adopting a common vision aimed at decoupling economic growth from the use of natural resources by limiting the extraction of natural raw materials, by reintroducing economic systems after consumption of materials through sustainable management of waste and chemicals, ensuring distribution systems and transport which have the effect of limiting emissions of pollutants and impacts on the environment and human health, all complementary or together to help improve people's health and respecting the carrying capacity of natural ecosystems, with the central objective of poverty eradication and improving quality of life.

The transition to a green economy has strong economic and social justifications. Green economy as defined by the United Nations Environment Programme report (released in February 2011) has resulted in improved well-being and social equity, while significantly reducing environmental risks and ecological scarcity (1). The transition to a green economy means policies and investments that will decouple economic growth from increased consumption of raw materials and energy intensive. A green economy can be thought of as a low-carbon economy through the efficient and sustainable use of resources and ensuring social inclusion. In a green economy, rising incomes and employment should be driven by public and private investments that reduce carbon emissions and pollution, enhance energy efficiency and resource efficiency, prevent loss of biodiversity and ecosystem services etc. Regarding the European dimension, it is known that the European Union is the promoter of global policies on transition to sustainable consumption and production, implementation of resource efficiency in order to reduce and stop the pressure on natural ecosystems. Both strategic documents - the "Danube Strategy" and the "Europe 2020 Strategy" enroll in meeting these objectives.

Through a series of factors such as infrastructure improvements through increased connectivity, environmental, socio-economic development and prosperity, improving governance at the institutional level, the "Danube Strategy" aims both exploitation of existing resources and develop new technologies and capabilities innovation in the Danube macro-region. In the "Europe 2020" initiative

included more efficient use of natural resources, important in the context of climate change and energy diversification. The strategy aims, inter alia, a number of objectives related to the concept of sustainable development, aiming trinomial "20x20x20" (reduction of greenhouse gas emissions by 20 %, raising energy efficiency by 20 % and reduced energy consumption by 20% increasing the share of renewable energy in gross final energy consumption to 20%) by 2020. Industrial agriculture system, the shortcomings accompanying tends to be replaced by "organic" ("sustainable agriculture"). It started to take a shape more clearly since the last decade in our country. Agriculture was from its inception "green", but in recent years is seeking a gricultural application and systematic vision of modern technologies.

Organic farming promotes farming through those means which provides a balance between agroecosystems and ambience and is based on the use of those means and methods offered by the company, the scientific and technical achievements that ensures high yields, consistency and quality in terms of protection environment. The farms using inputs varied, in order to achieve profitable agricultural production. For the same purpose it is necessary to apply the appropriate technical, organizational and economic. All the elements ( factors, products, technology components, components of agricultural policies etc.) act interdependent and can be assembled into a unitary so that inputs are allocated and optimally combined and products obtained in terms of economic efficiency convenient (4).

The components of a farming system is chosen and works closely with the costs and the effects it generates, aiming to ensure a positive impact on the effectiveness of each production system practiced. This system is based on the substantial investment and production cost found in the hectare (large amounts are allocated for the use of chemical for application to and control of diseases and pests etc.) and opposed, to a certain extent, in practice, system that use *organic farming*.

The main objectives to be met by sustainable agriculture are (5):

- food security (human needs for food and fiber);
- conservation of environment and natural resources on which agriculture depends;
- more efficient use of renewable resources and neregrenarabile;
- support the viability of farming and quality of life of farmers and members of society;

It is vital that the transition to sustainable agriculture to consider the need to maintain a competitive agricultural sector and economically efficient, responsive to fluctuating consumer preferences and to facilitate the development of trade in agricultural products, preserving at the same time, natural environment and resource base in the future.

According to the specialists of the European Union and experience in this area of the countries that joined before our country needs 10-15 years to the organization and practice extensive farming system, about 25 % of agricultural land, especially for training of farmers and farm equipment with appropriate material and technical base and for structuring and development of the internal market for food and agriculture, Romania's competitiveness in the EU market and important prerequisites for the development of high efficiency agriculture and strengthening the activity socioeconomic rural sector.

Organic farming is a dynamic sector in Romania, which has seen an upward trend in recent years, both in the vegetable and animal production sector. In 2011, Romania ranked 10 in Europe, with an area of 229 946 ha cultivated in organic farming system. According to data from the Ministry of Agriculture and Rural Development, the number of registered organic operators is increasing. The maximum was reached in 2012, namely 26.736 operators; compartment with 2010 the number of operators increased by 11,80 %. Of the 26.736 registered operators in 2012, 26.390 are farmers, processors 103 and the remaining traders. Figure 1 shows the dynamics of nationally registered organic operators for the period 2006-2012.

Most of these operators meet record in Suceava, their number being 4.358. Suceava is followed, in order, Caras Severin (3.754 operators), Nasaud (3.088), Alba (2.990), Iasi (1.929), Cluj (1.440), Hunedoara (1.162) and Maramures (1.010). Moreover, Suceava occupied this place every year

in the period 2007-2012, the number of operators increased by 1.693 new sign. In the same period, the amount recorded in the areas of organic farming increased from 13.844 ha to 30.817 ha, 16.973 ha respectively. Of the 30.817 ha of arable land, estimated at the end of 2012, 675 ha are occupied by arable land and 30.142 ha with pastures and meadows. The arable land in the system ecological occupy 8.8% of the agricultural area of the county, while the system comprises 18 % of the total area of pastures and meadows.

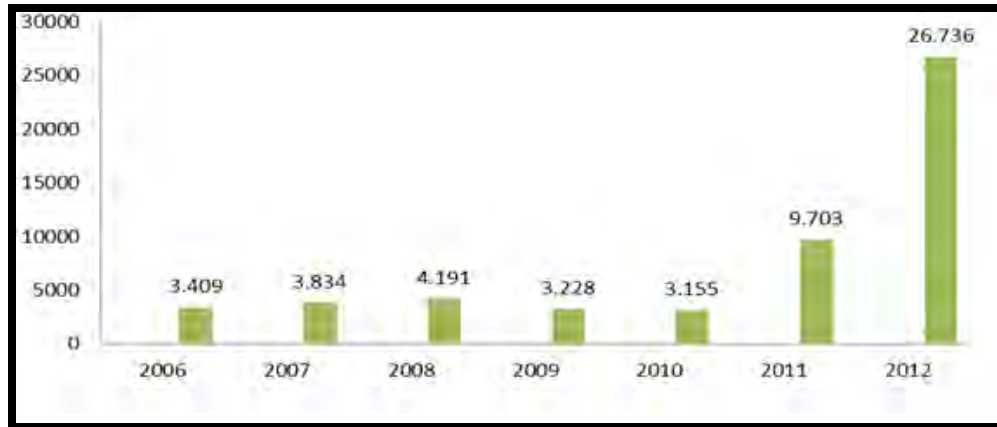


Fig. 1 Number of registered organic operators (Romania) (Source:MARD)

Regarding the share of certified organic crops in 2011, the first position is occupied by cereal grains and permanent grassland (by 34%), second place is situated industrial crops (21%), while other cultures have negligible weight, as shown in figure 2.

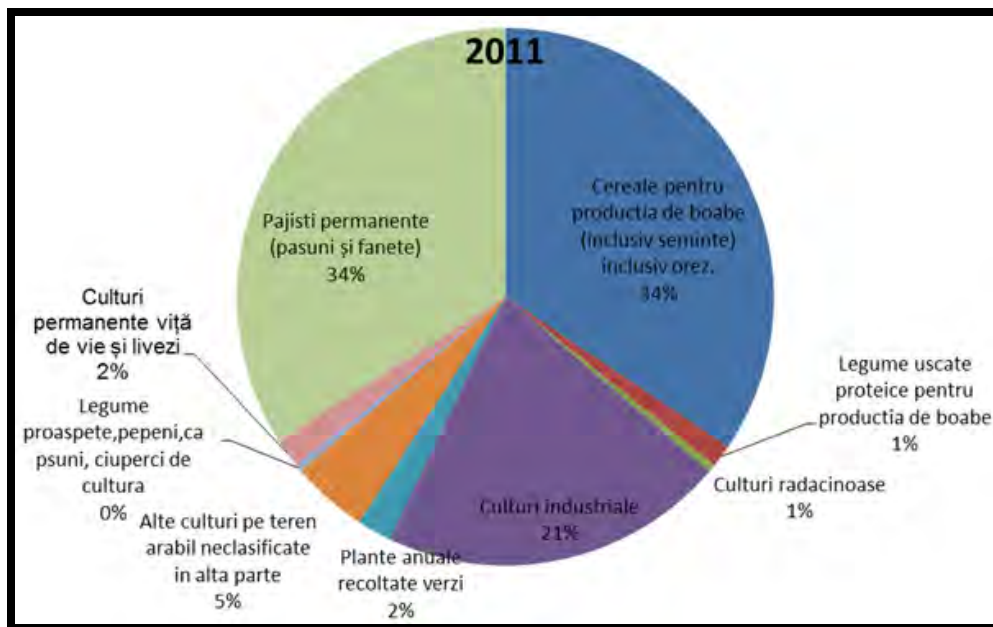


Fig.2. The share of certified organic crops, in 2011 (Source:MARD)

1. **Vegetable sector:** making a comparison between the average yield of main crops in both organic and conventional system can draw the following conclusions:

- the average crops in organic is smaller than that in the conventional system (as shown in the embodiment of figure 3 and figure 4);

- for example, white cabbage production culture medium in organic in 2011 was 15.264,9 kg/ha while in the conventional system there has been a production of 21.807 kg/ha;
- even if the average yield in organic is smaller than that in a conventional manner, the first receiving higher price advantage in the exploitation of the production.

Situation analysis for the specific applications submitted for 2012 shows that small operators in the sector of organic farming - crop production, with holdings from 0.3 to 5 ha is about 65 %. To meet the demands of supporting farm operators as associations small vegetable sector, required to maintain the system to cover the fee for inspection and certification, and continuing production, the government has proposed that the specific support to be more balanced in favor of small farm operators.

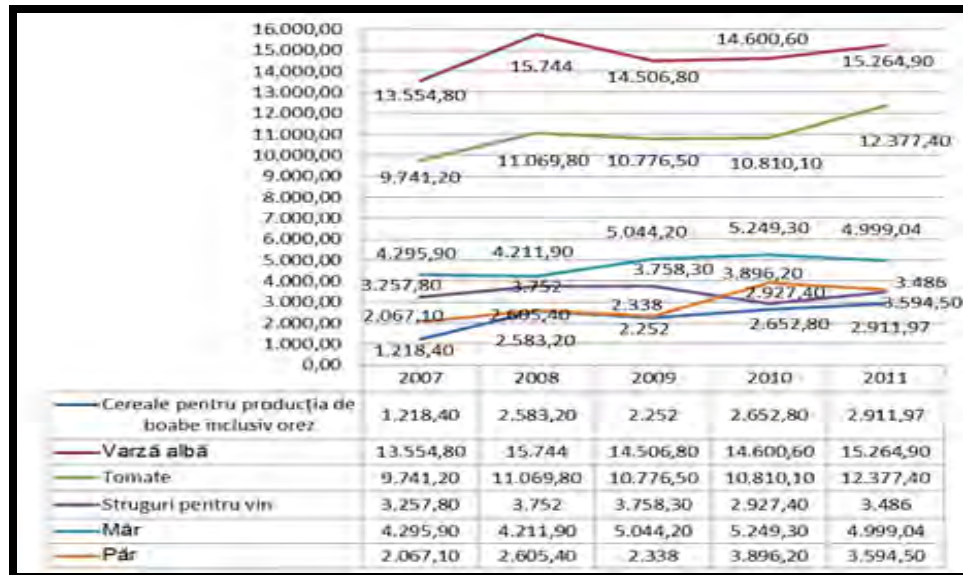


Fig.3. Average yields (kg/ha) certified in 2007-2011 (Source:MARD)

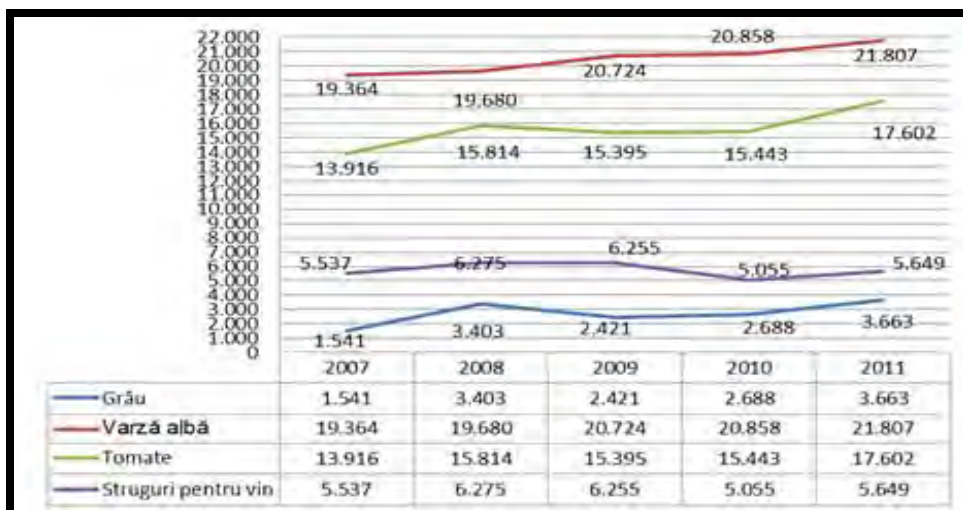


Fig.4. Conventional average yields(kg/ha)in 2007-2011(Source:MARD)

2. **The livestock sector:** as shown in figure 5, the sector has been a growing trend of livestock organically grown in large part due to the support measures coming from the state, by HG no. 759 of 21 July 2010 and the National Rural Development Programme 2007-2013 (7). However, interest in organic production of livestock is much smaller compared to the number of operators in the plant.



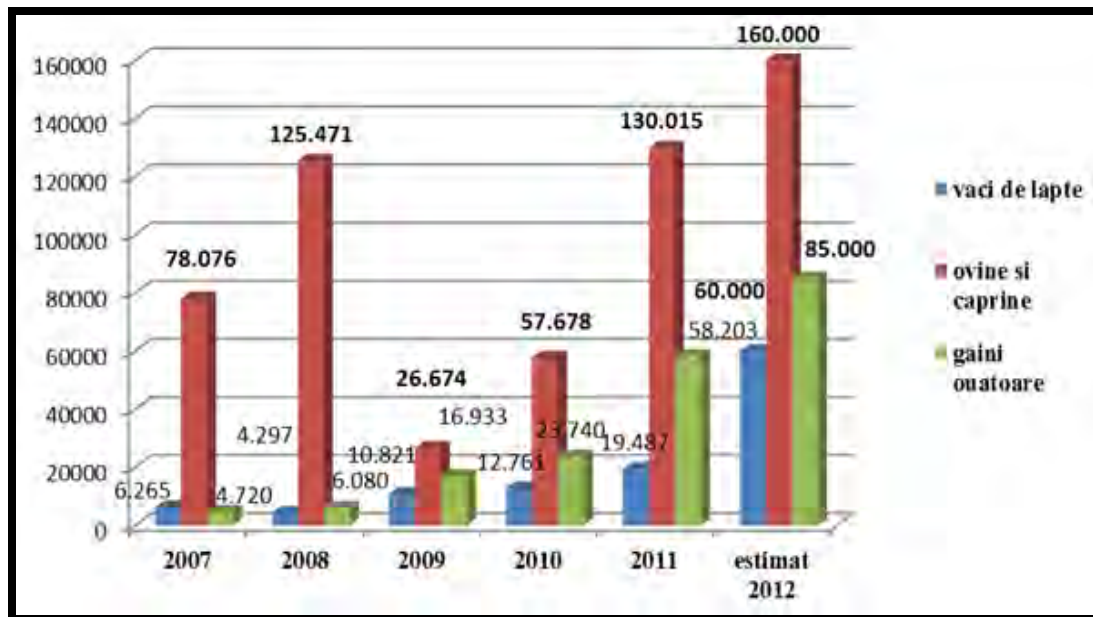


Fig. 5. Livestock(heads)in 2007-2011(Source:MARD)

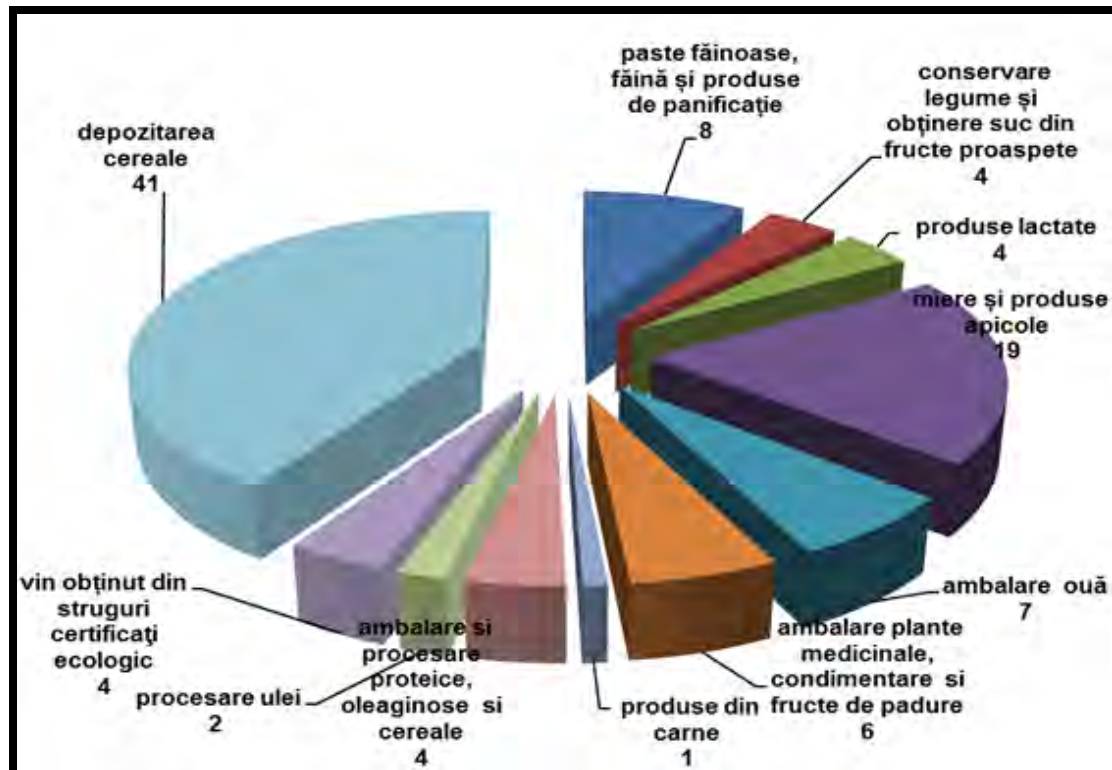


Fig. 6. Certified organic processing unit, in the year 2012 (Source:MARD)

Among the most important organic certified processing unit 103 at 2012, 41 are for storing grain, honey and bee products 19 and 8 for pasta, flour and bakery products.

In order to receive support from the state, both recipients of crop production, livestock production and those (for birds, cattle and sheep/goats) must meet the following conditions (6): a) be registered each year requesting specific support to the Ministry of Agriculture and Rural Development as organic producers;

- b) have a contract with an inspection body and certification body approved by the Ministry of Agriculture and Rural Development;
- c) hold a certificate of conformity/master certificate/certificate of conversion confirmation issued by manufacturer inspection and certification body that issued the policy;
- d) have no outstanding debts to the state budget or local government.

## CONCLUSIONS

European Union seeks a renewal of sustainable economic activity through:

- defining and implementing various aspects of the green economy;
- financial assistance and transfer of technology and know-how (especially developing countries);

- substantiate various aspects of governance for sustainable development, involving the whole of society in Europe to optimize vision of Rio and providing the necessary political support.

The new economic system based on sustainable development is likely to become the solution to overcome the environmental, economic and social, also regarding crisis management and its effects. In this respect, it is necessary to take measures using appropriate policies to create conditions to support economic growth and poverty reduction.

Green economy requires the use of natural resources, energy and new technologies with cleaner production methods in order to promote economic growth and create new jobs. Through this concept, we need to create new models of sustainable consumption and production, which does not force the ecosystem. Sustainable development requires dynamic, requiring constant change, adaptation and research, all of which are closely related to environmental conservation and proper use of natural resources. It is important to note that agricultural production has become more efficient in recent years, suggesting a new evolution in terms of satisfying the growing demand for food while reducing environmental impact.

It is clear that sustainable agriculture can not be "pure green" because you have to the fullest, but judiciously, achievements of chemistry and biology to raise crop yields. Rational use of fertilizers and other chemicals is mandatory to remember one of the main objectives of sustainable agriculture is food security, and these chemicals contribute to increased yield by about 40 % compared with other technological methods, and this cannot be neglected in the policy of population with food. But at the same time, an equally important objective of sustainable agriculture and environmental protection is therefore an ecosystem agriculture must become less polluting and energy intensive. This can be achieved by designing a type of technical progress to eliminate the shortcomings of industrial-type agriculture and to put the focus of increasing biological factor, using bioengineering and biotechnology in plant and animal growth.

Organic farming is actually synonymous with agriculture coming years, which ensures the integrity of the biosphere, maximizing the production capacity of agroecosystems and obtain good quality products. It will require a more conscientious and imaginative work and provide an abundance of food while reducing fossil energy consumption, maintaining or enhancing natural fertility of the soil, improving the living environment of human and environmental protection as a whole.

At the end of this paper we can draw several important trends that can help Romanian bioeconomy development in the context of organic farming and the use of renewable energy sources:

- Respect for the environment. Farm organization and production in harmony with nature, without an intoxicated with various chemicals, misused, or abuse, or mismanagement of animal manure.
- Maximizing profitability at farm level in terms of optimum use of available resources (financial, material and human).

- Conservation and carefully managing soil water. Most of the time farmers working in conditions of very low humidity in the soil, such as agricultural technology to preserve and protect the evaporation of water from the soil without such a n i ncreased production and significant savings for both farm and adjacent community of people.
- Strengthening agricultural land and their work effectively a re e lements tha t le ad to substantial savings both fuel and time.
- The application of appropriate technologies tillage and recording to an increase in land improvement works.
- Better planning so that activities can not be managed in crisis (lack of funding, lack of appropriate technology, lack of logistics and many other critical situations).
- Improved mechanization equipment fleet a t the farm level b rings not only a mor e efficient use them , but also to reduce fuel consumption and pollutant emissions.
- Improving nutrition in farm animals (both qualitative as well as technology) can lead to both a qua litative a nd quantitative i ncrease, especially at a di scount i ssued harm animals.
- The intensive cultivation of plants with high energy potential for providing a lternative energy resources.

## BIBLIOGRAPHY

1. ABRAHAM-FROIS, GILBERT, Economie politică, Editura Humanitas, București, 1994;
2. BĂLĂCEANU CRISTINA, DIANA APOSTOL, 2012, The sustainability approach of Romanian Agriculture, I nternational J ournal o f Academic Research i n Accounting, Finance a nd M anagement Sciences, V olume 2, S pecial Issue 1/ 201 2/, pp. 10 3-107, <http://www.hrmar.com/index.php?page=ijarafms>
3. HOLCOMBE R ANDALL G ., P ublic S ector E conomic, Wadsworth P ublishing Company, California 1998;
4. RUSU T., ALBERT I., BODIS A., 2007, Ecotehnica culturilor de câmp. Editura Risoprint, Cluj-Napoca;
5. TONCEA I., 2002, Ghid practic de agricultură ecologică. Editura Academic Press, Cluj-Napoca.
6. "Planul național de dezvoltare 2007-2013", Guvernul României;
7. „Planul National de Dezvoltare Rurala 2007-2013”.



## ENVIRONMENTAL PUBLIC GOODS SPECIFIC TO AGRICULTURE

TUREK RAHOVEANU MARIA MAGDALENA<sup>1</sup>, TUREK RAHOVEANU ADRIAN<sup>2</sup>,  
PETRUTA TUREK RAHOVEANU<sup>3</sup>

**Abstract:** *Agricultural and rural development policies have had and have a great influence in developing areas over others, by intensifying the use of land and the abandonment of others, with effect on exodus of rural population to urban areas, soil erosion, the continued decline of many species and habitats, diminishing water resources, forest fires. At the same time agricultural and rural development policies have great potential in providing public goods, which the general public becomes aware of an increasing extent. Agriculture in Romania which occupies more than 60% of the land is not only responsible for the provision of raw materials and products for the food and other industries. Moreover, it has a strong influence on the environment and the countryside and therefore the environmental quality highly depends on resource management and applied management at farm level.*

**Keywords:** *Public goods, the production of soybean, subsistence farms, optimizing the production of public goods*

### INTRODUCTION

Agriculture as a productive activity whose main purpose is the production of food and other materials, has a significant impact - both positive and negative - on the environment and the functioning of natural systems.

Some of these changes have occurred in the natural environment over time, but others are more recent. Agricultural technologies practiced in the last half of century, in response to the growing demand for food, caused agriculture to have an increased impact on the environment. These productivity gains were not without environmental and social costs. Like any productive activity in competition for limited resources, agriculture has had a negative effect on the environment because it involves the use of resources that are de facto non-renewable or at least renewable on long periods (fertile soil). There is widespread evidence of these adverse effects on the environment, such as: habitat loss, pollution of groundwater and surface water, soil degradation.

Certain forms of agricultural production have provided a wide range of social and environmental benefits to society in the form of public goods. Agricultural systems which have a low intensity offer a range of public goods to maintain and improve the farmland biodiversity and landscape, associated practices that promote good soil and water management.

Moreover, agriculture has a particular influence on economic and social public goods such as development of dynamic and prosperous rural communities.

### MATERIAL AND METHOD

The paper aims to answer the following questions:

- What is the demand and supply of public goods in agriculture?
- How do we define public goods at soybean crop in this context?
- How are public goods provided by agriculture in Romania?

---

<sup>1</sup> SRII - Research Institute for Agriculture Economy and Rural Development, Lecturer PhD University Dunarea de Jos Galati, email: [turek.magdalena@iceadr.ro](mailto:turek.magdalena@iceadr.ro)

<sup>2</sup>SRII - Research Institute for Agriculture Economy and Rural Development Lecturer PhD University of Agronomic Sciences and Veterinary Medicine, Bucharest, email: [turek.adrian@iceadr.ro](mailto:turek.adrian@iceadr.ro)

<sup>3</sup> SR - Research Institute for Agriculture Economy and Rural Development, email: [turek.petruta@iceadr.ro](mailto:turek.petruta@iceadr.ro)

In our approach we conducted a research on the production of environmental goods from agriculture with emphasis on soybean crop<sup>4</sup>. A key role is to know the level of support for the production of public goods in Romania, and knowing the status of implementation of rural development measures for the period 2007-2013 in the provision of such goods.

The main responsibility is coming from the NRDP 2007-2013 Axis II aimed at maintaining and improving the quality of rural areas by promoting sustainable management of both agricultural land and of the forest land. It is also concerned the animal breeding sector, particularly through the promotion of higher standards of animal welfare (table no. 1).

Table 1. Financial support on Axis II in 2007-2013

Measures		
<ul style="list-style-type: none"> <li>➤ Support for disfavoured mountain areas</li> <li>➤ Support for disfavoured areas - other than mountain</li> </ul>	<ul style="list-style-type: none"> <li>➤ Agro – environmental payments</li> <li>➤ Animal welfare payments</li> </ul>	<ul style="list-style-type: none"> <li>➤ First forestation of agricultural land</li> <li>➤ First forestation of non – agricultural land</li> <li>➤ Nature 2000 payments on forest land</li> </ul>
<b>1100.9 million Euro</b>	<b>1151.3 million Euro</b>	<b>229.4 million Euro</b>

Source: National Rural Development Programme 2007-2013

We specify that the purpose of Axis II will be achieved more easily by **organizing training courses and providing well-focused consulting services, as well as stimulation of awareness of local communities in order to raise awareness of the need for environmental protection.**

There are other CAP measures such as decoupled direct payments under the First Pillar of the CAP, which made a substantial contribution to the income of farmers. The large number of farms benefiting from these payments can provide public goods and some of them can rely on these payments to maintain their economic viability, allowing them to continue working to provide public goods further. Other farms while benefiting from these payments may not be providing public goods or even cause environmental degradation.

Measures not directly focus on the provision of public goods, which may have a positive impact on the provision of public goods include:

- Training and advice: Measure 111
- Modernisation of agricultural holdings: Measure 121
- Modernization of agriculture and forestry infrastructure: Measure 125
- Payments for disfavoured areas
- Processing of agricultural and forestry products: Measure 123
- Encouragement of tourism activities: Measure 313

Linking direct payments to the standards of agricultural and environmental good practice (AEGP), helps to ensure the basic levels of public goods.

## RESULTS AND DISCUSSION

### What is the demand and supply of public goods in agriculture?

The mechanism for the **allocation of adequate public goods** is based on the adjustment of supply to demand, as follows:

<sup>4</sup> The research was conducted under the Project ADER 4.1.3. "Impact assessment of irrigated / intensive soybean crop on the balance of environmental, economic and economic-productive soil characteristics while minimizing losses of biodiversity in agro-eco-systems, in order to define the specific environmental public goods."

- Private goods are provided through the market, and demand is achieved through pricing mechanisms.
- The effective functioning of this mechanism is based on the ability of consumers to record demand for goods, and for farmers to obtain production factors in ways that enable them to obtain such goods.

Otherwise, the **public goods market cannot function** as an efficient mechanism for allocation if:

- consumers can not be easily identified and can not be excluded from the consumption of goods, whether there was a preference for such a good or was paid to provide.
- on the supply side, the farmers have no incentive to provide public goods, but they are not paid to do this.

### **Defining the environmental public goods specific to the irrigated / intensive soybean crop**

The public goods constitute a product or service that provided to an individual remains available to others at no additional expenses.

The essential features of **pure public goods** are:

- non-rivalry in consumption. This means that in the situation of individual consumption of good, does not diminish its availability for other potential consumers. In other words, it is possible a simultaneous consumption of this good.
- non-exclusion. This refers to the impossibility braking consumption by excluding some consumers to use.

If a good is provided in conditions of exclusion or its consumption is not completely non-rival, it is called mixed good or impure public good, namely imperfect.

Public goods can be found in any market economy. They are not necessarily provided only by the public sector, the private market being also involved for their insurance. When consumption of a good is non-rival, but allows excluding in the sense that there is a price that allows him access, the consumption of the public good can be considered ineffective. This is because the additional consumption generates consumer satisfaction, but that one for which must bear a price is generating dissatisfaction and even reduce utility. In this way, the public good provided by a private market does not allow to achieve the optimal level of production or consumption of that good.

The linkages, namely the interpenetration and competition between public and private sectors of public goods are obvious:

- a good can be produced both by the public and private sectors, situation in which they are competing. An example of this is public and private land fertility, suitability of climate zones offering different productions, but of quality and with different prices.
- a good can be produced only by the private sector and then it does not have the characteristics of public goods of non-rival and non-exclusive consumption. It the situation of rival goods and exclusion goods: production of sunflower, maize production, the production of wheat, etc. In these areas, the consumption of a good decreases the offer, and thus consumption for other individuals. In addition, the producer imposes the exclusion of some individuals from the consumption of goods by the price required.
- a good can be produced only by the public sector and it is a public pure good, such as national legislation, training the producers of organic agriculture, jobs in agriculture, benefiting all producers and consumers in the same way, without discrimination and restrictions of any kind.

A combination of the features of goods which can be public or private production is presented in Table 2.

Table 2. Classification of public goods at soybean crop

	<b>Exclusion</b>	<b>Non-exclusion</b>
<b>Rival goods</b>	Private goods: sunflower production, the production of corn, wheat production.	Mixed goods: land infertility, poor quality of soybeans seeds, non treatments for pest and disease control
<b>Non-rival goods</b>	Mixed goods: land fertility, favourability of zones, climate, water quality.	Pure public goods: national legislation of organic farming, land taxation, training of organic agriculture producers, consumer access to organic soy products and by-products, advertising and promotion of soy products and preparations.

Source: [www.enrd.ec.europa.eu](http://www.enrd.ec.europa.eu)

Mixed goods have characteristics of both public and private goods, they may be non-exclusionary but rival, when are offered to all consumers in the same conditions, without cost, but excess demand overwhelms them and makes them inaccessible to other users. There are also mixed goods with excluding but non-rival, when the consumer's access is hindered by practicing price or technical restrictions and thus the offer is not met by demand and goods can be consumed by other individuals.

In this classification, including of mixed goods is not rigid in time. This means that some non-rival goods can become rivals or transformations on exclusion feature can exist. For example, land fertility, that is a mixed good supporting exclusion and non-rivalry can become rival, namely private good if the land prices fall or rise, decreases or increases the demand of their sale or purchase.

Also, failure to culture soy treatments for pest and disease control, which is a good mixed non-exclusion and rivalry, can become non-rival, namely public good if it gets an organic soybean production, and consumer access is not hindered, possibly through the consumption of another product (sunflower).

A public good may become impure if it loses one of two specific conditions.

For example, the national legislation of organic agriculture makes it a public good. But charging a price for its application is a restriction by which the non-exclusion is lost and the good becomes mixed.

Sometimes, even a private good can become mixed good. For example, the soy milk offered first started free to consumers by a promotional policy, in this period is characterized by non-exclusion (price is zero) and rivalry (the consumption of some individuals reducing the available supply for other individuals).

### How are public goods provided by agriculture in Romania?

In Romania, agriculture has a large number of farms participating in a number of markets for the production of food, fibers, raw materials for energy and industrial products. Their distribution depending on the value of agricultural production is presented as follows: 73% fall in first class of economic size (<2000 Euro), 15.6% (2000-4000 Euro); 0.34% is held by large farms (over 50,000 Euro) (data processing, source NIS 2013 - "Typology and size of agricultural holdings 2010").

Farm size has different implications, such as the ability to use certain technologies of crop, labour availability and the pressure to maximize yields per hectare. They can create a mixture of positive and negative forces on the practices adopted and environmental outcomes. Small farms have a number of attributes that could lead, in principle, to the adoption of intensive management techniques. Even the intensity of production on the farm is less than average, a landscape of small farms is likely to provide a greater variety of management systems due to the large number of stakeholders and different perspectives.

The nature of agricultural infrastructure is also significant to provide more public goods, particularly biodiversity, water and soil management and landscape. Land merging involving the

creation of large parcels, economically viable resulted in major changes in the landscape in several Member States, often involving removal of land unused.

The environmental public goods differ in many respects. However, a number of characteristics of agriculture are particularly relevant to the provision of public goods, and they are:

- Coverage degree of crops and agricultural land use in a wider sense;
- Farm practices (including inputs used, plant varieties or livestock, types of machines used, etc.);
- Farm size and structure;
- Local agricultural infrastructure (drainage and irrigation).

Besides farming systems and practices, structural dynamics also influence the degree to which public goods are provided. Some systems are associated with a certain level of management, such as large grain farms, but variations can be found according to the farming system and socio-economic conditions. The agricultural infrastructure (drainage, irrigation) and roads are also important in providing a range of public goods and may constrain the management choices to an individual farm.

The size of farms in Romania shows the potential to provide environmental public goods widespread in this sector:

- There is a high level of interaction with the environment during the production process and therefore, causes certain types of land management, improving water and soil quality, helping to maintain semi-natural habitats and wildlife survival.
- agricultural production is spatially diffuse and occupies much of the land surface, which leads to an appreciation of the population, the close association between agriculture and rural areas

### **Optimum of production of environmental public goods**

The creation of public goods is a matter of collective decision. The access to public goods is free and without discrimination, but it does not mean that production and supply of public goods eventually maintenance is done with zero cost. Someone has to pay. And often not the beneficiaries of public goods, or not them in totally are those who bear the costs for obtaining public goods.

There are two ways to obtain funds for the production of public goods:

- A. voluntary agreement
- B. mandatory taxation

A. Voluntary agreement is a way of supporting material for the production of public goods, not very common in practice. The difficulty of this approach is the tendency of some individuals to hide their appraisal of the public good in order to be considered non-beneficiaries and escape of payment. When some of them manage to avoid paying the contribution, they are called illegal beneficiaries.

The voluntary agreement reflecting the unanimous will, without coercion and is the voluntary exchange model.

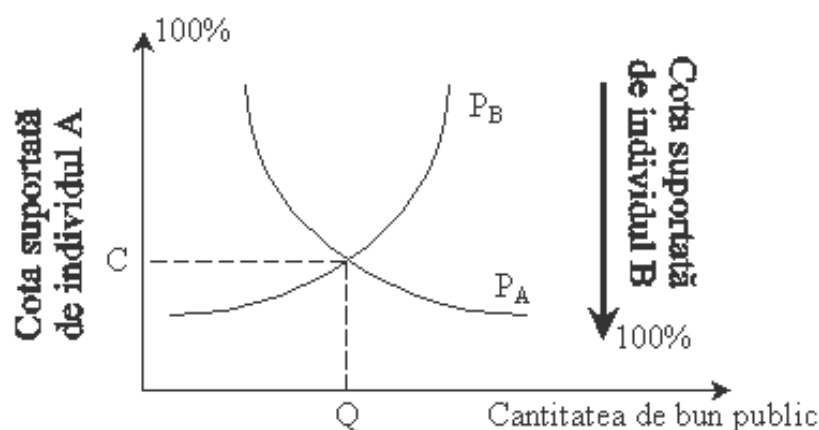
This voluntary exchange approach was presented for the first time by Knut Wicksell which showed that:

- each public good should be funded by a separate tax, known;
- unanimous consent of all members of society should be used in the decision on production (why and how) of a public good

The analysis was continued by E. Lindahl, who has developed an exchange model in which a correlation between the tax rate and the size of the public good was made. The equilibrium of this model is reached when each individual pays a fee (tax) equal to the marginal utility that gives him that good.

The voluntary exchange model can be illustrated graphically in a simplified form of a company formed by two persons A and B (Figure 1).

Figure 1. Raising funds for the production of public goods  
At the soybean crop, by voluntary agreement



In Figure 1, the curve  $P_A$  expresses the organic soybean production which the producer is willing to produce on different levels of taxation of agricultural land. It is noted that production that is willing to provide increases as the rate of taxation decreases. Also, the curve  $P_B$  reflects the individual preferences in the same manner. The higher the tax incurred, the offer, or disposition to produce of the individual B is lower.

The equilibrium conditions (rate C and quantity Q), each individual wins in the production of public goods. In economic theory, it represents a Pareto allocation namely the allocation of resources that allows the gain of at least one individual without affecting anyone else. In other words, this equilibrium corresponds to Pareto **optimum**, in which the resources and production in an economy are so allocated that may benefit a person without the other person to feel a loss.

From Figure 2, it follows that each individual consumes the most preferred public good or optimal amount of public good to a given tax share. In practice, achieving a voluntary agreement is complicated by the possibility that individuals may not express their real preferences and become illegal beneficiaries of the public good.

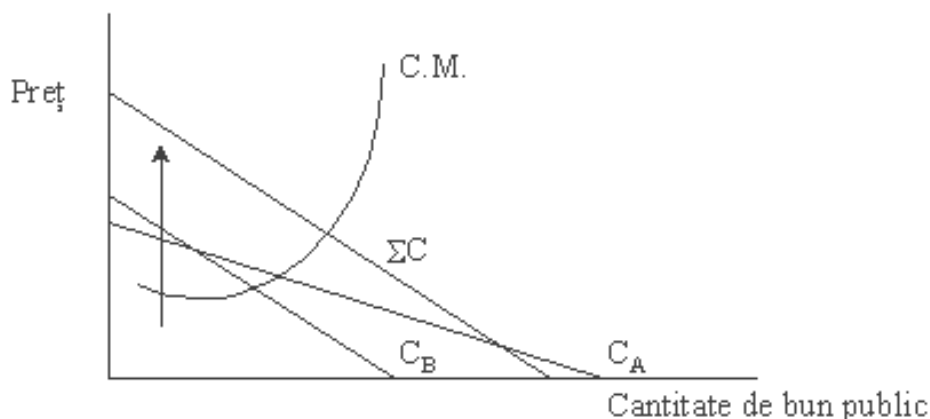
B. Compulsory taxation is a frequent way of material support of production of public goods, namely soybean crop.

Total demand for public goods is determined by summing the individual claims of members of society. For a private good total demand is obtained by summing individual horizontal applications (at different price levels gather quantities required by each person).

Instead, for a public good, the total demand curve is obtained by vertical aggregating individual requests curves, as in Figure 2.

Individual curves of individuals A and B applications, namely  $CA$  and  $CB$  are vertically summed to obtain the total demand curve  $SC$ , since non-rivalry conditions, each unit of the public good is provided to all members of society. The problem is to determine the price that society is willing to pay for each unit of public good. It is calculated by adding the prices that individuals are willing to bear to produce a public good, namely in a simplified graphic form, the amount of the price that individual A it is willing to bear and the price individual B is willing to bear.

Figure 2. Total demand for a public good



**The optimal level of public good production** is recorded when the aggregate demand ( $C$ ) coincides with the marginal cost ( $MC$ ). At this level of production, the society cost needed to supplement the public good by one unit equals the amount the society is willing to pay for it. Of course, balance is a trend that reality constantly pursues. In general, achieving this level is difficult, especially in the area where the aggregate demand can not express the real demands of individuals. Therefore, the total demand is pseudo-demand aggregated. However, in terms of some pure public goods, the agreement of individuals in relation to their production is total; is about public goods such as national legislation of organic farming, land taxation, training producers of organic agriculture, consumer access to products and by-products of organic soy.

## CONCLUSIONS

All types of agriculture can provide public goods where land is managed properly. However, there are significant differences in the type and quantity of public goods, which can be provided by various types of farm and agricultural systems. Some agricultural practices necessary for the provision of public goods are found throughout the agriculture, others are more associated with certain specific regions. Many of these management practices offer many environmental public goods simultaneously. In addition, the range of agricultural practice due to the new technology offers some possibilities for increasing the average value of the specific practice, for example, by improving energy efficiency.

The main public goods associated with agriculture:

- *Farmland biodiversity*: historically, many plants and wild animals have coexisted with the food production. Given that agriculture is very much intensified, the farmland biodiversity depends largely on areas of low intensity (uncultivated strips between crops, hedges and ponds). Farmland biodiversity also includes the rich genetic diversity of local breeds of farm animals and varieties of plants, many of them highly suited to soils, vegetation and climate in the region.
- *Water quality and availability*: The use of fertilizers, herbicides and pesticides to improve agricultural production results are common, can have a major impact on water quality both surface and groundwater. Finding ways to reduce the amount of nitrates and phosphates that end up in rivers and aquifers, will have the effect of protecting drinking water sources and contribute to the biodiversity of rivers and wetlands. As agriculture is a major user of water, particularly for irrigation of high value crops, it is at the heart of efforts to ensure a more efficient and sustainable use of water.
- *Functionality of soil*: Soil is the basis of food production. A well maintained soil has a good structure, sufficient organic matter and is resistant to erosion by wind or water. The

impact of agricultural practices can improve or degrade the functionality, but it may be preserved by the use of different methods.

- *Climate stability - Increasing carbon storage and reducing emissions of gases with greenhouse effect:* Plants can accumulate carbon dioxide very effectively and farming methods that maintain cover with permanent vegetation and plant waste are a good way of collecting carbon. Also, permanent grasslands can store almost as much carbon as forests. Such as carbon storing, the agriculture can also play an important role in reducing emissions of greenhouse gases that are responsible for global warming - not just CO<sub>2</sub>, but also methane and nitrogen protoxide.
- *Inundations and fire resistance:* the central and southern Member States, in particular well grazed, vegetation can be a significant barrier to the spread of forest fires, as well as reduce the risk of fire in permanent crops such as olive groves. Land capacity to absorb excess rainfall and flooding will become increasingly important as climate change increases flood risk in urban areas.
- *Agricultural landscapes:* agriculture shaped the distinctive rural landscapes of Europe for thousands of years and continues to do so. These range from alpine grasslands to terraced landscapes, orchards and flood plains to mosaic landscapes of mixed arable and grass. Many land use patterns and distinctive features of the local landscape are not essential to the current modern methods of agriculture. Protecting agricultural landscape diversity plays a key role in protecting the attractiveness of rural areas as a place to live or travel.
- *Vitality of rural areas:* rural areas in the EU-27 have differences in the land use. Agriculture can help to support the vitality of the countryside, by the role that the agricultural population, associated rural activities and traditions play in rural areas. Rural areas economically and socially can support further economic activity such as agriculture and forestry, which in turn are important in providing environmental public goods that many areas - such as rural tourism and the recreation - depend.
- *Food security:* while the food is a private good, a common action is needed to ensure long-term food supplies at a European or global level. To achieve this it is essential to preserve the ability to produce food sustainably in the future by maintaining the characteristics of land and other resources.

## REFERENCES

1. J. M. Buchanan, Demand and Supply of Public Goods, Chicago, Illinois, Rand McNally, 1968
2. JG Head, Public Goods and Public Welfare, Durnham, Duke University Press, 1974
3. National Rural Development Programme 2007-2013
4. Michael Howlett, M. Ramesh, Studying Public Policy: Policy Cycles and Policy Subsystems, Oxford University Press, Oxford, 1995
5. Jean-Erik Lane, The Public Sector. Concepts, Models and Approaches, SAGE Publications, London, 1995
6. L. von Mises, Bureaucracy, Westport, Arlington House, 1962
7. D. Mueller, Public Choice, Cambridge, Cambridge University Press, 1989
8. [www.enrd.ec.europa.eu](http://www.enrd.ec.europa.eu)
9. Deborah Stone, Policy Paradox: The Art of Political Decision Making, WWNorton, New York, 1997
10. 4.1.3 Sector Project ADER. "Impact assessment of irrigated / intensive soybean crop on the balance of environmental, economic and economic-productive soil characteristics while minimizing losses of biodiversity in agro-eco-systems, in order to define the specific environmental public goods" Stage III "Defining environmental public goods specific to agriculture - irrigated / intensive soybean crop".



## COOPERATIVE PHENOMENON IN EUROPEAN CONTEXT

Gabriel POPESCU<sup>1</sup>

**Abstract:** *The study aims to highlight the role of agricultural cooperatives as agents of rural development and their huge potential for socio-economic structures. The potential of cooperatives resulting from their ability to respond to the needs of economic, social, cultural and institutional outcomes in the rural development process, as well as their ability to provide mechanisms for organization, mobilization and management of material, financial and human resources. In addition, cooperatives, rural organizations and management as its own management, the ability to respond in a higher degree the needs of all members at the same time helping to increase confidence in the actions and mutual aspirations. However, European agricultural cooperatives function as business organizations, where there is capacity to act directly as agents of social and economic development. In the process of accumulation of goods, expanding the variety of services, to increase the rate of supply of performare management and increasing employment of labor unions are actively involved in the process of modernizing and improving activities in rural and / or agriculture. Through qualitative analysis of the common agricultural policy documents were highlighted: typology of agricultural cooperatives in the EU operation, cooperative models, the weaknesses of European agricultural cooperatives, the main shortcomings of European agricultural cooperatives, etc.. It was concluded that in the EU, even if co-operative principles are the same, there is no uniform legal procedure regarding agricultural cooperative structures.*

**Keywords:** *agricultural cooperatives, PAC, socio-economic structures, business organizations*

### INTRODUCTION

Historically, in Europe, the cooperative was first seen in England in 1843, where a group of 28 textile workers have joined to address the acquisition of raw materials at the lowest possible price.

Towards the end of the nineteenth century, cooperative movement abandon old models have often proved utopian. Representative were utopian theories, which ultimately proved bankrupt, of Englishman Robert Owen (1771-1858), French Saint-Simon (1760-1875) and Charles Fourier (1772-1837), and the novel Theodore Diamond (1810-1841), proponent of formulas foureriste.

Upgrading cooperative system was a reaction to the great natural "economic and social challenges of the times: farmers gradually discovered that by joining forces, and could improve access to markets and could easily fund vital activities such as procurement of inputs research, processing, selling, distribution and promotion "

In the period of preparation of the Common Agricultural Policy in 1957-1962, two bodies were created to represent the interests of farmer's cooperative entities of Member States to the decision-making bodies of the European Community.

First Professional Committee of Agricultural Organizations (COPA), which was founded in 1958 by agreement of will of 13 cooperative organizations in the 6 countries, signed the Treaty of Rome in 1957.

The second organization was the Committee of Agricultural Cooperatives in the European Union (COGECA), which was established in 1959 under the original title of the General Committee for Agricultural Cooperation in the European Community order to be "umbrella" for agricultural co-operatives countries (take the responsibility and fisheries cooperatives).

Secretariat COPA and COGECA two bodies merging in 1962, and now their name are the Confederation of Agricultural Cooperatives in the European Union.

When setting up, COGECA have six full members, their number reached 35, plus 4 members and 36 affiliated members partners. Currently COGECAs has about 660,000 employees and achieved a turnover of 300 billion Euros.

Another important aspect that favored structural plan to strengthen civil society in countries with agrarian tradition in Western Europe and not only is the branch organizations (OIPA) strong. Inter-branch organizations grouped entities in each link of the chain of value added agriculture and improving the operation of the chain. In France and Spain OIPA strengthened their market position,

<sup>1</sup> Professor Academy of Economic Studies, Bucharest

and the United States membership in such organizations is required - each relevant operator in the agro-food chain paying into "commodities representative association".

The common denominator of successful associations in these countries is the organizational goals simple, clear and measurable financial independence, but especially directed towards the market. "

## **MATERIAL AND METHOD**

The research method used is qualitative analysis by studying documents Common Agricultural Policy (CAP) and the literature that highlights the potential of cooperatives to socio-economic structures, respond to the economic, social, cultural and institutional results of rural development process, and in their possibilities to provide mechanisms for organization, mobilization and management of material, financial and human.

## **RESULTS AND DISCUSSION**

Common Agricultural Policy (CAP) treats agricultural cooperatives as agents of rural development. Such assessment is based, above all, the huge potential of these socio-economic structures. In addition, cooperatives, rural organizations and management as its own management, the ability to respond in a higher degree the needs of all members at the same time helping to increase confidence in the actions and mutual aspirations.

However, European agricultural cooperatives function as business organizations, where there is capacity to act directly as agents of social and economic development.

Motivations formation and operation of cooperative structures in Western European agriculture is based on three particular aspects:

- The need to protect farmers against competitive pressure from large companies manifested in agricultural markets;
- Need to manage on their own, but also effective to rare resources, with special reference to land resource;
- Concern farmers engaging in an active way, but also beneficial for them in their triple market relations as: producers, intermediaries and / or consumers.

### **EU official's typology of agricultural cooperatives**

From the typological point of view, in most developed countries of the EU agricultural cooperatives operate on vector integration on three distinct levels: primary, secondary and tertiary.

Another classification of agricultural cooperatives in European countries closer to the realities and conditions of Romanian agriculture, according to the specific typology addresses activities such as: marketing cooperatives, cooperative supply agricultural inputs, cooperative service organization.

And the plan area, "there are two different models for developing cooperative entities, namely:

- In the Nordic countries (Scandinavia, Germany, Belgium, United Kingdom) are a relatively small number of cooperatives, but with a greater economic value and specialized on different channels;
- In Southern Europe they are more numerous, but generally lower economic size. "

In Europe, agricultural cooperatives have proved the most efficient organizations of farmers benefiting from an array of state. Specialized studies reveal that the EU agricultural cooperative sells over 50% of total agricultural production. Moreover, statistics U.E. report the existence of more than 38,000 cooperative entities, in which the over 7 million cooperative members, out of a total of 13 million farmers.

In terms of cooperative Dame Pauline Green, President of the International Cooperative Alliance (ICA), which is the global organization of cooperative representative, he particularly appreciated in November 2012 in New York, the Europeans, because they understand that the

current economic crisis is more appropriate for workers to be paid from the surplus and not availability, even if the mass of capital decreases. "Human capital is the key to any business and cooperatives prove a harsh economic environment, the maintenance of human resources and expertise is more important long-term business success than profit conservation," said this.

### Models of cooperative

By the model found in England, were then established cooperative in Germany, Belgium, Japan, Canada, USA.

In a ranking of cooperatives in the EU by size of turnover, the top 30 places are seven cooperative in France, six in the Benelux (Belgium, Netherlands, Luxembourg), 5 from Germany, three Irish, three from Finland, two Denmark 2 Sweden 1 Austria 1 Swedish-Danish (Tables 1 and 2).

In terms of the profile of the activity, mention that, among the 10 cooperative dairy farm is situated a Swedish-Danish dairy products. The second is dealing with Danish and meat processing, and the other two are Dutch and deals with the processing of milk and dairy products. Among the ten are an Irish farm milk processing and dairy products.

**Table 1: Agricultural Cooperatives in the European Union**

No.	Cooperative name	Country	Sector
1	Metsallitto	Finland	Forestry
2	Bay Wa	Germany	Supply
3	Arla Foods	Sweden-Denmark	Milk and milk products
4	Danish Crown	Denmark	Meat
5	Coberco Friesland Dairy Foods	Benelux	Milk and milk products
6	Kerry	Ireland	Milk and milk products
7	Campina	Benelux	Milk and milk products
8	Agravis	Germany	Supply
9	Svenska Lantmanen	Sweden	Supply
10	Terrena	France	Supply
11	Union in Vivo	Finland	Grain
12	Humana Milchunion	Germany	Milk and milk products
13	Nordmilch	Germany	Milk and milk products
14	Glanbia	Ireland	Milk and milk products
15	SOCOP	France	Meat
16	Flora Holland	Benelux	Horticulture
17	Dlg	Denmark	Supply
18	Sodiaal	France	Milk and milk products
19	Irish dairy board	Ireland	Milk and milk products
20	Terre	France	Sugar
21	Valio Group	Finland	Milk and milk products
22	Bloemenveiling	Benelux	Horticulture
23	The Greenery	Benelux	Horticulture
24	Rwz Rhein-Main	Germany	Supply
25	RWA	Austria	Supply
26	Sodra	Sweden	Forest
27	Brittany	France	Multifunctional
28	Cecab	France	Multifunctional
29	Agri	France	Multifunctional

No.	Cooperative name	Country	Sector
30	Cosun-Bred	Benelux	Multifunctional

**Source:** Eduardo Baamonde Noche, *Agricultural Co-Operatives in the European Union*, Madrid, Spain, 22 November, 2005, pp. 8-10.

There are, as shown in the table above, a great diversity in the profile of activity of agricultural cooperatives, but the center of gravity on the activities of processing and marketing of milk.

In the Nordic countries recorded a large number of specialized and large associations, but with a limited number of cooperatives.

**Table 2: Top 10 agricultural cooperatives in Europe**

No.	Name cooperative	Country	Sector	Turnover (Million Euro)
1	Metsallitto	Finland	Forestry	8300
2	Bay Wa	Germany	Supply	5891
3	Arla Foods	Sweden-Denmark	Milk and dairy products	5460
4	Danish Crown	Denmark	Meat	5420
5	Coberco Friesland Dairy Foods	Benelux	Milk and dairy products	4575
6	Kerry	Ireland	Milk and dairy products	3693
7	Campina	Benelux	Milk and dairy products	3655
8	Agravis	Germany	Supplies	3380
9	Svenska Lantmanen	Sweden	Supplies	3100
10	Terrena	France	Supply	

**Source:** Eduardo Baamonde Noche, *Agricultural Co-Operatives in the European Union*, Madrid, Spain, 22 November, 2005, p 8.

In the new EU member states, the dynamics of the agricultural cooperative is upward, although the level is poor.

In terms of the legal status of cooperatives, we present further experience three EU countries, namely the Netherlands, France and Romania.

a) In the Netherlands structures established name in the field of agricultural cooperatives and cooperative association is defined as "an economic organization in which farmers or gardeners constantly working and partly conducted jointly economic activity (generally commercial function) assuming and shared risk, the idea of pursuing an economic activity as profitable as possible, while maintaining the character of the other functions of the enterprise self-sustaining farm". In fact, they are simple structures that facilitate and manage more than a relationship, usually contractual, or are supported by a non-organizational structure that has a social capital contribution represented by the participants.

b) In France using the name of the cooperative society, which is defined as "a category of society, distinct from civil societies and companies who act as producer person acting jointly in the economic field." The objective of this activity is sharing cooperative societies of farmers of all necessary means to facilitate or develop the economic activity, improve or increase business results.

c) In Romania, according to the law, cooperatives operated by cooperatives and other forms of a association of their territorial and national level. Agricultural cooperatives are defined as "associations of individuals who are considered in order to jointly exploit agricultural land owned by cooperative members, to conduct joint land improvement works, to use common machinery and plant and exploit agricultural products."

For example, in Germany there are institutes for the development of cooperatives, which provide training for cooperative members, both at national and at regional level.

Ireland is offered a degree in management support cooperatives University - National University of Ireland.

Agricultural policies in Europe given the role of agricultural cooperatives active player in the market orientation of producers, i.e. farmers.

In view of the above, cooperatives are responsible to join efforts to reduce costs to meet the necessary investments to ensure market competitiveness.

At European level, it promotes the growth of cooperatives and the alliance dimensions of national and transnational.

### **Weaknesses of European agricultural cooperatives**

- The similarities between Romanian agriculture cooperative sector, which is in a state similar to early development of European agriculture sector strongly represented in the agrarian relations in most EU countries are obvious. These similarities are due to several common elements, namely Romania and other EU countries, namely:
- Adoption by Romania, from its entry in E.U., namely January 1, 2007, the common agricultural policy and, hence, the entire set of measures, principles, objectives, contained in the *aquis communautaire*, which is led by entire agricultural sector;
- The existence of an ancient tradition which co in Romania, as in the EU, took as a starting point, but substantiation cooperative principles developed in the first half of the nineteenth century;
- Need the performance or currently cooperative Romanian agriculture is almost identical to the situation or the requirements of agriculture in Western European countries during the building of the European Economic Community in 1957;
- In addition to these general similarities, specific characteristics of the cooperative plan, identified the following commonalities:
- Nature members and farmers who own the cooperative;
- Redistribution added value obtained in the production process as a function of the activities of members;
- The principles classics as democratic principle, the social dimension and solidarity;
- Cooperatives are the main way to improve the competitiveness of many farms in the European Union whose size (if he held on a activity the production and marketing of agricultural products) could not ensure the economic viability;
- The desire to increase farm production and improve the quality of life of the cooperative members (farmers).

But these similarities and commonalities doctrinaire may lead to danger download or repeating the mistakes in the cooperative sector in Romania, mistakes or shortcomings manifested in European agriculture.

### **The main shortcomings of European agricultural cooperatives**

Development of European agriculture cooperative sector has faced constant multiple shortfalls which most often were resolved within a reasonable time but there is always the danger of their reactivation. That is why, in what follows, we try to present as a result of a broad and deep investigation and analysis of the European co-operative sector, the main drawbacks facing the sector drawbacks in Romania can be avoided if policies economic field and strategies for their implementation will be active and will take account of those recorded in the scientific endeavor.

#### *a) Realism objectives*

Most cooperatives in Western European countries operate in a free market system, competitive regime worded legislative rules and procedures specific to the capitalist economy.

Cooperative members, mostly farmers or processors, with low turnover or poor, are subject to constraints in free markets and strong pressure from companies or large corporations. Under

these conditions, their expectations towards cooperative owned by more often exceed its capacity, capital, human resources, and management.

Cooperatives vulnerability is caused, in many cases, when under conditions favoring market and prints a brisk growth pace that is not supported by its own capital capacity, financial resources attracted but usually borrowed at various banks.

Quick introduction, and massive capital borrowed exceed the management capacity, especially when the market is showing signs of fatigue, leading to increased risk factors and, ultimately, to record losses and even bankruptcy.

Under these conditions, the cooperative must promote a appropriate development speed, adapted and corresponding potential and needs of farmers cooperative.

#### *b) Conflicts between economic and social goals*

In their development, given the competitive environment in which the free market, cooperatives have emerged as genuine capitalist businesses.

In these circumstances there was a substitution of Democratic control of the cooperative members with decision-making power of managers who can take dictatorial forms. In such a situation, it is important not profit cooperative principles of equality and fair play.

Raising capital by reinvesting profits, regarded as a normal and necessary practice, may induce certain shortcomings as the share of shares owned by cooperative members in total capital becomes insignificant.

This is the equation which, amid economic motivations goals naturally leads to a decrease democratic control of cooperative members to seize power and decision-making by managers as a natural consequence, to abandon cooperative principles and replace them with the need to obtain a profitability increasingly larger.

#### *c) Subordination cooperatives political interests*

Naturally, the control exercised by its members, the cooperative has ties with the politics. There is a risk that meetings become cooperative members of political forums where the divisions of opinion may create factions or interest groups, with adverse effects on cooperative activity as it can lead to distraction of its economic and social objectives. In these circumstances, some members, often not a few, lose interest in cooperative activity, which enables a minority to take control and cooperative subordinate their own interests.

Another factor political risk arises from governmental power. Cooperative system in each country is organized and tightly controlled by the government, because it is an important instrument of state economic policy. In this situation, state control restricts democratic control of its members. Because of this situation comes from the fact that the objectives of macroeconomic policy makers and politicians do not always coincide with the interests of cooperative members.

*Addressing these conflict situations resulting from:*

- The principles which require cooperative, cooperative members prohibit political involvement in the organization;
- Approximation in a flexible and positive government policies cooperative member' interests.

#### *d) Management*

Most cases of failed agricultural cooperatives were due to constraints performed by the democratic nature of the organization's authority over its management. Not infrequently it is suggested that the General Assembly as the ultimate exercise for democratic control should reduce its own authority, leaving other bodies' subordinate executive role, respective. committees, boards and managers a wider field of action manifestation in the decision. Accepting this situation would deny cooperative principles to enable members to lead and participate in their own businesses. The solution is to increase and improve the level of participation of members in the decision of the cooperative and not its restriction.

Causes less efficient management of cooperatives should be sought somewhere else. The first question, resulting in lower standards imposed in cooperative management, standards formulated according to the specific objectives of these organizations namely activation niches debts and limited geographical area, increasing the range of services to farmers and in the Final economic efficiency, profit-margin.

The second reason, which is supported by the natural first appears in working conditions, wages and less attractive locations for managers with good results.

Solutions to this situation are, first, to reach each cooperative, and secondly, they must retrieve in governmental policies with respect to improving the training and continuing education of managers and organizations supporting increased cooperative through the CAP.

## CONCLUSIONS

In conclusion, we can say that, in the EU, even if co-operative principles are the same, there is no uniform legal procedure regarding agricultural cooperative structures. Such a situation is natural if we take into account the specific conditions and socio-economic relations in each EU Member State

Two major trends are registered cooperatives in the EU:

- Specialization and merging cooperatives aim to become actors in the single market, such as the countries of northern European Union;
- Making alliances and diversification of production cooperatives that want to conquer local markets, as in southern EU countries

In the cooperatives in the EU, there is a growing need for investment and the difficulties in making investments only from its own resources and the capital of the cooperative members.

To achieve changes impacting cooperative activity should promote training courses for members, both the Management and the rest cooperators voting.

## REFERENCES

- One. Chloupková, J., 2002, European Cooperative Movement-Background and common denominators, Unit of Economics Working Papers 2002/4
- Two. Defourney, J., 1988, from à l'économie Cooperation in Co-opertivismo Congreso, University of Duesto and the World Basque Congress, 71-88;
- Three. Laidlaw, Alexander, 1980, Co-Operatives in the Year 2000, International Co-operative Alliance, Geneva;
- April. Leadbeater, C., 1997, The Rise of the Social Entrepreneur, Demos, London;
- May. Levi, Y., Davis, P., 2008, Cooperatives as the "enfants terribles" of economics: Some Implications for the social economy, The Journal of Socio-Economics, no. 37, 2178-2188
- June. \*\*\* Law for organizing cooperatives appeared on March 28, 1929
- July. Cooperative organization \*\*\* Law of March 27, 1930
- August. \*\*\* Commission of European Communities, 23.02.2004, COM (2004) 18, pp. 1;
- September. \*\*\* Commission of European Communities, 23.02.2004, COM (2004) 18, page 10;
10. [http://www.booz.com/media/uploads/The\\_Cooperative\\_Future.pdf](http://www.booz.com/media/uploads/The_Cooperative_Future.pdf);
11. [http://www.co-op.or.jp/jccu/English\\_here/](http://www.co-op.or.jp/jccu/English_here/);



## REGIONAL DEVELOPMENT BASED ON CLUSTERS IN AGRI-FOOD SECTOR. CASE OF ASSOCIATION „CLUSTER AGRO-FOOD-IND NAPOCA”

FELIX ARION<sup>1</sup>, IULIA MUREȘAN

**Abstract:** *The paper has as main objective to observe the factors that encourage and/or restrict the development of clusters associative forms, especially on the agrifood sector. The study was focused on investigating the activity sector of an agrifood cluster in Cluj county, created as a complex swot analysis based on of relevant local, regional and national databases and official studies. The primary data were correlated focusing on the multifactorial role of associative form, which cluster is, could play for developing local and regional economy, mainly on its specific domain of activity. the results clearly revealed the importance of a cluster on the field, but, in the same time, exposed the difficulties that is has to confront in order not only to significantly contribute to the improvement of social and economic results of its members and of local and regional economy, but to stay on the business. It can be concluded that the added value which cluster can offer to its members is mainly based on gaining their trust on its ability to act as a convergence pole among them and with the third parts. the multiplier and multifunctional effect generated by cluster's activity has the potential to lead not only to obtain immediate benefits for its members, but, also, to gain collaborative relationships that will facilitate the access to the labor market and, implicitly, the access to exchange of good practices, critical for acquiring practical skills necessary for the future development of the agri-food sector.*

**Key words:** *cluster, Cluj County, cooperation, agrifood development*

### INTRODUCTION

The sector where the Association "Cluster Ind Agro-Food-Napoca" is acting is, probably, one of the most sensitive areas in the Romanian economy, as results of the complex national and European factors that, directly and indirectly, affect it. As noted in the document "The National Strategic Framework for Sustainable Development of the Agrifood Sector and Rural Area in the Period 2014-2020-2030 - Rural National Strategic Framework [5], prepared by the Presidential Commission for Public Policies for Development in Romania, the agrifood sector is currently facing in Romania major challenges whose solutions require a concentrated effort not only at the central level, but also regionally and locally. The development of modern agriculture is seen as the main element around which it has to be created the overview of the rural area, focusing, primarily, on providing a balanced diet for the population and on producing raw materials necessary for non-agricultural activities. Since the rural economy, generally, and agriculture, particularly, is a huge market for upstream and downstream industries, its development contributes to the progress of non-agricultural industries and agriculture-related sectors.

It can be observed the highly bipolarity phenomenon of the agricultural structures; the agricultural exploitations under 2 hectares representing almost three quarters of the total farms, but only 13 % of the surface; while agricultural exploitations over 100 hectares represents only 0.3 % in number, but almost half of the agricultural area of the country [2]. In these circumstances, despite the remarkable agricultural potential (Romania being the sixth among EU's countries on arable land on inhabitant), it fails to ensure its food security, due to modest agricultural productions, highly dependent on environmental factors. Another priority of the Rural National Strategic Framework [5] is to increase the quality of agricultural raw materials and their level of processing since the imports of food products increased from year to year due to shortage of supply from domestic production and of their disadvantages compared to imported similar products. The disadvantages of domestic food industry are due to the lack of strong quality Romanian recognized local brands and the lack of integration on the value chain of producers, processors, middlemen and traders.

In the Northwest Region, "Regional Development Plan for 2014 - 2020" [6] brings at regional level the analysis of the National Strategic Rural, on field of agriculture and food. The document notes that agricultural production in semi-subsistence agricultural exploitations is

<sup>1</sup> Associate Prof. Dr. Felix Arion, Lector Dr. Iulia Mureșan, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Manastur St., Cluj-Napoca 400372, Romania, e-mail: felixarion@usamvcluj.ro

experiencing barriers to trade, as agri-food processing sector are hesitant to buy from a large number of small producers, as that process would involve high transaction costs and an inhomogeneous level of the quality of the purchased raw material.

## MATERIAL AND METHOD

The territory where the cluster activates is, currently, mainly, but not exclusively, focused on Cluj County, where its members run their businesses. Anyway, the intention of the cluster is to develop in space according both to administrative modernization of Romania and to the European associative trends, so gradually expand its activity in the territory of the North-West region, to national level and, finally, to be part of associative structures as transnational clusters.

The cluster was created as a complex associative form in order to support the development of agro-industrial sector for increasing the competitiveness of the association as an entity, as well as of its every member, both on the national and international market, based on a common development strategy.

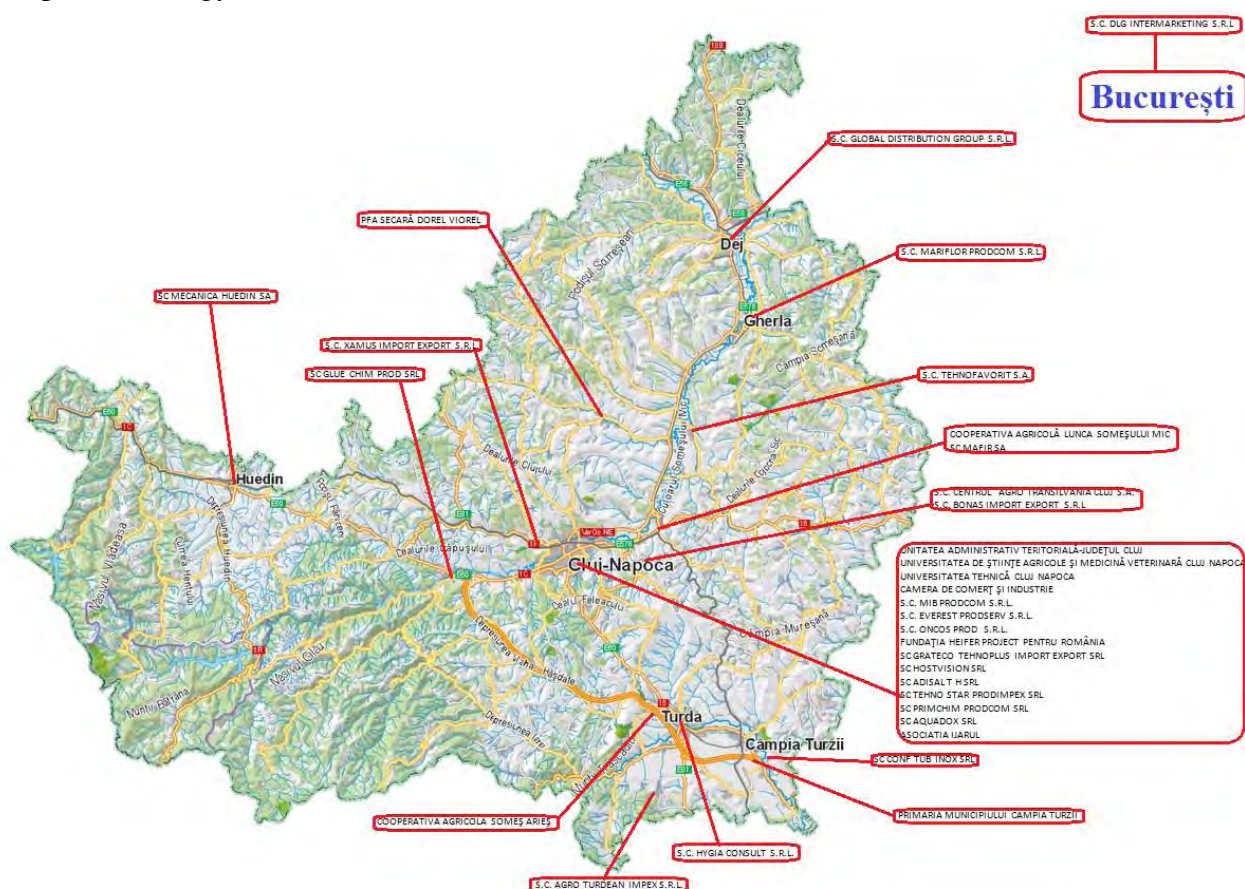


Figure 1. Area distribution of the members of the Cluster

Source: internal documents of Cluster

The methodology used for obtaining the results consists in a sensitive selection of the most representative source of information related to the sector of and the region studied, starting from national level to regional and, finally, to local level. The study of the documents and the databases was completed by face-to-face discussions with all members of the cluster and visits to each of the community of Cluj to implement a survey for observing the perceptions of authorities, of the representatives of the agribusiness companies and of the individuals. All information was consolidated in a SWOT Analysis which, after all, offered an internal and external overview of the social and economic framework. For each weaknesses and threats there were analyzed the possible ways of counterstrike them.

## RESULTS AND DISCUSSIONS

As any other entity, the cluster is confronting with diverse factors that influence its activity, some of the depending on them, and others are just affecting it in diverse way, with no possibility of adjusting them. The strengths of the cluster are, at the moment, mainly consequences of individual acts of each member, as the entity itself is not yet mature to direct them into the same direction. But the positive facts should be mentioned.

The cluster is a consortium of institutions, universities and companies acting in various industries, having some common interests; all of them having expertise and experience in agrifood sector. In that way, the cluster is a strategic alliance of local and regional entities created and managed to achieve collective positive results in economic activity. As a new entity, with no recognized brand (in fact the brand “AgroTransilvania Cluster” is in process of registering at Romanian State Office for Invention and Trademark – OSIM), the cluster benefits from the transfer of positive image transferred from individual members, reported, after all to consumers, business partners and the general public as a distinctive and strong locally identity.

The cluster is clearly positioned on the market it has the intention to bring together the distinct interests of the members to solve specific problems in order to improve the agrifood sector based on innovation. It can be said that the cluster is focused on continuous adaptation to the market and consumers. As a long-term strategic alliances with institutions as public administration, education and research, the cluster brings together a highly qualified and experienced team able to conduct studies and to implement development and investments projects, based on a positive attitude in solving the cluster's and its members' struggles. Finally, the process of strategic decision making is transparent, based on its members' consultation with in the strategic decision-making.

The main weakness is the fact that each individual members and the cluster, as entity, have insufficient information, knowledge and skills in terms of practical running of a cluster. For improving this fact, there are to be taken some actions as are the involvement of each cluster's members, along with the ones on the executive management team, in specific activities, according to the specific skills of each member. Another weak point consists in the fact that there is only a limited experience of cluster's members in raising funds for specific projects. So, there have to be run actions in direction of training of involving them, under the coordination of the cluster, in the practical process of applying and implementing of specific projects.

One important issues that is seen to be a shortage for the cluster is the age short (only several months – still being in the early life cycle of the cluster) since the cluster has been set up and operate, and thus the lack of positive interference among the members. For improving this, it can be used, mainly, the executive management team experience in related activities until they accumulate enough experience. Relatively low coverage of the sector through its 32 members, especially regarding agricultural production sector, which is represented, on the territory by a large number of farmers it is another weak point. Promoting a positive image of the cluster as positive example for attracting new members is an action to be realized. In fact, since its establishment, in just several months, the member number increased from 20 to 32 and there are other applications are in the process of evaluation.

Related to the above mention affirmation, there can be observed the insufficient coverage of the food value chain, particularly in respect of some inputs for agriculture and food, but also in terms of opening to final consumers [3]. Obviously, the cluster has to attract new members, especially in sensitive areas, fact that was implemented since the beginning; the cluster has expanded into related, productive sectors, providing inputs and services for agricultural sector.

The increase number of members leads to a slowdown in decision-making process through consultation and opinion requests of all members of the cluster. Actions for improvement are seen to be the continuous and transparent information to cluster members so the time of their meetings to be reduced by decreasing the time required for understanding the subject to be discussed and approached.

Some members, mainly SMEs, have limited resources and skills and only a short-term business vision in the direction of survival. Actions for improvement include: integrating strategy to find each of them the distinct place and role on the cluster and increasing the resource efficiency by integrating them into a value chain. The staff on the second management level of the cluster has insufficient experience to replace the short time vacancy of the higher position management. In order to improve that, it is necessary their gradually involvement into the decision-making process and delegation of authority to them, so they will obtain, through personal experience, the required skills.

Having a single contact point for the large number of people involved into the activity of the cluster, while they are specialized for different actions, it could be a problem in term of connected them in time. As a possible action to solve this problem is the use of the premises cluster members as points of information and organizing a permanent organizational business headquarter.

The cluster could benefits, in the same time, by the opportunities that can be used as in its advantage. The main opportunity is seen to be the proximity of Cluj-Napoca city, with its large number of local consumers (over 300,000 inhabitants) [2], to whom are added the significant number of people who are into the city for a limited period (students, business people, visitors etc.).

Another significant opportunity is the high potential of future development of agrifood sector in Cluj County, which is, at the moment, underutilized compared to the results that may be obtained with a proper use. Positive long-term prospects for business development in the agrifood sector at local, regional, national and international level are generated by progressively increasing consumption of agricultural products, especially in Europe and Asia. Overall, the constant and sustained increasing of global consumer trends and developments in the food market makes possible for local food businesses to create a medium and long term strategy. The above mentioned trends are to be completed by the existence of opportunities related to food security, necessity of availability of products, of their specific taste, of their durability, combined with the current trend of increasing the visibility and traceability of products to enhance the attractiveness of local and/or traditional products will generate an increase in demand for food products.

There can be expected an increase of the efficiency of cluster members through joint work as a team through direct address of a wider range and variety of consumers, as the more efficient use of resources currently used by cluster members through their integration into the value chain will reduce the cost per produced unit [4]. Another possible positive effect resides from the more efficient use of unexploited resources (including labor) by joint development opportunities, as are the possibility of accessing funds to finance the development of businesses that are only associative forms.

Finally, the shift of the Common Agricultural Policy for the period 2004-2014, by increasing the interest in environmental measures, it makes more difficult to meet the requirements for accessing funds for small entities, compared with the larger associative structures [5]. And, it is worth to be mentioned that, apart from this cluster, there are no other similar associations to the food group active in the region [1]. Threats of the cluster include lack of adequate infrastructure in the agrifood sector, which is unable to ensure a balanced internal structure of cluster in terms of universities, research institutes, government agencies, SMEs, manufacturers and retails. Actions to counter includes, mainly, the development of complete and integrated networking and promoting it towards stakeholders and the general public towards participation in events profile.

The insufficient knowledge of actors in agriculture and agrifood sector in the area, mainly due to aggressive land fragmentation generates the instability's production both qualitatively and quantitatively. Actions which need to be done included the study "A chance for every farmer", already implemented, for identifying the sector opportunities and the specific possibilities of the utilization of the available resources towards developing productive associative forms. The fierce and unfair competition on the Romanian market due to the multinational companies [5] on the agrifood sector, especially in terms of policy and sales price, is another important threat. There are actions to be done, which include the integration the cluster members as deep as possible to the value chain, in order to reduce production costs and to raise funds for development.

Low negotiation power of the cluster's members comparing with the large retail networks, especially supermarkets and hypermarkets level, impose the development of a brand promoted at local and regional level, to be known and appreciated by consumers and thus asked by stores and consumers. As an alternative, there will be create specialized stores with local and traditional produce qualitative certified by the cluster.

The lack of up-to-dated production technologies of the cluster's member's lead to higher production costs. Actions to be done are seen to be the share the human, financial and capital resources to attract major investments, and in that way, to ensure added value to the products of the members of the cluster. The agrifood sector and, implicitly the cluster members, suffer from a shortage of skilled and experienced technology [5]. Actions to be done: homogenization of the practical requirements to those offered by universities and specialized schools, and to facilitate the access to the jobs provided by the cluster members to the graduates from the partner universities.

The high pressure of national and European government agencies for the "food safety" and issues related to hygiene and health of the consumer takes to the necessity to anticipate new policy measures through studies and to take care of the changes from time the transition period to their practical application. Conservative attitude towards the agrifood sector to the innovative technologies and to the requirements of development and implementation them (certifying ISO, HACCP etc.) forces the clusters to promote to the business partners the need of the quality certification and the advantages for the future collaboration.

The media campaign on obesity, diabetes and other diseases related to the consumption of food affects the image of the agrifood sector, mainly of the new and unknown products for the customers. It is required to promote the own trademark brand, associated with an image of quality and food safety. The possible exacerbations of competition with other associative forms associative like the cluster, or other form, it to be expected during the next period of time, so cluster has to develop skills and experience that provides a comparative advantage to any newly new create structures.

The cluster members are aware of the weaknesses and threats, especially of the importance and of the need to eliminate and counter their effects. For every weakness and each threat of the cluster were analyzed and identified the opportunities to overcome them and the act in direction of underline and to take advantage based on the strengths of cluster. Finally, it can be said that there are prerequisites not only to survive but also the harmonious development of the cluster on the short, medium and long term.

## CONCLUSIONS

The development vision of the cluster has as central starting point the purpose and the general objective of the Statute and the Charter of the Association "Cluster Agro-Food-Ind Napoca" which consists in sustaining the development of the agribusiness sector and the competitiveness of the association on one hand, and of each member on the other hand, either on the national and on international markets.

Based on those above mentioned and according to the vision of the cluster development, it aims to become a center of the harmonious development of the centralized food sector, a strategic reference entity of professional and institutional field, recognized and appreciated for the quality of its work and results, by the business and institutional environment. In the view, the Association "Cluster Agro-Food-Ind Napoca" will become an active and viable business partner for the actors from the agrifood sector and a model of best practices for associative entities.

As conclusions, cluster intends to create and to develop a sustainable marketing food chain for local and localized products. The setup and the proper functioning of this integrated marketing chain is considered vital for the reduction of the cost production and brings a comparative advantages over the competition in the market of food products. Also, it will ensure a steady market for agricultural products in the territory where the cluster acts. The marketing chain is intended to be complete by integrating the suppliers of the raw materials, of the equipment, of the services and

of the information for the farmers, on one hand, and of the agricultural producer and food processing companies (specific to the food industry), on the other hand.

Other fact which is desired to be included into the marketing food chain, is represented by the storage, sorting and refrigeration structures and the specialized entities in the field of middling the food products to final consumers (sores, households, restaurants, hotels, public and private institutions). A marketing chain will have the desired positive results only if all stakeholders accept the fact that a common strategy is needed to be adopted on long term, which take precedence over the individual interests or on the strategies on the short term.

The cluster assumes, at the same time, as a strategic objective, the integration of the small producers into the associative forms. The current profile of the farmers in particular, and also of the majority of companies of the food industry from the rural areas, reveals their excessive fragmentation, sometimes up to the level that ensures only the survival of the entity, with devastating effects on the average yields and on the social and economic decisions. The reduce number of small enterprises on the marketing chain imposes to adapt strategic plans to attract them in different associations (producers associations, marketing organizations, technologies and other forms of associations) which assure them the competitive advantage. The cluster's members are aware that they assumed very sensitive and difficult goals, whose achievement requires time. They also realize that their achievements depend directly on the success and on the positive image of the cluster and on the example it offers. So, even from the beginning, they want to integrate the known producers that can act as opinion leaders in the area they run their activities.

The strategic objectives of the cluster include as well, the efficient use of local resources. This objective is generated by the mediocre results obtain in the agrifood sector, caused by the inefficient administration or no appropriate use of the resources. All the strategic objectives mentioned above should be supplemented by a strategic integrator objective: attracting investors and investment funds to support the financial effort required to develop of the territory where the cluster runs its activity. The cluster takes effort to seek various funding sources and potential investors – specific for the cluster needs – and takes the necessary steps to attract them.

## REFERENCES

1. \*\*\* (2012), Asociația Clusterelor din Romania, Analiza situației privind clusterelor existente și potențiale din România (Echipa editorială Daniel Coșniță, Coordonator Analiză, Andreea Baban), ISBN: 978-973-0-13852-8, [http://www.clustero.eu/images/biblioteca/analiza\\_clusterelor\\_01%2004%202013.pdf](http://www.clustero.eu/images/biblioteca/analiza_clusterelor_01%2004%202013.pdf)
2. \*\*\* (2012), Institutul Național de Statistică al României, Rezultatele Recensământului populației și al locuințelor 2011, Retrieved September, 30, From <http://www.recensamantromania.ro/rezultate-2/>
3. \*\*\* (2012), Ministerul Agriculturii și Dezvoltării Rurale, Planul Național de Dezvoltare Rurală 200-2013, versiunea consolidată decembrie 2012. Număr CCI: 2007RO06RPO001, Retrieved September, 30, From [http://old.madr.ro/pages/dezvoltare\\_rurala/Program-National-de-Dezvoltare-Rurala-versiunea10-consolidata-decembrie-2012.pdf](http://old.madr.ro/pages/dezvoltare_rurala/Program-National-de-Dezvoltare-Rurala-versiunea10-consolidata-decembrie-2012.pdf)
4. \*\*\* (2013), Cluster Observatory, Retrieved September, 30, From <http://www.clusterobservatory.eu>
5. \*\*\* (2013), Comisia Prezidențială pentru Politici Publice de Dezvoltare a Agriculturii, “Cadrul Național Strategic pentru Dezvoltarea Durabilă a Sectorului Agroalimentar și a Spațiului Rural în Perioada 2014-2020-2030 - Cadrul Național Strategic Rural -”, site-ul oficial al Administrației Prezidențiale din România, <http://presidency.ro/static/Cadrul%20National%20Strategic%20Rural.pdf>
6. \*\*\* (2013), Planul de Dezvoltare Regională pentru 2014 – 2020. Regiunea Nord-Vest (Transilvania de Nord) (versiune mai 2013), site-ul oficial Agenției de Dezvoltare Regională Nord-Vest, Retrieved September, 30, From <http://www.nord-vest.ro/planul-de-dezvoltare-regionala-2014-2020--eID1458.html>



# THE IMPACT OF THE NEW CIVIL CODE ON THE ASSOCIATIVE FORMS WITHOUT LEGAL ENTITY IN THE AGRICULTURAL FIELD

ANCA POPESCU-CRUCERU\*

**Abstract:** *The legal system of the forms of deployment of the activities in the agricultural domain is regulated by Law no. 36/1991 on agricultural establishments and other forms of association in the agricultural field, amended by Government Emergency Ordinance No. 125/2006 starting with 26.05.2007. Once with the entrance into force of the Law no. 287/2009, completed and amended by Law no. 71/2011 (the New Romanian Civil Code), republished (O.G. no. 505/15.07.2011), interferes the implicit amendment of the legal system of the forms of association in the agricultural field. Traditionally, the activities in the agricultural field have been considered a part of the civil field, yet, once with the transition from the dualist to the monist system in the Romanian national regulation, the delimitation is no longer relevant. Agricultural exploitations, regardless their denomination, can be organized either under the form of establishments with legal entity (in such manner they are enlisted by the Law no. 31/1990, republished), or the form of establishments without legal entity (respectively the limited partnership or the association of participation regulated by the New Civil Code), irrespective of, at least at the inferior level of agricultural surfaces held, by the form regulated by the GEO OUG no. 44/2008 (respectively those of the entrepreneur natural person, whose activity is conducted under the form of self-employed person, sole proprietorship or a family partnership). From the perspective of the amendments brought by the Fiscal Code, it can be outlined a decreasing tendency of the options for the classic forms of association, with legal entity, in favor of other partnerships, which taxation system is less constrictive.*

**Keywords:** *agricultural exploitations, legal entity, limited partnership, association of participation*

## INTRODUCTION

The objects of the analysis of associative forms in the agricultural field overlap the analysis of the general legal system of companies, in the light of the entrance into force of the Romanian New Civil Code, with the interception of the adjustments occurred in the general system, given the explicit abrogation of the Civil Code from 1865, as well as the effects on the special regulation in company matter. From this point of view, it is raised in public esteem the importance of the analysis conducted on the company forms without legal personality and the opportunity of option for these types of companies in the agricultural field.

Irrespective of the company classification, all these have a binding nature which dilutes the classic concept of legal personality. Certainly, the concept of legal personality does not yield its importance, at least in the Romanian law. The legal person, the way it is defined in art. 187 of the New Civil Code, represents any form of organization which, complying with all the conditions stipulated by law (autonomous organization, proper patrimony, moral and lawful purpose), is entitled to rights and civil obligations, becoming a self-standing law subject, with an appropriate legal statute (which effects the brand, the headquarters and own nationality, distinct from those of the shareholders), as well as its own legal will (Militaru I.N., 2013).

According to the stipulations of art. 1 of Law no. 36/1991, the land-owners benefiting from the stipulations of Law no. 18/1991 on agricultural real estate, as well as other land-owners, are allowed to exploit the land also in associative partnerships, as long as the law shows that the forms of simple partnership represent the partnerships between two or more families on the grounds of a binding contract, aiming to exploit the lands, breeding, supplying, storage, conditioning, processing and selling of goods, delivering certain services, as well as other activities.

## MATERIAL AND METHOD

The considered method circumscribes to the logical and teleological analysis of incidental standards in company matter, both those pertaining to common law and those related to special laws, in the Romanian law and in the comparative law. In the light of this approach, it is

\* Associate professor PhD., ARTIFEX University of Bucharest, [ancacruceru@yahoo.com](mailto:ancacruceru@yahoo.com)

emphasized the relevance of company forms without legal personality and the opportunity of option for these types of company in the agricultural field.

The stipulation, expressly enounced in art. 1892 of the NCC, refers to the lack of legal personality of the simple partnership, except for the situation when the partners convene upon (unanimously), during the existence of the company, the modification of its form, thus conferring it legal personality by means of an institutional procedure.

The preeminence of the contractual nature of companies results preponderantly from regulating the companies without legal personality, on which the doctrine has not insisted, though the associative forms of the civil company (in terms of the anterior regulation), of the simple partnership (in terms of current regulation, where it can be noticed a similarity with the simple partnership's regulation – *società semplice* – comprised in the Italian Civil Code, bearing in mind the idea that both the current Romanian and the Italian structures adopted the monist system), especially of the association in partnership represented and can still represent, during limited historical periods, justified options of certain economic interests.

The legal system of the simple partnership is pronounced upon by Section II of Chapter VII from the NCC, an explicit definition of this form not included. In recent doctrine, (Săuleanu L., 2012), it has been appreciated that the simple partnership corresponds to the company's memorandum of association, regulated by art. 1491 and the subsequent of the Civil code from 1865.

As against this opinion, several juridical-historical specifications are imposed. In what concerns the non-stock professional corporations, classic doctrine of commercial law, in the traditional dualist approach of the Romanian law, acknowledged that for companies, the purpose or the object mentioned in the memorandum of associations suffices for the delimitation between commercial and private limited companies, regardless if, in fact, it exerts or not the commercial activity and regardless if, in the memorandum, they both conduct civil operations. From this point of view, the activities in the agricultural field have always been included in the category of civil operations (Militaru I.N., 2001).

In other words, irrespective of the form under which the companies were constituted, they whether considered commercial or not, depending on the existence, within their object, of at least one of the acts of merchant illustratively enlisted in art. 3 Commercial Code. As against the disappearance of the classic concept "act of merchant", in relation to which was established the legal nature of the company, private limited or commercial and as against the inclusion, in the general area of civil law of the category of "professional", as defined by means of the art. 3 NCC as any entity exploiting an enterprise, it could be appreciated that in this category of the professional it is included also the simple partnership, no matter the concrete object of activity.

One argument for the possibility of conducting activities with economical character by simple partnerships is the possibility itself that they acquire a legal personality, by means of the shareholders' will, under the form of a company with legal entity having as object conducting an economical activity. Within the Italian law, the regulation of the simple partnership (art. 2251-2290 Italian Civil code) has as effect considering it a form which can conduct economical yet non commercial activities (for instance, agricultural activities or of management of real estate and personal properties). Such forms are registered in the *Registro Imprese – Sezione speciale* (the correspondent of the Romanian Trade Register Office); yet, in the Romanian law, until now, there has not been made such a distinction.

The simple partnership, having an expressly contractual nature and all the specific elements of companies, the way they had been outlined by the doctrine (submission, *affectio societatis* and the accomplishment and the distribution of benefits), is founded by a simple agreement of the contractual parties, expressed, *ad probationem*, in written. The exceptions to the rule of the written form target the object of the partners' submissions, in which case become incidental the provisions of the art. 1883 NCC, the authentic form being imposed *ad validitatem* (Cristea S., 2012).

By means of the memorandum of association, the partners convene to commonly submit amounts of money, goods, labor conscriptions or know-how, which, together, form the social capital, achieving in exchange fractions of it, known under the name of shares.



The law establishes that, with a character of novelty, in a sole case one of the partners can be exempted, conventionally, from participating to losses, respectively the owner of the submission of labor conscriptions or know-how, within the limit of his/her submission, which is also a singular situation in the entire normative context – compared to the specific of the activities in the agricultural field, where the purpose of the association is preponderantly the labor conscription; the legal novelty may excite interest.

In the case of commercial partnerships with legal persons, art. 16 para. 5 of Law no. 31/1990, republished, allows the owners of these submissions to participate to the sharing of benefits, yet it imposes, by means of its last thesis, the bearing of the losses, in certain quotas, established in the memorandum of association. The Civil code from 1865, by regulating the rights of the owner of submission in industry at the constitution of a limited private partnership (under which manner agricultural activities could be conducted), by art. 1511 para. 2, imposed him/her a quota of participation to profits, but in the same time to losses, too, equal to the part of who submitted the smallest amount or value in the company.

The law allows the partners, within the limits of the decision of the assembly of associates, to use the social goods in personal purpose, under the condition that this use does not hinder the rights of the other associates and does not breach the confidentiality obligation derived from the art. 1903 para. 2 of the NCC.

It is as well permitted the allocation of certain funds for the satisfaction of the partners' particular expenses, under the same conditions – the provisions, from this point of view, resemble those provided in the case of unlimited companies (art. 80 and 81 of Law no. 31/1990, republished). By means of the memorandum of association, the shareholders are allowed to take from the association's resources (in other word, from the financial funds kept in cash at the company's disposal and not deposited in banks, under the incidence of the law) determined sums for personal expenses.

The law institutionalizes, by means of art. 1911 of the NCC the general assembly of the shareholders (Stoica C., 2009), as an authority of deliberation and decision, where the decisions are adopted by the majority of the shareholders' votes, either presents (or represented), or consulted, in written. The law does not impose the designation of an administrator, admitting the right to administer and represent the company in the person of each shareholder, who, as a rule, have mutual mandate to administer one for another, in the company's interest (art. 1.913 para. 2 of the NCC).

Thus, behold the recognition of an interest particular to the simple partnership, distinct from the personal interest of the partners, who, under certain limits, contour an incipient form of personal will. Simple partnership, although lacking legal personality, enters in relationships with the third parties by means of its representative, being a good quasi-subject of law; the absence of legal personality (*stricto sensu*) is balanced by its possibility to stand on its own behalf in law, under its own name, but also its possibility to be liable in front of the third parties with the common goods of the shareholders.

The Romanian legislation contains correlative dispositions with the legislation of other countries in what concerns the loss of the quality of partner and the effects such loss may have on the simple partnership. Thus, according to art. 1925 of the NCC, the loss of the legal personality quality may occur through cession, forced execution of the shares detained in the partnership, the termination of its legal capacity, by means of withdrawal from the partnership or exclusion. From the procedure's perspective, the liquidation of a simple partnership is similar to the liquidation of companies with legal personality. Yet, the absence of legal personality brings into discussion a particularity, because the submissions of the partners are returned from the remaining active asset, after the payment of the company's debts.

The company's goods are returned either in kind, in the case of the submission in beneficial interest or in commission or in the case of co-ownership, to the extent to which the shareholder who submitted it solicits its attribution, thus obliging himself to a balancing payment towards the other shareholders, according to the regulations in matter of partition. The shareholder whose submission

had know-how or labor conscriptions as effect has the right to receive, within the limits of his/her participation quota to the profit established in the memorandum of association, the goods resulting from its conscription, with the obligation to a balancing payment. If pursuant to the case in which the active does not suffice for the payment of the submissions and debts, they are considered losses of the company and are personally supported by the shareholders, proportionally with the quota established in the memorandum of association.

Another way of developing the activities in the agricultural field may be represented by the association of participation, regulated currently by Section III of Chapter VII – On companies of the NCC (art. 1949 – 1954 NCC). The association of participation is a contract by means of which one of the parties grants the other party a participation in benefits and losses generated by the conduction of an activity, form which is regulated also in the French legislation, similarly, under the name of *sociétés en participation*, without legal personality, but with fiscal personality (Chapter III, art. 1871 – 1873 Fr.Civ.C, [www.legifrance.gouv.fr](http://www.legifrance.gouv.fr)). In the German law, it is commonly met a similar form of association by participation regulated in the Romanian and French legal systems, under the form of *Stille Gesellschaft* (Andenas M., Wooldridge F., 2009). This is defined as that particular contract by means of which an entity acquires a participation in a commercial operation conducted by another entity, under the form of a submission of capital, the goods pertaining to the entity granting the participation.

The law does not impose any disclosure formality, but the occult character of the association may be eliminated, by convention of the parties, by accomplishing such formality (for instance, in the case of the termination of contract in authentic form). Moreover, the occult character imposes it a relative confidentiality, because the association is subject of fiscal law, as long as it is registered properly to the fiscal authorities (art. 28 of Law no. 571/2003 on Fiscal code, with adjustments and additions (consolidated version 2013). Hence, in accordance with the fiscal legislation, in the case of an association without legal personality, the incomes and expenditures registered are attributed to each shareholder of Romanian origin, correspondingly to the quota of participation in association.

Beside the general cases of termination of the association by participation, the partners may convene the termination of the association to take place in the case of the registration of losses at a certain interval of time or even if a certain level of profit is not attained after the association, the disappearance of one of the partners (the adjudication of his/her civil incapacity included).

## CONCLUSIONS

By means of regulations of such kind, it is revealed, once more, a trend of dilution of the characteristics of the legal personality towards all the forms of association recognized by the law (irrespective of the existence or the absence of the legal personality), which contours more and more conspicuously the contractual theory. The option for conducting agricultural activities under the form of entities without legal personality may be thus justified by the elimination of the formalism specific to companies with legal personality, mostly because the determination of the annual income from agricultural activities is made, nowadays, only on the grounds of the annual norms of income, with the elimination of the manner of determination of the net annual income in real system, on the grounds of the accounting data by simple-entry bookkeeping.

## BIBLIOGRAPHY

- Andenas M., Wooldridge F. (2009), *European Comparative Company Law*, Cambridge University Press
- Militaru I.N. (2013), *Dreptul afacerilor. I. Introducere în dreptul afacerilor. Răspunsuri la întrebări de afaceri. Contractul*, Universul Juridic Publishing House
- Săuleanu Lucian (2012), *Societăți comerciale. Studii*, Universul Juridic Publishing House
- Cristea S. (2012), *Contractul de societate în noul Cod civil român (art. 1881-1954). Comparație cu Codul civil de la 1865*, în *Tribuna Juridică*, Volume 2, Issue 1, p. 50-77
- Militaru I.N. (2001), *Aspecte privind stadiul actual al armonizării dreptului român cu dreptul comunitar în domeniul agricol*, “Evoluție și perspective în domeniul financiar-contabil”, ASE Publishing House, p.164 –166
- Stoica C. (2009), *Elemente de noutate în noul Cod civil privind drepturile și obligațiile asociaților*, *Curierul Judiciar* no. 1, p. 673-676

## COMPLEX OBLIGATIONS UNDER THE NEW CIVIL CODE

IOANA NELY MILITARU<sup>1</sup>

**Abstract:** *Complexity obligations is determined by the number of parties involved in the legal obligational or the number of benefits. From this perspective, the work comprises two chapters. The first is the complex obligations plurality of parts, which are obligations: divisible and indivisible solidarity and second chapter complex plurality benefit obligations, which are: main and optional alternative.*

**Keywords:** *duty, solidarity, divisibility, indivisibility, alternative duties*

### INTRODUCTION

Complexity obligations (Art. 1421 to 1467 civil code) are determined by the number of parties involved in the legal obligations or the number of benefits<sup>2</sup>.

Obligation legal relationships can be established between<sup>3</sup> a single lender and a single borrower, legally called simple or between more lenders and / or more borrowers compared called complex legal obligations causing complex or plural birth.

### MATERIAL AND METHOD

**1)** Complex obligations are divisible or indivisible. Divisible obligations may be conjunct or solidarity. Obligations conjunct can be established between several lenders and a cross multiple borrowers.

Obligations conjunction between several lenders has basically a common debtor and each creditor may demand from the debtor only to the debt. So divide obligation on creditors. For example, if four brothers inherit an estate (lenders obligation to pay the price) and selling to one buyer (debtor's obligation to pay) for a - split it in terms of value, each of the four brothers will claim only 25% of the property value.

Obligations conjunction between several debtors, means more borrowers on the same benefit to a single creditor. The creditor is entitled to claim from each debtor only to the debt. For example, a seller (creditor's obligation to pay) sells a property to two buyers (debtors payment obligation). The seller may claim from each, separately, by 50% of the property value.

Debtors conjunct an obligation to their creditors are held in equal parts is the example above, if the law or the contract does not provide otherwise (Article 1423 Civil Code).

Civil Code establishes the presumption of divisibility rule, with two exceptions:

- If indivisibility was not expressly stipulated times
- If the obligation is not by nature such material or intellectual division (Art. 1424 Civil Code).

a) Obligations indivisible. Indivisibility can be active - among several lenders and passive - among many borrowers.

Effects of indivisible obligation are:

- The indivisibility passive, each of borrowers or their heirs can be forced a part in the execution of all obligations, for example, the obligation undertaken by a team of builders to carry out a work or a group of actors to play a song theater, or by a music band to perform a concert etc. .

- For active indivisibility, each of their heirs or creditors may require full performance, even if the obligation is joint and several, for example, an individual couple borrowed a sum of money,

<sup>1</sup> PhD. Senior Lecturer, Academy of Economic Studies, Bucharest, [ioananelimilitaru@yahoo.com](mailto:ioananelimilitaru@yahoo.com)

<sup>2</sup> See Nely Militaru, Introduction to business law. Legal business report. Contract, Law Publishing House, Bucharest, 2013, page 89 et seq., Popescu Cruceru, Anca Sorina, "Elements of law applicable in the management of the organization," Artifex Publishing House, Bucharest, 2010, p 201 et seq.

<sup>3</sup> See Popescu Cruceru, Anca Sorina, "Economic and legal competitive economy", Economic Publishing House, 2006, pp. 10 ff.

either spouse has the right to request the loan maturity or a team of builders work performed, each team member can claim full payment of its beneficial work .

Therefore indivisible obligation does not divide between debtors to creditors, or between their heirs (Art. 1425 phar. 1 Civil Code ) .

Also, since it is assumed divisibility, indivisibility must either be expressly stipulated in a contract, so i t c ontractual, c onventional, s uch as t he ex amples abov e or r esulting f rom t he obligation, which by its nature can not be divided, for example, can be divided in carrying out a car, a property (land , buildings), a musical instrument, etc.

When the performance of indivisible obligation occurs in nature, each creditor may request and receive the benefit payable only in its entirety. If the same obligation will run the equivalent indivisible obligation is divisible .

b) Obligations of solidarity. Active solidarity can be established between several creditors and liabilities, among many borrowers.

As indivisibility, solidarity is not presumed<sup>4</sup>:

- Active solidarity must be expressly provided;
- Solidarity liability is expressly stipulated by the parties or specified by law.

Civil Code establishes a presumption of solidarity among debtors of obligations incurred in the course of an undertaking where otherwise provided by law (Art. 1446 Civil Code ) .

Active Solidarity give each lender the right to demand performance of all obligations debtor (and give receipt liberating). Once the debtor has made an obligation to the creditor is free and solidarity on the other creditors. The debtor may pay, at its option, any of the solidarity creditors, thus free to all. Other creditors are entitled therefore to ask their debt to the creditor that the debtor has fully settled the obligation. I mean, other solidarity creditors retain the right of recourse against the creditor that the debtor person was extinguished the proportion of debt that is for the latter. For example, a t eam of cr aftsme n execute m ore w ork. A t t he e nd t hereof, i f pr ovided f or i n t he agreement s olidarity am ong cr aftsme n, whic hever may require full pa yment f or ex ecution of t he work from its recipient, so that, having received full pa yment cr aftsma n to pa y a su m of m oney, each cr aftsma n, proportional with the returns of each of them.

Passive solidarity implies that more borrowers are forced to the same benefit, so that each can be kept separated for the entire obligation and its enforcement by one of his debtors to exempt the ot hers c reditor. S olidarity e xists e ven i f bor rowers a re r equired i n di fferent w ays ( t erm or condition).

In the circumstances, the lender may require full payment at any of the solidarity debtors, with payment of the legal relationship between the creditor is paid off and others debtors, the debtor pays. Solidarity debtor who has paid, is subrogated to the rights of the creditor, but can not ask his co-debtor of the debt than it is for each of them. For example, spouses who have entered into a loan agreement with the bank, it fixing them a monthly rate. Either spouse has the right to pay monthly bank rate drinkable.

Solidarity d ebtors or c reditors not a ttract its elf i ndi visibility obl igations. Creditors a nd debtors are not tied to an obligation indivisible solidarity (if there is a contrary stipulation in this regard) .

**2) Obligations complex plurality of benefits.** Main obligations, a lternative a nd opt ional. Obligations of the object, generally a single supply main and mandatory, for example, a recipient must stay for tourism to pay its price<sup>5</sup>.

The legal obligations also requires that concern several benefits:

<sup>4</sup> See Camelia Florentina Stoica, Business Law, Contracts, ASE Publishing House, 2012, p 27-39.

<sup>5</sup> See Crenguța Leaua, Business Law. General notions of private law. Legal Publishing House, Bucharest, 2012, p 85.

a) principal, all mandatory (ex buying an apartment, with parking, including a services for building maintenance of green space)

b) Alternatively, when covers two main benefits, and executing one of these releases the debtor from a liability. For example, in a shop organizes a raffle, after which it will provide customers gain the right to buy, at a very small choice, one of the two products, or a travel agency undertakes to make to the client already has a contract right to choose one of two locations (hotels) in the same resort<sup>6</sup>.

Choice of benefit that will settle the obligation lies with the debtor, unless it is given explicitly buyer (art.1462 par. 1 Civil Code). If the benefit to which he belongs choice within opts to it for that purpose, the choice will benefit the other Party.

If the debtor benefits choice if one benefits became unenforceable even his fault, the debtor is obliged to execute other benefit<sup>7</sup>.

Choosing benefit the execution creditor can do (for example, the choice between the two products does the store, not the client) in this case differs some situations that determine the performance of the service differently:

- If one of the benefits has become impossible to execute without being guilty of any of the parties, the lender is required to receive other;

- If the creditor is unable attributable to execute some benefits he can claim the execution of other benefits, compensating the borrower for damages it is to free it from fulfilling its obligations - whether it is attributable to the debtor's failure to perform one of the benefits, the lender may require compensation to be unenforceable performance or other benefit;

- Whether it is attributable to the debtor unable to execute both benefits, the creditor may claim compensation for any of them. If benefits are impossible to execute without fault of the debtor, and before he is in default, the obligation is extinguished.

c) be voluntary when the obligation is to one main benefit of the debtor may be free running another benefit (ex sales contract would have provided a building a studio on the first floor comfort, society can saleswoman provide instead for the same price, on the 8th floor in an adjacent block, a three-room apartment). The debtor is discharged if the main benefit is unenforceable without it due to his fault.

Thus, in the above example if the company saleswoman said can not offer for sale apartment without his fault, it is not obliged to offer for sale any bedroom apartment, where alternative obligation but, given the choice of benefit does the lender, if one of the benefits has become impossible to execute without fault of any of the parties, the lender is required to receive the other (art. 1465 civil Code). In our case the creditor is obliged to buy the two-bedroom apartment (if course requirements are alternatives).

## CONCLUSIONS

The need to reform legal institutions, political and economic development has led to a modern legislative framework, UE, the New Civil Code. This is a modern instrument regulating fundamental aspects of civil legal relations, not least, in their civil obligations, UE obligations complex.

## BIBLIOGRAPHY

<sup>6</sup> Idem

<sup>7</sup> If the same case, both benefits are impossible to execute, and failure on one of the benefits attributable to the debtor, it is bound to the creditor up to the amount of benefit that has become final unenforceable (Art. 1464 par. 2 civil Code).

1. Leaua Crenguța, Dreptul afacerilor. Noțiuni generale de drept privat. Editura Universul juridic, București, 2012.
2. Militaru Ioana Nely, Introducere în dreptul afacerilor. Raportul juridic de afaceri. Contractul, Editura Universul Juridic, București, 2013.
3. Popescu-Cruceru, Anca Sorina, Elemente de drept aplicabile în managementul organizației, Ed. Artifex, București, 2010,
4. Popescu-Cruceru Anca Sorina, Economic-juridic în economia concurențială, Ed. Economică, 2006.
5. Stoica Camelia Florentina, Dreptul afacerilor, Contracte, Ed. ASE București, 2012.

# LEGAL SYSTEM OF AGRICULTURAL COMPANIES WITH LEGAL ENTITY

EUGENIA GABRIELA LEUCIUC<sup>1</sup>

**Abstract:** *From the point of view of the corporative organization with legal entity, in agriculture, the activity can be conducted either under the form of companies regulated by Law no. 31/1990, republished, or the form of agricultural companies regulated by the Second Title of Law no. 36/1991 regarding agricultural companies and other forms of association in agriculture, altered by the Emergency Ordinance no. 125/2006 starting with 26.05.2007, or the form of agricultural cooperative regulated by Law no. 566/2004 on the agricultural cooperative, the way it was altered. Such forms of company acknowledge a series of particularities, as they are destined in principle to agricultural exploitations of large dimensions, where are concentrated both real estates and capitals. The legal entity confers them an apparent independency of the patrimony, which is distinct from that of the members, but which, as against the recent regulation of the companies without legal entity and as against the notional delimitation of the patrimony of affectation, corroborated with the procedural institutionalization characterizing their constitution, no longer represent the acknowledged relevance. The analysis of these forms of the development of the activity in agriculture is yet of actuality, not only because they will continue existing in the Romanian economy, but also because they allow the infusion of capital and that of foreign models of organization of agricultural activities in forms already known.*

**Keywords:** *agricultural exploitations, legal entity, agricultural company*

## INTRODUCTION

Recently, it can be acknowledged the praiseworthy effort of the lawmaker to modernize the legal framework of the company's incorporation, to adjust this legal institution to the realities of the contemporary economical life; an example in such sense being the abandon of obsolete notions of universal and particular company, or the investment of the (nonstock professional) company with legal personality etc. (Art.1881, para.(3) A company can be constituted with or without legal entity.)

Within the current research, we will examine, especially in the light of the provisions in the New Civil Code and the law of entrance into force of this organic law, the legal system of the agricultural company, form of company adopted with priority by the quasi-majority of agricultural entrepreneurs for the practical advantages it presents.

Despite all these, the lawmaker's attempt to unify the rules applicable to the great majority of legal relationships established between particulars, between natural persons and/or legal entities of private law, to which is added the professional's institution, generates a series of confusions at the reception of the new civil code. By virtue of the new civil code, where the difference between the various associative forms (associations, foundations and companies) is attenuated, where the distinction between nonstock professional company and company disappeared, all these forms of organization entering in the category of professionals, changes substantially the vision over the companies exploiting an economic enterprise.

## MATERIAL AND METHOD

The new civil code maintains the duality of the company's institution [S.Angheni, M.Volonciu, C.Stoica, p.68] understood, on one hand, as a deed, on the other hand as a legal person, distinct from its members. The legal text surprises the complexity of the legal institution, the company being, in the first place, the agreement of two or more individuals convening to unite their efforts and resources in order to conduct, together, on their risk, certain activities, aiming to accomplish a common purpose: to obtain benefits – shared between them –, or to accomplish together a certain economy. To the extent to which they will consider opportune, the members of the

<sup>1</sup> University Assistant at "Ștefan Cel Mare" University Of Suceava, Faculty Of Economics And Public Administration, [gabriela.leuciuc@yahoo.com](mailto:gabriela.leuciuc@yahoo.com)

company will take the necessary steps for the investment of the company with legal personality, and thus an autonomous authority will be founded, an independent legal subject.

It is added to all these a new dimension, which is the legal personality recognized by the lawmaker to the great majority of companies regardless of the object of activity, especially because of its multiple practical advantages presented by the creation of certain subjects of law distinct both in the relation with its own shareholders and in the relation with the third parties [D.D.Gerota, p.12].

In principle, the lawmaker leaves at the discretion of the founders the choice of the company's form to be constituted, thus respecting their freedom of association. In certain domains only, where the nature of the activity or the possible impact on the company produced by its development, the law narrows the founders' option over the company's form, by imposing a certain type.

In all cases, the shareholders will opt for a certain company form, taking into account the advantages they present as against to each case in particular and to the economic finalities which are accomplished by the different types of company [I.L.Georgescu, pp.26-28].

Taking into consideration the practical importance presented by this type of company, being the manner of organization of the economic activity preferred by the entrepreneurs, the agricultural company has met, all along the time, transformations which enriched and reconfigured its regime. Within this research, we propose to analyse in detail all these legal changes.

These forms of company acknowledge a series of particularities, being destined in principle to agricultural exploitations of large dimensions, where are concentrated both real estates and capital [S.D. Cârpenaru, p.48]. From the point of view of the organization, the activity in agriculture can be conducted either under the form of companies regulated by the Law no. 31/ 1990, republished, or the form of agricultural companies regulated by the Second Title of the Law no. 36/1991 on agricultural companies and other forms of association in agriculture, altered by the Emergency Ordinance no. 125/ 2006 starting with 26.05.2007, or, under the form of agricultural cooperatives regulated by the Law no. 566/2004 on the agricultural cooperation, the way it has been altered.

According to the law, the agricultural company, as the most important form of association in agriculture, is a private company with variable capital and a variable and unlimited number of shareholders. The companies may contribute, if it is had in view the object of activity, to the rational exploitation of the land, the use of machines and agricultural plants, to the capitalization of agricultural products etc. At the same time, as a particularity of this type of company there must be mentioned the fact that the agricultural company does not dispose of commercial character. On the other hand yet, by regulating the possibility of constituting a company for the exploitation of lands, law no. 36/ 1991 consecrated a solution different from that of the art. 5 Com.C., abrogated at present, in the sense that it recognizes, implicitly, the commercial character of the acts and operations of land exploitation effected by a commercial company.

The normative consecration of the agricultural company accomplished to the detriment of founding an economic enterprise in the theory of the affectation patrimony [R.I.Motica, p.35].

As any type of company, the agricultural company as well must accomplish certain substantive and procedural conditions in order to be valid. The minimum number of shareholders cannot be smaller than 10. At the same time, the quality of shareholder of an agricultural company can be acquired by submitting the memorandum of association or, after the constitution, by signing a statement which must contain the pieces of information identifying the signatory, the surface of agricultural land brought into use, as well as other goods, the account receivable included, with which the holders enter in the company, the number and value of the shares to be submitted.

At the constitution of an agricultural company, each shareholder assumes the responsibility to constitute a contribution to the social, which can have as object any movable and immovable good. Agricultural lands are submitted only for the company's use and the shareholders maintain their right of property over them. When entering into an agricultural company, all movable and immovable goods, as well as the animals, will be evaluated in order to determine the shares due to



each associated member. Within the limits of the contribution, the shareholder becomes debtor of the company, and after its payment, full creditor of the company, with all the consequences resulting from this quality. By not subscribing the contribution has the signification of the shareholder's non-execution of the assumed obligation with consequences provided by the law. The social capital is formed by shares, of equal value, which size cannot be less than 1 lei each.

The memorandum of association of the agricultural company, must accomplish, at its turn, the minimum exigencies provided by art. 1179 Civ.c., corroborated with art. 1325 Civ.c. for its valid existence: the capacity of the authors to conclude such agreements, the consent of its author, a licit determined object, a licit moral cause, to which are added, to the extent to which the law provides expressly, a particular form. We also add certain specific conditions of the memorandum of association, such as the concept of *affectio societatis*.

In the case of the agricultural company, the memorandum of association, which expresses the agreement of the shareholders to constitute a common fund from their individual contributions, with the intent of collaborating to conducting an agricultural activity with the purpose of obtaining a profit and of sharing the results, incorporates the provisions of the memorandum of associations and the statutes.

Despite the commercial companies where, usually, the memorandum of association is presented under the form of private deed, the memorandum of association of the agricultural company is presented under an authenticated form.

The valid incorporation of an agricultural company as subject of law implies crossing a procedure and accomplishing certain formalities, subordinated to the condition of *form lato sensu*, imposed by the law.

The agricultural company, like any other form of company regulated by the Law no. 31/1990, acquires legal personality from the moment of its incorporation with the observance of the conditions established by the law, being a legal entity with own will [O. Căpățină, p.133].

Having its own subjectivity, the agricultural company shows itself in the field of legal relationships, as it is a holder of rights and liabilities, distinct from those of the shareholders, assembling all the constitutive elements of a legal entity of private law: a self-standing organization and own patrimony, affected to the accomplishment of a licit and moral purpose, according to the general interest. As a consequence, the agricultural company has capacity of competence and exercise, being the holder of rights and liabilities, it participates directly and immediately within the legal relationships and retorts to the third parties for the obligations assumed. Such any subject of law, the agricultural company individualises within the framework of legal relationships by means of: brand, headquarter and/or subsidiaries.

As any other legal entity, the agricultural company does not have an organic existence, for which reason, its will is expressed by its authorities, respectively: management, execution and control authorities. The company's will is formed within the GMS and is brought to its accomplishment by the executive authority which is the council of administration. The control of the administrators' activity is accomplished by the shareholders who have the quality of censors.

Starting from the specific of the attributions, within the agricultural company we can distinguish ordinary and extraordinary meetings, although the lawmaker regulates these types of general meetings exclusively within the joint stock companies regulated by the law 31/1990. In principle, the ordinary general meeting will be called at least once a year, while the extraordinary general meeting, any time considered necessary.

The company's will is expressed by the general meeting, but is brought to its accomplishment by the administration authorities of the company. According to the law no. 36/1991 the agricultural company is administered by an administration council. The number of the council's members must be at least 3, but not bigger than 13, chosen from the shareholders. The council of administration will choose a president and vice-president within its members. In the absence of the president or the vice-president, the president's role will be played by the oldest member in the council of administration.

For the validity of the deliberations of the administration council, it is necessary the presence of at least half plus one of the administrators. The decision is adopted with the majority of 2/3 of the number of the present members.

The company's control of management is ensured by the censors. Thus, each year, one to three main censors and one to three suppliant censors are elected within the shareholders during the general meeting. The censors deliberate within a committee with the participation of the staff and the decision of the simple majority.

## CONCLUSIONS

The analysis of these forms of conducting an activity in agriculture is yet highly topical, not only because they will continue existing in the Romanian economy, but also because they allow the infusion of capital and of foreign models of organization of agricultural activities under already known forms.

The choice of the form of association by landowners, as a way of conducting their activity, is determined by the low individual possibilities of capitalization of own household, which does not allow it to ensure all necessary material means for its development. By association, especially because the shareholders dispose of certain material means, there can be operated in the sense of the annihilation of unwanted effect of the lack of capital.

The difficulties with which are confronted small agricultural producers justify the necessity of association are determined by the difficult cooperation of the units supplying services, especially when the surface of exploration is reduced.

## BIBLIOGRAPHY

- Angheni, S., Volonciu, M., Stoica, C. (2008), *Drept comercial*, Ed. CH Beck, București,  
 Căpățînă, O. (1996), *Societățile comerciale*, ed. a-II-a, Editura Lumina Lex, București,  
 Cărpenaru, S. D., (2009) *Tratat de drept comercial român*, Ediția a VIII-a revăzută și adăugită, Editura Universul Juridic, București,  
 Georgescu, I.L. (1948), *Drept comercial român*, vol. II – Societățile comerciale, Editura Socec&Co., SAR, București,  
 Gerota, D.D. (1928), *Curs de societăți comerciale*, Ed. Fundația culturală „Regele Mihai I”, București  
 Militaru I.N. (2013), *Dreptul afacerilor. Introducere în dreptul afacerilor. Raportul juridic de afaceri. Contractul*, Universul Juridic Publishing House  
 Motica I.R. (2005), *Drept comercial român*, Ed. Lumina Lex, București

# FROM THE TRADITIONAL TO THE MODERN AND COMPLEX AGRICULTURAL COMPANIES THAT ARE USING BUSINESS INTELLIGENCE TOOLS

BALINT ANTONIU OVIDIU<sup>1</sup>

**Abstract:** *In the current conditions of a volatile economic environment, the ability to use an intelligent way the information that allows agricultural companies to cope with the challenges that they are facing regarding the current economic environment, represents the solution to strengthen their position on the global market. I explain in this paper how in the prospects of adapting intelligent business solutions they can influence not only agricultural companies but also the whole economic system. To remain competitive in the new global environment, characterized by an increasingly sharp competition, companies must adapt to new technologies and solutions.*

**Key words:** *intelligent systems, agricultural companies, economic development, business intelligence, support system*

## INTRODUCTION

Business Intelligence (BI) is a term that designates a set of concepts and methods used to improve the quality of decision-making in business. More simply, although, we can say that, Business Intelligence is providing relevant information in a timely manner for the people who need them [1].

We can define BI as a presentation of the information platform in a correct manner, useful and specific to each person in adequate time to be able to serve in an effective mode.

In a 1958 article, IBM researcher Hans Peter Luhn used the term of BI. He defined intelligence as "the ability to understand the relationship between the facts presented in a way that lead us towards the desired goal."

BI as it is understood today represents the evolved form of a decision-making support system that began in the 1960s, and was developed through the 1980s [2]. DSS (Decision-making support system) has its origins in computer models designed to assist with decision making and planning process. Since then, data storage, and the BI Executive Information System began to evolve rapidly [3].

In 1989 Howard Dresner has proposed that the term BI to describe: "concepts and methods to improve business decisions, using a support system based on facts." Only in the late 1990s the term BI began to be spread throughout companies worldwide.

Thomas Davenport argued that BI should be divided in queries, OLAP reports (On-line Analytical Processing) and BA (Business Analysis). In this definition, business analysis is a sub-branch of BI based on statistics, predictions and optimization.

There are two basic interactive techniques to gather the necessary data:

1. interviews and
2. open session features.

Before starting implementing a BI solution, it is appropriate that certain factors to be taken into consideration. There are three critical areas that must be valued in an organization before making a BI project:

- the level of commitment and sponsorship from the top management;
- you need a certain business level to create a new BI implementable;
- the quantity and quality of the existing business should facilitate implementation of a new BI.

<sup>1</sup> PhD Student BALINT Antoniu Ovidiu, The Bucharest University of Economic Studies, 6, Romana Sq, Sector 1, 010374, Bucharest, Romania, E-mail: balint\_antoniu\_ovidiu@yahoo.com

Business Intelligence is not a set of printed reports or an presentation on a screen [6]. The rows of a sales report, for example, may contain detailed information and accurate, but is not a Business Intelligence solution until they are put into a format that can be easily understood and interpreted by a person in order to establish an effective solution for a particular situation encountered in the day-to-day process by agricultural companies or any other type of companies.



The analysis of Business Intelligence

Source: <http://www.computernetworksit.com.au/blog/corporate-success-through-business-intelligence>

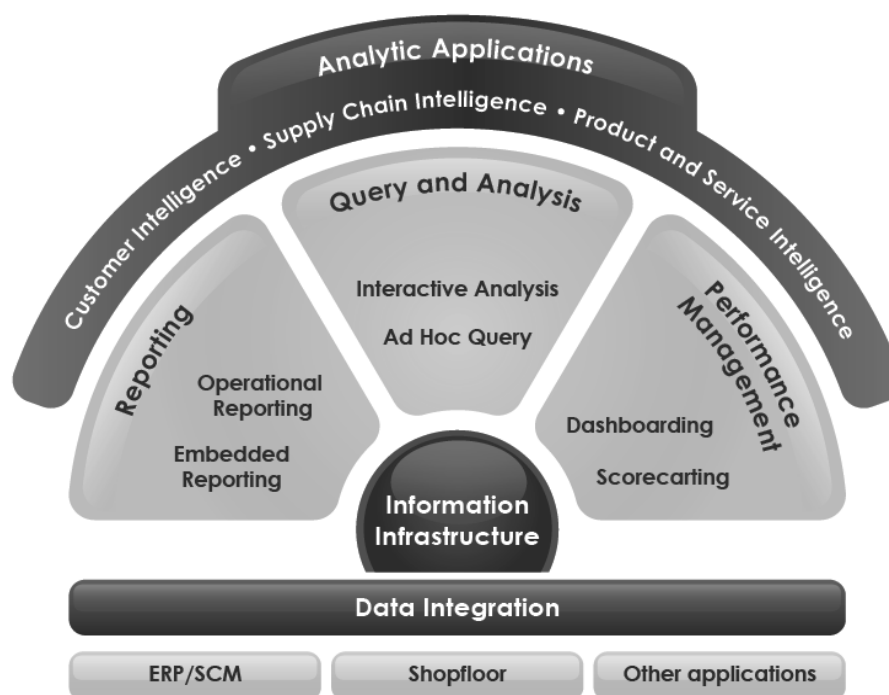
Business Intelligence solutions have witnessed an unprecedented development in the last decade and companies that offer such solutions continued developing them despite the economic downturn that we are facing in the present - worldwide. The functionalities offered users, have become increasingly varied, covering a broad range of needs, from simple tabular or graphical reports to the ability to track key indicators of the performance of the organization in a synthetic manner and concise.

## MATERIAL AND METHODS

Business Analytics (BA) used to develop and improve Business Intelligence reduces considerably the risk of decision-making process and marketing activities that generate real value, usable with minimal resources.

Business Analytics applications include decision support systems, reporting and query tools, on-line analytical processing (OLAP) and also forecasting systems and data mining. Ultimately, the results of business analytics deployments are in-depth analysis, refinement and concentration of a large number of business information, in specific performance indicators and finally, organizational knowledge. Business Analytic deployments are efforts involving multiple aspects of organizational management strategies and processes from application management to infrastructure changes. Business Analytic projects does not aim to teach managers how to take the right decisions, they help them instead to take decisions based on facts and figures and not on assumptions.

Companies collect vast amounts of data throughout transactional systems (e.g. ERP - Enterprise Resource Planning, CRM - Customer Relationship Management and SCM - Software Configuration Management) which have been implemented over the years and are used daily to perform a variety of corporate functions.



Analytic application in Business Intelligence

Source: <http://dninixites20.alfabyte.be/SAPServices/SAPBusinessanalyticsSAPBWBusinessObjects.aspx>

Development of concepts and technologies for BI using BA creates an ambience where the current data management can be used to improve the quality of decisions. In addition, the existence of large volumes of transactional data, and in particular transactional data with a high degree of specificity and particularity, creates opportunities for managers within agricultural companies to improve the accuracy of forecasts [4].

## RESULTS AND DISCUSSIONS

The global demand for new and innovative business solutions, especially in agricultural companies, has increased in the last decade and continues to grow. But despite the technology that we have access to, the evolution of intelligent systems is deficient [9].

The concept of Business Intelligence is relatively new and appeared approximately 40 years ago [5] and it has not been used in agricultural companies since a few years ago and only in the USA.

The application of multidimensional dynamic systems that supports the decision-making processes with intelligent and predictive skills, has led to the development of the concept of business intelligence [12] which can be a new and revolutionary tool for the development and increase of agricultural companies. These systems (BI) are becoming increasingly more complex, being capable of multidimensional data analysis with statistical analysis capabilities and software that serves much better the decision-support systems [10].

The need for business intelligence systems can be easily explained if we study the current economic context: to survive in today's competitive agricultural and economic conditions a company has to develop a successful strategy to increase its resources, to anticipate future development of the economic environment and to know how to analyze the strategies that are used by other companies to be able to predict its own future. Business Intelligence does all of these things.

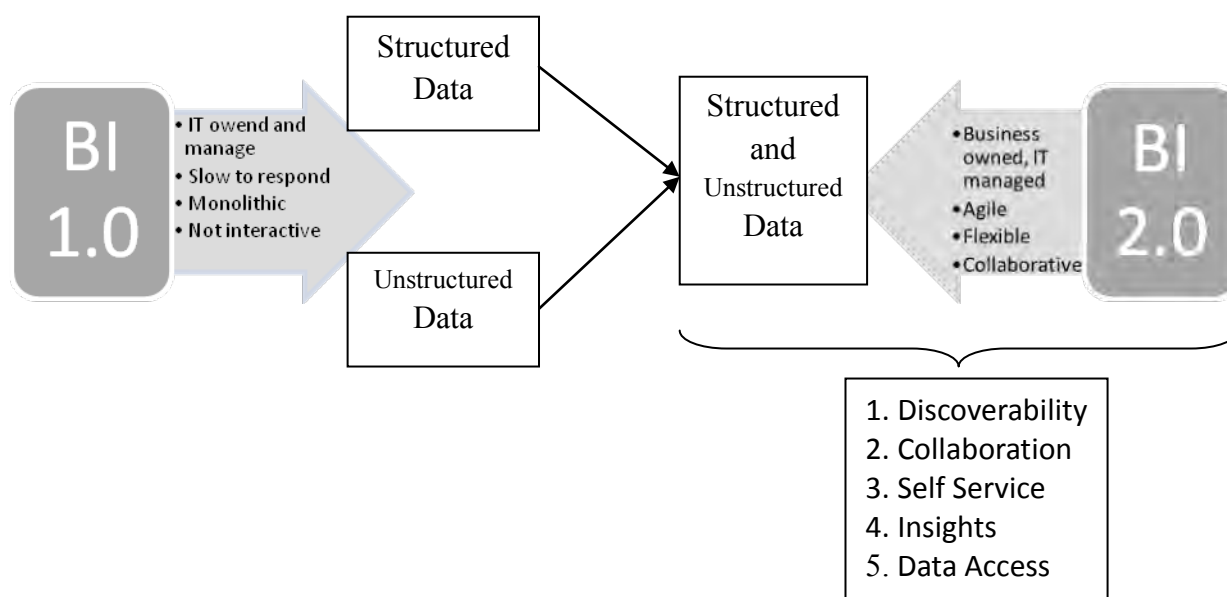


Figure 1: The evolution from BI 1.0 to BI 2.0

Source: Proposed Model by BALINT A. O.

The success of a company is based on the newest information that the business environment is offering and BI represents a systematic process of collecting, analyzing and disseminating the information, which is mainly aimed at getting or keeping competitive advantage, preventing the ignorance in the company activity and capitalizing on opportunities that arise in the agricultural market [7].

Business Intelligence has evolved over the years, progressing from its incipient state, becoming a very powerful tool that it's used by companies worldwide. The current concept of BI (also named BI 1.0) has reached its second stage on the evolution scale and is named BI 2.0. The implementation of BI 1.0 and BI 2.0 in agricultural companies started in the USA in the mid 2000s and represents a set of tools and software for the traditional agricultural companies [1].

The main differences between BI 1.0 and BI 2.0 are represented by the fact that in the past BI was focused on strategic and operational views, its responses came in a slow rhythm, very inflexible and not very interactive [8]. BI 2.0 resolved all these inconvenient factors and added new features such as a more collaborative and easy way to use the system which is integrated with the business ideals and goals.

## CONCLUSIONS

The permanent changes that are taking place within the global markets require agricultural companies and managers to constantly adjust their operations and business strategies, to redefine their objectives and to analyze the competitors performance.

A long time BI systems have treated only the daily activities of the organizations. As a result of their evolution they have surpassed the level of importance regarding the tactical and strategic level of management and are now used with success in agricultural companies. They represent an important step in the integration of business processes with the information technology. Providing solutions to transform data into information and knowledge, Business Intelligence 2.0 systems can help agricultural companies cope with the actual financial market and adapt the competitive factors in order to respond better and faster to their clients.

## BIBLIOGRAPHY

1. Burghilea C., 2010, Trend analysis of the autochthonous agricultural segment evolution, *Supplement of Quality-access to success Journal*, No. 111, ISSN 1582-2559, Pp. 50-56;
2. Cebotarean E., 2011, Business Intelligence, *Journal of Knowledge Management, Economics and Information Technology*, Vol. 1, Issue 2, pp. 2-12;
3. Davenport T.H., Patil D.J., 1998, *Working knowledge: How organizations manage what they know?*, Cambridge, MA: Harvard Business School Press;
4. Gheorghiu A., Gheorghiu A., Spănulescu I., 2009, *Target market risk evaluation*, Proceedings of the International Conference on Econophysics, New Economics & Complexity – ENEC 2009, Victor Publishing House, Bucharest, ISSN 2065-2550, p. 113;
5. Greenbaum J., 2003, *"The Paradox of ROI"*, Intelligent Enterprise, pp. 60-62;
6. Luhn H. P., 1958, "A Business Intelligence System", *IBM Journal of Research and Development*, Issue 4, pp. 314 – 319;
7. Mărcuță L., Mărcuță A., Tindeche C., 2013, *Analysis of Romanian GDP during crisis*, 20th International Economic Conference - IECS 2013 „Post Crisis Economy: Challenges and opportunities”, Sibiu, Romania;
8. Nelson G. S., 2010, *"Business Intelligence 2.0: Are we there yet?"*, SAS Global Forum April 11 – 14 2010, Seattle Washington;
9. Soejarto A., 2003, *Tough Times Call for Business Intelligence Services, an Indisputable Area of Growth*, <http://vb.channelsupersearch.com/news/var/40682.asp> or [www.VarBusiness.com](http://www.VarBusiness.com) (acc. 24.08.2013);
10. Waltz E., 2003, *"Knowledge Management in the Intelligence Enterprise"*, Artech House Publishing House, ISBN-13: 978-1580534949, p. 211;
11. Weston H. J., Wixom B. H., 2007, *"The Current State of Business Intelligence"*, Computer Magazine, Vol. 40 Issue 9.
12. Whiting R., 2003, *"Look Within—Business-Intelligence Tools have a New Mission: Evaluating All Aspects of a Company's Business"*, InformationWeek, p. 32;
13. \*\*\*<http://www.computernetworksit.com.au/blog/corporate-success-through-business-intelligence>;
14. \*\*\*<http://dninixites20.alfabyte.be/SAPServices/SAPBusinessanalyticsSAPBWBusinessObjects.aspx>.

## BRAND - IMAGE OF RECOGNITION OF ENTREPRENEURIAL SYNERGY

UDRESCU MIRCEA ALECSANDRU<sup>1</sup>, BUIGA ANDREI<sup>2</sup>

**Abstract:** *Brand represents reputation of offer. Branding means cultivating the reputation of offer. But brand and branding are synergistic actions of entrepreneurship, a combination of vision and promotion strategy of offer by the management team. Brand is a reputation of something as a result of the actions taken by someone interested. Many beautiful places of nature exist in different parts of the world, but also in the tourists minds, because their beauty and perfection is always maintained by the unequaled creator: nature itself. Likewise, in society, products and services become brands, as far as the one who produces aims to achieve the highest level of customer satisfaction through quality of supply. That is why, the reputation originates from fulfilled pleasure. And such a state is felt only if the entrepreneur creates unique value for the customer and make things better than the competition. This is how social success is built up. We believe that the country brand is the way in which Romanians travel around the world and how they treat their guests. A country brand can't be built up with a leaf and a marketing campaign, although it is a tourism brand, but money, that could have been used for a better purpose, were certainly spent in a lamentable way.*

**Key words:** *brand, branding, product, mark features, quality, needs, desires, requirements, competitiveness, satisfaction, pleasure*

### INTRODUCTION

Ever since the beginnings of a business were related to the identification of the need which was intended to be satisfied in terms of competitiveness. Social needs and product or service formed and continue to form the inseparable binomial of social and economical becoming. Throughout time social needs, products and services have greatly diversified, dynamic balance between them being managed by market principles. In the market, the need manifests itself through desires and requirements and the offer manifests through products and services. As the social division of labor became more evident, the productive force became greater.

Therefore, producers, in order to customize the offer, applied to the use of mark in order to identify products. Thus generic products began to be overcome by the branded products in terms of quality. In essence, the brand made and makes possible an easy identification of products and services characterized by a certain quality performance, which can underlie customer satisfaction.

### 1. BRAND AND BRANDING - BUSINESS MANAGEMENT MAJOR CONCERNS

Marketing, as theory and economical practice appeared and developed as a necessity to identify customer needs and to manage the production and sales, so that customers can enjoy maximum satisfaction, while avoiding general social wealth losses caused by overproduction. But brands have greatly diversified. Now, each product or service may be represented by a lot of marks. Therefore, as well now as in the near future, communication efforts of supply are linked to brand, as regarding reputation and linked to branding as a conscious action to create and assert a reputation.

It is already estimated that branding is vital for any organization and any business as it follows: "Brands underlie most organizations. Brands are your reputation – what you represent in the minds of your customers, as well as in the minds of your investors. If you have a bad reputation, then it will be difficult to reach your business goals. If you have a positive reputation, it will have a visible impact on your future profits (Don Sexton, 2012). " Since the brand is not the product or service, but what the product or service represents in the consumer's mind, an image or state of mind, then branding appears as a process " of creation and management of associations which generate images and feelings about a brand. Associations are transmitted through signals. Branding is the process of creating the signals which are communicated to the consumer through what is different and relevant to the brand. (Allen Adamson, 2006) "

<sup>1</sup> Prof. univ. dr. Mircea Alecsandru Udrescu, University ARTIFEX of Bucharest, udrescumircea@yahoo.com

<sup>2</sup> Conf. univ. dr. Andrei Buiga, University ARTIFEX of Bucharest, andrei.buiga@gmail.com



If the brand is what remains in the minds of consumers after they become aware of a product or a mark, through observation, buy or use, then that memory regarding it is maintained through brand signals, signals attributes and associations which are in the consumer's mind.

So, first of all, the brand signals are given by the product and then the product name, logo, color, shape and so on, and everything that customers associate with that company. Signals attributes cover all the things that are in the customer's mind as a response to the appearance of a brand signal. Associations express all the connections between brand signals and attributes related to it through thoughts, feelings, emotions and so on, which are in the consumer's mind.

In essence, branding is the process of developing the positive image of a product, in essence its reputation, and brand is the mark or product that cultivate an increasingly better reputation. This is why the brand remains with a particular image in the minds of consumers because the image was initiated by a business management, as a future business vision. Connections between need, product, mark and brand are shown in Fig. 1.

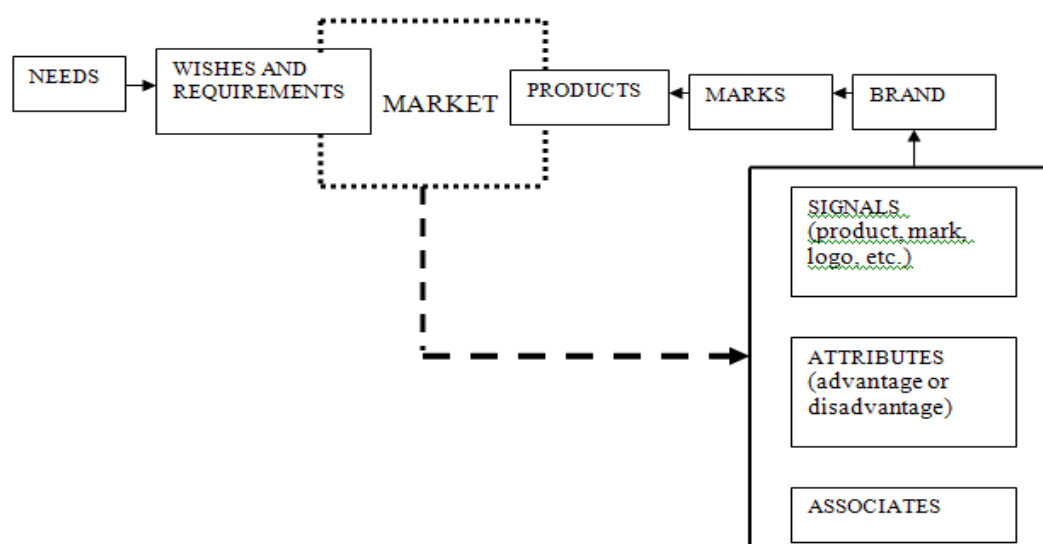


Fig. 1: Configuration of brand in the market

From the description above results that products and brands measure up to desires and requirements, meaning certain needs. It is characterized by something tangible, size, dimension weight, color, functionality, etc.. Possibly being identical, products and brands are able to diversify choice. In case of travel, the need for rest gets us to the idea of a hotel that provides various services. In any larger city there are hotels that offer similar services at profitable prices, that make the choice more difficult.

Hotels do not exist in the minds of the consumers, but on the field, in their locations. A specific hotel brand is on the field, but also in the minds of consumers, representing something, a good or bad memory, which simplifies the choice, being preferred the one whose level of satisfaction or confidence level is most convenient. This simplifies and differentiates brand choice.

Product and mark are elements that justify past businesses, the brand is what gives perspective to a business. Therefore, the businessman who is not interested in the brand is not interested in the future of his business. The brand enjoys the most interesting associations, thoughts and emotions, that justifies the purchase decision. Brand does not mean advertising. That can be a brand signal. But even the best quality advertise can make products and brands fail very quickly. A professional commercial can persuade some consumers to buy the product, or at least, try it, but if

it have defects, the buyer will treat it with indifference or discontent, in the future. In the market, the buyer buys the product over and over again only if it generates increasingly higher satisfaction.

Business management involves vision and managerial strategies. Successful coordinates of business management are related to how product quality, value perception and branding are monitored. All this are reflected in reputation. And reputation must be constantly consolidated. A consolidated reputation means efficient management.

Brand is the reputation of an offer. Branding means cultivating the reputation of offer. But brand and branding are synergistic actions of entrepreneurship, a combination of vision and promotion strategy of offer by the management team.

## 2. BRAND - IMAGE OF ENTREPRENEURIAL SYNERGY

Brand is a reputation of something as a result of the actions taken by someone interested. Many beautiful places of nature exist in different parts of the world, but also in the minds of the tourists, because their beauty and perfection is always maintained by the unequalled creator: nature itself. Likewise, in society, products and services become brands, as far as the one who produces aims to achieve the highest level of customer satisfaction through the quality of supply. Therefore, the reputation originates from fulfilled pleasure. And such a state is felt only if the entrepreneur creates unique value for the customer and makes things better than the competition does. This is how social success is built up.

Brand means much more than starting a business and proposing an offer. It means continuous development of performance, of competitive advantage. This represents a business that starts and develops, becoming more appreciated. Such an event involves principles of entrepreneurial culture, the motivation of all whom are involved in actions that make possible all the transformative processes of resources in satisfaction.

At the beginning, the successful entrepreneur is not thinking about earning, but he starts the creating action of products or services from the universal principle, according to which the greater is the effort made by the consumer in order for him to be satisfied, the greater can be the resulting profit from the projected business.

The entrepreneur is the one who have the vision of the business, the one that solves all the aspects of resources to be engaged in the creative efforts and harmonizes the efforts of all employees to give shape to success. So the entrepreneur becomes the catalyst of the synergetic action for the cultivation of the idea of performance product or service, source of synergistic energy by which the brand is installed and developed.

Entrepreneurs are seen as people looking for opportunities to sell, but also the one who has any managerial and marketing knowledge and knows that what it sells is only necessary, it is desirable and may be required in the current market conditions. Thus, entrepreneurs innovate in bringing value to customers, and pleasing shareholders; the brand, product or service vision is the starting point of the creative effort. At such times, entrepreneurs know what the unique commercial offer will consist in designed to bring satisfaction both shareholders and consumers.

The brand that brings satisfactions is the treasure to be discovered. The chosen path to get it represents entrepreneurial strategy. Schematically, the harmonization between entrepreneurial vision and strategy results from Fig. 2

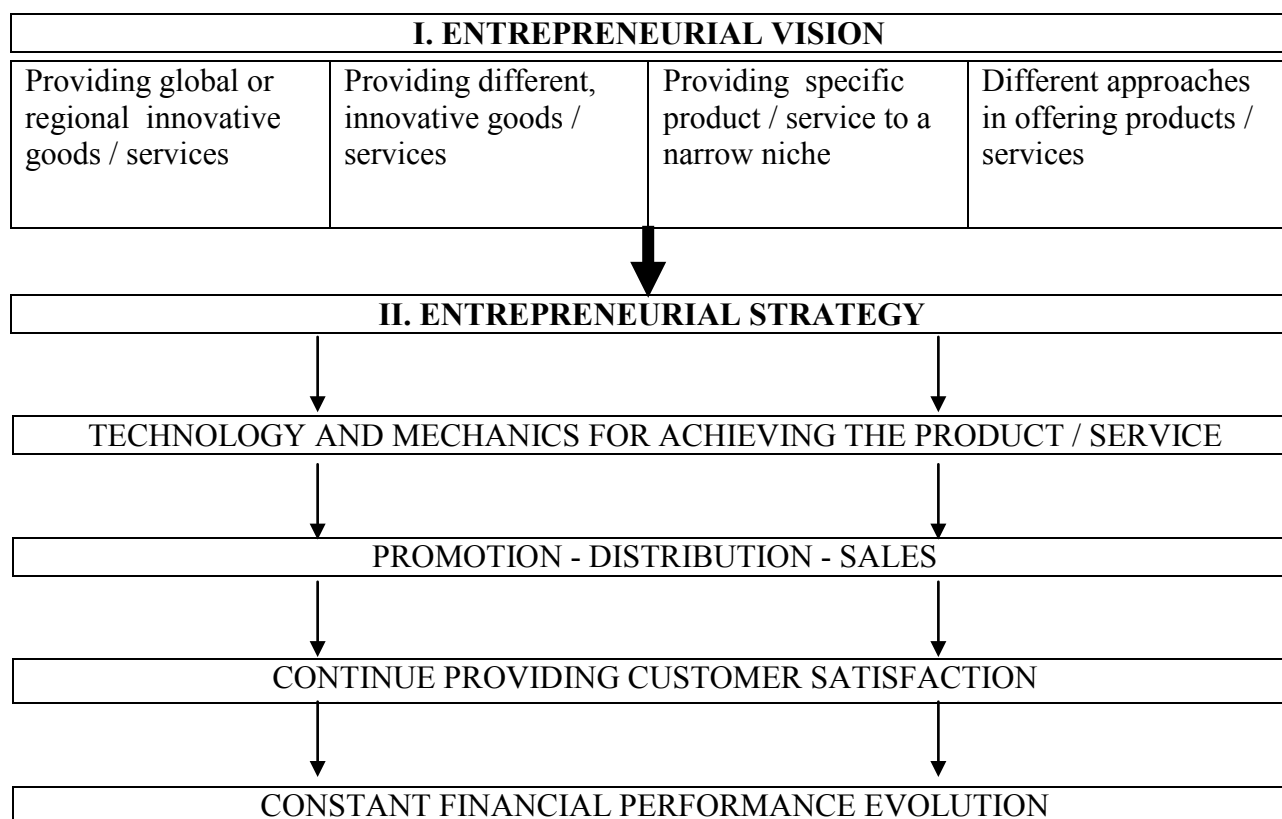


Fig. 2: Entrepreneurial strategy for achieving a brand

Entrepreneurial vision and strategy involves objectives, resources, processes, transformative processes, plans, all with a certain running time. That is why vision and strategy are not processes that once started they slide. They must necessarily take into account the environmental changes, so that result - the product or service – to be an excellent one.

From now on the daily processes to coordinate efforts in order to achieve the vision are starting, while the entrepreneur keeps a close look on the entrepreneurial synergy dedicated to the declared common goal.

From now on, behavioral moral principles will be implemented, in order to guarantee success. These take the form of cultural rules like "Do you want to travel first class when you travel for business? Yes. Try at Morgan Stanlex. No. Amazon executives travel in economy class." or "build the strategy on principles that do not change - for Amazon, selling lipsticks, tractor seats... is all part of one big plan with three big constants: offer wider selection, lower prices and fast, delivery. " or "Be obsessed with clients - Early on Bezos brought an empty chair into meetings so lieutenants would be forced to think about the crucial participant who wasn't in the room: the customer. Now that surrogate's role is played by specially trained employees, dubbed "Customer Experience Bar Raisers." When they frown, vice presidents tremble (Barbu, 2012).

Products and services become brands insofar as each employee contributes to their structural functional and advertising configuration. Entrepreneurial synergy accelerates the process of achieving the objective specified by vision, and any imperfection is reflected as a dissatisfaction in consumer's mind. That is why only the synergic action represents the success guarantee in creating brands. And guaranteeing the performance of a ny product through collective effort, means the transformation of the name in renown, means to add a critical, intangible characteristics to a product for the future of the business: reputation.

### 3. COUNTRY TOURISM BRAND - AS A SYNERGIC ACTION

If the brand is a name, a picture, a sign, etc. through which we distinguish one product from another, at the rhetorical question "What is the brand?" Allen P. Adamson, the famous branding manager, replied: "It is something that lives in your head. It's a promise that links a product or

service to a consumer. Whether words, or images, or emotions, or any combination of these three, brands are mental associations that get stirred up when you think about or hear about a particular car or camera, a watch, a pair of jeans, a bank, a beverage, a TV network, an organization, a celebrity, or even a country. (Adamson, 2006)" The brand is not only the mark, is what remains in the ideational and affective plan, in consumer's mind and hearts after it had consumed or used the product. It is the reputation of the product sold under a particular mark.

For example, Mamaia is a city in Romania, is a resort on the Black Sea, but as a brand, for some it is a certain state of mind that links sunny beaches, clean sand, warm water, an elegant nightlife, tennis courts, select restaurants, promenade, performances on the sand, order, safety, discretion, etc. Such brand becomes strong only if the majority of people make such associations, not others.

From here emerges the idea that, in order for a brand, this integrated assembly of words, images, feelings and emotions, to be successful, it is necessary to be different from the competition in the minds of the consumers, and this difference must be increasingly relevant. In the name of this differentiation, people use brands as a catalyst when they make purchasing decisions. For this, they need simple ideas, interesting and honest, to be connected in the minds of consumers to support their own product in front of all other tests.

Hence, the success of a brand derives from the identification of what must be sold under the brand name, from the proof that what sells is different from the competition and from the conversion of this difference in ideas or interesting emotion that can motivate consumer's entire business ensemble related to the mark. It is very important that the brand promises made to consumers to be completely different from other brands. However, "The best brands are different from other brands of the same category by communicating, and respecting this promises. Ideas on which brand is conceived can be based on a different way of thinking about one particular product or service, or can be completely unique - something people have never seen. A good brand is able to transmit to consumers elements that make it different and why it is better than others. Good idea the brand manages to do both. (Adamson, 2006)"

The products, as well as marks, are similar, but different among them. That is why any management must provide consumers a simple significance that differentiates its product from others and attracts people's interest. However, product, mark or brand management must be very careful because the difference just for its sake not bring commercial gain, but rather brings other financial issues. Hence, a product or a brand which is not interesting for buyers will not have to find commercial support through a policy brand, on the contrary, the financial losses will increase.

For the brand to be successful, business strategy must be connected to the brand idea, so the success of a brand depends on the experience that it can offer. Any brand idea becomes irrelevant when you can not fulfill the promise behind the brand idea. If the idea of brand promises wonderful evening promenade, a photo of two young people holding hands is not enough, if parks are not there, walkways, benches, floral arrangements, cleanliness, safety, etc.. Therefore researchers in the field argue that the "simple and different ideas are parts contributing to the successful equation of a brand. The need to know if the organization that represent the brand has the resources, services and people they need to support these ideas is another aspect that matters. Brand idea must represent what you can really offer. Before setting a simple and differentiated brand idea, before developing a strategy to convey this idea, make sure that you have all that is necessary to give life to the idea. (Adamson, 2006) "In the particular case of a brand and a mark, product is the supreme condition on which the two commercial approaches are based and that gives hope to the business plan of the company.

Mark differentiates products, and brand differentiates ideas that come from the essential characteristics of the brand, because the brand is a set of mental associations that are created in people's minds, related to the essence and product details, which aims to stimulate buyer's purchase decision. The brand of a product is the mission of the management team, that connects in a coordinated effort marketing specialists, functional departments of the company, all its employees, plus research, production, promotion and distribution, both their own as well as those of

cooperation. Brand is the idea in which the client can trust. The hope of a good brand is maintained by how it can answer the following questions: What problem is solved? What is the uniqueness of the product and the brand? Who is interested in this specific difference? Is the number of people interested in the product high enough so that the effort to create brand can lead to profit? Is the business strategy able to sustain the effort to differentiate the brand? The brand is the idea, but the hope of a well made business comes from the conduction of the idea to many consumers, with obvious economic results. In this regard, experts are warning that brand may not be a magic formula for success and a big effort to create a brand without a good product, turns into a façade enthusiasm and its bill can be disappointing.

Such an approach, in which success is questionable, is related to the famous "tourism brand of the country." Before proceeding to the creation of a tourism brand of a country, it started from the error that Romania is, by name, the recognized country brand. But mass media did not hesitate to show that we are far to assume such a national social project in this direction. At questions about what Romania represents for its own inhabitants, they received responses like: is the country where we live, the country where we were born, country in which one can't live, a country with potholes, a land where everything is possible, it is a beautiful country-too bad it's inhabited, country where people die of hunger, country with generalized corruption, country which buried the tourism.

Without taking into account the overall negative perception, has begun with an incomprehensible rush the achievement of the "country's tourism brand", of the idea, of key message etc.. to catalyze Romanian's and foreign tourist's emotions to desire to turn Romania into a generalized tourism destination, especially of those who want ecological tourism, aiming to achieve certain economical advantages.

If we consider Romania as a great organization, we understand that the assembly of this brand was supposed to be done by specialist teams of national and international recognition, for engaging all administrative managerial levels political, social and legislative, and the final message should be assumed with interest by most citizens of the country.

Also, a "national tourism brand" should necessarily find the specific difference in the field towards the tourism of the countries compared to us, relevance of this distinction, the value of this distinction, and, of course, the level of knowledge of the value and differentiation, with an estimate evolution in time of the relationship difference-relevance and value-knowledge.

Studies show that the extremely strong B2B brands not only hold high brand awareness but they also have high understanding and positive feelings about their products or services in their key audiences (Carney, 2004).

In fact, for any country, its tourism brand is a major action that synergistically engages all national components that contribute to define the product, mark and, ultimately, the brand, the wanted reputation. A touristic brand is built on a number of trails on a number of tourist attractions, the transport infrastructure, the infrastructure of entertainment, a certain level of comfort etc. It is possible to built up a touristic country brand, without having any alternative brand to support the aggregate? We believe that the country brand is the way in which Romanians travel around the world and how Romanians treat their guests. A country brand can't be built with a leaf and a marketing campaign, although it is a tourism brand, but money, that could have been used for a better purpose, were certainly spent in a lamentable way.

From ignorance or bad faith, those responsible with promoting Romanian tourism didn't reflected on a principle made public by Jeff Bezos: "In the old world, you devoted 30% of your time to building a great service and 70% of your time to shouting about it. In the new world, that inverts. Amazon's ad budgets are surprisingly small for a retailer of its size. Bezos believes old-fashioned word-of-mouth has become even more important in the digital age— so he prefers low-key process improvements that are meant to get happy customers buzzing. (Forbes, 2012)"

Since Romanian co-nationals fill the pages devoted to the negative aspects of Western publications, since foreign tourists put their lives in danger to get from the airport, to the nearest town, since the hotel services are vague promises, since transport infrastructure barely edges into the rudimentary appellation since instead of the beauty of nature and traditional dishes tourists

found two star hotels that charge as a four or five stars hotel, waiters begging undeserved tips, dirty beaches and rivers hidden under rubbish etc. then this tourists feel frustrated by the commercials that lied them and, of course, they will tell friends about their adventures, that will make the effort to create a national brand to have unwanted effects.

Since the product, tourism has no comparative quality characteristics with those of neighbors and others, efforts to impose reputation through lies are doomed to fail from the start. To create spots with Ilie Nastase, Nadia Comaneci and Gica Hagi, Romanian tourism officials had paid the fabulous sum of 400 000, plus 2 000 000 EUR for the purchase of advertising space on foreign television. In fact, attempts to promote our country were perceived as political forms of fraud of public funds, since the commercial results have been disqualified. The album printed in 97 000 copies in the campaign "Eternal and Fascinating Romania" had cost six million dollars and brought as compensation only smiles and awkward thanks. The "Fabulospirit" campaign intended to change the image of Romania in the EU, has no results but Romanians had paid over three million euros. The "Romania always surprising" campaign also has cost us \$ 1.7 million and it hasn't brought us more tourists. Since brand promises have not been fulfilled, tourists noted unfulfilled promises and searched better travel products at neighbors (A.Lupu, 2009). In fact, to promote internal tourism, the state spent huge sums every year but the results were insignificant. Advertising budget at rate-card spent by Romania in internal campaigns (press, radio, TV) is presented in Table no. 1 (P.Barbu, 2012).

Tab. 1: Advertising budget to promote internal tourism

YEAR	GROSS AMOUNT (EURO)	NUMBER OF INSERTS
2008	622 000	618
2009	2 281 000	2 044
2010	6 284 000	3 155
2011	9 308 000	11 455

Anyone can ask himself why the number of Romanian tourists increased with only 16, 9%, attending to a growth of 48% in 2011 of the advertising effort compared to 2010?

If for an entrepreneur, the brand is the synergistic result of entrepreneurial culture of all employees that contribute to the creation and polish of good reputation of the product, so, country brand is the synergistic result of those who contribute to refine the product, citizens and institutions which must combine their efforts to give glow to the national image.

This challenge appertains to civic convictions, based on faultless morality, inspired by responsible governmental institutions. Romania, like other countries, has its own beautiful natural places, it has olympical and global champions, it has good quality products, but all of these must be included in a symbolical aggregate, by narrowing negative aspects: thefts, beggars, small doggeries, sloppy roads, especially by eliminating the indifference gestures towards the great moral values of humanity, as we can see in the following example: "In a few days, Menuhin had got to leave Romania at the break of dawn from Baneasa Airport, after assisting a concert of Madrigal group, lead up then by Marian Constantin. He was 83, but he accomplished his schedule with the cheerfulness of a 50 year old. When he saw Constantinescu, who came to greet him as well as he was leaving, he reproached with being up to the lark just for him. They had a talk in a small chamber beside the guest hall, that remained locked because the responsible servant hadn't woke up in time to bring the key, Menuhin only asking for a cup of tea, which he tasted from a plastic glass. When the responsible servant to unlock the guest hall arrived, Menuhin refused to leave from the stairs which redounded him as a chair, by only telling the hosts that even though he switches the place, the tea remains as good as always (Catalan, Barbu, 2013).

Of course the tea has the same flavor, but the institutional and individual reputation had to suffer. This is why country brand needs a synergetic action of simple people and institutions, in the system of responsibilities and motivation, that is built up on moral values. Otherwise, brand advertising passes from the most appreciated product into the undesirable one, leaving behind only regrets and many unanswerable questions.

## BIBLIOGRAPHY

1. Allen P. Adamson, (2006) *Brand Simple*, București, Ed. Publica.
2. Andreea Lupu, (2009) *Turismul românesc a ales cea mai facilă metodă pentru promovarea internațională*, Forbes Romania, 18 mai 2009.
3. Alexandru Catalan, Petre Barbu, (2013) *Omul-orchestra*, Forbes Romania, 18 februarie 2013.
4. Carney, P. (2004) *Brand leaders in business to business*. Brand Strategy February 2004, London, Centaur Communications.
5. Don Sexton, (2012) *Branding*, București, Ed. Curtea Veche.
6. Petre Barbu, (2012) *Mai ușor cu promovarea turismului*, Forbes Romania, 17 aprilie, 2012, pp.75-81

# THE AGRICULTURAL CONSULTANCY ACTIVITIES, STRUCTURES AND FEATURES PERFORMED IN THE TERRITORY OF THE OLT COUNTY

EMIL MARINESCU<sup>1</sup>, RALUCA NECULA<sup>2</sup>

**SUMMARY:** *The paper analyzes the consultancy activities organization and development in Olt County during the period 2008-2012. The average number of villages returned to a consultant was of 7, and the number of farms of 6441. It was found that most activities are represented by organizing seminars and group counseling, workshops, group visits and demonstration.*

*As a consultant's work appreciation activity it has been analyzed the number of projects carried out or in progress. In the period 2008-2012 there were carried out 2010 projects and the average per consultant was of 184, which means 37 per year. The projects carried out or in progress were directed predominantly to invest in vineyards, orchards, the purchase of agricultural machinery and vegetable greenhouses, and animal production.*

*Highlighting these problems, it was shown on the one hand, the need to know the current situation for all consulting activities performed and on the other hand the hierarchy existence of the main technical and socio - economic problems structure manifested at the farm level.*

**KEY WORDS:** *consultancy, consultancy activities per consultant and on village, individual consultancy, group consultancy, projects carried out.*

## INTRODUCTION

The consultancy activity has experienced great changes in the organization and the activities it carries out. At the establishment, in 1998, the National Agency for Agricultural Consultancy had as activity object the specialized technical assistance, managerial consulting, professional development, technical assistance for the implementation of research results and ensuring the informations flow necessary for agricultural producers from private sector and for agriculture specialists [3]

Despite the fact that farms need consultancy, this activity was continuously reduced, the state was limited at maintaining consultants responsible for a few villages and are deprived of any material means. In the most part, this consultancy activity was oriented towards training and counseling activities for drafting projects for the European financial accessing funds [2].

This paper attempts to quantify the organizing way of the consulting activities in Olt county, through the consultants number, the villages and farms number per consultant, and the activities carried out by consultants through the activities number for individual and group consultancy, the rural development projects number incumbent on the consultant, farms and villages.

## MATERIAL AND METHODS

The data analyzed were provided by consultants that develop their activity in Olt county, based on a questionnaire that included quantitative information (surfaces, number of farms, number of projects, et.), and also evaluations.

The indicators were determined regarding the consultancy activity, in Olt County, in absolute values and as percentages, which characterizes activities carried out by the 14 consultants (C1-C14) during the period 2008-2012. It allowed comparative analysis and interpretation for the 98 villages of the county, where there is a number of 90 170 farms, of which 2574 are legal entities. By appropriate indicators it has been made references on the group consultancy on actions types, on consultant and on villages and holdings, on the projects number structure of village interest to holdings, carried out or completed, on county area or of a consultant.

<sup>1</sup> PhD Student, Faculty of Management, Economic Engineering in Agriculture and Rural Development, Bucharest, Romania, phone/fax: 00 40 744 6474 10; E-mail- ev.marinescu@yahoo.com

<sup>2</sup> Ph.D. Assistant, Faculty of Management, Economic Engineering in Agriculture and Rural Development, Bucharest, Romania, phone/ fax: 00 40 744 6474 10; E-mail: raluca\_necula@yahoo.com



## RESULTS AND DISCUSSIONS

The work ensemble was structured through a differentiation through which it followed the existing / created trend on: rural development projects as a consulting activities result, the consultancy structure forms in the topics approached, technical specialized assistance and its deployment area.

**1.- The specialised technical assistance and its deployment area for the Olt County agricultural holdings.** Regarding the conditions for activities deployment in 2012, Table 1 illustrates aspects of the 14 consultants activities that develop their activity in the 98 municipalities where there are 90170 agricultural holdings, from where, we can conclude the following:

Table 1. The area main characteristics where the consultants are developing their activity

Consultant	No. Villages per consultant	Average distance from Slatina	Holdings on consultant		Projects carried out or in progress	
			Total	From which with legal form	Total	From which average /year
	no.	km	no.	no.	no.	nr.
<b>C1</b>	7	93	4037	8	338	67.6
<b>C2</b>	3	29	2084	219	55	11
<b>C3</b>	7	60	4069	64	81	16.2
<b>C4</b>	8	87	3277	393	384	76.8
<b>C5</b>	8	89	3546	149	354	70.8
<b>C6</b>	9	46	12113	62	183	36.6
<b>C7</b>	7	15	7081	90	138	27.6
<b>C8</b>	11	38	13160	255	178	35.6
<b>C9</b>	8	29	16392	1238	115	23
<b>C10</b>	7	47	3013	163	147	29.4
<b>C11</b>	5	46	2010	27	191	38.2
<b>C12</b>	6	20	7543	28	83	16.6
<b>C13</b>	7	16	9641	328	211	42.2
<b>C14</b>	5	49	2204	25	116	23.2
Total, of which:	98	49	90170	3049	2574	514.8
per consultant	7	X	6441	218	184	37

Source: Emil Marinescu, 2013, Questionnaire Agricultural Consultant, Olt County [1]

- the villages average number on consultant is of 7, with limits between 11 (C8) and 3 (C2) and spatially, the average distance from the city of Slatina is of 49 km;
- the average holdings number on consultant is of 6441, but ranging from 2010 holdings (C11) to 16392 holdings (9). Of these holdings only 3.81% have a legal form;
- the projects number that were carried out during 2008-2012, on total is of 2574, and the media on consultant was 184, which means 37 per year (the average amplitudes being significant between 11 and 42.2).

By highlighting all these issues show that the consultancy work was carried out under different conditions for each consultant, with no criterion for allocating of villages or holdings on consultant.

**2.- The consultancy structure forms within the topics approached.** One of the main forms of consultancy, is the individual consultancy at the farm level on technical and socio-economic problems. Thus, the individual consultancy structure on consultant, presented in Table 2, for the same structure of the 14 consultants (C1 .... C14), are given these individual consultations both on total but also for 5 years consultations at 100 holdings and annual average consultations for

100 holdings. The values given in the table are based on 2008-2012 period achievements, highlighting the following:

Table 2. The individual consultancy structure per consultant and per holdings in the period 2008-2012, in Olt county.

Consultant	Individual consultancy		Total holdings	Consultations on 5 years at 100 holdings	Consultations annual average at 100 holdings
	no	%	no	no	no
C1	1502	1.4	4037	37	7.4
C2	14320	12.9	2084	687	137.4
C3	10250	9.2	4069	252	50.4
C4	16385	14.7	3277	500	100
C5	11450	10.3	3546	323	64.6
C6	2550	2.3	12113	21	4.2
C7	4518	4.1	7081	64	12.8
C8	10510	9.4	13160	80	16
C9	2865	2.6	16392	17	3.5
C10	9800	8.8	3013	325	65.1
C11	1366	1.2	2010	68	13.6
C12	7543	6.8	7543	100	20
C13	17000	15.3	9641	176	35.3
C14	1160	1	2204	53	10.5
Total, of which:	111219	100	90170	X	X
per consultant	7944	7.14	6441	123	24.7

Source: Emil Marinescu, 2013, Questionnaire Agricultural Consultant, Olt [1]

- The total consultations number of 111219 renders an average of 7944 individual consultations, being reported the amplitude that at ponderal level is between 1.2% (C11) and 15.3% (C13);

- The consultations on five years at 100 holdings also recorded variations between 17 (9) and 687 (C2).

- Annual individual consultancy activity on 100 holdings consultant oscillates between 3.5 (9) and 137.4 (C2);

It was further pursued the consultants group activities structure played differently in Table 3, from which have emerged the following:

- on total county was registered a total amount of 20878 group consultancy actions for the 14 consultants. Analyzing the activities on consultant are found differences that are significant compared to the total, being reported percentage levels ranging between 0.2% and 32.2% (the average being of 149.07 consultancy actions on consultant);

- It appears that most group activities are held by seminars and roundtables group (56.60% of total) and group visits demonstration (8.26% of total);

- at the task assignment consultancy for 5 years, for the 98 villages, it is found an amplitude between 13 actions (C14) and 361 (C3);

- regarding the annual village actions is indicated the situation in which it is registered an amplitude between 3 actions (C14) and 193 actions (C13);

- It is interesting that out of the 20 878 group activities, 6337 are for environmental care, which means that the consultants activities have a civic character.

Table 3. Group consultancy structure on ways of actions, on consultant and pvillages , in the period 2008-2012, Olt County

Consultant	Group Consultancy (total actions)		From which:				Villages distribution		
			By group	Demonstration visits	Experience exchanges	Care for environment	Villages	Actions /5 years	Annual actions
	No.	%	No.	No.	No.	No.	No.	No.	No.
<b>C1</b>	319	1.5	-	181	81	57	7	46	9
<b>C2</b>	725	3.5	470	115	27	113	3	242	48
<b>C3</b>	2530	12.1	1150	115	115	1150	7	361	72
<b>C4</b>	2559	12.3	1455	580	137	387	8	320	64
<b>C5</b>	793	3.8	510	46	42	195	8	99	20
<b>C6</b>	419	2	285	70	46	18	9	47	9
<b>C7</b>	702	3.4	148	61	12	481	7	100	20
<b>C8</b>	3181	15.2	2794	101	101	185	11	289	58
<b>C9</b>	1367	6.5	1037	110	110	110	8	171	34
<b>C10</b>	751	3.6	461	156	0	134	7	107	21
<b>C11</b>	52	0.2	19	7	7	19	5	10	2
<b>C12</b>	657	3.1	261	79	56	261	6	110	22
<b>C13</b>	6760	32.4	3205	175	175	3205	7	966	193
<b>C14</b>	63	0.3	22	5	14	22	5	13	3
Total, of which:	20878	100	11817	1801	923	6337	98	213	43
per consultant	1491	7.14	844	129	66	453	7	15	3

Source: \*(seminars,roundtables), Questionnaire Agricultural Consultant, Olt County[1]

All these problems of individual and group consultancy activities at the villages territorial level , pursue a quantitative aspect regarding the consultants activity, but also a qualitative aspect that refers to the structure of the citizens.training

**3. Rural development projects as a result of consultancy activities in Olt County.** One of the activities to which was oriented consultancy activity was to know the direction of rural development projects or even drawing support for these projects. Such , the activity could shape on the one hand the consultants analysis the projects number and their destination structure.

Structural analysis of the number of projects undertaken or completed, was made for the following activities: agricultural machinery procurement, establishment of greenhouses, greenhouses, vineyards, orchards, livestock, different forms association and production valorification.

From the projects analysis shown in Table 4, it shows the following:

- in the activities, the largest share is held by design activities for the establishment of greenhouses, solariums, vineyards, fruit bearing (35.2%), purchase of agricultural machinery (29.5%) and animal husbandry (25.4%) , which cumulated to the total of 2010 projects , have 90.1%;

- The projects average number that were carried out during 2008-2012, on consultant was of 144, which means 37 per year;

- Analysis of projects number in five years reported at 100 holdings, is projecting a differentiation on consultants that is also significant, meaning the variations are between 0.5 and 10.7 which would be an average of four projects per year;

Table 4. The projects s tructure for agricultural holdings, performed or completed, on the territorial area of a consultant, Olt County, during 2008-2012

Consultant	Total projects		<i>din care pe activitati</i>					<i>Exploat. agricole</i>	
			Agricultural machinery purchase	Greenhouses, solariums, vineyards establishment	Animal breeding	Diferent forms association	Production valorification	Total holdings	Projects on 5 years/100 holdings
	nr	%	nr	nr	nr	nr	nr	nr	nr
C1	209	10.4	36	56	52	33	32	4037	5.2
C2	36	1.8	13	11	8	2	2	2084	1.7
C3	81	4	0	44	37	0	0	4069	2
C4	350	17.4	85	183	18	8	56	3277	10.7
C5	313	15.6	57	214	22	5	15	3546	8.8
C6	142	7.1	65	25	43	0	9	12113	1.2
C7	108	5.4	7	12	84	1	4	7081	1.5
C8	120	6	18	4	96	1	1	13160	0.9
C9	84	4.2	22	18	42	1	1	16392	0.5
C10	108	5.4	46	30	23	0	9	3013	3.6
C11	172	8.6	147	0	25	0	0	2010	8.6
C12	58	2.9	9	14	35	0	0	7543	0.8
C13	138	6.9	18	97	12	6	5	9641	1.4
C14	91	4.5	70	0	14	1	6	2204	4.1
Total	2010	X	593	708	511	58	140	90170	2.2
	100,0	100	29,5	35,2	25,4	2.9	7	X	X
Projects/consult	144	X	42	51	37	4	10	X	X
Projects/village	21	X	6	7	5	1	1	X	X
Projects/100 holdings	2.23	X	0.66	0.79	0.57	0.06	0.16	X	X

Source: Emil Marinescu, 2013, Questionnaire Agricultural Consultant, Olt [1]

- It is interesting to analyze the projects number at 100 holdings, which is of 2.23, represents approximately 1 project at 200 holdings per year;
- The projects number in the equipment procurement reveals that they were performed 593 projects, which represents 6.5 per 1000 farm projects, or 1.3 projects per year at 1000 holdings.

The brief overview of the Olt County Agricultural House activities organization and conduct enables us to draw a parallel with the establishment of Agricultural Chambers in France, where the idea was set up since 1840. After numerous attempts , the law was approved on January 3, 1924, and the law from 1927 specifies its resources,from where it becomes practical operational. For the French State, The Agriculture Chambers , is the only agriculture economical representant and responsible for the implementation of agricultural and rural development policy [4].

Certainly the adoption of the functioning law of Agriculture Chamber will bring changes in the organization and functioning of agricultural consultancy in the country.

## CONCLUSIONS

From the organization and running analysis of the main consultancy activities in the county Olt, we draw some conclusions aimed at improving this work.

1. Analyzing the conditions for conducting the consultancy activities in Olt county, it appeared that the average number of villages per consultant is 7 and the number of holdings per consultant is 6441 farms, which is a great load level for a consultant .
2. In Olt county, individual and group consultancy forms were the main forms for consultants activity.
3. An appreciation of consulting activities is represented by the number of projects that have been conducted over the period 2008-2012. On a consultant the average for 5 years is 184, which means 37 projects per year and consultant.
4. In the projects structure is predominant the investment field for the establishment of greenhouses, solariums, vineyards, trees, plant and animal production.
5. By highlighting all these issues it is clear the existing situation need knowledge in the holdings and villages in order to make an inventory, while prioritizing the problems facing agriculture and municipalities in the county of Olt.

## REFERENCES

1. Emil Marinescu, 2013, Questionnaire Agricultural Consultant, Olt County
2. \*\*\* Olt County Agricultural Chamber, 2010, <http://www.ojcaolt.ro/>
3. \*\*\*HG 676/1998 Abrogat(a) partial, Hotarare privind infiintarea, organizarea si functionarea Agentiei Nationale de Consultanta Agricola, M.O. 381/1998
4. \*\*\*Wikipedia, 2013, Chambre d'agriculture, [http://fr.wikipedia.org/wiki/Chambre\\_d'agriculture#Histoire](http://fr.wikipedia.org/wiki/Chambre_d'agriculture#Histoire)

# THE ANALYSIS OF THE AGRICULTURAL HOLDINGS STRUCTURE IN THE COMMUNES BISOCA, PIETROASELE AND GHERĂSENI, BUZAU COUNTY

NECULA RALUCA<sup>1</sup>, NECULA DIANA<sup>2</sup>

**SUMMARY:** *This paper represents a first part of a larger study on three villages in Buzau County using a questionnaire implemented in three different geographical areas villages. There are showed some descriptive statistics based on data from the questionnaire. These statistics help us to better illustrate the reality of the analyzed villages. Are shown agricultural holdings structures by the owned group area and after the exploited area, aiming to describe the exploitation area level, the agricultural machinery provision and the production disposed for sale. All these manage to outline a picture of agricultural holdings in Buzau county, image needed to find solutions to the county agriculture development.*

**KEYWORDS:** *agricultural holdings, surface owned, exploited surface , agricultural machinery, production.*

## INTRODUCTION

The agriculture is an important economic activity sector of Buzau County, in this respect remarking the special quality of arable land.

Potential land resources of the county is placed on the three forms of relief, namely: plain (where predominates the arable land), hill (the vineyards and orchards are specific branches) and mountain (where animal husbandry is based on extensive areas of pastures and meadows).

To mention the predominance of agricultural land, hence the the need of structural knowledge of farms in Buzau.

In the mountain agricultural field (Bisoca village ) inhabitants know and correctly interpret the fundamental relationships of the key factors: land, fodder plants, animals and farmers. Resources on which the locality economic potential rely on are only own resources (forests, agricultural land, plant products, animal products) [2].

In the hilly agricultural area village Pietroasele), a large part of the inhabitants are engaged in agriculture, taking advantage of the hilly area with favorable conditions for vineyards, field crops and wood processing [3].

The specific of Gherăseni village is agricultural , respectively the cultivation of cereals, corn technical plants and animal breeding. Agricultural land fund is the natural source of the village . The dominant function being the development of the two main branches of agriculture: production of crops and animal breeding [4].

## MATERIAL AND METHOD

As a method for obtaining the appropriate data for the study it was used - the survey. In preparing the questionnaire , we made the following steps: setting goals, defining the population, establishing the data collection method, the questionnaire actual development. It was established first, a representative sample of three villages, that were selected from three different areas as relief (village Bisoca - the mountains, the village Pietroasele-hilly and plain- Gherăseni village) in Buzau County. 90 people were interviewed, 30 from each village , and the selection has been accomplished randomized.

To give the scientific relevance of the study and highlight the impact of the results, we chose to use statistical indicators of association, Chi square test. This indicator involves verifying the hypothesis of association between responses obtained in a questionnaire alternatives of questions and checking a particular set of data that can follow a known statistical distribution.

<sup>1</sup> Ph.D. Assistant, Faculty of Management, Economic Engineering in Agriculture and Rural Development, Bucharest, Romania , phone/ fax: 00 40 744 6474 10; E-mail: raluca\_nec@yahoo.com

<sup>2</sup> SR, Research Institute for Agricultural Economics and Rural Development, Bucharest, Romania, phone/fax 00 40213181686; E-mail: anaididianec@yahoo.es

## RESULTS AND DISCUSSIONS

Table no. 1. The agricultural holdings structure belonging to respondents by area in property and geographical area, 2012

Relief area Surface	UM	Mountains	Hill	Plain	Total	
<1	ha	2	10	5	17	18.9
	%	11.76	58.82	29.41	100.00	x
1-3	ha	14	8	10	32	35.6
	%	43.75	25.00	31.25	100.00	x
3-6	ha	8	7	11	26	28.9
	%	30.77	26.92	42.31	100.00	x
6-9	ha	4	3	1	8	8.9
	%	50.00	37.50	12.50	100.00	x
>9	ha	2	2	3	7	7.8
	%	28.57	28.57	42.86	100.00	x
Total	ha	30	30	30	90	100.0
	%	33.33	33.33	33.33	100.00	x

Source: Raluca Necula, 2012 Questionnaire, Perception and dissemination of agricultural innovations, Buzau county[1]

- Agricultural holdings studied by the surface in property (Table 1), are classified into 5 groups, namely:  
holdings with an area less than 1 ha, with 17 (18.9% of total), of which most are located on the hill - 10 holdings (58.82%);
- Holdings with area between 1 and 3 ha have the largest share 35.6% of the total (32), of which the most numerous - 14 holdings in the mountains (43.75%);
- The the surface between 3 and 6 ha, we find a total of 26 holdings , the plain has the most representatives, 11 with a share of 42.31%;
- Between 6-9 ha the holdings have a smaller number, 4 in the mountains, 3 to hill and 1 plain, with a percentage of 8.9% of the total;
- Holdings exceeding 9 hectares are fewer in number, their distribution on areas is similar, two in the mountains, two to the hill and 3 in the plains.

Table no. 2. Structure of agricultural holdings belonging to the respondents after the the surface in exploitation, on geographical area, 2012.

Relief Area Surface	UM	Mountains	Hill	Plain	Total	
<1	ha	2	16	6	24	26.67
	%	8.33	66.67	25.00	100.00	x
1-3	ha	11	8	11	30	33.33
	%	36.67	26.67	36.67	100.00	x
3-6	ha	10	3	9	22	24.44
	%	45.45	13.64	40.91	100.00	x
6-9	ha	4	1	1	6	6.67
	%	66.67	16.67	16.67	100.00	x
>9	ha	3	2	3	8	8.89
	%	37.50	25.00	37.50	100.00	x
Total	ha	30	30	30	90	100
	%	33.33	33.33	33.33	100.00	x

Source: Raluca Necula, 2012 Questionnaire, Perception and dissemination of agricultural innovations, Buzau county [1]

Analyzing Tables 1 and 2 we can make a comparison between the surface which respondents have in property and the one they exploit .

Due to the population aging high degree and the lack of material and technical basis for the owned area exploitation , many of the respondents answered that they prefer to lease the

land, but there are few who have exploitation possibilities and take on lease land, so the exploited area is greater than the one they own. It can be seen in the table with the surface in exploitation (Table 2) compared with the surface in property (Table 1), that the number of respondents who have an area less than 1 ha increased from 17 (property) to 24 (exploited) (26.67%) of the total, decreasing the number of those who exploit between 1-3 ha and 3-6 ha (57.7%), meaning that some of those who have in property land in these two groups prefer to lease some land.

The more explicit comparison is shown in Table 3.

Table no. 3. The land exploitation level analysis, owned by respondents.

Structure of holdings by area in property	Structure of agricultural holdings by the exploited area						
	UM	<1 ha	1-3 ha	3-6 ha	6-9 ha	>9 ha	Total No / %
	<1 ha	11	3	x	x	1	15
		73.33	20	x	x	6.67	100
	1-3 ha	7	23	4	x	x	34
		20.59	67.65	11.76	x	x	100
	3-6 ha	2	6	15	1	2	26
		7.69	23.08	57.69	3.85	7.69	100
	6-9 ha	x	1	2	4	1	8
		x	12.50	25	50	12.50	100
	>9 ha	1	x	2	x	4	7
		14.29	x	28.57	x	57.14	100
	Total	21	33	23	5	8	90
		23.33	36.67	25.56	5.56	8.89	100

Source: Raluca Necula, 2012 Questionnaire, Perception and dissemination of agricultural innovations, Buzau county [1]

### Material and technical base.

Table no. 4. The number of machines owned by respondents by geographical area 2012.

Machines	UM	Mountains	Hill	Plain	Total	
Cart	no	19	1	7	27	30
	%	70.37	3.7	25.93	100	x
Circular	no	7	4	1	12	13.33
	%	58.33	33.33	8.33	100	x
Chainsaw	no	16	6	8	30	33.33
	%	53.33	20	26.67	100	x
Mill	no	7	1	5	13	14.44
	%	53.85	7.69	38.46	100	x
Tractor	no	x	9	7	16	17.78
	%	x	56.25	43.75	100	x
Plow	no	1	7	7	15	16.67
	%	6.67	46.67	46.67	100	x
Seeder	no	x	1	3	4	4.44
	%	x	25	75	100	x
Harvester	no	x	x	2	2	2.22
	%	x	x	100	100	x
Trailer	no	x	11	7	18	20
	%	x	61.11	38.89	100	x
Truck	no	1	2	1	4	4.44
	%	25	50	25	100	x
Auto Car	no	12	21	19	52	57.78
	%	23.08	40.38	36.54	100	x

Source: Raluca Necula, 2012 Questionnaire, Perception and dissemination of agricultural innovations, Buzau county [1]



Culture technologies require the use of tractors and agricultural machinery as an important means of practicing profitable agriculture. Also, the transport of production, its processing, means for processing the wood helps to facilitate the work of the agricultural holdings and is an innovation in agriculture.

In the Table 4, we analyzed tools, by groups, according to their usefulness:

- for agricultural works : tractors, plows, seeders and harvesters, of which the most numerous are tractors - 16 , plows - 15, especially in the hills and plains;
- Woodworking: -12 circular, chainsaw - 30, here they the largest share have the mountains where this occupation is the base;
- production processing – mill, a number of 13 respondents answered that they have a mill in their household, 7 of the mountain area, 1 of the hill and 5 from the plain;
- own transport or production: truck, trailer, cart or auto car. Over half of the respondents 57.78% have auto car, about a third (30%) cart, and truck and trailer in hilly we find the most machines.

**Trade activity.** Among those surveyed, we find also respondents who are involved in trade of obtained productions.

Table 5. The percentage analysis of products sold quantities

Sold quantity	Mountains	Hill	Plain	Total
50%-100%	x	5	9	14
30-50%	14	14	7	35
Don't sell	16	11	14	41

Source: Raluca Necula, 2012 Questionnaire, Perception and dissemination of agricultural innovations, Buzau county [1]

Thus, it appears that 41 of the respondents, ie 45.5% of total respondents, do not sell anything of the production, all used for own consumption, 38.8% sell some of it (between 30 and 50%), 14 being in mountain, 14 hill and 7 from the plain, and those who sell their entire production are mostly in the plains - 9 people and 5 from the hill, the latter - which represents 15.55% of total earn their living from agricultural business.

Table no. 6. The correlation between the quantity sold and the the surface in exploitation

Sold quantity					Total	
Surface	UM	100 %	30-50%	0%	Nr	%
<1 ha	No	2	4	11	17	18.89
1-3 ha	No	5	8	19	32	35.56
3-6 ha	No	5	13	8	26	28.89
6-9 ha	No	1	7	0	8	8.89
>9 ha	No	1	3	3	7	7.78
Total	No	14	35	41	90	100
	%	15.56	38.89	45.56	100.00	x
Indicators	<b>Testul <math>\chi^2</math></b>	Significance level				
	$\leq$	0.1	0,05	0,01	0,001	
CHITEST (value Sig)	0.0372					
Liberty degrees	8					
CHIINV (Chi theoretical)	$\geq$	13.36	15.51	20.09	26.12	
CHIINV (Chi calculated)	16.39		*			
Pearson Coeficient	0.392					

Source: Raluca Necula, 2012 Questionnaire, Perception and dissemination of agricultural innovations, Buzau county [1]

Analyzing the relationship between the surface which it operates and the amount that they sell of the products obtained (Table 6) shows the following situation:

- Those who sell part of their production, with the share of 38.89% of the total fall in - 4.4% of those under 1 ha, 8.8% have between 1-3 hectares, 14.44% of category 3-6 ha, 7, 7% of category 3-6 ha and 3.3% of those operating over 9 ha;
- Of those who sell everything they produce, the majority hold of category 1-3 ha and 3-6 ha, accounting for 5.5% of the respondents each;

## CONCLUSIONS

Following this analysis , we drawn the following conclusions:

- The holdings have a major 'subsistence'character, with an average size of 1-3 ha / holding, a percentage of 7.8% of these have a commercial character , with over 9 ha of agricultural land in private ownership;
- The current land resources and livestock assets of households, their endowment with equipment and necessary material basis for agriculture practice does not demonstrate an encouraging situation of households that produce a third of their capacity.
- The obtained production is in a very high percentage used for own consumption, of which most are respondents in the mountains, though there are a small part of the total respondents who work in agricultural business (15.55%) with full production achieved sales.

Results that in Buzau County agricultural holdings practice an underdeveloped agriculture due to the lack of machinery and agricultural areas exploited relatively small.

## REFERENCES

1. Raluca Nacula, 2012 Questionnaire, Perception and dissemination of agricultural innovations,Buzau county
2. \*\*\*Village Bisoca, Buzău, [http://ro.wikipedia.org/wiki/Comuna\\_Bisoca,\\_Buz%C4%83u](http://ro.wikipedia.org/wiki/Comuna_Bisoca,_Buz%C4%83u)
3. \*\*\* Village Pietroasele, Buzău, [http://ro.wikipedia.org/wiki/Comuna\\_Pietroasele,\\_Buz%C4%83u](http://ro.wikipedia.org/wiki/Comuna_Pietroasele,_Buz%C4%83u)
4. \*\*\* Village Gherăseni , <http://primariagheraseni.ro/>

# FROM THE EXPERIENCE OF S.C. TOMA S.R.L. CĂLĂRASI COUNTY ON AUTUMN RAPE CROP TECHNOLOGY

GEORGIANA CRUDU<sup>1</sup>, TOMA MARIN<sup>2</sup>

**Abstract:** *The company SC TOMA LTD is wholly owned private capital company, created and operating under the Law 31/1990. The company is located in Modelu commune, Calarasi county having in operation currently an area of 360 hectares of arable land. The technology represents all methods and procedures used for obtaining the particular product. The term technology refers to both the technical aspects and the economic ones, transposing them into practice. In fact the technology has two distinct sides or distinct parties in interdependence: the technical side and the economic side. The technical side is considering the means and works to provide conditions for plant growth and development according to their requirements in order to obtain higher productions per unit area. The economic side aims the parameters of efficiency of the technology both on each segment or link of it, as well as a whole.*

**Key words:** *technology of rape crop, rapeseed varieties and hybrids, bio stimulator, average productions, selling prices*

## INTRODUCTION

The rape now occupies an important place in the global economy as a source of vegetable oil. In the world, the rape is grown on an area of over 27 million ha. The biggest cultivators are China with 7.2 million ha, and India with over 6.9 million ha, followed by Canada with 5.1 million ha, Germany with 1.3 million ha, and France with 1.2 million (Pirná I, 2011[1]). In Romania, the rape was cultivated on 392 700 ha in 2011, the 97 100 ha in 2012 (surface destroyed was 324 thousand ha (77%) [3]).

The rape seeds contain 42-48 % oil used both in food and in the preparation of margarine and in industry and transport. In recent years from the rapeseed oil bio diesel is extracted used for diesel engines operation. This bio fuel has big advantages compared to fossil fuels because it is not polluting, is renewable and has a competitive price with fossil fuels. Added to this, there are multiple phyto advantages: it is sown and harvested outside the critical periods, against the grain, they react favourably to fertilization, allowing full use of the same set of machines as grain; it can be used as an excellent prior for successive crops or for autumn grains; it raises the soil fertility and it prevents the erosion on slopes, it is a good honey plant; the cakes are high in protein (38 to 41.9 %), carbohydrates (31.5 to 36 %) and minerals (8 to 9.8 %), thus having good feed value.

## MATERIALS AND METHODS

In order to approach the issue as working methodology, the method of structure indicators, was used which was based on the measuring technologies of the analysed phenomena. We determined in terms of physical aspect and value the indicators (crop areas, average yields, delivery prices of production, total value of total production and per hectare), indices (the ratio of the two indicators for determining the production per hectare, the price of delivery, of the production value).

The data analyzed and interpreted from the technical and economic specifications with observations from the farm and studied specialised literature.

The comparisons aimed for 6 years, respectively 2008-2013. The annual variation of the levels of achievement of the indicators analyzed could result in relevant interpretations, which were able to delimit the factors that caused the deviation size.

## RESULTS AND DISCUSSIONS

The main soil types in the company are brown chernozem and grey chernozem. The agro-chemical study conducted at S.C TOMA SRL [5] recorded the following: on an area of 7 hectares (1.9%), the soil reaction is slightly acidic on 33 ha (9.1%) is neutral and the 330 ha (91%) is slightly alkaline; the supply with phosphor is a verage 25.8% (93 ha), good in 62.5% (225 ha) and very good on 7.5% (27ha) the potassium supply on a verage 6% (21 ha), good 31% (114 ha) and very good in 63% (235 ha) nitrogen supply is poor in 5% (19 ha) and a verage on 95 % (351 ha). The study shows that soils are favourable for rape crop.

Compared to the very harsh climate with hot dry summers and very cold winters with blizzards, the rape, however, presents some disadvantages of the sensitivity to drought during sowing period, the alternation of freezing and thawing in spring and frost during the bud flowering (Pirnă I, 2011).

Year	2008		2009		2010		2011		2012		2013	
	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
Wheat	80	22.9	140	40.0	113	31.4	105	29.2	100	27.8	95	26.4
Barley	80	22.9	34	9.7	75	20.9	80	22.2	75	20.8	80	22.2
Maize	60	17.1	60	17.1	59	16.5	60	16.7	120	33.3	70	19.4
Rape	50	14.3	50	14.3	60	16.6	65	18.1	-	-	65	18.1
Sun flower	80	22.9	66	18.9	53	14.6	50	13.9	65	18.1	50	13.9
Total	350	100.0	350	100.0	360	100.0	360	100.0	360	100.0	360	100.0

Table 1. Structure of crops for the period 2008-2013, at SC Toma SRL

As prior plants, the rape was cultivated for all analyzed years after crops that clean the land, until the early August in order to ensure land preparation conditions and water storage needed to emergence. There was not cultivated after sun flower to prevent the spread of sclerotinia attack. The rape share of 14-18% allowed the rape to return to the same land until after a minimum of 4-5 years, and after sunflower after at least 3 years (Table 1). The crops of barley and wheat which ensured the prior plant within the farm for all years analyzed.

Plowing was done in late July, early August, immediately after cleaning the land to a depth of 20-25 cm in aggregate with star shape harrow. In the situation when the soil was dry and plowing could not perform without removing the boulders, it was imposed the soil processing with disc harrow in aggregate with adjustable harrows. The plow has been made after the first rain. Until sowing, the plowing remained clean of weeds and loose and shredded by works with disc harrow, in aggregate with adjustable harrow.

The rape is a plant consuming nutrients. In rape, the nutrient absorption occurs with intensity in the early stages of vegetation, but the greatest amount absorbed during the spring coming and early fruiting. In the company, the fertilizers managing before sowing was carried out with the dose of 200 kg / ha complex fertilizer in the range 18.46. After fertilizer managing, their incorporation was done with combinatorial at the depth of 10 cm.

The seeding was made during 1<sup>st</sup> -10<sup>th</sup> September, using a quantity of 8 kg / ha for varieties and 2.5-3.5 kg / in case of hybrids. The farm has grown at the beginning Valesca type, and the last 5 years hybrids Exagone (Monsanto), Mercure and Danone.

In 2012/2013, the hybrid Mecure was cultivated on 30 ha and hybrid Danube, on 35 ha, hybrids produced by Euralis (Table 2). Mercure ES hybrid is semi-late, one of the most cold tolerant hybrids and its potential production reaches 5900 kg / ha. DANUBE ES hybrid is semi-late, offering safe profit due to genetics and a high-performance hybrid is resistant to cold. The production potential of ES Danube is 5,300 kg / ha.[2]

Initially the company SC TOMA SRL sown winter rape at a distance of 25 cm between rows. Currently sowing is made at a distance of 37.5 cm between rows, this allows the use of smaller quantities of seed per hectare, better branching plant and therefore a significant production increase.

Crop/year	2008	2009	2010	2011	2012	2013
Rape	VALESCA	EXAGONE	MERCURE EXAGONE	EXAGONE	-	MERCURE, DANUBE

Table2. Rape varieties and hybrids grown by SC Tomas SRL, for the period 2007-2013

The seed is treated with an insecticide and fungicide, ORS Cruiser 322 FS (15 l / tonne of seed) against dirt flea (*Phyllotreta* SP), grey lice (*Brevycernie Brassicae*) rape wasp larvae generation G2, fall of seedlings, rizoctonioza, Fusarium, dry rot - infection from soil and seed. In recent years as a result of experience and testing done in the previous years, the company treats seeds with a natural stimulator for growth and development, product CROPMAX (1 litre / ton). [4] This bio stimulator has shown in practice that helps to develop the root system of the plant by 30%, it increases the plant resistance to cold rising its resistance level from -14 ° C to -19 ° C. This is due because the plant with a well developed root system stores its larger quantities of sugar, which increases resistance to frost. Also, in spring the vegetation restarting occurs with increased vigour against the plots witness and their seed was not treated with this product.

A not insignificant thing is that this is completely natural stimulator being made of three seaweed and it contains besides a wide range of trace elements, acids, essential amino acids for the plant. Sowing is done at 2-3 cm depth and it is necessary to roll the sowing, thus providing better contact between the seed (very small) and soil. This leads to a uniform and explosive emergence of the rape crop.

As the rape surfaces have become larger and larger, the maintenance works have increased and have become more and more expensive, because it started to appear aphid attacks, requiring treatment with a contact insecticide usually a synthesis stone. Because many times previous plant is wheat or barley, also in autumn it is required to fight against wheat and barley mixture as well as annual and perennial monocotyledonous species by their herbicide with a selective herbicide Pantera (11/ha). When spring is coming, the crop must be monitored very carefully because at temperatures above 10 ° C it can be attacked by strains ladybug (*Ceutorhynchus turnips*), the shiny rape bug (*Meligethes*) and rape wasp (*Athalia Rosa*). Detection of these pests attacks is done by installing yellow traps in the plant crop. When detecting such pests, immediately treatments will be made with contact and systemic insecticide (Faster10EC, 0.2 l / ha). The number of treatments varies depending on the night and daytime temperatures in spring and on the number of pests attacks.

Apart from the crop protection against these pests, a great importance must be paid to crop fertilization given the very high requirements of the plant nutrients which the plant consume during this period. Thus, one fertilisation was applied when starting the vegetation in March with 50 kg.Ns.a / ha, which besides nitrogen, it also contains boron, sulphur, manganese and other microelements necessary for rape crop. In the phase of flower button, one fertilization was also been carried out with 50 kgNsa / ha.

Before harvesting SC TOMA SRL used to prevent capsule dissolution on harvesting, a product called Nu-film which is a resin which incorporates the capsule preventing it to come apart and it allows capsule removal, and it allows water eliminating from the capsule not allowing its entry into grain. This treatment is done in the phase when the capsule colour changes from green to brown and the capsule still has elasticity. It applies in the air and it is given at a dose of 2-3 l / ha.

In order to purchase inputs, SC Toma SRL, provided the following companies: SC PRUTUL SA, SC AECTRA SA, BRISE GROUP, SC MIG VAS SA.

The harvesting was done using mechanized combine at 12-13% humidity. The international

trading rules of the rape are: maximum moisture 9%, maximum impurities 2%, minimum oil 40% (Pirnă I, 2011) [1].

Year	MU	2008	2009	2010	2011	2012	2013
Rape, SC Toma SRL	kg/ha	1800	2100	2800	2565		3300
	%	100.0	116.7	155.6	142.5		183.3
Rape at the country level*	kg/ha	1844	1357	1755	1882	1622	X
	Deviations from the (kg/ha)	-44	743	1045	683	X	X

Table 3. Evolution of average productions, at SC Toma SRL, for the period 2008-2013

\*\*\*MADR, 2013, Agriculture, Rape for oil, <http://www.madr.ro/ro/culturi-de-camp/plante-tehnice/rapita-pentru-uilei.html> [4]

The average productions obtained by SC Toma SRL increased in the analyzed period. Thus from 1800kg/ha in 2008, it was a rape production of 3300 kg / ha in 2013 (Table 3). This was due to hybrids, observing the technology accurately, and the technological improvements with Bio stimulator CROMAX (1 litre / tonne of seed) in seed and plant treatment at maturity with Nu-film product (2-3l/ha) to prevent capsule dissolution. Compared to the national average productions, it is found that the farm was below the national average in 2008, but it has exceeded in 2009 (+743 kg/ha), 2010 (+1045 kg / ha), 2011 (+683 kg / ha).

The rape prices had a continuous increase over the past 6 years, from 1.1 euro / kg in 2008 to 1.65 lei / kg in 2013 (an increase of 50 %). In 2012, due to the fact that many units had destroyed productions, the rape price reached values between 1.8-2.34 lei/ kg. (Table 4). [3].

Year	MU	2008	2009	2010	2011	2012	2013
Rape	lei/kg	1.1	1.65	1.2	1.7	1.83*	1.65
	%	100.0	150.0	109.1	154.5		150.0

Table 4. Evolution of sale price, at SC Toma SRL, for the period 2008-2013

\*) Quotation MATIF for rape, harvest 2012, MADR[3].

In 2013, the company Toma, delivered the entire production harvested to the following beneficiaries: S.C PRUTUL S.A, S.C AECTRA S.A, BRISE GROUP, S.C MIG VAS S.A, at the price of 1,65 lei/kg.

Crop	Year	MU	2008	2009	2010	2011	2012	2013
Rape	Total production	to	90	105	168	167		215
		%	100.0	116.7	186.7	185.3		240.0
	Total income	Thousand lei	99	173	202	283		355
		%	100.0	175.0	203.6	286.3		360.0
	Income per hectare	lei/ha	1980	3465	3360	4360.5		5445
		%	100.0	175.0	169.7	220.2		275.0

Table 5. Evolution of the total production, total revenue and revenue per hectare at SC Toma SRL, for the period 2008-2013

The total production of rape increased in the analyzed period from 90 tons in 2008 to 215 tons in 2013 (240%) by increasing the productions per hectare and increasing the cultivated surfaces. (Table 5). Total revenue also increased from 99 thousand in 2008 to 355,000 lei in 2013 (360%), by increasing the total productions and the sale prices.

As main element of the technology is to increase the revenue per hectare which increased from 1980 lei / ha in 2008, to 5445 lei / ha in 2013, mainly due to the increase of average productions per hectare.

## CONCLUSIONS

1. Autumn rape crop has a real economic interest worldwide through its use in human nutrition and in industry .
2. The winter rape crop is an opportunity for SC TOMA SRL, Calarasi county , where it is cultivated on areas between 50ha and 65 ha representing 14.3 % and 18.1 % of the farm surface.
3. Within the company, the technological links were followed: previous plant, prepared seedbed , sowing date , fertilization , pest control , harvesting .
4. Within the technology, Bio stimulator CROMAX intervened (1 litre / tonne of seed ) in seed and plant treatment at maturity with Nu film product ( 2-3l/ha ) to prevent capsule dissolution.
5. The harvests obtained and the sale prices of the rape allowed SC TOMA SRL , obtaining significant revenue, revenue per hectare increased from 1980 lei / ha in 2008 to 5445 lei / ha in 2013 (increase of 275 %).

## BIBLIOGRAPHY

1. \*\*\* Agro chemical study, 2013, S.C TOMA S.R.L Modelu, Calarasi county no. 294 of 23.03.2013
2. \*\*\*Hybrids of rape for autumn campaign, 2013, FERMA Magazine, <http://www.revista-ferma.ro/articole/hibrizi-de-rape-pentru-campania-de-toamna.html>
3. \*\*\*MADR,2013,Agricultura, Rape for oil, <http://www.madr.ro/ro/culturi-de-camp/plante-tehnice/rape-pentru-uilei.html>
4. Pirnă I. and colab, 2011, Technology of rape crop, INMA București - P2,
5. \*\*\*PRODUCTS Holland Farming,2013, Bio stimulators, <http://hollandfarming.ro/pagina/prezentare-hibrizi-porumb>

## ANALYSIS OF NOMINAL INCOME EVOLUTION IN THE RURAL AREA, ON TYPES OF HOUSEHOLDS. CASE STUDY, SOUTH MUNTENIA REGION.

DANIELA CREȚU, RADU ANDREI IOVA, ELENA LASCĂR<sup>1</sup>

**Abstract:** *The income and consumption of the population are determined by the general evolution of the national economy, these know effects of the accession and post-accession processes of the country to the European Union. In this respect, in the present paper we proposed to study the evolution of the household, of the agricultural and non-agricultural income, supposing that the agricultural income determined a favourable evolution, using the research methods documenting, analyzing and processing of data by the secondary analysis. In Romania in the analysed period, the decrease of the purchasing power of available income, inflation, high prices and tariffs for some goods and services led the households to reduce consumption to the bare minimum and to try to keep as much as possible the prior levels of consumption choosing to save costs.*

**Key words:** *agricultural household, rural population, nominal income, agricultural income, non agricultural income*

### INTRODUCTION

The consumption and costs on the agricultural production include : the value of the material resources purchased in the current year for the purpose of producing the agricultural production, payment for services and work performed by other organizations (persons) (ploughing, reaping, etc), the remuneration of persons employed, the contributions for social security and for health insurance, made for workers employed, paying for rent land, fixed assets objects, animals, etc. .

The income related to the agricultural activities include: income from the sale of plants and animal production (including sale from processed production), fishing activities; income from land lease transmission, technology and other assets; income from performing work and services; amounts from the sale of fixed assets of production and other goods, subsidies and allowances issued from the state budget related to the agricultural production and the amounts of credits (loans) taken for the needs of the agricultural production and other income (compensations of insurance, fines, penalties, damages, compensations and others) [3].

### MATERIAL AND METHODS

As research methods, we used documenting, the analysis and data processing from a secondary analysis. These methods are based on the synthesis processes, induction and deduction, analogy and comparative analysis. Once the information was defined, known and interpreted, the next step was the detailed documenting of the interest field. In the analysis activity, the study of the documentation available for the field or for the analysed system is a starting point. This allows in the analysis to obtain the first knowledge and information. The documentation implied also the analysis of the legislation or the compared analysis of the various specialised sources.

The documenting, the analysis and the data processing and the information obtained from the following sources: The Statistical Yearbook; The socio – economic profile of South Muntenia Region[4].; The economic pre-accessing plan of Romania; Statistical data of the County Chamber of Commerce and Industry and the County Agency for Labour Force Training and Employment; Statistical data of the Department for Agriculture and Rural Development; The development strategy of the counties, elaborated by the county councils; the Publications of the National Statistics Institute.

---

<sup>1</sup> PhD Associate Professor Daniela CREȚU, PhD University Assistant Radu Andrei IOVA, PhD University assistant Elena LASCĂR, University of Agronomical Sciences and Veterinary Medicine Bucharest, Calarasi subsidiary



## RESULTS AND DISCUSSIONS

As it is shown in table 1., total nominal income, on an average household increased from 1,085.79lei in 2004, to 2,131.67 lei in 2008 and 2,417.26 lei in 2011, namely by 122.6% more. The households of the employees have the highest level of income, and the unemployed the lowest one. For 2004-2011, the pensioners recorded a continuous increase of average income per household, in 2008 and 2011 exceeding the farmers income (of 1,594.47 and 1,672.24 lei), by 109.91 lei and respectively 233.2 lei, but not also in 2011 when the pensioner income are lower by 68.71 lei per household.

**Table 1. Evolution of nominal income in Romania on types of households**

Specification	2004		2007		2010		2011	
	Lei/household	%	lei/household	%	lei/household	%	lei/household	%
TOTAL households	1085,79	100,0	1686,74	155,3	2304,28	212,2	2417,26	222,6
Employees	1478,79	100,0	2347,16	158,7	3091,09	209,0	3146,53	212,8
Farmers	988,05	100,0	1281,9	129,7	1672,24	169,2	2085,67	211,1
Unemployed	758,98	100,0	1136,03	149,7	1647,32	217,0	1637,5	215,8
Pensioners	843,35	100,0	1274,07	151,1	1905,44	225,9	2016,96	239,2

Processed according to: *Romania Statistical Yearbook, time series 2005, 2008, 2012*, INS [1]

The data presented in the table, highlights the increase of the nominal income on types of households, in absolute value, in the period 2004–2011, but its percent expression from the total value, reveals a decreasing percent, for the category of farmers households from 91.0% in 2004, to a 72.57% in 2010, in the favour of the households for employees also in 2011 to 86.28%.

In South-Muntenia Region, in 2008, the total income on types of households for farmers had a value of 510.66lei/month/person, higher than the value of the income for the same category, at national level, of 474.43lei/month/person, highlighting both the percent of population employed in agriculture and the number of farms and the value of agricultural production, obtained in South-Muntenia Region (table no. 2).

The expression in percent of the money income, for the farmer households, was in 2008, at the region level, of 61.4%, compared to the national level, of 54.0%. the percent expression of the income from agriculture at the level of total households represented for South-Muntenia Region 2.2% compared to 2.5% at the country level.

The percent of income from agriculture for the farmer households was of 22.1%, both for South-Muntenia Region and for the country level. The income from independent non agricultural activities for the farmer households represented 3.3% at the region level, compared to the national level of 3.1%, the value being close.

In 2011, the percent expression of the income from agriculture at the level of total households represented 2.7% for South-Muntenia Region, compared to 2.8% at the country level. The percent of income from agriculture for the farmer households was of 22.8% for the region and 23.6% at the country level. The income from independent activities for the farmer households was 2.2% for the region, compared to 3.1% for the country. The counter value of the consumption of agricultural products from own resources was of 40.3% per region, more reduced compared to that of 50% per country. (table 4). The percent of income from agriculture achieved by the unemployed in the region was of 4.5% higher than in the country, and the self consumption was 23.3% per region compared to 17.3% at the country level.

**Table 2. Total income of the main categories of households in Romania and in South-Muntenia Region, year 2008**

Romania						South-Muntenia Region				
Specification	Total	Households of:				Total	Households of:			
		Employees	Farmers	Unemployed	Pensioners		Employees	Farmers	Unemployed	Pensioners
	lei, monthly per one person									
Total income	731,5	894,7	474,43	380,8	692,9	697,6	851,8	510,6	349,9	666,63
	Percents									
Money income of which.:	83,1	89,6	54	80,1	78,8	82,5	87,9	61,4	80,1	79,4
Gross salaries and other rights	52,1	81,3	8,6	31,1	22,2	48,2	78,2	12,6	30,8	25,4
Income from agriculture	2,5	0,4	22,1	2,8	2,1	2,2	0,3	22,1	4	1,7
Income from independent non agricultural activities	2,9	0,8	3,1	3,7	1,4	4	1,1	3,3	9,8	1,8
Income from social services	21,6	5,3	15,1	22,6	49,5	22,9	5,4	16,8	23,3	45,7
Income from property	0,3	0,2	0,1	0,9	0,1	0,6	0,1	0,1	-	0,1
Counter value of the income in kind obtained by employees and beneficiaries of social services	3,1	3,3	1,5	3,3	3,1	3,4	3,8	2,3	3,6	3,2
Counter value of the agricultural products consumption from own resources	13,8	7,1	44,5	16,6	18,1	14,1	8,3	36,3	16,3	17,4

Source: Romania Statistical Yearbook, 2009, INS [1]

**Table 4.. Total income of the main categories of household in Romania and in South-Muntenia Region, year 2011**

Romania						South-Muntenia Region				
Specification	Total house holds	Households of:				Total household s	Households of:			
		Emplee yees	Farmers	Unemp loyed	Pensioners		Emplee yees	Farmers	Unemp loyed	Pensioners
	lei, monthly per one person									
Total income	839,53	1016,0	603,72	497,7	824,40	800,6	939,9	634,2	571,5	792,9
	Percents									
Money income of which.:	81,7	89,9	49,0	80,4	78,6	79,1	86,5	58,6	74,7	75,7
Gross salaries and other rights	48,7	81,6	7,3	39,3	19,5	44,8	78,0	12,9	30,1	19,2
Income from agriculture	3,1	0,5	23,6	1,6	2,2	2,9	0,7	22,8	4,5	1,7
Income from independent non agricultural activities	2,6	0,4	3,1	3,8	1,1	2,5	0,4	2,2	3,3	1,2
Income from social services	23,8	5,5	9,5	21,9	53,6	25,4	5,7	14,8	17,3	50,6
Income from propretv	0,1	0,1	-	0,1	0,1	-	-	-	-	0,1

Counter value of the income in kind obtained by employees and beneficiaries of social services	1,8	2,0	1,0	2,3	1,8	1,9	2,5	1,1	2,0	1,4
Counter value of the agricultural products consumption from own resources	16,2	8,1	50,0	17,3	19,6	19,0	11,0	40,3	23,3	22,9

Source: Romania Statistical Yearbook , 2012, INS [1]

In 2007, at the country level, the net monthly average nominal salary income in agriculture, increased from 748 lei to 1,044 lei/month in year 2011 (table no. 5)..

In 2011, the net average nominal salary income over the country average of 1,044 lei, was obtained in Prahova county, of 1,102 lei, Argeş 1,084 lei, Călăraşi 1,022 lei.

**Table 5. Net monthly average nominal salary income in agriculture South-Muntenia Region, in years 2007 and 2011**

Development region/county	2007				2011			
	Total economy		Agriculture, hunting and forestry		Total economy		Agriculture, hunting and forestry	
	lei/sal	%	lei/sal	%	lei/sal	%	lei/sal	%
Romania	1042	100,0	748	100,0	1444	100,0	1044	100,0
South - Muntenia	974	93,5	706	94,4	1321	91,5	1014	97,1
Argeş	1008	96,7	745	99,6	1469	101,7	1084	103,8
Călăraşi	845	81,1	658	88,0	1123	77,8	1022	97,9
Dâmboviţa	992	95,2	761	101,7	1254	86,8	1145	109,7
Giurgiu	931	89,3	780	104,3	1236	85,6	1021	97,8
Ialomiţa	889	85,3	654	87,4	1161	80,4	984	94,3
Prahova	1043	100,1	775	103,6	1400	97,0	1102	105,6
Teleorman	841	80,7	666	89,0	1139	78,9	887	85,0

Processed accordign to: *Romania Statistical Yearbook, 2008,2012* INS [1]

For South-Muntenia Region, the value of the net monthly nominal salary from agriculture in 2007 and 2011, was of 706 lei and 1014 lei. In absolute values, the indicator increased for agriculture at the region level by 308 lei. The highest values of this indicator at the county level recorder for year 2011 compared to year 2007, in Călăraşi, Ialomiţa, Giurgiu, Prahova and Dâmboviţa counties. The economic increase, implicitly the rural development at South-Muntenia Region level, depends, in the context, by the economic increase and rural development at the country level, in close relation with the implemented agricultural policies. The level of income achieved in the rural area from agricultural and non agricultural activities influences directly and proportionally the economic development in the rural area, the economic development at regional and national level being a restrictive factor [2].

## CONCLUSIONS

The population income is an important factor of consumption, which constitutes the main source of economic goods purchase. By its volume and dynamics the income is based on consumption basis. The impact of income on consumption has two components, the first related to the overall level of income and the second related to dynamics of purchasing power of the population.

In general, the rural population has lower income than urban population because of the own occupation in agriculture predominates in the occupational structure and income in non performing agriculture is low [3].

As a result of the European Union accession, the farmers income increased due to the subsidies granted by the community, especially after 2007.

The salaries represented, as usually, the most important source of income, (half of the total income of the households, increasing percent by 2.4 % compared to semester I and by 1.4% compared to semester II 2011).

To the formation of the total income of the households, contributed, also, the income from social services, income from agriculture, income from independent agricultural activities and income from property and from sale of household assets. An important percent is owned also by the income in kind, mainly, the counter value of the consumption of the food products from own resources.

## REFERENCES

[1] \*\*\*INS- Romania Statistical Yearbook 2005 -2012, INS

[2] Daniela Crețu, Andrei Radu Iova, THE NON-AGRICULTURAL ACTIVITIES IN THE RURAL AREA - VIABLE ECONOMIC ALTERNATIVE: CASE STUDY, ROMANIA- SOUTH-MUNTENIA REGION, **Indian Journal of Applied Research**, Website: [www.theglobaljournals.com](http://www.theglobaljournals.com), ISSN 2249-555X

[3] Iova Radu Andrei, Daniela Cretu -, *Perception of the life quality in the rural communities in Romania* case study- Călărași county , LAMBERT ACADEMIC Publishing, Germania

[4]\*\*\* Regional Development Agency, DEVELOPMENT PLAN OF MUNTENIA REGION, [http://www.adrmuntentia.ro/documente/1195475713\\_1.pdf](http://www.adrmuntentia.ro/documente/1195475713_1.pdf)

## RESEARCHES ON SOCIAL INFRASTRUCTURE DEVELOPMENT, IN SOUTH MUNTENIA DEVELOPMENT REGION.

DANIELA CREȚU, RADU ANDREI IOVA, ELENA LASCĂR<sup>1</sup>

**Abstract:** *The infrastructure constitutes a support element, with particular importance for supporting all economic and socio- cultural activities. The infrastructure covers both structural field, giving unity to the system unit and the spatial field, thus achieving a viable or not territorial configuration , which is reflected by different levels of accessibility in the physical, technical, economic or socio –cultural area. An important aspect for the development of the region, including the rural area, is the social infrastructure with reference to houses, education and health system. In this respect, in the present paper we propose the analysis of the social infrastructure, namely, house building , education and the health infrastructure, using as research methods, documenting, analyzing and processing the secondary analysis. The ascending dynamics of new house building in the rural area, can be combined with the dynamics of the population mobility and increasing economic importance of agricultural activities at social levels. The infrastructure for education is well represented in the region and thus it can support the development in good conditions of the educational act. From the analysed data, it results a deficiency of providing health infrastructure in the rural area, this situation requiring major investments made with projects funded under various development programs.*

**Key words:** regional development, social infrastructure, houses fund, development potential

### INTRODUCTION

South Region is characterized by a well defined infrastructure due to its advantageous geographical position. Its location in a peripheral area of Romania favoured the emergence of some major communication ways, which allowed not only the development of its relations with the neighbouring national regions, but also with the neighbouring state of Bulgaria. Its situation around Bucharest-Ilfov Development Region, resulted in the creation of a dense transport and communication infrastructure, an extension of that developed in Bucharest municipality, the most important city and administrative centre. The physical infrastructure as a specific form both for the development of South - Muntenia rural area and for the urban area includes transport infrastructure and means of communication, technical infrastructure which includes the distribution of drinking water supply, sewerage system and gas network, house building. The physical infrastructure includes post and fixed / mobile network.

In the wider context of the regional infrastructure development strategy, its specific objectives are: to improve the road access within the region, by modernising the county and commune roads and utilities, including increasing their territorial density; to orient investments to the less developed areas, increasing the quality of life especially in the areas with social and economic problems by connecting them to the regional and national infrastructure; to eliminate the problems caused by the traffic conditions in the community; to eliminate the factors that restrict the development potential of the region; to stop the migration of the active population migration from the rural communities. [4].

### MATERIAL AND METHODS

As research methods, we used documenting, the analysis and data processing from a secondary analysis. These methods are based on the synthesis processes, induction and deduction, analogy and comparative analysis. Once the information was defined, known and interpreted, the next step was the detailed documenting of the interest field. In the analysis activity, the study of the documentation available for the field or for the analysed system is a starting point. This allows in the analysis to obtain the first knowledge and information. The documentation implied also the analysis of the legislation or the compared analysis of the various specialised sources.

---

<sup>1</sup> PhD Associate Professor Daniela CREȚU, PhD University Assistant Radu Andrei IOVA, PhD University assistant Elena LASCAR, University of Agronomical Sciences and Veterinary Medicine Bucharest, Calarasi subsidiary

The documenting, the analysis and the data processing and the information obtained from the following sources: The Statistical Yearbook; The socio – economic profile of South Muntenia Region; The economic pre-accessing plan of Romania; Statistical data of the County Chamber of Commerce and Industry and the County Agency for labour Force Training and Employment; Statistical data of the Department for Agriculture and Rural Development; The development strategy of the counties, elaborated by the county councils; the Publications of the National Statistics Institute.

## RESULTS AND DISCUSSIONS

The *houses fund* consists of residential construction (residences for population) and residential buildings for communities. The house building in the rural area, include also some of the household annexes, which have the double roles of housing and / or employment. The houses fund is privately owned or state majority.

The houses dynamics in the period 2004-2011 both at national and regional level, on property forms and residence areas, is described in table no. 1

**Table .1 Dynamics of houses fund, on property forms and residence areas, in South-Muntenia Region**

Property forms	2004		2008		2010		2011	
Residence areas	number	%	number	%	Number	%	number	%
TOTAL ROMANIA								
TOTAL Romania of which:	8.176.487	100,0	8.328.663	100,0	8.427.941	100,0	8.467.832	100,0
Urban	4.445.260	54,4	4.519.179	54,3	4.607.796	54,7	4.585.420	54,2
Rural	3.731.227	45,6	3.809.484	45,7	3.820.145	45,3	3.882.412	45,8
Total South-Muntenia Region of which:	1.267.177	100,0	1.283.639	100,0	1295755	100,0	1.301.029	100,0
Urban	507.521	40,1	512.109	39,9	515.970	39,8	517.359	39,8
Rural	759.656	59,9	771.530	60,1	779.785	60,2	783.670	60,2
State Property								
TOTAL Romania of which:	199.617	100,0	190.776	100,0	185.231	100,0	195.830	100,0
Urban	156.518	78,4	145.535	76,3	140.593	75,9	149.594	76,4
Rural	43.099	21,6	45.241	23,7	44.638	24,1	46.236	23,6
Total South-Muntenia Region of which:	20.807	100,0	19.203	100,0	18926	100,0	19.419	100,0
Urban	14.835	71,3	13.805	71,9	13.763	72,7	14.070	72,5
Rural	5.972	28,7	5.398	28,1	5.163	27,3	5.349	27,5
Private property								
TOTAL Romania of which:	7.976.870	100,0	8.137.887	100,0	8.242.710	100,0	8.272.002	100,0
Urban	4.288.742	53,8	4.373.644	53,7	4.425.511	53,7	4.435.826	53,6
Rural	3.688.128	46,2	3.764.243	46,3	3.817.199	46,3	3.836.176	46,4
Total South-Muntenia Region of which:	1.246.370	100,0	1.264.436	100,0	1276647	100,0	1.281.610	100,0
Urban	492.686	39,5	498.304	39,4	501.467	39,3	503.289	39,3
Rural	753.684	60,5	766.132	60,6	775.180	60,7	778.321	60,7

Processed according to: *Romania Statistical Yearbook, time series 2005-2012*, INS [1]

The data highlights a viable dynamics in the analysed period, but in an extremely low percent, both at national level and at South-Muntenia Region level. In 2008, 2010 and 2011 the houses fund increases with a percent of 1.86%, 3% and respectively 3.56% compared to the reference year 2004. It is worth remarking the fact that in South-Muntenia Region, compared to the national level, in the analysed period, the share of the houses in the rural area is higher than that in the urban area, being for 2004 of 59.95%, in 2010 of 60.18% and in 2011 of 60.23% in the rural area, compared to the urban area of 40.05% in 2004, 39.82% in 2010, and respectively 39.77% in 2011. From this analysis it is remarked a decreasing trend of the number of houses in the urban area and an increasing trend in the rural area. At national level, in 2011 the share is of 45.84% for the rural area, compared to 54.16% for the urban area.

Depending on the type of property, the most numerous houses, in 2011, both at national level and in the region, belong to the private property, namely, from 8,467,832 houses at national level, 8,272,002 houses belong to the private property (97.67%), and in South-Muntenia Region, from 1,301,029 houses, 1,281,610 houses belong to the private property (98.51%).

**Table 2. Evolution of the number of houses, on counties and total region**

Specification	MU	2000	2005	2007	2009	2011
Total country	thousand houses	352.5	379.2	384	390.5	393.2
	%	100.0	107.6	108.9	110.8	111.5
South-Muntenia Region	thousand houses	355	382	387.2	394.4	395.6
	%	100.0	107.6	109.1	111.1	111.4
Argeş	thousand houses	376	401	405.9	414	418
	%	100.0	106.6	108.0	110.1	111.2
Călăraşi	thousand houses	339	366	368.6	374.7	377.1
	%	100.0	108.0	108.7	110.5	111.2
Dâmboviţa	thousand houses	344	371	377	383.5	386.1
	%	100.0	107.8	109.6	111.5	112.2
Giurgiu	thousand houses	369	387	391.4	397.2	400.3
	%	100.0	104.9	106.1	107.6	108.5
Ialomiţa	thousand houses	340	369	373.6	381.2	384
	%	100.0	108.5	109.9	112.1	112.9
Prahova	thousand houses	348	376	381	386.4	389.5
	%	100.0	108.0	109.5	111.0	111.9
Teleorman	thousand houses	367	397	404.5	416.4	414
	%	100.0	108.2	110.2	113.5	112.8

Processed according to: Romania Statistical Yearbook, time series 2001-2012, INS [1]

From the data presented in table 2 . it is remarked that this indicator had, both at the country level, and in South-Muntenia Region, a continuous increase in the analysed period, respectively in 2011 being higher with 11.5% and respectively 11.4%, than at the beginning of the period. The counties with the highest increases were Ialomiţa (12.9%), Dâmboviţa (12.2%) and Teleorman (12.8%), the lowest increase being recorded in Giurgiu county (8.5%).

The development of the houses fund, in the period 2004-2011, both at the country level, and at South-Muntenia Region level, as regards the number of newly built houses, expressed by the number of authorisations issued for the building of new houses, is described in dynamics, in table no. 3.

**Table .3. Dynamics of building authorisations of the residences in South-Muntenia Region**

Residence areas	2004			2008			2011		
	Number	%	thousand square meters useful surface	number	%	square meters useful surface	Number	%	square meters useful surface
TOTAL Romania									
Urban	13.813	40,2	2.805	23.045	37,7	8.397	26.778	38,9	10.017
Rural	20.533	59,8	2.672	38.047	62,3	6.554	42.068	61,1	7.485
Total	34.346	100,0	5.477	61.092	100,0	14.951	68.846	100,0	17.502
South-Muntenia Region									
Urban	1.820	33,7	306	3.070	27,8	688	3.607	28,7	820
Rural	3.583	66,3	405	7.971	72,2	1.052	8.943	71,3	1.211
Total	5.403	100,0	711	11.041	100,0	1.740	12.550	100,0	2.031

Processed according to: *Romania Statistical Yearbook, time series 2005-2012*, INS [1]

The data in the table highlight the ascending dynamics of the number of building authorisations of the residences in the rural area, both at national level, and at South-Muntenia Region level. Thus, if in 2004 20,533 building authorisations were issued at the country level in the rural area, in 2011 the number of authorisations issued was of 42,068 authorisations (an increase of 104.88%).

At South-Muntenia Region level, for the rural area, in 2004, 3,583 authorisations were issued (namely 17.44% of the total country), and in 2011, 8,943 authorisations were issued, (namely 21.25% of total country). Compared to the rural area, the number of authorisations issued for new buildings in the urban area is constant as percent, having values of 13.17% in 2004, 13.32% in 2008 and 13.47% in 2011.

**Infrastructure for education.** It is represented by the buildings in which the educational act takes place, respectively kindergartens, schools, high schools, faculties and locations for professional and special education. It can be mentioned that the school infrastructure is well represented in the region and thus it can support the development of the educational act in good conditions, except that in the rural area, this type of social infrastructure may be considered inappropriate for the rural development process, requiring a restructuring of school structures and investment projects correlated to the local needs and requirements [5].

The data on infrastructure for education at national level and in South-Muntenia Region in 2011, for various levels of education in a cumulative way on the two urban and rural areas are described in table no. 4.

**Table 4. Structure, on counties, of the education units in South-Muntenia Region, in 2011**

Development region/County	Kindergartens		Schools		Vocational schools		High schools		Post high school units		Faculties	
	No	%	no	%	No	%	no	%	No	%	No	%
Romania	1367	100,0	4022	100,0	6	100,0	1615	100,0	86	100,0	108	100,0
South – Muntenia	145	10,6	684	17,0	1	16,7	210	13,0	12	14,0	4	3,7
Argeş	25	1,8	128	3,2	-	-	45	2,8	2	2,3	2	1,9
Călăraşi	16	1,2	65	1,6	-	-	17	1,1	1	1,2	-	-
Dâmboviţa	18	1,3	106	2,6	-	-	31	1,9	-	-	1	0,9
Giurgiu	6	0,4	66	1,6	-	-	13	0,8	1	1,2	-	-
Ialomiţa	20	1,5	75	1,9	-	-	27	1,7	1	1,2	-	-
Prahova	41	3,0	137	3,4	1	16,7	54	3,3	6	7,0	1	0,9
Teleorman	19	1,4	107	2,7	-	-	23	1,4	1	1,2	-	-

Processed according to: *Romania Statistical Yearbook, 2012*, INS [1]



The percent of schools at the region level is represented as follows: 0.15% for primary education and 99.85% for secondary education compared to the national level where the percent was of 1.29% respectively 98.71%; Prahova county is remarked with: the highest number of kindergartens 41 units, the most secondary education schools - 137 schools, as well as the most high schools in total region, respectively 54 high schools and 6 post high schools units in 2011; Argeş county is remarked by the highest number of faculties, respectively 2 high education units.

**Medical infrastructure.** It is represented by care and medical assistance units, respectively hospitals, policlinics, diagnosis and treatment centres, medical offices and rural clinics, as well other public and private medical entities (table no. 5).

The infrastructure for medical assistance providing, recorded at South-Muntenia Region level, in 2008, a percent of 14.19% in the national level for hospital equipping and a percent of 16.65% for medical offices of general medicine, while, for policlinics the percent was only 7.06%, respectively a relatively reduced percent of 10.55%, recorded for other medical units [2]. The highest values regarding the number of medical units on counties, were recorded in the counties in the North part of the region, Prahova, Argeş, Dâmboviţa. South Muntenia Region had the lowest developed medical system (4.8 hospital beds to 1,000 inhabitants at the end of 2008 compared to 6.4 hospital beds to 1,000 inhabitants – average at national level), recording high variations from one county to another [2].

Thus, while in Argeş county, 6 beds were for 1,000 inhabitants, in Ialomiţa and Giurgiu counties were recorded only 3.1 and 3 beds to 1,000 inhabitants [3]. From the data presented, in 2008, it results implicitly, a sinuous deficiency to provide the medical infrastructure in the rural area, this situation implying major investments made with projects funded under various development programs.

**Table 5. Structure of medical units in South Muntenia Region, in 2011**

Development region/ County	Hospitals		Policlinics		Medical offices of general medicine		Family medical offices		Dental offices		Pharmacies and pharmaceutical points		Other medical units <sup>1)</sup>	
	no	%	no	%	no	%	No	%	No	%	no	%	No	%
Romania	458	100,0	269	100,0	1.033	100,0	11.279	100,0	11.025	100,0	7.215	100,0	17.379	100,0
South – Muntenia	65	14,2	19	7,1	172	16,7	1.571	13,9	1.017	9,2	919	12,7	1.834	10,6
Argeş	19	4,1	1	0,4	57	5,5	374	3,3	295	2,7	184	2,6	361	2,1
Călăraşi	6	1,3	0	0,0	20	1,9	118	1,0	62	0,6	61	0,8	145	0,8
Dâmboviţa	7	1,5	14	5,2	18	1,7	249	2,2	205	1,9	171	2,4	350	2,0
Giurgiu	5	1,1	0	0,0	15	1,5	122	1,1	57	0,5	96	1,3	113	0,7
Ialomiţa	4	0,9	3	1,1	0	0,0	122	1,1	51	0,5	83	1,2	94	0,5
Prahova	16	3,5	1	0,4	62	6,0	365	3,2	307	2,8	235	3,3	581	3,3
Teleorman	8	1,7	0	0,0	0	0,0	221	2,0	40	0,4	89	1,2	190	1,1

Processed according to: *Romania Statistical Yearbook, 2012*, INS [1]

Unfortunately, for 2011, the data reflect a worst situation. The infrastructure for providing medical assistance at the level of South-Muntenia Region recorded a percent of 12.29% in the national level for hospital equipping and 17.68% for medical offices in general medicine, for policlinics the percent was of 0.77%, and for other medical units a percent of 13.37%. The highest number of medical units was recorded in Argeş and Prahova counties, of 17 respectively 16 hospitals, with 64 respectively 63 medical offices of general medicine, and 418 respectively 588 other medical units.

## CONCLUSIONS

From the brief presentation of the state of the social infrastructure results the conclusion that from the point of view of rural utilities equipping is low, the level of equipment is much lower than in the urban area. The public utility networks are far from secure urban needs of the rural population, being undersized in relation to the population number.

The education and learning are key factors in accelerating the economic and social progress, in terms of high performance in all social areas, including the rural communities. Unfortunately, there are obvious discrepancies in the social infrastructure in the rural area compared to the urban area and obviously compared to EU member countries.

In the field of rural education, the material equipping in quantity seems to be acceptable. In many rural areas, the education units (or the number of classrooms) in relation to the number of inhabitants in the rural area (or the number of pupils) are surplus due to the decreasing number of young people. But, a qualitative analysis reveals severe deterioration of the rural education, an obvious discrepancy between the services provided in this field, in the rural and urban areas, due to the large differences existing between the infrastructure of education system and skill level of the teaching staff [6] .

Compared to the urban area, the medical care and health in the villages is far behind. In most rural localities, only primary health services are provided, the population using the services of specialized medical facilities in the cities. The medical staff serving the health units in the rural area is characterized by a low quality of care, situation explained by poor equipping of buildings, specialized equipment, usually obsolete or nonexistent equipment. In relation to the number of residents in the rural area, the qualified personnel have an insignificant percent, the number of doctors being reduced, which also affects the quality of health care [5]. Compared to an average of 378 urban residents per one doctor in the rural area, this social indicator is, in the rural area, of 1417 inhabitants, namely 3.7 times higher.

## REFERENCES

- [1] \*\*\* INS -Romania Statistical Yearbook 2001 -2012
- [2] \*\*\*Calarasi county-economic profile, 2012, <http://cartiere.ro/129913-judetul-calarasi-profilul-economic>
- [3] Iova Radu Andrei, Daniela Cretu -, „*Perception of the life quality in the rural communities in Romania* case study- Călărași county , LAMBERT ACADEMIC Publishing, Germany
- [4]\*\*\* Regional Development Agency, DEVELOPMENT PLAN OF MUNTENIA REGION, [http://www.adrmuntenia.ro/documente/1195475713\\_1.pdf](http://www.adrmuntenia.ro/documente/1195475713_1.pdf)
- [5] Analysis of current situation NDP 2007-2013, General Direction of Rural Development, management Authority for NPRD [http://www.madr.ro/pages/dezvoltare\\_rurala/](http://www.madr.ro/pages/dezvoltare_rurala/)
- [6] Council Conclusions on a strategic framework for European cooperation in education and training ("ET 2020"), <http://www.edu.ro/index.php/articles/12044>

# IMPROVEMENT OF THE SOCIAL REQUIREMENTS OF THE QUALITY-SOCIAL ACCOUNTABILITY-HEALTH AND SAFETY INTEGRATED MANAGEMENT SYSTEM

DENUNTZIO ROMEO<sup>1</sup>

**ABSTRACT:** The paper has the goal to present a method to improve the social requirements of the quality-social accountability-health and safety integrated management system with the social requirements of the Business Social Compliance Initiative (BSCI) Code of conduct because SA 8000 standard have to fulfil all the requirements of BSCI Code of conduct. The method used was to make a correspondence between the SA 8000 standard requirements and the BSCI Code of conduct requirements because the requirements of the BSCI Code of conduct are more detailed in some areas than the requirements of SA 8000 standard which establish the social requirements of the quality-social accountability-health and safety integrated management system. It was established on this way the detailed supplementary requirements from the BSCI code of conduct which have to be added to the requirements of SA 8000 standard to reach the full compliance with the social requirements of the BSCI Code of conduct. The conclusions of the paper is that the supplementary detailed requirements improve the implementation of quality-social accountability-health and safety integrated management.

**Key words:** Management system; Social accountability; Business Social Compliance Initiative (BSCI)

## INTRODUCTION

SA 8000 standard is considered the best practice for organizations which implement the social accountability management system according to BSCI Code of conduct. That's why a company which is certified according the SA 8000 standard have to be in conformity with the social management system defined by BSCI Code of conduct. But often happens that an audit of the social accountability management system according to the requirements of SA 8000 standard reveals non-conformities according to the requirements of BSCI Code of conduct because the requirements of BSCI Code of conduct are more detailed in some areas, more explicit but in SA 8000 standard the same requirements are implicit. That's why the detailed requirements for BSCI Code of conduct have to be added to the requirements of SA 8000 standard to reach the conformity to all BSCI Code of conduct requirements.

## MATERIAL AND METHODS

The methods used is to compare the requirements of SA 8000 standard with the requirements of BSCI Code of Conduct and present in a table the supplementary detailed requirements which are to be added to SA 8000 standard to fulfil all the requirements of BSCI Code of Conduct.

## RESULTS AND DISCUSSIONS

The detailed supplementary requirements from BSCI code of conduct is established making a correspondence between the SA 8000 requirements and the requirements from the BSCI code of conduct in the following table:

---

<sup>1</sup> DENUNTZIO ROMEO-Doctorand-Universitatea de Stiinte Agronomice si Medicina Veterinara Bucuresti-denuntzio@yahoo.com

Tab. 1. Correspondence between the requirements of SA 8000 standard and the requirements of Business Social Compliance Initiative (BSCI) Code of conduct

SA 8000:2008		Suplimentary detailed requirements from BSCI Code of conduct	
Clause	Requirements	Clause	Suplimentary requirements
1	Child labour		
1.1	The company shall not engage in or support the use of child labour	B.5.1.3	The company keeps and makes available registers that contain the names and ages or dates of birth of workers less than 18 years old
1.2	Written procedure for remediation of children		
1.3	Use and education of young workers	B.5.2.3.	The company complies with the national regulations on apprenticeship especially but not limited to the educational programme, theoretical lessons, compensation and working hours
1.4	Protection of young workers		
2	Forced and compulsory labour		
2.1	The company shall not engage in or support the use of forced or compulsory labour, nor shall personnel be required to pay 'deposits' or lodge identification papers with the company upon commencing employment.	B.6.7	If the company is using prisoners work, that work is conducted in the frame of the national law and ILO Conventions 29 and 105 and labour laws applies to those prisoners to the extent the prisoners condition allows
2.2	Neither the company nor any entity supplying labour to the company shall withhold any part of any personnel's salary, benefits, property, or documents		
2.3	Free to leave the workplace premises after completing the standard workday Free to terminate their employment	B.6.3	The security guards (armed or unarmed) do not keep the workforce under pressure
		B.6.4	Workers are free to terminate their contracts and leave the company without sanctions
2.4	-Trafficking in human beings		
3	Health and safety		
3.1	Risk assessment	B. 11.1.2	Special needs of pregnant women, young workers and other particularly vulnerable employees are taken into account
		B. 11.1.3	Transmittable and non-transmittable diseases are particularly regarded in the risk assessment
3.2	Management representative		
3.3	Health and safety instructions Health and safety training	B. 11.2.2	Workers have been properly trained in using personal protective equipment

		B.11.2.3	Workers handling and/or administering hazardous substances including but not limited to chemicals, disinfectants, crop protection products or biocides, have been properly trained
3.4	Systems to detect, avoid, or respond to potential threats Written records of all accidents	B.9.1	Building is suitable for production and permits work in human dignity
		B.9.2	Temperature in the workplace provides reasonable comfort to employees
		B.9.3	Ventilation in the workplace ensures acceptable working conditions
		B.9.4	Noise level is adequate
		B. 9.5	The level of illumination is adequate
		B. 9.6	Work place is clean and protects workers according to hygienic accepted standards
		B. 9.7	The space provided for each worker is adequate for the safe execution of all activities
		B.10.2.5	Workers transportation provided by the company is safe and complies with national regulations
		B.11.1.5	The company conducts regular inspection and testing of all safety measures to ensure maintenance and continuous improvement
		B. 11.4.1	Documentation of hazardous chemicals used by the company is available and accurate
		B. 11.4.2	The company avoids or minimize the release of hazardous substances into the work environment
		B. 11.4.3	Communicating chemical hazards through labeling and marking is done
		B.11.4.4	Chemical substances are adequately labeled, safely stored and contained in their original packing
		B.11.4.5	Only authorized workers have access to chemical substances
		B.11.4.6.	Distribution, use and disposal of chemicals are properly recorded
		B.11.5.1	Potential hazards are adequately identified with understandable and visible signs and warnings
		B.11.5.2	Accidents and emergency procedures exist and are properly implemented
		B.11.5.1	Accidents procedures are visually displayed and easily understandable to exposed workers and first-aid

			personnel
		B.11.5.5	Investigation of any occupational accident si satisfactory
		B.11.6.2	Electrical installations and equipment are checked periodically by a competent person
		B.11.6.3	Workplaces are free from distribution lines
		B.11.6.4	Electrical installations and equipment are properly functioning
		B.11.6.5	People wording with electrical installations and equipments understand their task and agreed safety procedures
		B.11.6.6	When dealing with electrical installations and equipment adequate working space and lighting are provided
		B.11.6.7	Only properly insulated tools are used when dealing with electrical installations and equipment
		B.11.7.1	Fire early warning system are installed and properly functioning
		B.11.7.2	Adequate amount of fire fighting equipment is installed and properly wokding
		B.11.8.1	Escape routes, aisles and emergency exists are not blocked, easily accessible and conspicuously marked
		B.11.8.2	Evacuation plans are in line with the legal requirements and properly posted in relevant places so they are visible and understandable for workers
		B.11.8.3	Emergency lights and anu other evacuation signals are correctly installed, and maintained by a competent person
		B.11.8.4	The emergency exits are appropriate to secure evacuation of the work force in emergency cases
		B.11.9.1	Any machine part, function or process which may cause injury to workers is adequately safeguarded
		B.11.9.2	Workers operating machinery and powr generators are properly qualified in safty regulations and operation procedures
		B.11.9.3	Inspection and insurance for machinery and vehicles are valid and issued by competent bodies
		B.11.9.4	Hazardous machinery and/or vehicles

			are properly marked and related precautionary measures are understandable for workers
3.5	Personnel protected equipment First-aid Follow-up medical treatment	B.10.1.2	The company provide the necessary first-aid material and a sick room-if relevant- in adequate hygienic conditions
		B.10.1.3	The company has written emergency procedures in place for dealing with cases of trauma or serious illness up to the point at which the patient care can be transferred to an appropriate medical facility
		B.11.3.2	Proper maintenance is given to the PPEs, including but not limited to cleaning, replacement when damaged and appropriate storage
		B.11.3.3	The use of PPEs is enforced to provide protection to the workers
3.6	Risks of new and expectant mothers		
3.7	Clean toilet facilities, access to potable water, sanitary facilities for food storage	B.10.2.4	The company provides workers with washing facilities, changing rooms and toilets in adequate number according to the workforce population
3.8	Dormitory facilities	B.12.1	Dormitory facilities provided for personnel do not violate any basic human right
		B.12.2	Dormitory are not expose to natural hazards or affected by the operational impacts
		B.12.3	Workers using the accommodation provided by the company are allowed to enter and leave the dormitories without seeking permission from the company
		B.12.4	Social environment at the accommodation provided by the company is adequate according to local customs, avoids safety hazards and protects workers from potential sexual harassment
		B.12.5	The temperature, humidity, space, sanitation, illumination and any other relevant living conditions are reasonable for the specific environment
		B.12.6	Washing facilities and toilets are provided adequately to guarantee that users of the accommodations can fulfill their hygienic habits
		B.12.7	Potable water is provided to ensure its

			hygienic consumption and avoid stagnation or other situations that would spread diseases
		B.12.8	All relevant health and safety procedures are properly implemented in the accommodation area provided by the company
3.9	Protection in case of imminent serious danger		
4	Freedom of association & right to collective bargaining		
4.1.	Right to form, join, and organize trade unions and to bargain collectively	B. 7.2.	Copies of relevant local regulations or collective bargaining agreements are properly recorded and accessible to workers for consultation
4.2	Where the right to freedom of association and collective bargaining are restricted under law		
4.3	Rights of the representatives of workers	B.7.5.	The workers are aware who is their representative towards management
5	Discrimination		
5.1	The company shall not engage in or support discrimination	B.8.2	Questions regarding health conditions are not used for discrimination during the recruitment process
		B.8.3	Questions regarding health conditions are not used for discrimination during employment
5.2	Personnel's rights to observe tenets or practices, or to meet special needs		
5.3	Sexual harassment		
5.4	Pregnancy or virginity tests		
6	Disciplinary practices	B.1.3.	The company established documented working rules and procedures
		B.1.4.	Legal regulations are recorded and up-to-date
		B.1.9.	The company has a functioning and transparent anti-corruption/anti-bribery system in place for all business activities
		B.6.6	Work is not conducted under the threat of illegal penalty or any other illegal sanction
7	Working hours		
7.1	Working hours and public holidays		
7.2	Weekly days off		
7.3	Overtime work		
7.4	Overtime work is needed in order to meet short-term business demand		
8	Remuneration		
8.1	Living wage	B.4.5.	Workers are properly informed on



			wage and payment terms upon employment
8.2	Deductions from wages are not made for disciplinary purposes		
8.3	-Pay slips, wages payment	B.4.8	Workers are paid for any time spent in required meetings, training sessions or any other unproductive time due to conditions beyond workers control
8.4	Overtime shall be reimbursed at a premium rate		
8.5	Schemes to avoid fulfilling its obligations to personnel		
9	Management systems		
9.1	Policy		
9.2	Management representative		
9.3	SA 8000 worker representative		
9.4	Management review		
9.5	Planning and Implementation		
9.5.a	Roles, responsibilities, and authority	B.1.13.	The company appointed a qualified person for the implementation of the social management system at farm level
		B.2.3	The employment contract is in writing
		B.11.6.1	A competent person has been appointed by the employer to maintain safe electrical installations
9.5.b	Training of new, reassigned, and/or temporary personnel upon hiring		
9.5.c	Periodic instruction, training, and awareness programs for existing personnel	B.1.16.	The company conducts trainings regularly to farmers and processing unit managers about BSCI requirements
9.5.d	Continuous monitoring of activities and results	B.1.17.	The company conducts self-assessments regularly at the level of farmers and processing units in a documented way about BSCI requirements
		B. 1.18	The company has a clearly documented internal audit procedure for the BSCI requirements that apply to processing units and farms
		B.1.19	The internal auditor is competent to conduct the BSCI internal audits
9.6	Consult the SA8000 Guidance Document		
	Control of Suppliers/Subcontractors and Sub-Suppliers		
9.7	Maintain appropriate records of suppliers/subcontractors' (and, where appropriate, sub-suppliers')	B.1.14.	The company prepared a list of all processing units and all farms regardless whether owned or external

	commitments to social accountability		to the company
		B.1.15.	The company has a documented internal social management system (ISMS) implemented on the level of both processing units and farms
9.8	Writing appropriate procedures to evaluate and select suppliers/subcontractors		
9.9.	Reasonable effort		
9.10	Home workers		
	Addressing Concerns and Taking Corrective Action		
9.11.	Confidential means for all personnel to report non-conformances with SA 8000 standard		
9.12.	Corrective and preventive action		
	Outside Communication and Stakeholder Engagement		
9.13.	Procedures to communicate regularly to all interested parties		
9.14.	Demonstrate its willingness to participate in dialogues with all interested stakeholders	B.1.7.	The two way communication meetings take place between management and workers regularly (minimum twice a year)
9.15	Access for Verification		
9.16	Records		
		B.1	Management practice
		B.1.1.	The workforce capacity is sufficient and properly planned
		B.2	Documentation
		B.2.1.	All documentation and necessary official approval and/or certificates are valid and up-to-date
		B.2.4.	The company keeps information and corrective actions from any other social audit
		B.2.5.	Documentation is reliable and not in conflict with other sources of information

## CONCLUSIONS

The tabel of correspondence shows that the detailed suplimentary requirements from the BSCI Code of conduct are especially in the field of health and safety but also in the fields of management practice and documentation.This requirements have to added to the requirements of SA 8000 standard in order to reach full compliance with BSCI code of conduct

## BIBLIOGRAPHY

- \*\*\* Social accountability 8000 international standard,Ed. 2008,New York,Social Accountability International
- \*\*\*BSCI Code of Conduct,Ed. 2009,Business Social Compliance Initiative

## EMPLOYMENT AND UNEMPLOYMENT IN THE BUCHAREST-ILFOV REGION

STOICESCU Alina, ALECU Ioan Niculae, TUDOR Valentina, BUTU Marian

**Abstract:** *This paper aims to achieve a study that consisted of research, analysis and interpretation of statistical data, in conjunction with theoretical aspects that allowed regional assessment of information on the structure of employment and unemployment in the Bucharest-Ilfov Region. Bucharest-Ilfov Region still remains the one with the lowest ILO unemployment rate nationwide. It has fluctuated quite a bit in 2006-2010, around 4%, with the exception of 2008 when it fell sharply by almost a percentage to return a year later, value that increased in 2010 to 4.7; since 2011, it recorded an increase of 5.4% reaching 6.3% in 2012.*

Key words:

### INTRODUCTION

Making demographic studies is a fundamental tool needed for the development of programs and economic and social development strategies. One such study conducted at the regional level is used in the definition and development options and sectorial development programs in the fields: economic, social, education, health, transport, tourism, etc.

To substantiate the economic and social development programs it is necessary to know the evolution of labor resources and the workforce, very important is the observation of these phenomena and bringing them to the attention of policy makers in order to prevent the negative effects that these demographic processes determine.

The purpose of the present paper is that based on the data provided by the National Institute of Statistics, to achieve regional assessment of information on employment and unemployment in the Bucharest- Ilfov Region.

### MATERIAL AND METHOD

Data were collected through public institutions, including the National Institute of Statistics and Statistics County Department of Ilfov.

The study was to research, analyze and interpret statistical data. These, in conjunction with theoretical aspects extracted from the literature, allowed assessment of regional information on population structure in the Bucharest-Ilfov Region.

### RESULTS AND DISCUSSIONS

Bucharest-Ilfov is the most important region in terms of the share of employed civilian population (14%) and the number of employees (about 21%). Also, unemployment values are consistently the lowest of all regions.

Table no. 1

Active population (thou people)									
	2002	2003	2004	2005	2006	2007	2009	2010	2011
<b>Romania</b>									
<b>TOTAL</b>	9090	8964	8796	8913	8930	9094	9150,4	9120,1	8826,5
<b>Male</b>	4738	4751	4641	4729	4728	4845	4919,2	4854	4645,5
<b>Female</b>	4352	4213	4155	4185	4202	4248	4231,2	4266,1	4181
<b>Bucharest-Ilfov</b>									
<b>TOTAL</b>	937	972	1009	1088	1156	1232	1302	1250,4	1248,9
<b>Male</b>	499	538	551	603,8	622,1	641,4	683,4	652	634,2
<b>Female</b>	438	434	458	484,1	533,4	590,7	618,7	598,4	614,7

Source: National Institute of Statistics, TEMPO-Online data series, data access 2013;

Active population of the Bucharest-Ilfov Region has seen a sharp increase in the last seven years, probably due to the increase of the general population in the area. If nationally in terms of

active population, the growth is insignificant, in the Bucharest-Ilfov Region it increased by 33 % between 2002-2010. The increasing trend started in 2003, emphasizing significantly around 2009, however, for the first time in two years, appears a decrease of 6 percent in the active population, remaining still above the 2007 level.

For the activity rate, for Bucharest-Ilfov Region there is recorded a similar trend, with growth of 7.9 percent between 2005 and 2011. According to AMIGO research, in 2011, the rate of activity in the region remained the highest nationally, probably because of population growth recorded in the region, by working age categories, and the decision of postponing retirement or returning to work, because of economic situation (crisis, etc.) and a series of legislative measures likely to stimulate activity. As in the rest of the country, the number of active male exceeded that of the females (retirement age for women is lower than that of men).

Table no. 2

Activity rate of labor resources (%)							
	2005	2006	2007	2008	2009	2010	2011
<b>Romania</b>							
<b>TOTAL</b>	64,5	64,7	66	66,6	65,7	64,1	62,8
<b>Male</b>	66,6	66,2	68,1	69,3	67,9	66,2	64,2
<b>Female</b>	62,3	63,1	63,8	63,7	63,4	61,8	61,4
<b>Bucharest-Ilfov</b>							
<b>TOTAL</b>	73,1	77	81,8	86,2	82	80,4	81
<b>Male</b>	82,1	82,3	84,1	90,6	85,8	81,8	83
<b>Female</b>	64,3	71,6	79,4	81,8	78,2	79,1	79,1

Source: National Institute of Statistics, TEMPO-Online data series, data access 2013;

The employment rate of labor resources has, during 2005 -2011, a constant evolution nationally, increased by approximately 1.9%, while the Bucharest-Ilfov Region increased by 21.8% in the same period. Bucharest-Ilfov Region concentrates 14% of total employment nationwide, having the highest rate of employment in Romania. Also in this area it is the largest share of employed population in urban areas, and the highest rate of employed population belonging to the age group 25-54 years. Regarding the level of education of persons employed in the labor market, the Bucharest-Ilfov Region also holds a national record: so easy to guess, the highest percentage of university graduates, given the higher education infrastructure in Bucharest.

Table no. 3

The employment rate of labor resources (%)							
	2005	2006	2007	2008	2009	2010	2011
<b>Romania</b>							
<b>TOTAL</b>	57,7	58,8	58,8	59	58,6	60,4	59,6
<b>Male</b>	63,9	64,7	64,8	65,7	65,2	67,2	60,7
<b>Female</b>	51,5	53	52,8	52,5	52	53,5	58,4
<b>Bucharest-Ilfov</b>							
<b>TOTAL</b>	59,4	62,9	62,4	63,3	63,8	64,4	79,5
<b>Male</b>	65,9	69,5	69,6	66	65,5	79,8	81,5
<b>Female</b>	53,4	56,9	55,9	53,3	53	77,3	77,4

Source: National Institute of Statistics, TEMPO-Online data series, data access 2013;

Bucharest-Ilfov Region still remains the one with lowest ILO unemployment rate nationwide. It has fluctuated quite a bit in 2006-2010, around 4%, with the exception of 2008 when it fell sharply by almost a percentage to return a year later), value that increased in 2010 to 4.7; since 2011, it recorded an increase of 5.4% reaching 6.3 % in 2012. If the rest of the labor indicators show significant variations between activity and participation rates of females and males identified, and the rest of the country, for the ILO unemployment rate, Bucharest-Ilfov is one of the two regions in which these values are very close, differences being almost negligible. As for environment sourcing, this area is among those with the lowest ILO unemployment rate among urban areas, but at the same time, the highest among rural areas. This is probably due to the multitude of jobs available especially in the capital, together with the progressive abandonment of agricultural occupations in the rural area of Ilfov County and difficulties in finding a new job.

As for the ILO unemployment rate among young people (15-24 years), this is the highest and most worrying of the socio-demographic rates. Bucharest-Ilfov, it measured in 2012, about 22%, increasing from the previous year. Paradoxically, it is higher in urban areas than in rural areas, possibly due to the large number of young people who come to the capital to attend university after having difficulty in finding a job.

Table no. 4

Unemployment rate (%)							
	2006	2007	2008	2009	2010	2011	2012
<b>Bucharest-Ilfov Region</b>	4,7	4,1	3,4	4	4,7	5,4	6,3

Source: National Institute of Statistics, TEMPO-Online data series, data access 2013;

Table no. 5

ILO youth unemployment 15-24 years (%)										
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
<b>Total</b>	26.2	21.2	23.4	22.5	20.4	15.5	19.2	22.2	22.2	22.3
<b>Male</b>	28.7	25.3	26.4	24.4	24.8	14.2	20.2	23.5	23.4	21.5
<b>Female</b>	22.6	15.9	16.3	15.5	12.7	17.4	17.9	20.3	20.7	23.3
<b>Urban</b>	26.3	21.5	23.6	23.8	19.5	15.9	25.7	28.4	24	22.6
<b>Rural</b>	25.1	19.3	19	18.1	26.9	12.1	13.8	16.7	11.2	19.6

Source: National Institute of Statistics, TEMPO-Online data series, data access 2013;

This statistic shows that economic areas, that had the greatest need for new employees in the Bucharest-Ilfov Region, were in 2013, industry and health and social care. As for the few sectors where vacancies are available, they were the mining industry and real estate (probably amid the housing crisis).

Table no. 6

Job vacancies in Bucharest-Ilfov Region (2013)	
CAEN Rev.2 (activities of national economy)	Periods
	I st Trimester 2013
	Number
<b>TOTAL</b>	7099
<b>AGRICULTURE, FORESTRY AND FISHING</b>	44
<b>INDUSTRY</b>	1149
<b>MINING INDUSTRY</b>	2
<b>PROCESSING INDUSTRY</b>	438
<b>WATER SUPPLY, SANITATION, WASTE MANAGEMENT AND REMEDIATION ACTIVITIES</b>	709
<b>CONSTRUCTIONS</b>	68
<b>WHOLESALE AND RETAIL TRADE, REPAIR OF MOTOR VEHICLES AND MOTORCYCLES</b>	467
<b>TRANSPORT AND STORAGE</b>	264
<b>HOTELS AND RESTAURANTS</b>	157
<b>INFORMATION AND COMMUNICATION</b>	409
<b>FINANCIAL AND INSURANCE ACTIVITIES</b>	304
<b>REAL ESTATE</b>	1
<b>PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES</b>	361
<b>ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES</b>	482
<b>PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY</b>	1920
<b>EDUCATION</b>	183
<b>HEALTH AND SOCIAL CARE</b>	1092
<b>ARTS, CULTURE AND RECREATION</b>	117
<b>OTHER SERVICES</b>	81

Source: National Institute of Statistics, TEMPO-Online data series, data access 2013;

Of the total number of 4376 thousand qualified employees in Romania in 2012, a percentage of 21% is found in the Bucharest-Ilfov Region. This percentage is slightly higher compared to 2008, when the percentage was 20.9%.

Compared to the situation at the national level, the Bucharest-Ilfov Region has the largest number of employees in the same fields of activity, particularly economically important: industry, commerce and construction. However, the proportion of employees in each of these areas differs. Thus, if nationally in 2012, 29 % of the total number of employees were working in industry, at regional level, only 15 % were working. In trade and construction, the Bucharest-Ilfov Region invested a higher proportion of employees (21 % and 9 % , compared with 17 % and 8 % ). Other areas where the Bucharest-Ilfov Region allocated a higher percentage of employees than the national total are closely related to the quality that Bucharest holds as capital and financial center (percentage of employees in financial transactions (5%) is more than double that country level (2%) and in information and communications 7% (respectively 3%). Areas in which there is found a lower rate of employees than the national level are slightly paradoxical, education, health and (much more understandable) agriculture.

Regarding agriculture, the regional level is insignificantly represented (0.5%), but in Ilfov County it has a much higher share. The industry is also well represented in the County of Ilfov and in the light of removal outside Bucharest, of all large enterprises producing pollution. In the industry, the largest share is held by the processing industry.

**Table no.7**
**Average number of employees trained by fields (2010-2011)**

	Romania	Bucharest-Ilfov	Romania	Bucharest-Ilfov
	Year 2010		Year 2011	
	Thousand people			
TOTAL	4376	918	4349	912
AGRICULTURE, FORESTRY AND FISHING	95	4	98	5
INDUSTRY	1237	139	1259	133
MINING INDUSTRY	67	3	64	4
PROCESSING INDUSTRY	999	110	1028	105
PRODUCTION AND SUPPLY OF ELECTRICITY, GAS, STEAM AND AIR CONDITIONING	73	12	70	12
WATER SUPPLY, SANITATION, WASTE MANAGEMENT AND REMEDIATION ACTIVITIES	98	14	96	14
CONSTRUCTIONS	337	94	334	86
WHOLESALE AND RETAIL TRADE, REPAIR OF MOTOR VEHICLES AND MOTORCYCLES	752	187	753	187
TRANSPORT AND STORAGE	258	60	256	60
HOTELS AND RESTAURANTS	109	23	108	24
INFORMATION AND COMMUNICATION	106	62	110	64
FINANCIAL AND INSURANCE ACTIVITIES	101	45	99	45
REAL ESTATE	27	7	26	8
PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES	126	60	127	62
ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES	181	67	198	74
PUBLIC ADMINISTRATION AND DEFENCE; COMPULSORY SOCIAL SECURITY	210	40	193	39
EDUCATION	380	49	364	47
HEALTH AND SOCIAL CARE	366	53	333	51
ARTS, CULTURE AND RECREATION	53	16	51	15
OTHER SERVICES	39	10	39	11

Source: National Institute of Statistics, TEMPO-Online data series, data access 2013;

## CONCLUSIONS

Bucharest-Ilfov Region concentrates 14% of total employment nationally, its overwhelming majority inhabiting the urban area. Also, it holds the highest share of university graduates among the active population in the country, Bucharest being a very important source of jobs and qualified personnel. In terms of employment, the Bucharest-Ilfov Region has the biggest advantage in Romania: both the activity rate as well as the employment one, still records the highest levels nationally and sustains an upward trend in recent years. The ILO unemployment rate is the lowest in the region. The distribution of these rates, however, is not uniform; activity and employment rates are lower for female population than for male and lower for rural areas than urban areas, the opposite is true for the unemployment rate (except the 15-24 age segment, where ILO unemployment is higher in urban areas). Also, the population aged 15 to 24 face the greatest difficulties in finding work, having the highest rate of ILO unemployment at regional and national levels.

As for the number of qualified employees, this region focuses around a fifth of the total country's share, a slightly increasing trend. Of these, most work in areas most economically powerful: commerce, industry and construction.

## ACKNOWLEDGEMENTS

This article was developed by the project „Grants to improve the quality of doctoral young researchers in agronomy and veterinary medicine” (code agreement POSDRU / 107/1.5/S/76888), co-funded by European Social Fund Operational Programme Human Resources Development 2007-2013, coordinated by the University of Agronomic Sciences and Veterinary Medicine Bucharest.

## REFERENCES

- Barthelemy Ph., Granier R., Robert M., (2009), *Demographics and society*, Publisher European Institute;
- Feraru Daniela, (2011), *Migration and development. Socio-economic issues and trends*, Publisher Lumen;
- Gavris A., (2011), *Large urban habitats in Bucharest*, Publisher Universitara;
- \*\*\*National Institute of Statistics, (2013), *TEMPO-Online series data*, access data 2013;
- \*\*\*National Scientific Research Institute For Labour and Social Protection (INCSMPS), *Romanian population in territorial design by 2025*;
- \*\*\*Permanent Technical Secretariat, (2012), *Regional Pact for Employment Inclusion Bucharest and Ilfov, Regional plan of action for employment and social inclusion 2012 – 2014 of Region Bucharest-Ilfov*, Bucharest, Romania;
- \*\*\*Regional Development Agency Center, (2010), *Demographic analysis of regional center. Disparities geodemographical. Trends and forecasts*, Bucharest, Romania;
- \*\*\*[www.mdrl.ro/\\_documente/regiuni/8.BI\\_ro.pdf](http://www.mdrl.ro/_documente/regiuni/8.BI_ro.pdf)

## PERFORMANCE EVALUATION OF PRODUCTION STRUCTURES IN AGRICULTURAL HOLDINGS – case study

ADRIAN TUREK RAHOVEANU<sup>1</sup>, MARIA MAGDALENA TUREK RAHOVEANU<sup>2</sup>

**Abstract:** *The performance of production structures in agriculture is determined by a complex of factors, the most important are: the natural potential of agricultural holdings, financial resources necessary to purchase inputs, ensuring balance in the allocation of factors of production, technical and technological potential, the existing workforce and the readiness of the farm manager. Based on these considerations we want in this paper to analyze the aspects defining application of performance management in order to develop sustainable production structures, increase competitiveness of farms, farmers' income stabilization and Romanian rural development.*

**Keywords:** *production structure, management, efficiency, competitiveness*

### INTRODUCTION

Romanian agriculture is no homogeneous in terms of farming structures and their dual nature is emphasized compared to the vast majority of Member States of the European Union. Although some progress has been made, an excessive number of individual, small and very small, underperforming farms are maintained, as a small number of large and very large units whose activity was not restructured to become compatible with the requirements of unique market.

Small farms are generally undercapitalized, fails to provide a high degree of mechanization technologies, growers focusing mainly on crop management methods by manual means. The labour force is represented by family members and some times of staff used to meet temporary needs works in the best moments.

To reduce the number of subsistence and semi-subsistence farms and formation of the medium sized commercial farms sector, suitable structural policy measures are needed, simultaneous with the reform of land ownership.

In the period 2002-2010, the structures operating in Romania's agriculture had some developments, but poor in adapting to the requirements of the Community market and for the better use of resources that Romania has.

According to results of the General Agricultural Census 2010, the number of agricultural holdings in Romania was 3,856 thousand, of which 3,825 thousand unincorporated farms, with 14.3% lower than in 2002 and 31 thousand holdings with legal personality, increased by 34.8% compared to 2002. Reducing the number of farms was due mainly to merging of unincorporated farms.

The changes in the structure of agricultural holdings in the period 2002 - 2010, are shown in the data from Table 1.

In Romania the small subsistence farms proved very durable. Structural changes should lead to the multifunctional development of these households, their association for the marketing of products, supply inputs, common investments and agricultural works, product storage, processing of raw materials, etc. Gradually, the number of subsistence farms will decrease in favour of forming a viable commercial sector and rural economic diversification in Romanian rural space.

The existence of diversified farming structures linked by various forms of cooperation and agro-industrial integration that are competitive on the unique and world market is the fundamental option for Romania.

---

<sup>1</sup> SRII - Research Institute for Agriculture Economy and Rural Development, Lecturer PhD – University of Agronomic Sciences and Veterinary Medicine, Bucharest, email: [turek.adrian@iceadr.ro](mailto:turek.adrian@iceadr.ro)

<sup>2</sup> SRII - Research Institute for Agriculture Economy and Rural Development, Lecturer PhD – University Dunarea de Jos, Galati email: [turek.magdalena@iceadr.ro](mailto:turek.magdalena@iceadr.ro)



Table 1. The main indicators at national level, by legal status of Farms, in the period 2002-2010

Indicators	Year	MU	Total farms	Unincorporated farms	Farms with legal personality
Farms	2002	Thousands	4485	4462	23
	2005	Thousands	4256	4238	18
	2007	Thousands	3931	3914	17
	2010	Thousands	3856	3825	31
The total area	2002	thousand ha	15708	8454	7254
	2005	thousand ha	15442	9886	5556
	2007	thousand ha	15265	9591	5674
	2010	thousand ha	15867	8488	7379
The used agricultural area (UAA)	2002	thousand ha	13931	7709	6222
	2005	thousand ha	13907	9102	4805
	2007	thousand ha	13753	8966	4787
	2010	thousand ha	13298	7445	5853
Average agricultural area utilized on farm	2002	Ha	3.11	1.73	274.43
	2005	Ha	3.27	2.15	263.08
	2007	Ha	3.50	2.29	270.45
	2010	Ha	3.45	1.95	190.84

Source: General Agricultural Census 2010, NIS 2011

The commercial agricultural units sector to produce for the market and integrate into the structures and community norms should include most of the agricultural area of the country, merged in surfaces with economic dimensions, operated at least in the following types of economic organization: individual farms (family); family agricultural unincorporated associations; freelancers; groups of producers with legal personality that develop association or cooperative forms on the product chain; agricultural cooperatives organized, especially in the upstream and downstream of agriculture; agricultural companies; private agricultural companies etc.

The commercial agricultural units sector should include both medium and large businesses, as well as a part of small households in hilly and mountainous areas and surrounding cities. The latter should be encouraged to develop as forms of organization that provide diversification of rural economy by using local resources and available labour within the family, as well as those engaged in other activities (commuters or with urban residence that have households in rural areas).

The commercial family farms can form as a result of measures to support semi-subsistence farms and strengthen the existing family farms producing for the market, by facilitating the access to EU structural funds.

## MATERIAL AND METHOD

To capture best the opportunities for developing and enhancing the performance of agricultural activities, it was conducted a research at farm level from the plain area.

The research objectives were to identify the ways to use the land, human, material and financial resources in agricultural units and economic performance of their work.

The research methodology consisted of a documentation study conducted using a questionnaire survey. The sources of information have been domestic farm records.

The method of data collection is the survey. As investigation technique, was used structured questionnaire-based investigation by direct interview. The questionnaire included questions on different aspects of the farm business: agricultural area, its structure by use; level of technical equipment of the holding; human resources used and structure; structure of agricultural production

of vegetable origin; livestock; average and total yields; commodity production and market policy; costs, prices and profitability of products sold; costs per hectare and per animal; income and economic outcomes.

## RESULTS AND DISCUSSION

When selecting the participants for study documentation was considered both farm profiles: cereal, vegetable, wine, livestock and so on as well as their territorial spread and the legal status of holdings (individual husbandries, family associations, agricultural societies).

The analysis of data collected from the survey was their critical analysis: analyze, evaluate, explain, inference and interpretation. In addition, temporal comparison was used to capture the changes in economic performance in 2009-2011, due to the market (price changes) and to management decisions on crop structure, human resources utilization, allocation of production factors, market policy, etc.

For example we have chosen a case study of a farm type family agricultural association.

Family Association has a mixed profile, in the revenue predominantly oilseed crops, although in the area cultivated the shares held by them and cereals are close.

Table 2. The land use mode

Specification	Total hectares	of which:		% Arable from agricultural
		Property	Lease	
Agricultural area, of which:	482	482	-	x
- Arable	482	482	-	100.0

### Conclusions:

- association has a significant agricultural area, if we consider the excessive fragmentation of land holdings in Romanian agriculture;
- entire area is found in the form of arable land (one category of use);
- crop structure mentioned above is natural, being recognized arable land suitability for cereals, oilseeds and other field crops

Table 3. Technical facilities owned by the association

Type	2009	2010	2011
- Tractor U650	3	3	3
- Plows	3	3	3
- Disc harrows	2	2	2
- Seeders for straw cereals	1	1	1
- Seeders for row plants	1	1	1
- Transport trailers	2	2	2
<i>Average agricultural area per tractor is 160 ha</i>			

### Conclusions:

- existing technical means are formed mainly of those necessary for the soil basic works and for crop sowing;
- load on the tractor is 160 hectares, which exceeds its level found in countries with developed agriculture, and the one in our country;
- the combines for harvesting grain and oilseeds are not found among technical means, which, in case of failure in relationships with service providers, delays may occur in carrying out this work

Table 4. Dynamics of income, expenses and financial results

Specification	2009		2010		2011	
	Ron	%	Ron	%	Ron	%
<b>Total revenue, of which:</b>	<b>619 347</b>	<b>100.0</b>	<b>670 105</b>	<b>108.2</b>	<b>657 495</b>	<b>106.2</b>
Income from operations	588 380	100.0	636 600	108.2	624 620	106.2
Subsidies	18580	100.0	20103	108.2	19725	106.2
Other income	12387	100.0	13402	108.2	13150	106.2
<b>Total expenses, of which:</b>	<b>543 953</b>	<b>100.0</b>	<b>556 660</b>	<b>102.3</b>	<b>558 421</b>	<b>102.7</b>
Operating expenses	512 236	100.0	524 202	108.3	525 852	102.7
<b>Profit before tax</b>	<b>75394</b>	<b>100.0</b>	<b>113 445</b>	<b>150.5</b>	<b>99 083</b>	<b>131.4</b>
<b>Net profit</b>	<b>63 330</b>	<b>100.0</b>	<b>95 294</b>	<b>150.5</b>	<b>83230</b>	<b>131.4</b>

## Conclusions:

- the economic activity has been profitable, which is the ultimate goal of any lucrative endeavour;
- positive correlation between income and expenditures, the latter knowing slower growth;
- increasing profit trend as a result of the above-mentioned correlation;
- low level of profitability (gross profit / operating expenses), showing that there are possibilities for a better exploitation of the existing production conditions

Table 5. Crop structure

Specification	2009		2010		2011	
	ha	%	ha	%	ha	%
<b>Grain-total, of which:</b>	245	50.8	258	53.5	236	49.0
Wheat	94	19.5	99	20.5	89	18.5
Corn	68	14.1	80	16.6	71	14.7
Barley	83	17.2	79	16.4	76	15.8
<b>Oilseed crops-total, of which:</b>	237	49.2	224	46.5	246	51.0
Sunflower	89	18.5	95	19.7	101	21.0
Rape	148	30.7	129	26.8	145	30.0
<b>TOTAL</b>	<b>482</b>	<b>100.0</b>	<b>482</b>	<b>100.0</b>	<b>482</b>	<b>100.0</b>

## Conclusions:

- the crop structure contains field crops, wheat and maize being traditional crops of Romanian agriculture;
- almost half of the area cultivated remains to oilseeds crops: sunflower and rapeseed;
- the share of the two crops is determined by the demand for them, in order to obtain oil for human consumption and in the case of rape, the production of biodiesel;
- sunflower with a rate around 20% of the cultivated area will not come back after itself in less than five years, which is well, knowing the fact that this crop is a big consumer of nutrients from the soil

The average yield determines, according to its level and to correlation with the size of production costs per hectare, the production and economic results of farm. Therefore, there is interest to give it an ascending trend.

Table 6. Evolution of average productions

Specification	2009		2010		2011	
	kg / ha	%	kg / ha	%	kg / ha	%
Wheat	2809	100.0	3470	123.5	3295	117.3
Corn	3318	100.0	3650	110.0	3547	106.9
Barley	3107	100.0	3580	115.2	3340	107.5
Sunflower	1370	100.0	1530	116.7	1453	106.0
Rape	1520	100.0	1786	117.5	1630	107.2

## Conclusions:

- Average yields have increased for all cultures, compared to 2009;
- in the given circumstances, the average crop production can be considered as satisfactory;
- the size of the average production much depends on natural rainfall;
- the fact there are no irrigation, makes no other production factors are boosted, decreasing their impact on average yields;
- compliance with all technological phases is, as known, a condition that determines the size of the average production

Table 7. Evolution of total and commodity production

Specification	2009		2010		2011	
	TP (t)	CP (t)	TP (t)	CP (t)	TP (t)	CP (t)
Wheat	264	148	344	193	293	193
Corn	226	132	292	160	252	157
Barley	258	235	283	244	254	219
Sunflower	122	122	145	145	147	147
Rape	225	225	230	230	236	236

TP - total production

CP - commodity production

## Conclusions:

- total production follows the trend of the average production per hectare of each crop;
- trend of increasing total productions is accompanied by annual variations of their levels, with consequences on the size of income;
- in the case of cereals, commodity production has a certain percentage of the total, while at oilseed crops was capitalized everything was obtained as a consequence of these products specific, which enter in processing activities, being found in the form of raw materials for different industries.

Table 8. Dynamics of costs, prices and profitability of products

Specification	UM	2009	2010	2011
<b>Wheat</b>				
- Quantity of commodity	t	148	193	193
- Cost per t	lei	490	455	470
- Price per t	lei	480	500	520
- Profit / loss	lei / t	10	45	50
- Subsidies	lei / t			

<b>Corn</b>				
- Quantity of commodity	t	132	160	157
- Cost per t	lei	340	320	332
- Price per t	lei	350	360	390
- Profit / loss	lei / t	10	40	58
- Subsidies	lei / t			
<b>Barley</b>				
- Quantity of commodity	t	235	244	219
- Cost per t	lei	480	430	455
- Price per t	lei	500	500	520
- Profit / loss	lei / t	20	70	65
- Subsidies	lei / t			
<b>Sunflower</b>				
- Quantity of commodity	t	122	145	147
- Cost per t	lei	850	835	840
- Price per t	lei	870	900	850
- Profit / loss	lei / t	20	65	10
- Subsidies	lei / t			
<b>Rape</b>				
- Quantity of commodity	t	225	230	236
- Cost per t	lei	960	935	948
- Price per t	lei	1100	1000	950
- Profit / loss	lei / t	140	65	2
- Subsidies	lei / t			

#### Conclusions:

- looked on the whole crops, the profitability experienced in the period a significant increase;
- exception to the situation mentioned above, are sunflower and, especially, rapeseed (sharp decline in profit per ton, approaching an equality between its selling price and the cost per ton of product);
- sale prices are relatively stable, registering, however, some small deviations from one year to another, causing, together with the volume of output, some variation of incomes;
- costs per ton of product have a slight downward trend, which is positive, could appreciate that there was a good management of inputs allocated

Table 9. Staff structure

Specification		2009	2010	2011
Total staff, of which:	TESA	1	1	1
	Workers		3	3
Higher education personnel	Technical Studies	1	1	1
	Economic studies	-	-	-
Staff with secondary studies	Technical Studies	3	3	3
	Economic studies	1	1	1
Total workers	Machine operators	3	3	4
	Daily labourers	11	12	12

## Conclusions:

- the staff of association remained almost constant numerically;
- technical higher education holds a single person;
- there is no superior economic trained staff, given this kind problems and importance of market relations

Table 10. Labour productivity

Specification	UM	2009	2010	2011
Income from operations	Ron	588 380	636 600	624 620
	%	100.0	108.2	106.2
Permanent staff	No.	10	10	11
Income per person with permanent activity	Ron	58 838	63 660	56 784
	%	100.0	108.2	96.5

## Conclusions:

- staffing is nearly constant, the productivity experienced the same trend as that of income;
- tendency seems to be to reduce productivity;
- allure of productivity growth is driven by changes in current prices as physical quantities of products sold have a more moderate reduction trend

**Commodity production**

The association induces the products obtained in economic flows (some only partially). Here comes, with important role, the marketing policy (increased demand, offer, negotiation, compliance with the quality requirements, etc.). This step concludes the cycle of activity, putting his mark on the final results, if we only think about the prices at which the products are marketed.

Table 11. Evolution of commodity production

Product	MU	2009		2010		2011	
		quantities / amounts	%	quantities / amounts	%	quantities / amounts	%
Wheat	t	148	100.0	193	130.4	193	130.4
	ron	71040	100.0	96500	135.8	100360	141.3
Corn	t	132	100.0	160	121.2	157	118.9
	ron	46200	100.0	57600	124.7	61230	132.5
Barley	t	235	100.0	224	95.3	219	93.2
	ron	117500	100.0	122000	103.8	113 880	96.9
Sun flower	t	122	100.0	145	118.8	147	120.5
	ron	106140	100.0	130500	123.0	124 950	113.7
Rape	t	225	100.0	230	102.2	236	104.9
	ron	247500	100.0	230000	92.9	224200	90.6

## Conclusions:

- there is a link between the two productions, which appears differently depending on the physical commodity production trend, and the "movement" of prices;
- prices determined that value of commodity production to increase or reduce faster than physical commodity production;
- when prices fell sharply (such as rape), although physical commodity production increased, however, could not compensate for the severe reduction in the selling price

Table 12. Dynamics of average selling prices

Product	UM	2009	2010	2011
Wheat	lei	0.48	0.50	0.52
	%	100.0	4.2	8.3
Corn	lei	0.35	0.36	0.39
	%	100.0	2.8	11.4
Barley	lei	0.50	0.50	0.52
	%	100.0	100.0	4.0
Sunflower	lei	0.87	0.90	0.85
	%	100.0	3.4	-2.3
Rape	lei	1.10	1.00	0.95
	%	100.0	-9.1	-13.7

#### Conclusions:

- Prices have not seen big changes, except rape culture;
- price fluctuations have had an impact, as shown, on the value of commodity production and, of course, on income from operations;
- pricing policy should be considered in marketing activities that will take place in the unit

### CONCLUSIONS

The analysis of agricultural holdings economic activities ended with conclusions and recommendations in the form of SWOT analysis, in which have been captured main strengths and weaknesses of agricultural units, the opportunities they can capitalize on and threats in the environment they are exposed to.

The relevance of the research is to create the necessary conditions to further design of optimal farm size and crop structure.

#### *Strengths*

- conduct every year activities in profitability conditions;
- positive correlation between income and expenditures, the first having a faster growth, with positive consequences on the dynamics of profit;
- the fact that the association has a large area of arable land, having real possibilities of organizing crop rotation;
- a relatively diversified production structure, which contributes to the achievement of objective from the preceding paragraph;
- the use of technologies based on capital allocations, which can lead to increased productivity of the production system practiced in the association;

#### *Weaknesses*

- low profitability, it has a less favourable influence on the development policy of the association;
- variations in time of the yields per hectare, with implications for the size and stability of income;
- reduced profitability of some crops, which have a negative influence on all its degree of activity;
- technical equipment appears to be insufficient in relation to the area and the crop activities of the production structure;
- lack of staff with higher economic studies;

- high level of arable land per tractor, which adversely affect the optimal time to perform the land works;
- in technical equipment is not found a grain and oilseeds harvester.

### **Opportunities**

- expansion of the market (market share);
- demand to the diversification of the production (other crops);
- increasing accessibility to inputs (their price level);
- increasing export opportunities;
- improve the quality of inputs, with positive influence on yield per hectare;
- technical means more efficient, resulting in a higher yield and better quality of the work

### **Threats**

- Appearance in the crisis conditions, of financial difficulties of the customers (distribution companies, processors etc.);
- declining purchasing power of the population and therefore a reduction in demand for products that are made from some grains and oilseeds by processing;
- lower selling prices due to the occurrence and other competitors and increase supply;
- pressures, by price, of the imported goods

## **REFERENCES**

1. Davidovic, I. *Decision making and economic performance in farms, Ed IRLI, Bucharest, 2002*
2. Iuliana Dobre, R. Voicu, Bran Mariana - The Phenomenon of diversifying the production structure and Its economic, social and ecological Journal Quality - access to success, Year 12, no, 121, 2011
3. Rethore, A, Riquiter, D. - Farm management, French edition, 1998.
4. Voicu R., Turek Rahoveanu A., Ion Raluca - The structure of production in Romanian agriculture - the gap between the EU 27, Economics of Agriculture, Special Issue -2, I Book, 2010, p 366-374
5. Voicu, R., Iuliana Dobre, Mariana Bran - The management and economic performance of the production system from the agricultural exploitations, Metallurgy International, no. 2/2008
6. Voicu, R., Dobre, Iuliana - Organization and strategy development of agricultural organizations, ASE Publishing House, Bucharest, 2003
7. Zahiu, Letitia - Agricultural Management, Economic Publishing House, Bucharest, 1999
8. PNDI, Contract no. 52126/2008 - Improving the management of production structures in developing South-Muntenia region in order to increase the competitiveness of farms.



## CONSIDERATIONS ON THE INTELLECTUAL POTENTIAL CREATIVITY

SIMION CERTAN<sup>1</sup>, ION CERTAN<sup>2</sup>

**Abstract:** *The functionality of the new economic system of Republic of Moldavia, based on market relations and opened to world, frequently marked by dynamism, often by uncertainty and risk, sometimes even hostility, depends, crucially, on the innovation activity. Innovation activity, formation of innovation potential is definitely influenced by motivational politics and the reward system. The article reflects on the evolution of innovative activity, formation of innovation potential, motivational system and proposes some measures that would boost the intellectual property.*

**Key words:** *education, innovation, intellect, motivation, performance, rewards, research*

### INTRODUCTION

To qualify the transition to the market economy is mentioned in the Moldavian Parliament decision of 26 July 1990, as a model of management and the main measure of economic recovery of the country. The functionality of the new economic system of our country, frequently marked by dynamism, often by uncertainty and risk, sometimes even hostility depends, crucially, on the creative people, the intellectual potential. Creativity is influenced by a large number of factors, including staff motivation intellectually, what determines the actuality of this material.

### STAGE OF KNOWLEDGE THE PROBLEM

Aspects of both the study of the development of innovative activity and motivational appearance is found in the national and international research. However, even these have been discussed in various official meetings in our country, approached at scientific sessions, presented in various national and international publications, the innovation activity, forming and development of innovation potential remains a current and important investigation for our country.

### MATERIAL AND METHOD

Of the materials used in research, monographs and other specific publications that helped us to understand and explain the phenomena that occur in the work of innovation and motivation system are part. Quantitative analysis is performed on data selected and processed by the authors based on statistical yearbooks of the National Bureau of Statistics. The study of empirical information, the analysis of the links provided us relevant meanings and explanations in relation to the phenomena and processes of formation of the intellectual potential that occur in our country.

#### **Results and meditations**

For any country or business that intends to improve the competitive position against rival bidders is needed to encourage the research and development activity. Quantitatively this activity can be assessed by the number of invention patents or patents for plant varieties issued, by the number of drawings / industrial models and trade mark protection titles released.

#### ***A. Products of creativity and innovation activity***

The number of applications for invention patent has a clear trend of reduction from 401 in 2005 (Table 1) to 108 in 2011, or 3,7 times. The situation is identical for the national applicants' requests.

---

<sup>1</sup> Professor, State Agrarian University of Moldavia

<sup>2</sup> PhD in Economics, State University of Moldavia

Table 1. The evolution of applications filed for protection of inventions, plant varieties, utility models, drawings / industrial models and marks

	1995	2000	2005	2006	2007	2008	2009	2010	2011
Applications filed for inventions patent	299	246	401	289	353	292	141	143	108
inclusive national applicants	270	240	390	281	335	272	136	139	97
Patent for plant varieties	-	12	22	7	13	32	10	18	18
inclusive national applicants	-	11	22	5	11	30	10	18	16
Invention patents were issued	227	234	269	288	268	250	290	132	63
inclusive national applicants	124	200	261	287	262	247	280	125	61
Patent for plant varieties	-	-	3	4	3	12	17	25	15
inclusive national applicants	-	-	2	4	3	12	13	25	15
Titles of valid invention patents	266	1316	1108	1196	1033	1049	1139	1018	799
Titles of patents for plant varieties	-	-	13	17	24	32	49	74	86
Drawings / Industrial models issued	1383	1735	1469	1689	1305	1463	1171	1167	1114
Titles of mark protection issued	3827	3289	4742	4925	5330	5797	5017	4487	4451

Source: Statistical Yearbook of Republic of Moldavia, Statistica Publishing House, Chişinău, 2012, p.186-188

Although the share of patent applications for plant varieties increases from 2.4% in 2006 to 18.5% in 2011, their number remains unacceptably low for an agricultural country like Moldavia. The same downward trend both of share of patents issued from 67.1% and the number from 269 in 2005 to 58.3% and 63 respectively in 2011. It is normal that the total number of patent titles had reduced from 1316 in 2000 to 799 in 2011 or with about 40 percent.

The total patent titles for plant varieties increased from 13 in 2005 to 86 in 2011, or by 6.6 times, but remains far too insufficient, constituting only 10.7% of the total number of patent titles in our country. The categorical decline of patents of invention correlates perfectly with the situation in the national economy.

Slower, from 1735 in 2000 to 1114, or with about one-third had reduced the number of drawings / industrial models issued. Number of titles issued for trademark protection has increased from 3827 in 1995 to 5797 in 2008 or by 1.5 times and then reduced to 4451 in 2011, or with about 22 percent compared with 2008. The large number of titles issued for trademark protection in relation to the number of drawings / industrial models issued is due to the increasing of small and medium businesses who want to distinguish themselves on the market.

The level of development of creative thinking, allowing new and unusual ideas development is influenced, first, by the environment in which the person activates. Such environment can be both whole range of institutions (juridical persons) and individuals who seek protection for inventions and utility models.

The total number of legal persons requesting protection of inventions and utility models (Table 2) ranges from 128 in 2000 and 232 in 2005. The requests of the academic institutions to protect inventions and utility models increased from 29 in 2000 and 32 in 1995 to 100 in 2007, then decreases by about 16 percent in 2011. If in 1995 the applicants for protection of inventions and utility models of branch institutions were 2.06 times more than those required by the academic institutions and in 2011 were 3.82 times less.

Table 2. The evolution of national categories of applicants

	1995	2000	2005	2006	2007	2008	2009	2010	2011
Total legal persons	191	128	232	176	217	196	195	218	166
Of which: academic institutions	32	29	64	48	100	87	95	82	84
Branch research institutions	66	26	38	27	35	25	32	41	22
Institutions of higher education	71	51	104	89	73	74	61	91	53
Enterprises and organizations	22	22	26	12	9	10	7	4	7
Individuals	85	126	184	121	145	138	135	121	109

Source: Statistical Yearbook of Republic of Moldavia, Statistica Publishing House, Chişinău, 2012, p.187

Most of requests (104) for protection of inventions and utility models from higher education institutions were in 2005, decreasing practically continuously to 53 in 2011. The requests for

protection of inventions and utility models from companies and organizations are reduced from 22 - 26 in 1995-2005 to 4-7 in 2009-2011, which clearly demonstrates their interest decreased for creativity, for inventions.

Even the interest for developing creative thinking that enables development of new and unusual ideas ranges from 184 in 2005 to 85 in 1995 and 109 in 2011, their relationship to the legal entities has been of 79.3 %, 44.5 % and 65.6 percent in 2011. Creative thinking is the product of innate predispositions, developed by environment and grafting knowledge and skills, in other words by learning and training.

### ***B. The education system of the creative potential***

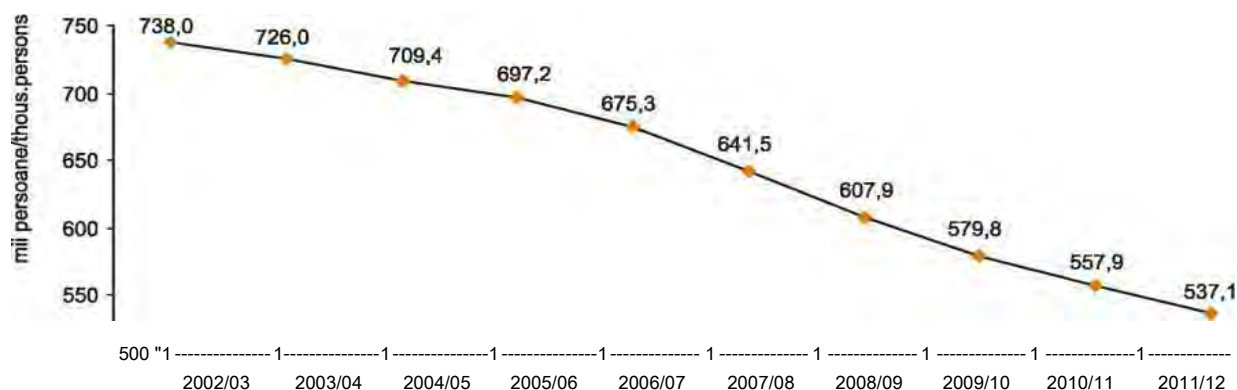
Given the increasingly competitive economy, people do not ask if they need to make changes, but want to know *how* to do. To make changes, the creative potential is required to be taught.

**Learning**, as Petington affirms, quoted by Daniela Tatiana Corodeanu [4, p.122], is "*the process by which skills, knowledge, attitudes and behavior are formed and developed*". Learning cycle, after Richard Pettinger [5, p.46], includes: concrete experience - observation and reaction - conceptualization and reaction - testing ideas and concepts in new situations.

Learning aims to achieve a personal growth. Those involved in this process can learn things they did not know before and whose knowledge and application can handle both the current problems and the next day's, can ensure greater efficiency in the economy both now and in the future. Number of pupils and students learning has a clear tendency to decrease.

Thus, as follows in Figure 1, the number of pupils and students in academic year 2011/2012 constitutes 72.8% of those studying in the academic year 2002/2003. Total number of pupils decreased from 605 200 in the academic year 2002/2003 to 381 400 in the school year 2011/2012, or with about 37 percent.

Figure 1. The evolution of pupils and students number

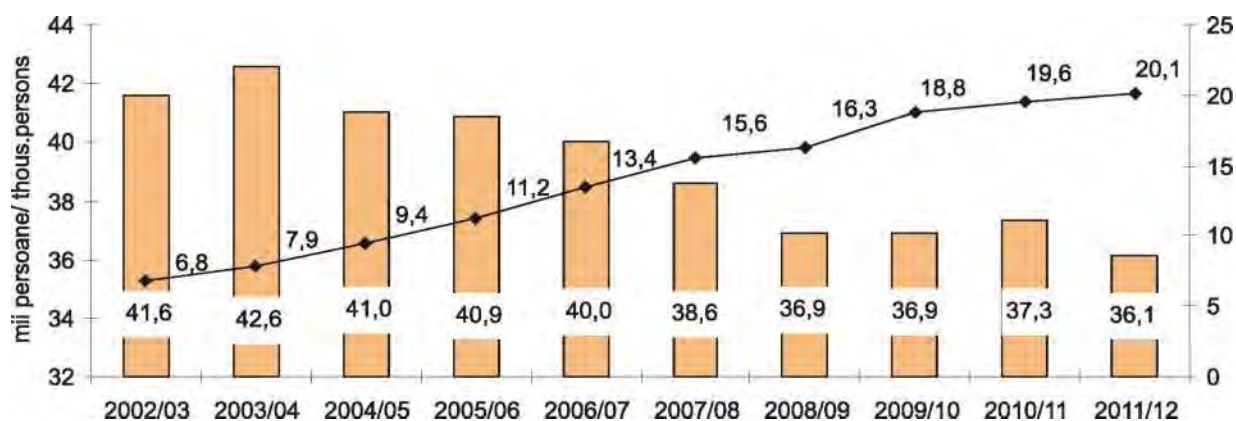


Source: Education in Republic of Moldavia, Statistical publication, 2011/2012

The number of pupils per 10,000 inhabitants decreases from 1671 to 1071 or with about 36 percents. Decline in the number of pupils was caused by the demographic situation in the country and partly by the fact that increasingly more pupils prefer to study in other countries.

The total teaching staff in schools has decreased from 41 700 in the school year 2002/2003 (Figure 2) to 36 200 in the school year 2011/2012, or with about 13.2 percents. Decreasing the number of teachers working in day schools, gymnasiums and lyceums is accompanied by another phenomenon - increasing the average age of teachers. The share of teachers at retirement age increased from 6.8 % in the school year 2002/2003 to 20.1 % in the school year 2011/2012. The fact that every fifth teacher is of retirement age should cause public authorities to develop contingency measures would change for better the situation.

Figure 2. The share of teachers at retirement age



=I teachers in day schools, gymnasiums and lyceums < -♦- teachers at retirement age

Source: Educația în Republica Moldova, Publicație statistică, 2011/2012

After the accession of the Republic of Moldavia, in 20 May 2005, in the "Project Bologna", which aims to improve the European education system so as to ensure the transformation of the European Union economy into one of the most competitive and dynamic global economy based on knowledge, the system education in our country has undergone major changes.

Under that draft, the national superior education is structured in three cycles: first - undergraduate, second - master, as research or professional and third - PhD.

If the number of students increased from 77 312 in the study year 1999/2000 to 114 552 in the study year 2004/2005, or with about 48 percent, then decreased to 103 956 in the study year 2011/2012, or with 9.3 percents. Even our country joined the "Bologna Project" in 2005, it closed the cycle in the study year 2009/2010.

The total number of students enrolled in the 2009-2011 rose slightly by 4.3 percents (Table 3), but the number of those enrolled in the first cycle (Bachelor) fell to 0.44 thousand and those enrolled in the second cycle (Master's degree) increased by 27 percents. Even in 2011 the ration of bachelor students and those who do master studies, being 2.7 to 1, does not meet the recommendations of "Project Bologna". And higher (4.3 to 1) is the gap of first and second cycle graduates.

Table 3. Evolution of student's number, thousand

	Graduates			Enrolled			Number of students		
	2009	2010	2011	2009	2010	2011	09/10	10/11	11/12
Total	26.61	28.41	27.79	27.08	27.90	28.26	109.9	107.8	103.9
First cycle (Bachelor)	18.16	21.99	21.95	20.53	20.40	20.09	93.40	90.70	85.34
Second cycle (Master's degree)	-	4.54	5.10	5.83	6.74	7.42	10.97	12.86	14.44

Given the fierce economic competition cannot be applied only the solutions crystallized in textbooks, monographs and other publications. Conditions generated by the economy based on market relations causes the necessity of performance investigations to ensure consistency of assumptions, phenomenon analysis and conclusions on which would propose concrete actions appropriate to the today realities.

Each graduate of the master can create the future by focusing on the synthesis of accumulated knowledge and the development of concepts which provide opportunities for innovation. Those who want to be creative are called to build researcher competencies, to gain experience on the formation and development of knowledge and skills on observation, conceptualization and generalization processes and phenomena that occur, testing ideas and concepts in new situations arising from the competitive economy.

In other words, those who want to be creative have to be equipped with skills to conduct scientific research that represents the oriented search of explanations and solutions to problems caused by phenomena and processes based on economy to market relations. Researcher skills formation takes place in the third cycle - doctoral, which lasts 3-4 years and is organized by day education or part-time education.

Scientific research concludes with the presentation of the thesis of doctor in sciences/habilitate doctor, which is an original scientific paper, prepared on the basis of the own scientific research published, contains new theoretical and practical results nationally and globally, illustrates the importance of the author contribution in science and is perfected in order to obtain scientific degree of doctor / habilitate doctor. According to the requirements of CNAA, the doctor / habilitate doctor thesis must be a product of innovation.

The number of PhD students in the years 2000-2006 (Table 4) increased by about a third, then oscillates, forming in 2011 just over 92 percent from 2006. In the years 2005-2011 the number of PhD students increases (by 8.3%) in the research institutions, but decreases (10.8%) in higher education institutions. The number of post-PhD students varies from 28 in 2005 to 59 in 2009, including research institutions from 4 in 2005 to 30 in 2009 and the higher education institutions from 24 in 2005 to 31 in 2008.

Table 4. Evolution of PhD students and post-PhD students' number

	2000	2005	2006	2007	2008	2009	2010	2011
PhD students number	1248	1667	1685	1610	1574	1601	1550	1556
Of which: -research institutions		359	367	354	345	378	359	389
- higher education institutions		1308	1318	1256	1229	1223	1191	1167
PhD students graduated	261	311	361	366	446	335	422	318
Of which: - research institutions		83	76	86	99	66	104	72
- higher education institutions		228	285	280	347	269	316	246
Of graduated, those who presented thesis	22	9	18	24	12	26	14	10
Post-PhD students number		28	41	52	48	59	51	40
Of which: -research institutions		4	14	23	17	30	23	13
- higher education institutions		24	27	29	31	29	28	27
Post-PhD students graduated		4	12	13	18	13	25	30
including - research institutions		1	3	2	8	7	12	17
Of which presented thesis		-	1	-	1	-	-	-
- higher education institutions		3	9	11	10	6	13	13
Of which presented thesis		1	1	1	4	1	3	1

Source: Statistical Yearbook of Republic of Moldavia, Statistica Publishing House, Chişinău, 2012, p.187

If the number of PhD graduates in the years 2005-2011 was 2559, the number of those who presented thesis amounted 113, which form only 4.4% of PhD graduates. Number of postdoctoral studies graduates in the years 2005-2011 was 115 of which 14, in those years, presented the thesis of habilitate doctor, meaning 12.17% of the graduates.

Number of employees in research and development (Table 5) in 2006 constituted 76.5% of those who were working in 2000, then rise to 5216 in 2011, or 15.8 percent. The share of researchers in total number of employees in research - development activity amounted 69.6% in 2000, 55.6% in 2006 and 64.6% in 2011.

Table 5. Employees in research and development

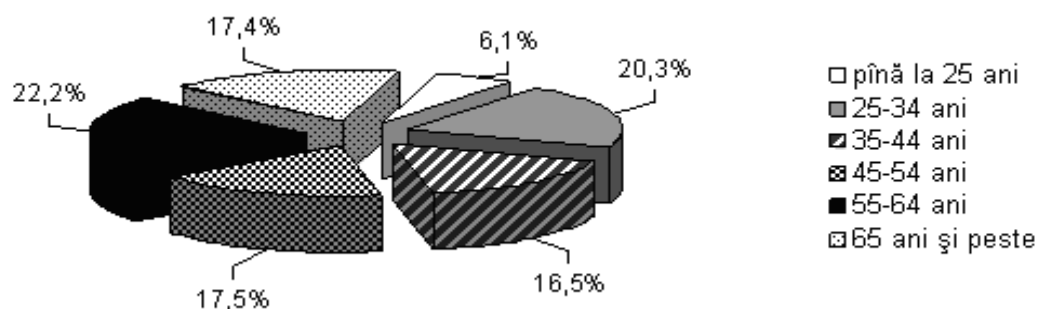
	2000	2005	2006	2007	2008	2009	2010	2011
Employees in research and development, total	5889	4672	4505	4587	5315	5424	5114	5216
Including researchers	4101	2583	2507	2592	3471	3561	3267	3372
Of total - doctors in sciences	2043	932	927	983	1311	1374	1288	1359
- habilitate doctors	501	256	259	271	367	382	378	393

Source: Statistical Yearbook of Republic of Moldavia, Statistica Publishing House, Chişinău

In 2011, in the total number of researcher, were 1618 women, or about 48 percents. PhD share of total researchers formed 49.8% in 2000, 36.98% - in 2006 and 40.3% in 2011 and habilitated doctors - respectively 12.2, 10.3 and 11.6 percents.

In 2011, the older researchers dominated. Thus, researchers under the age of 25 years made up 6.1% of the total (Figure 3), 25-34 years -20.3%, 35-44 years - 16.5%, 45-54 years -17.5%, 55-64 years 22.2%, 65 and over - 17.4%. Comments are superfluous.

Figure 2. Share of teachers at retirement age



Source: Education in Republic of Moldavia, Statistical publication, 2011/2012

Teaching and scientific potential of higher education institutions (Table 6) increased from 5058 in the study year 1999 / 2000 to 6571 in the study year 2006/2007, or by 29.9%, and then decreases until 6147 in the study year 2011 / 2012 or with about 6.5 percents.

Table 6. Evolution of teaching and scientific potential of higher education institutions

	1999/ 2000	2004/ 2005	2005/ 2006	2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012
Teaching and scientific staff of higher education institutions	5058	5909	6221	6571	6447	6415	6413	6493	6147
of total: - habilitated doctors, %	6	6	6	6	6	6	7	7	7
- doctors in sciences, %	37	37	37	35	35	36	36	36	39

Source: Statistical Yearbook of Republic of Moldavia, Statistica Publishing House, Chișinău

Basically, during the period indicated in Table 6 doctors in sciences and habilitated doctors share is maintained at 41-46%. If the ration of doctors in sciences and habilitated doctors was 4.1 to 1 in 2000, 3.6 to 1 in 2006 and 3.46 to 1 in 2011, then in similar years, in the university institutions this report was 6.1 to 1, 6.1 to 1 and 5.6 to 1.

The above situation on the formation and development of creative potential and innovation activity is the consequence of a large number of factors, among which the motivation system is highlighted.

### ***C. Motivation of the intellectual potential creative activity***

Motivation is the "force" which determines a certain behavior. Motivations designates those formal or informal, economic or moral-spiritual elements, which are given to those involved in innovation activity, satisfying certain individual and group needs, to determine that, by their attitudes, efforts, decisions, actions and behavior contribute to the objectives achievements.

Motivation can be effective and / or efficient if it is oriented toward mobilization of a collective or group, including the one made up of intellectuals. The staff and / or trained in research and development can be mobilized first by providing the financial resources necessary to carry out the work.

The internal expenses from the research and development activity in our country, even if they increased in last three years by 5 percent (Table 7), remain far too weak. Moreover, the share of domestic expenditures in R & D in GDP decreases from 0.52% in 2009 to 0.4% in 2011.

Table 7. Categories of domestic expenditures in the research and development activity, million lei

	2009	2010	2011
Gross domestic product	60430	71885	82174
Internal expenses in the research and development activity, total	317.6	316.2	333.5
Of which current domestic expenditures	281.8	291.8	312.8
including: -labour remuneration	174.2	170.5	174.8
- Mandatory expenses for social insurance and healthcare	43.4	43.2	44.4
Material expenses	45.3	51.3	62.6
Other current expenses	19.0	26.9	31.0
Internal capital expenses	35.8	24.3	20.6
Of which equipments	25.4	17.2	16.2

Source: Statistical Yearbook of Republic of Moldavia, Statistica Publishing House, Chişinău

Capital expenditures were reduced, in the reference years, by 42.5 percents, accounted in 2011 only 6.17 % of all internal expenses from the research and development activity. Material expenses in 2011 were formed about 18.8 % and for equipment - 4.8 % of total domestic expenditures in research and development activity.

Creativity of those involved in innovation activity is influenced definitely by way of "encouraging." Recognition from superiors encourages getting great results and increases the desire to achieve good performance in the future. Everyone, including those creative, reacts positively to praise, either orally or in the form of certificates or other distinctions. However, those creative are rarely mentioned. So, for example, the TV channel "PUBLIKA" recently achieved the project "10 for Moldova", according to which have been selected and specified personalities from various fields, but the representatives of science are not found.

The creative activity, especially of the individual, is influenced by rewards. A balanced system of rewards will have a positive impact on morale and satisfaction and will motivate employees engaged in research and development to be effective. The reward system must give employees the possibility to satisfy basic needs (in terms used by Maslow, the first two levels).

An important part of the reward expected by employees is money. The average monthly income per household member, even if the last three years increased by 23.9 percent (Table 8) does not cover subsistence. It is significant that the average monthly income of a household member was 42.4% in 2009, 42.8% in 2010 and 47.5% in 2011 in nominal average monthly earnings of the employee in the economy.

Table 8. Average nominal monthly earnings lei

	2009	2010	2011
Disposable income of population (monthly average on a household member)	1166.1	1273.7	1444.7
Minimum for existence (monthly average on a person)	1187.8	1373.4	1503.0
Disposable income ration with minimum of existence, %	98.2	92.7	96.1
Average nominal monthly wage of the employee in the economy	2747.6	2971.7	3042.0
Including: -agriculture, hunting economy and forestry	1468.9	1636.6	1831.8
- industry	3135.6	3430.9	3393.5
- financial activities	5637.7	6368.2	6047.1
- public administration	3209.0	3204.8	3457.3
- education	2135.6	2361.0	2755.8
% compared to average wage on economy	77.7	79.4	87.8
- research-development	3210.7	3333.3	3352.0
% compared to average wage on economy	116.8	112.1	110.2

Source: Statistical Yearbook of Republic of Moldavia, Statistica Publishing House, Chişinău

People in any organization are willing to compare their rewards with others both within their organization and with workers from elsewhere. For this reason, the perception of fairness plays an important role.

Average earnings of employees in education is inferior to average on economy and those in R & D even if it is a slightly higher, has a clear trend of reduction this difference. Significantly is that in agriculture and industry (goods sectors), in education and research and development (areas that ensure economic prosperity) average monthly nominal wage of the employee is less than those from public administration.

Finally, we consider imperative to develop a reward system that would ensure fairness to employees and motivate employees work in any field, including science and education, areas that provide functionality of the new economic system of our country.

### ***REFERENCES***

1. Breban V. Dicționar al limbii române contemporane. București: Ed. Științifică și Enciclopedică, 1980
2. Dicționarul explicativ al limbii române, ediția a II, București, Ed. Univers enciclopedic, 1998
3. Cole Gerald A., Management: Teorie și practică, Chișinău, Știința, 2006
4. Corodeanu Daniela Tatiana, Management. Comportamentul și performanța întreprinzătorului român, Tehnopress, Iași, 2006
5. Pettinger R., Mastering Organisational Behaviour, MacmillanPressL Ltd, UK



## ROMANIAN TRADITIONAL PRODUCTS

VALENTINA TUDOR, IOANA MĂCĂU (ȚOGOE), MARIAN BUTU<sup>1</sup>

**Abstract:** *The countryside is an available and eligible resource, with an unexploited growth potential for the exploitation of which is necessary to converge efforts of policy makers both at national level and in the Member States regarding the design, implementation, monitoring and evaluation of agricultural policies. The central elements of the policy - farms and farmers - will be central elements of the Common Agricultural Policy for the period 2014-2020.*

**Key words:** *Local agriculture, farmers, traditional products, consumers, consultancy.*

### INTRODUCTION

Increasingly present in the public space are noticeable the campaigns on organic agriculture, the opportunities offered by rural areas in the context of national and European policies and enhancing its development, particularly of agriculture, promotion and development of local markets, not the least all local traditions, thus traditional products – viable and dynamic alternative to trade promoted through commercial companies (eg. supermarkets). In this way agricultural products and, in particular, those traditional products produced on farms (local products), may reach the consumer in the shortest possible market chain, ie. local markets. Diversity of agricultural production, maintaining a high quality of its maintenance and development, create the premises of a real competitive environment for farmers and contributes significantly to the enrichment of present cultural heritage and, without doubt, the gastronomic heritage. The increasing demand for high quality products and traditional products may increase the agricultural and/or supply with certain identifiable characteristics, especially in terms of their geographic origin. In this context, complementary local services can be initiated and developed (eg. local supply services to urban areas), being recognized at European level as active factors in local economic development, generating jobs (permanent and seasonal).

### METHODS AND MATERIALS

For achieving the article we use statistics and official reports of the Ministry of Agriculture and Rural Development, official reports and communications of the European Commission - Directorate General for Agriculture and Rural Development. The technique and equipment used: laptop, programs for editing text and tables, Internet connection. Research period and location: This work was conducted under the Sectoral Operational Programme Human Resources Development 2007 - 2013, number of the contract: POSDRU/107/1.5/S/76888.

### DISCUSSION AND RESULTS

Supporting and promoting (small and medium) farms and local farmers, best meet consumers' needs in terms of providing local products, including traditional ones. Partnership between local actors (authorities, local farmers and consumers) is an important step towards sustainable rural development and the challenges that agriculture is facing today:

- The need to increase agricultural production and agricultural products to meet market demand.
- The need for increasing farmers' income, especially small farmers and their families.

---

<sup>1</sup> University of Agronomic Sciences and Veterinary Medicine, 59 Mărăști Blvd., cod 011464, sector.1, Bucharest, Romania, Phone/Fax: +40 721160698, E-mail [ioana.macau@gmail.com](mailto:ioana.macau@gmail.com), Corresponding author: [ioana.macau@gmail.com](mailto:ioana.macau@gmail.com)

- The need to carry out enabling conservation and natural resources needed to produce in the future (sustainable agriculture).  
Local, traditional products, recommended themselves by a number of characteristics:
- Are produced, processed by farmers to the final product, and sold directly by them (meat products, milk products, bakery products, wine, fruit and vegetables, etc.).
- Are products for which the farmer is fully responsible for the whole process (both production and processing of products).
- Are products that are sold directly from the farmer – the shortest marketing chain is created, in other words, there could be no more than an intermediary between the farmer-producer and the final consumer (EU citizen).

A solution of sustainable development of rural areas depends, therefore, on the existing local capacity to create added value in the global market by anchoring in a limited, specific, traditional space. The product thus acquires a territorial link inseparable from the place of manufacture, able to individualize the high quality that satisfy consumer demands to provide protection of the intangible right of the manufacturer on it, and encourage rural development. Such an individual can meet within local market such specific and profitable demand.

Mr. Dacian Cioloș, European Commissioner, European Commission - Directorate General for Agriculture and Rural Development, stressed that in order to increase consumer access to local products, structural decisions are necessary, that will most effectively meet expectations, and the need of an organized frame (local supply services).

„I was presented with a study on 26 farms involved in direct selling in the Paris area (France). Overall, these 26 farms by themselves generate 170 permanent jobs and 200 seasonal jobs, well above the potential of traditional farms.[...]

A study in Italy showed that in 2008, more than half of Italians turned to local markets. I quoted just now the United Kingdom, where the first agricultural market dates back to 1997. Today it holds more than 7,500 such markets every year. I could just as well quote Slovakia, Romania and Greece. The latter is no doubt record holder in the short circuit phenomenon intensified as a result of the economic crisis to the benefit of farmers and consumers. Economic difficulties have led to a direct sale potato circuit at attractive prices, with 60% smaller than conventional circuits. This experience will be extended to other products” (Cioloș, 2013).

Agricultural policies will have to answer a series of questions:

- ”How to identify local pathways so that they ensure credibility and to ensure better visibility?
- How to ensure impeccable hygiene and health safety without discouraging local initiatives, taking into account that their investment opportunities are not comparable to those of large enterprises? Sufficient current exemptions? What about awareness and training of farmers?
- How to resume the connection between major urban centers of consumption and production areas surrounding them? Agricultural policy must give them the opportunity to pass the gates of cities and urban markets to support initiatives.
- How to encourage farmers to invest? For the period after 2013, Member States will have a range of support measures that will address strengthening entrepreneurship in rural areas. This is a key element of our will to build an agricultural policy for all and for all farm types” (Cioloș, 2013).

In Romania there have emerged since 2004, a number of actions that were aimed at unlocking the potential of rural areas. A first step was to develop a normative act that established the conditions and criteria for the certification of traditional products (Order of the Minister of Agriculture, Forests and Rural Development no. 690/2004 for approval of the conditions and criteria for certifying traditional products). This order establishes that the "certification of traditional products" recognizes the traditionalism of a product through its registration in accordance with the above standard mentioned. It also defines the terms "traditional product" and "traditional" (the term "traditional product" means the "product to be made from traditional materials, presenting a traditional composition or a mode of production and/or processing reflecting a technological

process of production and/or traditional processing clearly distinguished from other similar products of the same category" and the "traditional" highlights "the element or combination of elements that distinguishes a product clearly from other similar products of the same category; traditionalism cannot be limited to a qualitative or quantitative composition or to a mode of production established by Community or national legislation or by voluntary standards, however this does not apply if the regulation or that standard was established to define a product's traditionality") and a mechanism apparently simple, obtaining the status of "traditional product".

The annual activity reports of the Ministry of Agriculture and Rural Development of Romania, documents published on the official website of the institution, showed a constant activity on the registration of traditional products, as recorded in the following data certification:

- In 2012 - a total of 440 products of which 220 meat and meat specialties, 89 dairy, 64 bakery, 32 from the fruit and vegetable sector.
- In 2011 – there are not presented information regarding the number of registered traditional products.
- In 2010 - a total of 309 products.
- In 2009 there were registered 448 traditional products and were given 33 serial numbers for: canned vegetables and fruits products, canned meat.

For the analysis of the traditional products in Giurgiu County were selected data available and information in lists of traditional products during the period 2005-2012, published on the official website of the Ministry of Agriculture and Rural Development in the South Muntenia Region (Table 1).

Table 1. Situation of traditional products in South Muntenia Region (2005-2012)

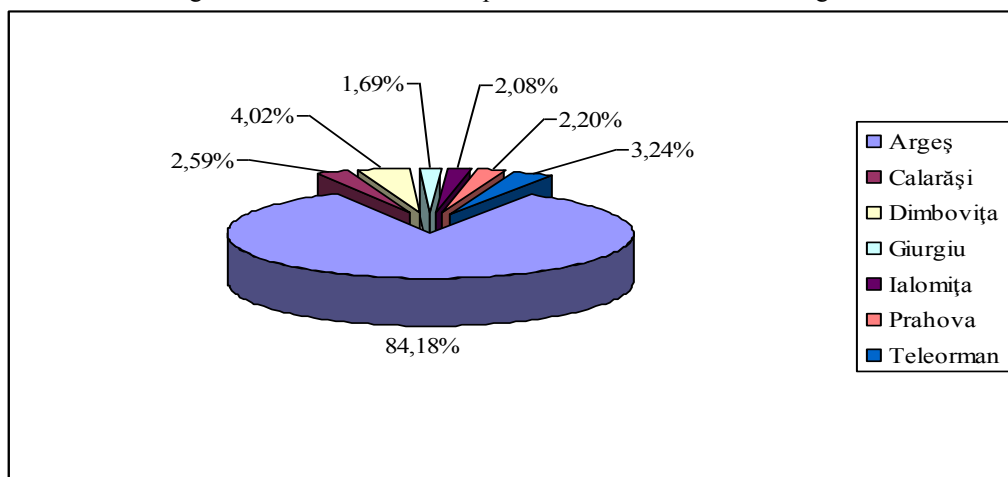
Year/	2005	2006	2007	2008	2009	2010	2011	2012
Total in South Muntenia Region	33	131	302	51	67	5	157	25
Argeş County	33	125	273	27	48	2	125	16
Calarăşi County	-	1	-	11	1	-	4	3
Dimboviţa County	-	-	23	5	3	-	-	-
Giurgiu County	-	-	-	-	-	2	11	-
Ialomiţa County	-	3	3	4	2	-	4	-
Prahova County	-	2	3	-	-	1	5	6
Teleorman County	-	-	-	4	13	-	8	-

From the traditional products list results that in South Muntenia were recorded in the period 2005-2012 a total of 771 traditional products (dairy products - 61 % meat products - 24 % ; drinks - 8.95 % bakery - 2.7 %). Traditional product distribution by county is shown in Figure 1.

If we achieve a ranking of component counties, Argeş County ranks first with the highest number of registered traditional products - 649 (dairy - 63.5; meat products - 19.4%; drinks - 9.24 %), Giurgiu County falls last, recording a total of 13 traditional products (dairy products - 62 %, meat products - 23 %, vegetables and fruit - 15%). We note that in terms of traditional products made in the counties of the South Muntenia Region weights for dairy and meat products are similar, differentiation is registered for the categories of products on the third place as percentage, explained by different geographical characteristics of counties, favoring the development of different agricultural activities.

For enhancement of Romanian traditional products and facilitating their access to local and European markets, there were initiated corrective legislative measures. It became necessary to clarify the situation of Romanian traditional products, current legislation allowing registration of products supposedly "traditional" not carrying the dowry farmers transmitted from generation to generation, becoming more of a marketing concept. This fact is joined by the low interest of farmers to record traditional European products, which made only one traditional product of Romania (Topoloveni Plum Jam - Argeş County) from more than 4,000 registered traditional products, to benefit from recognition at EU level - application for product registration.

Figure 1. Share of traditional products in South Muntenia Region



In late July 2013, the Ministry of Agriculture and Rural Development has proposed, in a draft order, conditions and criteria that a product must meet to receive the title of "traditional". Unlike the current rule, the draft law emphasizes the quality of "traditional" product, it must be produced from raw materials in the production area, not have the composition of food additives, except natural additives. Equally, the product must have a traditional recipe specific to the processing site, which reflects a mode of production and/or processing and a traditional technological process. In addition to regulating the way in which one can get a traditional product title and entry in the National Register of traditional products managed by the Ministry of Agriculture and Rural Development, there is operationalized an ex-post compliance mechanism by farmers-processors of conditions and requirements that formed the basis of the certificate.

Besides a measure for a better regulation in this area, information and promotion actions should be undertaken in order to obtain a better use of traditional products, both on the local market and the regional market. Thus farmers can make better use of their labor, while consumers can have access to a variety of products and behaviors rooted in local traditions and to make a contribution to the local and regional development.

## CONCLUSIONS

Taking into account the concept promoted at European level to promote rural and local traditions that support economic development in the period 2014-2020, the number of registered products as traditional products could be an important indicator to measure the quality, strength and performance of the business agricultural consultants at the county level.

Analysis of such county or regional level indicators can reveal objectively, systemic or operational barriers for the removal of which the authorities have the responsibility to establish a roadmap of measures, managing staff and deadlines.

## AKNOWLEDGEMENTS

The present work was supported by the project financed through the Sectoral Operational Programme Human Resources Development 2007-2013, Contract no. POSDRU/107/1.5/ S/76888.

## REFERENCES

- [1] Dacian Cioloș, 2013, Local Agricultural Conference and short sales channels, Bruxelles, <http://europa.eu>.
- [2] Order of the Minister of Agriculture, Forests and Rural Development no. 690/2004, published in Official Gazette No. 938 dated October 14, 2004.
- [3] Governance Program 2013-2016, <http://www.gov.ro>.
- [4] <http://madr.ro>

# HALOPHILIC MICROORGANISMS FROM ROMANIAN SALINE ENVIRONMENTS AS A SOURCE OF EXTRACELLULAR ENZYMES WITH POTENTIAL IN AGRICULTURAL ECONOMY

MĂDĂLIN ENACHE<sup>1</sup>, SIMONA NEAGU AND ROXANA COJOC

**Abstract:** *Halophilic microorganisms, either bacteria or archaea, flourish in media with salinity levels varying from negligible until to saturation in NaCl and thus are considered extremophiles. Such kinds of media as salt lakes, salted soils, salt deposits or salt mines are widely distributed over the entire Romanian landscape. Several strains of halophilic bacteria and archaea have been isolated from such environments and characterized either by polyphasic taxonomy approach or by their ability to produce extracellular enzymes with putative potential for use in several domains like industry, agriculture and biotechnology. Even if sodium chloride is widely used in Romanian agriculture fields, little is known about salt microbiota, and its effect on the agricultural processes. This paper approaches the wide spectrum of extracellular hydrolytic enzymes with putative use in agriculture for treatment of polluted soils or recovery of salted soils. The strains isolated from inside of salt crystal are divided in two groups, one consisting of six strains belonging to Halorubrum, Haloarcula and Halobacterium genera and characterized by the absence of detectable extracellular enzymatic activity for the tested substrates and the other group consisting of four strains, all belonging to Halorubrum genus and characterized by the presence of amylolytic activity and the absence of other activities. The starch degrading enzymes appear to have a wide distribution both among the strains associated with salt lakes and among those isolated from rock salt.*

**Key words:** *halophilic enzyme, halophilic microorganisms, salted soil, salt*

## INTRODUCTION

The soil represents the major factor for the agriculture even if is characterized by limited surface and shows fixity characters. In order to obtain a good agricultural production and interest products, mandatory compounds like fertilizers or other chemicals are introduced deliberately in soil. On the other hand the intensive mechanization and irrigation of agriculture could lead to an intensive exploitation for the agriculture and consequently, the production ratio and the obtained products could be affected either from the economical or the quality perspective. Following these processes, the already very slow action for recovering of soils by natural factors could be affected. Thus, it should be considered that the extracellular enzymes of halophilic microorganisms either bacteria or archaea could be used in this matter in order to facilitate the treatment of polluted soils or the recovery of salted soils.

The halophilic microorganisms are widely distributed in different saline and hypersaline environments. Generally, the saline water environments are differentiated in fresh water environments with an arbitrary concentration of dissolved salts higher than 3 g/L and hypersaline environments with total dissolved salts exceeding 35 g/L. When referring to saline environments, microbiologists denote a high interest for very well known salt lakes like Dead Sea or crystallizer ponds of salterns, environments almost saturated in sodium chloride, but also to salt mines or salt exploitation areas which harbor halophilic microorganisms (Enache et al., 2012).

These organisms grew optimally at high concentrations of salt and are generally divided in slight halophiles (optimum at 0.2 – 0.5M NaCl), moderately halophiles (0.5 – 2.5M NaCl) and extremely halophiles (over 2.0 M NaCl until to saturation). Halotolerant microorganisms are also able to grow until to 5M NaCl concentrations in culture media (Ventosa, 1989a). In opposition to halophilic bacteria, the halophilic archaea require at least 1.5M NaCl for growth and lyses in distilled water and hypotonic solutions like culture media without NaCl (Kamekura, 2007). Their first description in literature appeared in an old Chinese treatise on pharmacology written in the

---

<sup>1</sup>Dr. Mădălin Enache – Scientific Researcher I<sup>st</sup> degree; Simona Neagu and Roxana Cojoc – Research assistant  
Institute of Biology Bucharest of the Romanian Academy, Splaiul Independenței no. 296, sector 6, Bucharest, P.O. Box 56-53, e-mails: madalin.enache@ibiol.ro; simona\_trifan@yahoo.com; roxana.cojoc@ibiol.ro

year 1592 (Kamekura, 2007) and also into the journal of Charles Darwin written in the year 1839, during the voyage of H.M.S. Beagle'. Nowadays are recorded more than 150 haloarchaeal species, distributed in 40 genera and isolated from the entire world (www.bacterio.net).

This paper focuses on the extracellular enzymes produced by several halophilic archaea and bacteria isolated from saline environments from Slanic Prahova, Romania, referring to their putative use in agriculture for treatment of polluted soils or recovery of salted soils.

## MATERIALS AND METHODS

### *Sampling rock salt and salt water and isolation of halophilic bacteria*

*The rock salt samples* were taken from the wall of subterranean salt mine, Unirea, located in Slanic Prahova. One gram of salt crystal with no apparent contamination by clay or soil was immersed and shaken in sterile 10% NaCl solution for five minutes to wash the outside and was then dissolved in 50 ml of sterile 10% NaCl. One ml of this solution was mixed with 20 ml of autoclaved molten agar medium (around 55°C) MH with the following composition (g/l): NaCl - 100, MgCl<sub>2</sub>·6H<sub>2</sub>O - 7, MgSO<sub>4</sub>·7H<sub>2</sub>O - 9.6, CaCl<sub>2</sub>·2H<sub>2</sub>O - 0.36, KCl - 2, NaHCO<sub>3</sub> - 0.06, NaBr - 0.026, glucose - 1, proteose peptone - 5, yeast extract - 10 (Ventosa et al., 1989b).

*The water samples* were collected from various points of the lakes Green Bath, Red Bath, Shepherd Bath and Bride Cave. The strains were isolated in a medium (I) with the following composition (g/l): NaCl (125), MgCl<sub>2</sub>·6H<sub>2</sub>O (160), K<sub>2</sub>SO<sub>4</sub> (5), CaCl<sub>2</sub>·2H<sub>2</sub>O (0.1), yeast extract (1), peptone (1), soluble starch (2), agar (20). The medium pH was 7.0-7.2. In some experiments the strains were grown in JCM medium No. 168 which contained (g/l): Bacto casamino acids (5), Bacto yeast extract (5), sodium glutamate (1), trisodium citrate (3), MgSO<sub>4</sub>·7H<sub>2</sub>O (29.5), KCl (2), NaCl (175.5), FeCl<sub>2</sub>·4H<sub>2</sub>O (0.036), MnCl<sub>2</sub>·4H<sub>2</sub>O (0.36 mg). The medium pH was 7.0 – 7.2 before autoclaving.

### *Detection of extracellular enzymatic activities*

The MH medium without proteose peptone and glucose was designated as basal MH and used in the following experiments. The NaCl concentrations in the basal MH media varied until to 4M. This medium was used for halophilic bacteria. The JCM medium supplemented with appropriate substrates has been used for halophilic archaea. The basal medium was supplemented with different substrates according with the experiments. The amylolytic, lipolytic (Tween 80 and olive oil), cellulase, gelatin and casein hydrolysing activities were tested following standard microbiological methods with some modification previously described (Cojoc et al., 2009).

## RESULTS AND DISCUSSIONS

The obtained results revealed that both bacteria and archaea representatives inhabit salt waters and salt rock. In this last case, they could be isolated either from the surface of the crystal or from inside the crystal. Data from literature supported the identification of halophilic microorganisms in salt crystal (Dombrowski 1963; 1966; Stan-Lotter et al. 2000; McGenity et al., 2000). Previous investigations argued for the predominant presence of the *Haloferax* members in water samples taken from all salt lakes from Slanic Prahova area (Enache et al., 2008). These strains showed a relatively wide spectrum of extracellular hydrolytic enzymes. Enzymes active over a wide spectrum of salinities have been isolated from various halophilic archaea and bacteria microorganisms (Sanchez-Porro et al., 2003). These enzymes are often thermo- and alkalitolerant and those polyextremophilic features can be a tremendous advantage for their application in various biotechnologies (Margesin and Schinner, 2001; Oren, 2010; Ventosa and Nieto, 1995) or in agriculture fields (Shivanad et al., 2012).

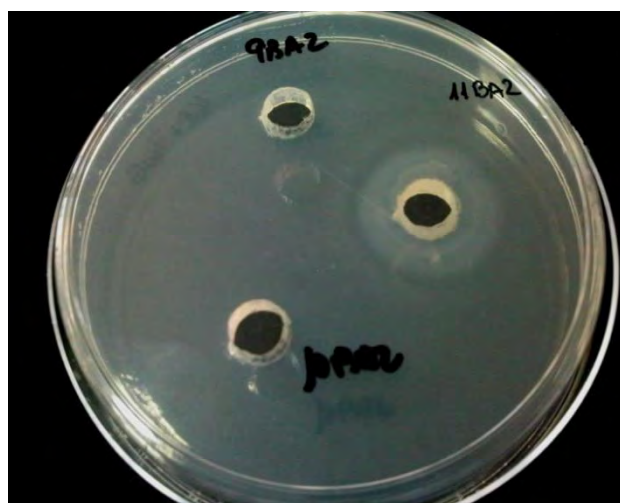
The data from Table 1 confirm the presence of amylolytic activity at 10 investigated strains; the lipolytic activity has been detected at 11 strains; gelatin hydrolysis at five investigated strains and casein hydrolysis at two strains. The hydrolysis of Tween 80 by one of the investigated strains

is also illustrated in Fig. 1, the strain surrounded by a halo resulted from the precipitation of reaction product being considered positive. The strain GR 3 assigned as *Haloarcula* sp. showed no hydrolytic activities. Excepting the strain Hfx 20 (*Haloferax* sp.), other remaining 10 strains showed combined hydrolytic activities which could be an advantage for their use in several biotechnological processes (Moreno et al., 2013; Sanchez-Porro et al., 2003) or for bioconversion of some agricultural products, agricultural waste and recovering of salted soils resulted from intensive agricultural exploitation.

**Table 1** - Extracellular hydrolytic activities of halorchaal strains isolated from salted lake in Slanic, Prahova; Hfx. = *Haloferax* species; Har. = *Haloarcula* sp.; 1 = Starch hydrolysis; 2 = Tween 80 hydrolysis; 3 = Gelatin hydrolysis; 4 = Casein hydrolysis; BR = Red Bath Lake; BV = Green Bath Lake; BB = Shepherd Bath Lake; GR = Bride Cave Lake (data from previous paper – Enache et. al. 2008)

	Hfx. BR1	Hfx. BR2	Hfx. BV1	Hfx. BV2	Hfx. BV5	Hfx. BB7	Hfx. BB8	Hfx. GR1	Hfx. GR2	Har. GR3	Hfx. 19	Hfx. 20
1	+	+	+	+	+	+	+	+	+	-	+	-
2	+	+	+	+	+	+	+	+	+	-	+	+
3	+	-	+	-	+	+	-	+	-	-	-	-
4	+	-	-	-	-	-	-	+	-	-	-	-

**Fig. 1** - The Tween80 hydrolysis by halophilic bacteria isolated from a salt lake



In a similar manner, the halophilic archaeal strains isolated from the surface or from the inside of the salt crystal showed the ability to hydrolyze starch and Tween 80, but were not able to degrade casein and carboxymethylcellulose (Table 2). Generally, the strains isolated from the surface of the crystal (table 2, numbers 3, 7, 8, 9, 10, 11) are characterized by the presence of amylolytic activity and the absence of other extracellular hydrolytic activities. The exception was the strain 8, which showed the capacity to degrade Tween 80 and strain 10, which was not able to hydrolyze any of the tested substrates.

On the other hand, the strains isolated from inside of salt crystal are divided in two groups, one consisting of the strains 13, 14, 15, 17, 18 and 19 and characterized by the absence of detectable extracellular enzymatic activity for the tested substrates and the other group consisting of the strains 4, 5, 6 and 13 and characterized by the presence of amylolytic activity and the absence of other activities. In this group, one exception was recorded for the strain 6 which showed also the capacity

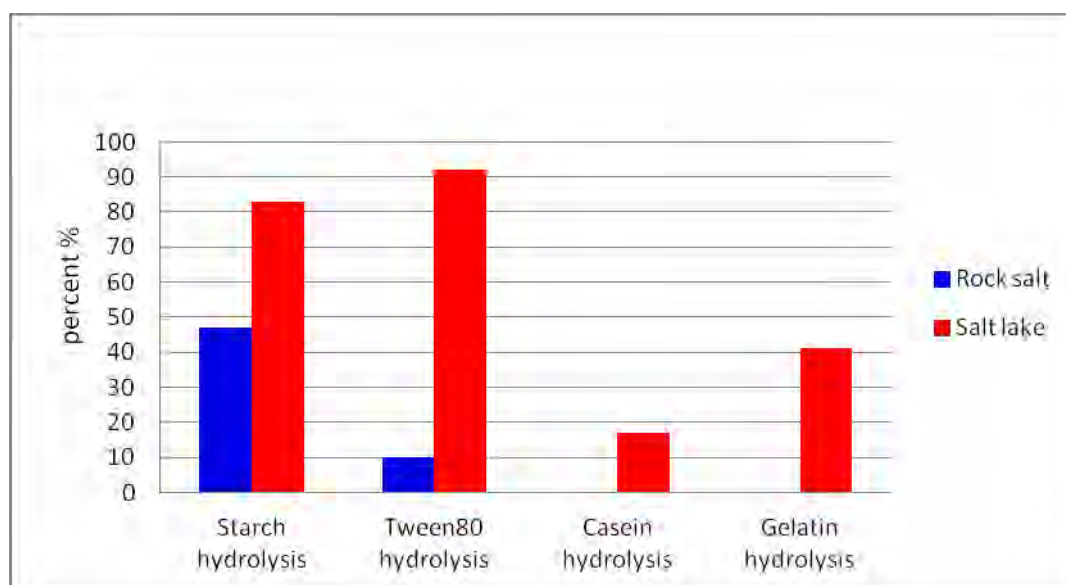


to degrade Tween 80 (Table 2). The first group covered six strains belonging to *Halorubrum*, *Haloarcula* and *Halobacterium* genera, and the second one covered four strains, all belonging to *Halorubrum* genus (Enache et al. 2008; Enache and Kamekura 2013).

**Table 2** - Extracellular hydrolytic activities of halorchaal strains isolated from salt crystal in Slanic, Prahova; *Halorubrum*: 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 17; *Haloarcula*: 14; *Halobacterium noricense*: 18, 19; A = Starch hydrolysis; B = Tween 80 hydrolysis; C = Casein hydrolysis; D = CMC hydrolysis; N = not determined

	Investigated strains																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	18	19
A	N	N	+	+	+	+	+	+	+	-	+	+	-	-	-	-	-	-
B	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-
C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Fig. 2** - Presence of extracellular hydrolases among the investigated strains isolated from salt lakes and salt crystal, from Slănic Prahova area, Romania



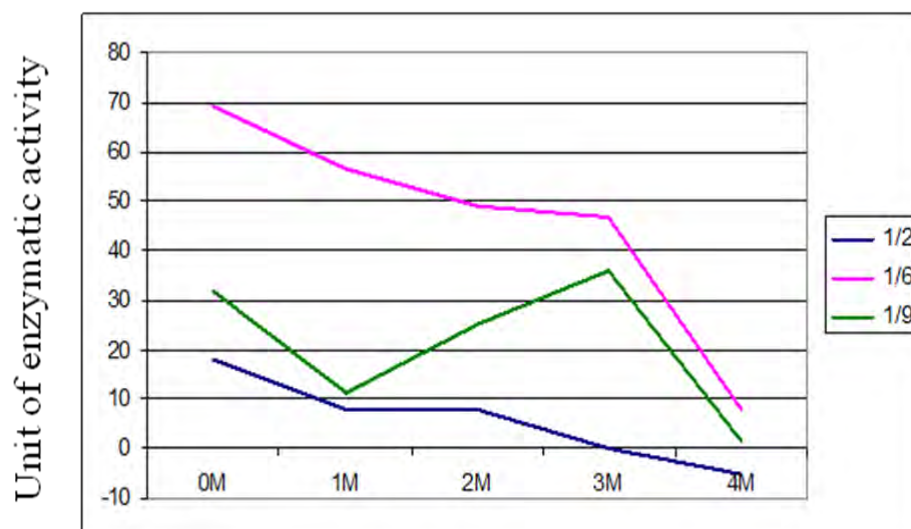
When comparing the distribution of extracellular enzymatic activity between the strains isolated from salt water and salt crystal (Fig. 2), it resulted that the strains isolated from rock salt showed the capacity to degrade only starch and Tween 80, while the strains isolated from salt lakes were able to degrade all tested substrates. This way, it could be considered that the strains associated with rock salt are able to degrade compounds with  $\alpha$ -1,4 and  $\beta$ -1,6 bonds which are characteristic for macromolecular compounds of sugar nature and also esteric bonds characteristic for the lipidic macromolecules. The strains isolated from the salt waters showed the capacity to degrade also the macromolecules of proteic nature. In this way they could be used more efficiently for the conversion of some agricultural products and the recovering of affected salted soils, taking into account the presence of combined extracellular hydrolytic activities (Table 1).

The data showed in figure 3 revealed the halotolerant behavior of extracellular amylase of some halophilic bacterial strains isolated also from salt rock. The activity of amylases was recorded until to 3.5M NaCl in culture medium, with the first maximum in the absence of sodium chloride



and another maximum around 3M NaCl. We also consider that this behavior could be optimally exploited for several biotechnological processes or for bioconversion of some agricultural products, agricultural waste and the recovering of salted soils resulted from intensive agricultural exploitation.

**Fig. 3** - The halotolerant behavior of amylases isolated from halophilic bacterial strains living on salt crystal; 1/2, 1/6 and 1/9 represent the investigated strains



### CONCLUDING REMARKS

A relatively wide spectrum of extracellular hydrolases was recorded from archaeal and bacterial strains isolated from the investigated salted area. The number of the halophilic microorganisms which showed extracellular hydrolases appears to be higher in the case of strains isolated from salt lakes comparing with the isolates from salt crystal.

On the other hand, it should be noted that starch degrading enzymes appear to have a wide distribution both among the strains associated with salt lakes and among those isolated from rock salt. The halotolerant behavior of enzymes argues for their use in various agricultural fields, the recovery of some salted soils and for the bioconversion of some agricultural waste to useful products.

### REFERENCES

1. Cojoc, R., Merciu, S., Popescu, G., Dumitru, L., Kamekura, M. & Enache, M. (2009). *Extracellular hydrolytic enzymes of halophilic bacteria isolated from a subterranean rock salt crystal*. *Rom. Biotechnol. Lett.* 14, 4658-4664.
2. Dombrowski, H.J. (1963). *Bacteria from Paleozoic salt deposits*. *Ann. NY. Acad. Sci.* 108,453-460.
3. Dombrowski, H.J. (1966). *Geological problems in the question of living bacteria in Paleozoic salt deposits*. In Rau, J.L. (ed.), *2nd Symp. on Salt, Vol. 1.* (pp. 215 – 219). Cleveland, Ohio: Northern Ohio Geological Society.
4. Enache, M., Itoh, T., Kamekura, M., Popescu, G. & Dumitru, L. (2008). *Halophilic archaea isolated from man-made young (200 years) salt lakes in Slanic, Prahova, Romania*. *Cent. Eur. J. Biol.* 3, 388-395.
5. Enache M., Popescu, G., Itoh, T. & Kamekura, M. (2012). *Halophilic microorganisms from man-made and natural hypersaline environments: physiology, ecology, and biotechnological potential.* (pp. 173-197). In: Helga Stan-Lotter & Sergiu Fendrihan (eds.). *Adaptation of Microbial Life to Environmental Extremes*. Springer-Verlag, Wien.
6. Enache, M. & Kamekura, M. (2013). *Halophilic archaea in the Neogene salt massif from Slănic Prahova, Romania*. *Oltenia. Studii și Comunicări. Științele Naturii.* 29, 237 – 243.
7. Kamekura, M. (2007). *Halophilic microorganisms*. *J. Japan. Soc. Extremophiles.* 6, 4-10 (in Japanese).
8. Margesin, R. & Schinner, F. (2001). *Potential of halotolerant and halophilic microorganisms for biotechnology*. *Extremophiles.* 5,73 - 83.

9. McGenity, T.J., Gemmell, R.T., Grant, W.D. & Stan-Lotter, H. (2000). *Origins of halophilic microorganisms in ancient salt deposits*. *Environ. Microbiol.*, 2, 243 – 250.
10. Moreno, M.L., Perez, D., Garcia, M.T. & Mellado, E. (2013). *Halophilic bacteria as a source of novel hydrolytic enzymes*. *Life*, 3, 38 – 51.
11. Oren, A. (2010). *Industrial and environmental applications of halophilic microorganisms*. *Environ. Technol.* 31, 825 - 834.
12. Sánchez-Porro, C., Martín, S., Mellado, E. & Ventosa, A. (2003). *Diversity of moderately halophilic bacteria producing extracellular hydrolytic enzymes*. *J. Appl. Microbiol.* 94, 295 – 300.
13. Shivanad, P., Mugeraya, G. & Kumar, A. (2012). *Utilization of renewable agricultural residues for the production of extracellular halostable cellulase from newly isolated Halomonas sp. strain PS47*. *Ann. Microbiol.*
14. Stan-Lotter, H., Radax, C., Gruber, C., McGenity, T.J., Legat, A., Wanner, G. & Denner, E.B.M. ( 2000). *The distribution of viable micro-organisms in Permo-Triassic rock salt*. (pp. 921 – 926). In: Geertman, R.M. (ed.). *8th World Salt Symposium*, Amsterdam: Elsevier Science, 2.
15. Ventosa, A. (1989a). *Taxonomy of halophilic bacteria*. (pp. 262 – 279). In: Dacosta, M.S., Duarte, J.C., Williams, R.A.D. (eds.). *Microbiology of extreme environments and its potential for biotechnology*, Elsevier Science Publishers Ltd.
16. Ventosa, A., Garcia, M.T., Kamekura, M., Onishi, H. & Ruiz-Berraquero, F. (1989b). *Bacillus halophilus sp. nov., a new moderately halophilic Bacillus species*. *Syst. Appl. Microbiol.* 12, 162–166.
17. Ventosa, A. & Nieto, J.J. (1995). *Biotechnological applications and potentialities of halophilic microorganisms*. *World J. Microbiol. Biotechnol.*, 11, 85 – 94.
18. <http://www.bacterio.net/> (accesed on November 26, 2013).

# THE CONCEPT OF ECONOMIC EFFICIENCY IN AGRICULTURE

CHETROIU RODICA<sup>1</sup>, CĂLIN ION<sup>2</sup>

**Abstract:** *The economic efficiency is a concept with a complex content, which expresses the useful effect achieved in an economic activity, in relation to the requested expenditures, or the effort for its realization. Through its applicative side, the efficiency (e) can be defined as a quantitative ratio between the effects (E) and the resources or efforts (R) made to obtain them, or, in other words, achieving maximum effect with a specified level of consumptions, or reaching the determined effect with minimum consumption:  $e = E / R \max$  (maximizing the effects obtained per unit of allocated, consumed resources);  $e = R / E \min$  (minimizing the resource consumption per unit of effect achieved). This concept is the most important qualitative indicator of the economic development, a key factor in accelerating economic growth. Applied in agriculture, it represents the obtaining the maximum amount of production per hectare or per animal, with minimal expenditure of manpower and materials. Determination of economic efficiency must be based on knowledge of the elements that characterize the production effort and having three main sources: the optimal use of resources, rational use of labour and production management.*

**Keywords:** *economic efficiency, effects, resources, agriculture, concept*

## INTRODUCTION

The economic efficiency is a concept with a complex content, which expresses the effectiveness achieved in an economic activity, in relation to expenses claimed, or the effort to achieve it. So, the effect achieved on a value unit spent is higher, the economic efficiency will be higher [3].

The term "efficiency" is used since antiquity and comes from the Latin language: *efficiens*, which in turn derives from the verb *ex facio*, which means "to obtain something from", idea found in both the pre-Roman civilization and in ancient Greece, where, in fact, the term economy (*oikonomia*) appears for the first time, meaning efficient management of family households [5]. The concept of economic efficiency should not be confused with the notion of economic effect, because it expresses only the results obtained and the concept of economic efficiency shows the effect in relation to expenditures incurred for its realization [7].

## MATERIAL AND METHODS

In the light of its applicative side, the efficiency (e) can be defined as a quantitative ratio between the effects (E) and resources or efforts (R) made to obtain them, or, in other words, reaching maximum effect, with a determined level of consumptions, or reaching determined effect with minimum consumptions:

$$e = E/R \max;$$

(maximizing the effects obtained per unit of resources allocated, consumed);

$$e = R/E \min;$$

(minimizing resource consumption per unit of effect achieved).

The higher consumption of resources, there is increasing economic effects, but it is accelerated to a level of efficiency, and after a certain threshold of resource consumption, there is a degree of saturation and the effects achieved slowly grow, stagnate or fall [15].

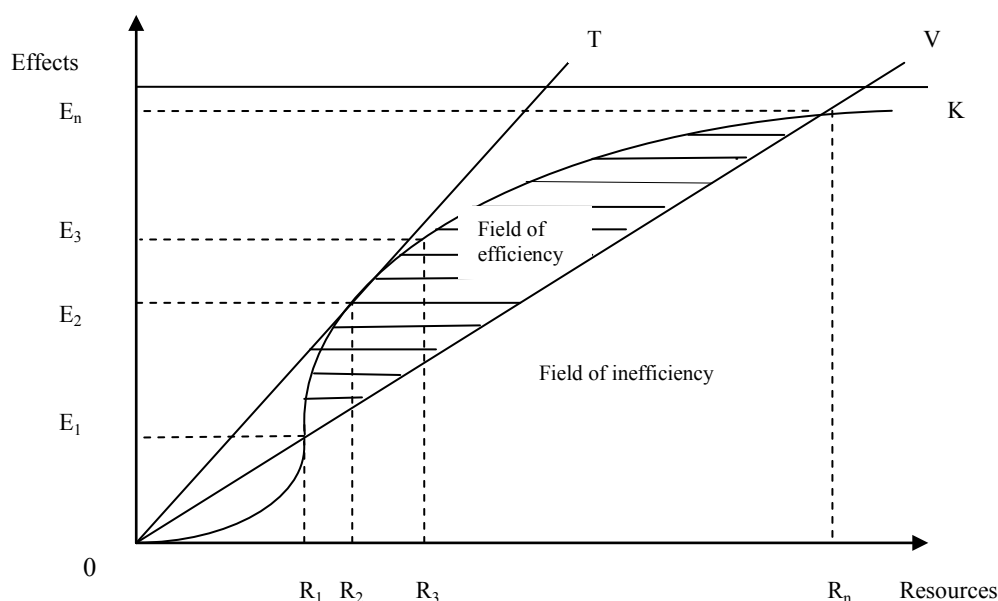
<sup>1</sup>PhD Candidate - University of Agronomic Sciences and Veterinary Medicine Bucharest, 59 Mărăști Bvd, sector 1, e-mail: rodigeo7@yahoo.com

<sup>2</sup>Prof. PhD. - Universitatea University of Agronomic Sciences and Veterinary Medicine Bucharest, 59 Mărăști Bvd, sector 1, e-mail: icalin63@yahoo.com

## RESULTS AND DISCUSSIONS

The dependence of effects of increasing the allocation of resources analyzing, it is found that this is a linear function of the type  $E = f(R)$  and in a coordinate system, it is as follows (see Figure 1):

Figure 1: Dependence of effects on efforts



in which:

$R_1 \dots R_n$  – levels of resource allocation

$E_1 \dots E_n$  – effects corresponding to resources

V – minimum limit of efficiency

C – curve of maximum efficiency

K – limit of effects

Source: adapting from Băjan G., 2009

If the ratio effect / effort is above the straight line V, the activity is efficient, under it becomes ineffective. On the range  $0 - R_1$ , the activity is inefficient due to insufficient allocation of resources, efficiency curve being convex. The effect increases with increasing resource allocation, the curve becoming concave, but over time the blocking effect occurs, even the effects are significant and will enter in the field of inefficiency [2].

By their nature, resources may be material, energy, human, financial and others, and based on the criterion of regeneration, can be renewable (human, vegetal material, specific energy) or nonrenewable (materials). The economic effects can be direct or indirect and depending on the activity purpose may be basic or complementary [13].

The theoretical approaches of the concept of economic efficiency appeared in capitalism, with different currents and economic doctrines:

- mercantilism – the first doctrine that affirms the importance of economic activity for the welfare of the nation;

- physiocrats (or power of nature) - is mentored by François Quesnay and as a doctrine is opposed of mercantilism, through a humanistic and liberal philosophy, arguing that freedom of change can be achieved with profit sharing all;

- classics, whose representatives were Adam Smith, W. Petty, David Ricardo, J.P. Boisguilbert; Sisimardi states that "the engine of economic development is freedom, not regulation";
- malthusianism said that economic efficiency is dependent on population growth ("Essay on the Principle of Population");
- marginalism considers that land, labor and capital contribute equally to the creation of value (represented by C. Menger, E. von Wieser, L. Walras, Ph. Wicksteed, etc.);
- Keynesianism, mainly through its representative, Keynes aimed, first, the study of the factors of production and the use of labor and shows that the only way of economic development is state intervention, placing the increasing of economic efficiency in the center of dirigisme doctrine;
- Socialism – that expresses the economic efficiency as a ratio between labor and its outcome, in terms of the degree of satisfaction of the needs of society.

În România, o contribuție importantă la dezvoltarea conceptului de eficiență economică au adus-o Virgil Madgearu și M. Manoilescu. Virgil Madgearu, punând accentul pe importanța gospodăriei țărănești, arată că „acolo unde economia capitalistă încheie socotelile ei cu pierderi, economia țărănească să socotească profituri”. M. Manoilescu a avut un aport științific deosebit prin „constanta Manoilescu”, care arată discrepanța dintre productivitatea muncii din industrie și agricultură, prima fiind superioară celei de-a doua [2].

The principle of efficiency, in its general form, involves three levels of analysis:

- Defining the set of solutions of technical and economic point of view;
- Choose effective solutions with the principle of saving resources, which means minimizing their consumption and maximize results;
- On the basis of the option, the choice within the effective solutions, to those considered optimal [4].

The economic activity from a unit is conditioned by regular flows exchanges with other economic agents, which are determined on the one hand, by the system inside (development of production), as well as the system outside (the market for products, inputs of force labor, materials, technology). Outside this continuous cycle, the energy of activities can be enhanced by stimulation and motivation of the workforce. Occurs thereby accelerated business cycles, materialized in products and then in money, targeting maximum effect.

The linguistic sense of the notion of efficiency shows that it is the attribute of all human action to produce the desired effectiveness. Protecting reserves and best use of resources require increasing role of efficiency criteria for decision-making within the activities. The necessity of economicity of material and labor use is generated by their limited level [13].

The analysis of economic efficiency is the main method of analysis of economic systems. Its application is based on the economic principle according to which decisions involve the allocation of rare resources (which takes maximum utility expression), distributed according to the requirements of competition [1]. The author mentioned here shows that the study of economic efficiency involves the analysis of relationships between resource costs for each variable, yields and risks of alternatives. The universal principle of Maupertius, that of the minimum action ("*desired goal with minimal effort*") suggests a fundamental question in defining efficiency ie what level of concordance between results and purpose the efficiency begins?

Referring to efficiency, Kotarbinski T. (1976) suggests that it is effective the action that ensures achievement of the aim in terms of minimal cost and S.G. Strumlin (1972) defines economic efficiency "maximum effect with minimum cost and shortest time."

The economic efficiency is a complex economic category, in which operation of economic laws is reflected and the most important part of economic activity is manifested: economic result (effect) [12]. The nature of effect has various forms of efficiency: production – productivity, savings - economy, profit - profitability. In the complexity of the hypostases and relations within an economic activity, there may be totally or partially effective activities, with different efficiency levels, between 0 (indifference) to 1 (total efficiency). Similarly, there are different degrees of inefficiency, compact interval being located between minus 1 and 1 [1].

Muresan V. (1986) defines efficiency with the relation "efficiency = effectiveness x economy", attracting attention to the fact that expenditures should be reported to the costs strictly necessary, at an optimal level determined scientifically minimal. The author mentioned above also shows that the quantitative aspect of the economic effect must be accompanied by its qualitative aspect.

The economic efficiency refers to the value of all inputs used to obtain a product. Its production is economically efficient where there is no other way of production in that it uses a less total amount of inputs. Of all the means of production technically efficient, must choose the one that attracts the minimum value of inputs, which involves economic efficiency [9].

This concept is the most important qualitative indicator of economic development, a key factor in accelerating economic growth. Applied in agriculture, it represents getting the maximum amount of production per hectare or per animal, with minimal expenditure of manpower and materials [12]. Often, economic efficiency in agriculture is associated with social efficiency of agricultural production, due to food security strategy.

Efficiency is one of the criteria for scientific substantiation of the decision. In animal husbandry, economic efficiency can refer to the entire branch, the species or categories of animals, or the animal products [3]. Băjan Gheorghe (2009) shows that "the economic efficiency is the activity result expression of any forms of existing farming systems in agriculture. Cannot be conceived an activity in agriculture without taking into account a positive outcome."

The particularities of economic efficiency in animal production refers to the fact that the results obtained are reported both to reproduction animals and to the costs for yearly average number of animals; also, economic efficiency can be measured throughout the year, as costs and their recovery occur gradually [15].

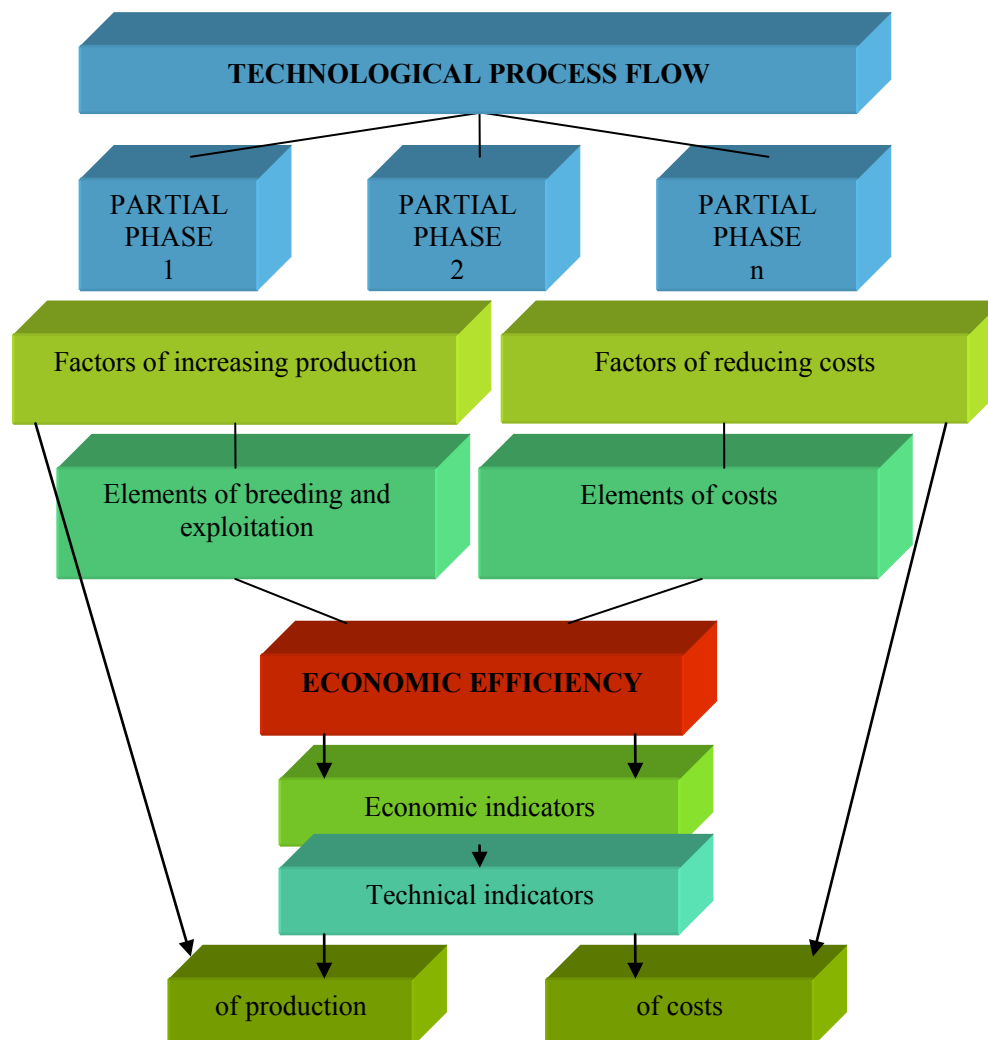
Livestock production is the result of convergent factors of production action. These are the resources that participate in the development of production processes and that the results obtained depend on. Optimizations of production processes require knowledge of the factors of production and their role for their efficient use in breeding activity and exploitation of animals. Inputs can be classified in:

- Natural factors (temperature, precipitations, light, wind, soil, etc.);
- Economic factors (labor, livestock buildings, machinery and equipment, medicines, energy, etc.);
- Organizational and management factors, which provides a combination of other categories of factors [6].

Between the concepts of optimally and efficiency there is an interdependence, the optimum reflecting the steady state of economic activity, resulted from a certain way of allocating resources and economic efficiency expresses the capacity of factors of production to determine obtaining of useful economic results, with labor-saving. Optimization of production activities allows concrete level foundation of economic efficiency, aiming at achieving maximum effect with existing means, or minimum total cost for the proposed production. The field of efficient solutions include a wider sphere, but the best solution is determined either by the amount of resources allocated either desired effect size [13].

The content of the concept of economic efficiency in animal production refers to two basic elements, namely: achieving increased production of animal products and the allocation of production factors leading to reduced production costs [7] (Figure 2):

Figure 2: Organisation chart of the concept of economic efficiency content in animal husbandry



Source: adapting from P.S. ADER 211/2011

## CONCLUSIONS

Determining the economic efficiency must be based on knowledge of the elements which characterize the production effort and has three main sources:

- Optimal use of resources;
- Rational use of labor;
- Production management.

In animal husbandry, optimal use of resources includes:

- full use of accommodation capacity, machinery, facilities and land for forage base;
- optimizing the unit size;
- optimizing the herds structure and reproduction indices;
- optimizing the structure of fodder;
- optimizing the feed rations etc.

The main directions of actions on rational use of labor are:

- Sizing staffing;
- Substantiation of labor norms;
- Determining the best forms of work organization;

- Training and qualification;
- Correlation of staff incomes with work results;
- Motivating and promoting staff. [16]

Production management includes the following activities:

- Design and economic substantiation of production systems;
- Design and technology foundation for growing and exploitation of animals;
- Organization of production processes [11].

In achieving the desired effect, particular importance is the quality of the results obtained; therefore, the whole concept of efficiency is a qualitative concept.

## BIBLIOGRAPHY

1. Andronic B.-C., 2000 – *The performance of company - cross-disciplinary approach in microeconomic analysis*, Polirom Publishing, Iași
2. Băjan G., 2009 – *Economic efficiency of agricultural exploitations* – PhD thesis, Bucharest
3. Chiran A., Gîndu Elena, Banu A., 2002 – *Livestock economy - theory and practice*, Bucharest
4. Cuțuhan M., Săbădeanu P., 1980 – *Economic efficiency of animal husbandry*, Ceres Publishing, Bucharest
5. De Soto J.H., 2011 – *The theory of dynamic efficiency*, University “Alexandru Ioan Cuza” Publishing, Iași
6. Drăghici M., Oancea Margareta, Pleșoiianu G., Zahiu Letiția, Scrieciu F., 2004 – *Farm management handbook*, Atlas Press SRL Publishing, Bucharest
7. I.C.E.A.D.R., 2012 – P.S. ADER 211- *Determining the economic indicators of production technologies for vegetal and animal products in order to increase the environmental performance (costs, productivity, profitability, gross margin)*
8. Kotarbinski T., 1976 – *Treatise on the job well done*, Political Publishing, Bucharest
9. Marinescu Daniela, 2006 – *Measuring efficiency. The link between productivity and efficiency* – PhD thesis, Bucharest
10. Mureșan V., 1986 – *Values and criteria of the efficiency*, Political Publishing, Bucharest
11. Oancea Margareta, 2003 – *Modern management in agricultural units*, Ceres Publishing, Bucharest
12. Parmacli D., Stratan A., 2010 – *The economic efficiency of agricultural production*, Publishing Complex of IEFS, Chișinău
13. Staicu F., Pârnu D., Dimitriu Maria, Stoian M., Vasilescu I., 1995- *Economic efficiency of investments*, Didactic and Pedagogic Publishing, Bucharest
14. Strumlin S.G., 1972- *Outstanding economic writings*, Scientific Publishing, Bucharest
15. Tăpăloagă P.-R., 2000 – *Comparative studies on the economic efficiency of breeding pigs by mating and artificial insemination* – PhD thesis, USAMV Bucharest
16. Zahiu Letiția, 1999 – *Agricultural management*, Economic Publishing, Bucharest



# HOW TO UNBLOCK THE FINANCING OF SMALL AND MEDIUM SIZE FARMS IN ROMANIA?

## FINANCIAL INSTRUMENTS PROPOSAL FOR RDP 2014-2020

Cornelia MIHAI, Alexandra TODERIȚĂ

**Abstract:** Recent evidence shows that that over 60% of private investment contracts have been canceled due to the lack of private co-financing. Basically, a large part of the EU funds for agricultural development cannot be accessed due to the current poor access to finance of (small and medium-size) farmers. Several factors, such as guarantees of up to 150% of the loan value, low profitability, or high default risk that hinder the sector's access to the credit market, should be mitigated by state intervention. Such a measure can be included in the 2014-2020 RDP, consistent with the European Commission's recommendation to include financial instruments for supporting access to finance for farmers and agricultural associations. The analysis presented in this paper builds on the solutions proposed in a previous CRPE report focusing on microcredit, based on the existing mechanisms of the state. Firstly, it aims to support OUG 43/2013 by establishing: (1) a fund for middle-size farms for investment of up to 300,000 Euro, significantly lower than the previous ceiling of 3 mil. Euro and (2) a microcredit fund (max. 25,000 Euro), both measures coupled with an interest rate subsidy facility. Ultimately, the aim is to reduce the interest rate that farmers are facing by at least 4 percentage points. Secondly, we propose extending and improving the instruments designed for bearing part of the risk burden, through (1) a state aid scheme for reducing the cost of the guarantees for projects undertaken by young farmers and start-ups, and (2) providing 100% guarantee for young farmers that access RDP funds for agricultural investment.

**Key words:** agriculture, credit, guarantee, financial instrument, interest rate subsidy

## INTRODUCTION

### Overview of Agricultural Funding

Although credit institutions have recently manifested a higher openness and willingness to finance SMEs in the agriculture and agri-food sectors, the problem of poor access to finance remains the burden to bear by most farmers in rural areas.

Many applicants for the financial aid offered by the National Rural Development Programme (RDP) are facing difficulties in procuring the private funds required by the co-financing program. In the absence of sufficient own capital, and often rejected by banks, potential applicants are constrained to abandon their development projects, thus directly affecting their income and the local economy, as well the RDP funds absorption rate.

According to recent data from the Ministry of Agriculture<sup>1</sup>, over 60% of the contracts concluded for the private investment measures were canceled due to the lack of private co-financing. Ceilings established in the current RDP for investment measures in the food industry (Measure 123), and in agricultural businesses (measure 121) proved to be overestimated in relation to the sector's capacity to absorb these funds effectively.

Projects worth hundreds of thousands of dollars have been drafted for the allegedly "cheapest money" (EU funds), but the issue that was not taken into account was that for every euro spent from the EU, the beneficiary has to contribute with a euro, either from its own capital, or borrowed from the credit market, to which the ineligible expenses should be added. Although most of these contracts have benefited from letters of comfort from commercial banks, pointing to the promise of receiving funding for the projects, subsequently the co-financing loans were either not granted, or the credit conditions were tightened.

On the one hand, the state considers attracting young people in agriculture (hence start-ups), as well as the development of middle-sized agriculture and family farms, to be among its priorities. However, the paradox is that no specific options for offering financial support for accessing co-financing credit have been offered to them.

<sup>1</sup>Data supported by explanatory memorandum HG 682/04.09.2013

There is a n obvious mismatch between the pace of development of this sector and the requirements of the agriculture credit system in Romania, for which there are a few explanations:

- ✚ Credit institutions place most farmers and aid recipients of the EAFRD for micro-enterprises and SMEs in the high-risk category:
  - Most of them are not able to meet the current indicators required by banks (e.g. regarding liquidity and solvency) or they cannot provide evidence of previous credit commitments;
  - Most of them do not have sufficient collaterals (banks require a minimum 110 % , sometimes reaching 150 %) for obtaining an investment loan;
- ✚ Loan management fees are too high compared to the financial means of the applicants (i.e. the income stream from production activities);
- ✚ The profitability of the sector is low, compared to higher added value sectors. The average area of farms in Romania (3.45 ha)<sup>2</sup> is below the economic sustainability threshold. This means that, in the first years of implementing the projects, farmers are not able to reap sufficient income for both repaying the requested loans, and supporting the production activities;
- ✚ Credit institutions lack expert staff for understanding the peculiarities and needs of agricultural credit. Moreover, there is a dire need of having access to targeted lending products that would complement the financial contribution from both National and European funds.

## MATERIAL AND METHOD

### Current Credit and Guarantee Facilities

In the current framework for agricultural funding, the chosen approach was to apply a credit guarantee scheme for co-financing projects through the RDP.

Thus, the funds elected by the MARD has facilitated, by means of bearing the farmer's (beneficiary of the RDP) credit risk, a switch in the focus of the banking sector towards investment in agriculture supported by European funds.

In the current RDP, two schemes for offering guarantees for private investment projects in agriculture and food industry are offered (Measure 121 - Modernization of agricultural businesses and Measure 123 – Increasing the added value of agricultural and forestry products), as well as developing SMEs in rural areas that focus on non-agricultural activities (Measure 312 – Support the creation and development of micro-enterprises and Measure 313 - Encouraging touristic activities).

The warranties offered are strictly related to the funding by the credit institution, falling within a maximum of 80 % of its value, and no more than 2.5 million Euro. Based on the annual reports of the RDP implementation, we can say that the average collateral is currently below the ceiling, which shows that the maximum eligible value of a project was too high (e.g. €2 million for modernizing the agricultural businesses – measure 121).

In addition to European funds, MARD has adopted in 2013 a national lending instrument through Ordinance 43/2013 regarding measures to develop and support family farms and farmers' access to finance.

The ordinance is introducing the concept of family farm, although we believe that the technical definition of this category is imprecise<sup>3</sup>. However, it is an indication that the State is concerned by the small and medium-sized farming category, considering the emphasis on a financing vehicle that was so far ignored, namely *non-bank financial institutions*.

Unfortunately, OUG 43/ 2013 is still not functional because it lacks the implementation procedures (no selection was made by credit institutions). Proceeding with the selection in the nearby future would allow access to credit for farmers through both types of financial intermediaries (banks and micro-credit institutions), hence meeting the explicit objective of the normative act: supporting small farmers.

<sup>2</sup> Data from the 2010 Agricultural Survey

<sup>3</sup> The 2-50 ESU limit includes almost all farmers.

## **CRPE Proposal: Financial instruments for stimulating agricultural investments.**

### **Credit and microcredit in the new RDP**

The new European Framework for 2014-2020 encourages Member States to introduce support facilities for private investment in their RDPs, by coupling these support measures with financial instruments.

In the "Position of the Commission Services on the development of Partnership Agreement and programmes in ROMANIA for the period 2014-2020" document, the chapter dealing with the competitiveness of small and medium-sized enterprises, the European Commission explicitly recommends facilitating the access to microfinance, particularly in the agricultural sector, especially in the agricultural sector and targeted at young people and the people that are furthest from the labor market, as well as micro-enterprises<sup>4</sup>.

Furthermore, the draft of the Partnership Agreement to be concluded between the Romanian Government and the European Commission states the need for using financial instruments:

"Given the current economic situation and the scarcity of public resources, financial instruments are expected to play a more important role in 2014-2020. Their introduction will allow a higher efficiency and effectiveness in using the funds. Financial instruments may be used for any kind of investment or by the beneficiaries.

Although during 2007-2013 the implementation hasn't had the expected success, Romania intends to use financial instruments in the next programming period in order to facilitate access to finance for SMEs, for innovative businesses generating added value and encourage demand for eco-innovation, as well as for using venture capital in research and development investment in order to boost start-ups and innovative spin-offs."<sup>5</sup>

#### **I. Including a Credit and/or Microcredit in the new RDP**

This fund should be included in the available financial allocation, under the measure that was recently announced by MARD, from the 2014-2020 RDP, "Investment in physical assets", for which an allocation of 1832 million Euro was estimated. This measure is aiming at "modernizing farms (orchards, other investments)", "processing" and "adaptive infrastructure". This amount should be large enough to also include credit facilities for the investment projects that are targeted by the measure.

The credit and/or micro-credit fund should be setup around clear, precise and measurable goals that correspond to real needs of support, for the restructuring of small and medium-sized farms (which are economically active and have expertise in relation to the project objective) into farms that are economically viable and suited to market requirements.

The proposal will support and complement the MARD initiative manifested by OUG 43/2013. Through our proposal, the Romanian state may decide to continue this effort (currently supported from national money) by means of also attracting European funds, starting from 2014, using the financial instruments from the RDP.

What should the financial instrument include?

a. Credit fund for developing existing medium-sized farms – loans up to 300.000 Euro, covering private co-financing, maximum of 50 % and some of the not eligible costs associated with the investment project).

We estimated the ceiling by analyzing the average value of the projects contracted under the current RDP. For example, in the year 2012 - the latest report published by MARD, the average public value of the projects contracted by APDRP were: measure 121, livestock sector - 627.925 Euro /

<sup>4</sup>"Position of the Commission Services on the development of Partnership Agreement and programmes in ROMANIA for the period 2014-2020"

<sup>5</sup> European Funds Ministry document regarding funding opportunities for 2014-2020 in order to provide a better business environment (Partnership Agreement with Romania for 2014-2020)

project, measure 121, the vegetable sector - 200.693 euro / project; measure 123 - 930800 EUR / project, measure 123, the agricultural sector - 604.071 euro / project.

b. **Microcredit fund** (max. 25,000 E uro) for young farmers who want to start an agricultural business, as well as for farm restructuring activities undertaken by small farms.

In both cases, the minimum lending criteria are:

1. Maximum credit period of seven years, maximum repayment period of 10 years.
2. Credits will be offered preferably in lei, only for investment projects under the RDP, and not for working capital.
3. The maximum value of investment projects through the RDP will be 600,000 E uro for the development of existing farms and 50,000 E uro for investment projects targeted at young people who set up farms (start-ups) and for restructuring projects for agricultural activities undertaken by small farms.

*The financial instrument regarding setting up a credit fund for agricultural investment projects financed by the RDP could be configured using a simpler format, predefined in the technical sheet, knowing from the very beginning the funding conditions of the grant percentage ceiling.*

This requires introducing the possibility of deducting the interest rate subsidies from the grant proportion (maximum 50 %). The proportion of the subsidy will be set on the basis of the ex-ante analysis conducted by MARD for selecting the financial instruments to be included in the new RDP. The proportion of the interest rate subsidy will be decided for the entire credit period and it will be invariable.

### **The lending instrument is accompanied by a grant interest rate subsidy on the fund performed.**

A similar methodology, approved by the Commission, has been implemented in Lithuania through the 2007-2013 RDP. The interest rate subsidy rate on loans financed from the RDP was calculated by applying a model based on the six months (VILIBOR) average interest rate for loans, denominated in the national currency, as presented by the Central Bank. Bank margin was not higher than 3 %, and the credit fee was 0.5% of the loan amount.

Our proposal makes the interest rate on loans depend on the NBR average interest rate for loans denominated in the national currency. The situation in which the money from this scheme would depend on the interest rate applied by other banking institutions should be avoided.

### **Sample calculation for Romania**

Currently, the interest rate on loans in lei for agriculture is somewhere from 10% -12% (there are banks that practice even higher interest rates when the beneficiaries are start-ups). Currently, the six-month Robor rate for loans denominated in lei set by the Central Bank 4%. If we apply the calculation model used by Lithuania in their 2007-2013 RDP, we get the following result:  
 $4\% - (4\% \times 4) + 3\% = 4\% - 0.16\% + 3\% = 6.84\%$ .

This reduces the interest rate for loans in the sector from 11 % - 12% to about 6.84 % (interest paid by farmers), out of which 4.16% is supported by the RDP. Hypothetically, for a credit of approx. 1,300,000 lei (about 300,000 euro):

- market interest would be 143,000 lei (11% )

- out of which 54,080 lei is paid as interest rate subsidy from the RDP, whereas the beneficiary pays 88,920 lei.

Granting credit through micro-credit institutions (NBFI) means higher operational costs<sup>6</sup>, making the NBFI margin higher than the bank margin (as shown in the previous example). In this respect, it is necessary to consider the average level of these costs and the methodology should include different margins, depending on the financial vehicle under consideration - bank or

<sup>6</sup> "Financing solutions out of EU funds for small farmers in Romania: Micro-credits and guarantees", CRPE Policy Brief No. 20, May 2013

microfinance institution. However, the interest rate paid by the beneficiary should be the same in both cases.

In order to simplify the implementation procedure of this support facility, such a methodology should be included in the RDP from the beginning. This way, the potential grant recipients will know the level of non-refundable grants that could be accessed. Considering that the percentage of non-refundable grants is lower than the usual, it should be noted that the cumulative amount of aid must not exceed the maximum, amounting to 50 % for public co-financing, or the ceiling value.

This option allows one to submit proposals on priorities established for this measure and the credit facility represents a powerful vector for directing funds according to the set pattern. Furthermore, it could solve the main problem faced by national authorities, as well as by the beneficiaries of the current program: namely the delay in project implementation, cancellation towards the end of the programming period and, hence, a low absorption rate of EU funds.

For an effective and efficient operation of such a scheme, and given the current RDP experience, the maximum eligible amount of a project should be reduced compared to the 2007-2013 period, and financial support for private investment projects, namely financial allocations set for the 2014-2020 RDP are to be expressed in national currency instead of Euro. There are several examples supporting such a proposal: the potential beneficiaries of investment in the agricultural sector are mainly focused on the local and national markets, rather than the foreign markets, so foreign currency receipts are not the issue. Exchange rate fluctuations are an important factor. They have to buy foreign currency to pay the rates, which induces an additional cost. Furthermore, in the process of simplifying the implementation of the new RDP supported by MARD, using the national currency for expressing the financial support under the RDP, and also in the procedures for the selection and contracting of APDRP would lead to a significant simplification much awaited by the applicants. Currently, under a financing agreement signed by a beneficiary with APDRP a level of Euro / leu exchange rate is used upon selection of the project, another one upon signing the contract and yet another one at the time of a authorization of payment applications related to the project. Within the application for funding for an investment project it is provided a budget line called "differences in foreign exchange rates", amounting to 5 % of the project and it is provided in the budget of an investment project. This is used by the recipient only at the end of the project implementation, based on well-grounded claims, and only with the approval of APDRP. Usually, these funds are locked in contracts between beneficiaries and APRDP and in the end they are not asked for by the customers. In conclusion, 5% out of the public allocation for investment in farm modernization stays locked in the budgets of the contracted projects and cannot be used optimally and efficiently for contracting and building of new projects.

In order to make the support package offered through the credit and microcredit fund more effective and accessible to applicants, we recommend the introduction in the RDP of a measure offering consultancy for the applicants to this credit/microcredit facility, whose support actions are targeted on specific consultancy activities, tailored to the farmer's needs. For example, in case a young farmer wishes to access an investment project, the project's economic and financial preparation can be carried out using funds from this provision.

We recommend two essential components:

1. An economic and financial component necessary for using RDP funds for private investment.
2. A technical component, specific to agricultural activities related to farm management.

## **II. Decrease of the guarantees costs for projects undertaken by young farmers and by start-ups that develop investment projects.**

### **Providing 100% guarantee for young farmers accessing RDP investment funds**

For start-ups, the guarantee fee is high (1.25 %) compared to the possibilities of access to finance for young farmers (start-ups). Therefore, it is desirable to institute state aid scheme, consistent with the European framework, for building the confidence of banks and non-bank

financial institutions in the capacity of the agricultural start-ups of accessing finance and financial instruments. Under this facility, the minimis aid is in the form of a collateral.

**This can be achieved by establishing a minimis scheme by taking a portion of the risk incurred by guarantee funds upon providing guarantees for SMEs in the agricultural sector.**

Currently, the amount of minimis aid cannot exceed EUR 7,500 for three fiscal years. Such a scheme may be established by MARD for small farms and young farmers (start-ups) in order to improve access to the EU funds.

The main reasons are related to the high cost of the guarantee fees currently charged by the guarantee fund for investment projects (start-ups), which amounts to 1.25 % of the guarantee. In addition to these costs, the start-ups must demonstrate the availability of funding amounting to a minimum of the interest due for the first year. **Furthermore, to increase the impact of the credit fund and/or micro-credit on young farmers we recommend a 100% guarantee (based on two guarantee schemes, one established by RDP funds whose coverage level to be within 80 % and another one through state budget funds, the level of which will be a maximum of 20%). To reinforce each other, the two schemes should operate in parallel and be available to ensure investment projects made by young farmers using funds from the 2014-2020 RDP.**

**What is the target market of our proposal?**

The proposals are addressing the categories of beneficiaries of the private investment measures of the 2014-2020 RDP as follows:

1. **Young farmers** with legal status in accordance with the national legislation. The program must include the definition of young farmers who have access to RDP funds;

2. **Small and medium-sized farms** with legal status in accordance with the national legislation, whose definition in terms of economic size is determined by RDP using the European methodology (provided by EUROSTAT) of farms, based on the "Standard Output" coefficient set by the European Commission for Romania;

3. Associative forms, first and second degree cooperatives, agricultural associations, producer organizations from all agricultural sectors, as defined in the national legislation.

## CONCLUSIONS

### Strategic Direction

The political will to improve access to capital for small and medium agriculture must be followed by concrete implementation instrument. Our proposal comes with such an instrument, hence providing a link with European funds. Being a very important project, the use of European funds for capitalization of smallholder farmers is consistent with the Common Agricultural Policy reform.

### Popularization

Popularization of support schemes is required for them to have an impact. Financial instruments are used as support actions through EAFRD for the final beneficiaries of the RDP and, in this respect, it is absolutely necessary for MARD to promote these undertakings, as well as choosing the promotion activities based on the vulnerabilities of the credit market with respect to funding investment in agriculture;

### Attention to preparing the implementation

Financial instruments can help to increase the efficiency and effectiveness of public resource allocation. This is why it is necessary to define them in the programming stage, considering the strong connection to the subsequent implementation process. This programming stage has to be preceded by a preliminary stage of preparing the national legislation necessary for implementation, of preparing the documents by the beneficiary, procedures which must be defined by the paying agency, specialized training for the employees of the agency for payments, and for those of the management authority.

### **Multiplier effect of capitalization in agriculture**

If these capitalization tools will work in the future RDP we have a chance to overcome major bottlenecks in the relationship between banking-agriculture. Currently, 60% of the contracts that are being terminated and this should be a warning for the future. The state can help to overcome this bottleneck and it can make through the realistic adoption and implementation of our proposal.

### **Accompanying the financial instruments with risk management tools in agriculture**

The Romanian authorities have started regulating risk management measures for agricultural production activities through Pillar I of the CAP. This aspect complements the RCEP proposal.

## **BIBLIOGRAPHY**

- European Commission (2012). *Position of the Commission Services on the development of Partnership Agreement and programmes in ROMANIA for the period 2014-2020*. Retrieved November 28<sup>th</sup>, from [http://ec.europa.eu/regional\\_policy/what/future/pdf/partnership/ro\\_position\\_paper.pdf](http://ec.europa.eu/regional_policy/what/future/pdf/partnership/ro_position_paper.pdf)
- Ministry of European Funds (2013, October). *Romanian Partnership Agreement for the 2014-2020 Programming Period*, first draft. Retrieved November 28<sup>th</sup>, from [http://www.fonduri-ue.ro/res/filepicker\\_users/cd25a597fd-62/2014-2020/acord-parteneriat/Partnership\\_Agreement\\_01.10.2013.pdf](http://www.fonduri-ue.ro/res/filepicker_users/cd25a597fd-62/2014-2020/acord-parteneriat/Partnership_Agreement_01.10.2013.pdf)
- Toderiță, A. (2013, May). *Financing solutions out of EU funds for small farmers in Romania: Micro-credits and guarantees*, CRPE Policy Brief No. 20. Retrieved November 28<sup>th</sup>, from <http://www.crpe.ro/en/wp-content/uploads/2013/06/micro-credits-and-guarantees.pdf>

# SOME ELEMENTS OF ECONOMIC EFFICIENCY OF BIOLOGICAL TREATMENT TO COMBAT CORN BORER (*OSTRINIA NUBILALIS* HBN) IN THE CONDITIONS OF TRANSYLVANIA

FELICIA MUREȘANU<sup>1</sup>, VOICHIȚA HAȘ<sup>2</sup>, MIRCEA IGNEA<sup>3</sup>

**Abstract:** The paper is a synthesis of the results obtained during 1998-2010, on the effectiveness of biological (*Trichogramma* spp.) and chemical treatments (different insecticides) in reducing the attack of *Ostrinia nubilalis* Hbn. to the corn genotypes created at The Agricultural Research and Development Station Turda. Among *Trichogramma* species used, a good efficacy in reducing attack of *Ostrinia nubilalis* was presented by *T. maidis* (80.0 %) and *T. evanescens* (78.0 %) - 3 applications. The applications with these species of *Trichogramma* to maize crops should be done at a distance of 6-7 m / row and between rows, in order to allow a uniform dispersion and a high degree of parasitizing eggs of corn borer. The biological treatments with *T. maidis* made to corn hybrids created at SCDA Turda, had reduced significantly the corn borer attack, recording production increases from 4.0 to 11.0 %. The basic conditions for achieving high efficiency in reducing the attack of *Ostrinia nubilalis*, with *Trichogramma* spp. are: conducting applications at optimal moment and ensuring optimum densities correlated with the density of the pest and chemicals used (Decis Mega 50 E W, C alypso 480 SC) had reduced the attack frequency significantly and very significantly, their efficacy in this regard was between 87-90 %. From the analysis performed through the economic effect of biological and chemical treatments to combat corn borer (*Ostrinia nubilalis*) resulted certain economic advantages using the method of biological control with *Trichogramma* spp., both in terms of reducing costs per hectare and the production growth produced. Thus, the species of this entomophage used, *Trichogramma* spp., constitutes in a way a "new generation of biological insecticides", that does not pollute and is used to combat the over 500 species of pests in the order Lepidoptera.

**Key words:** *Trichogramma* spp., *Ostrinia nubilalis* Hbn., biological treatments, economic efficiency.

## INTRODUCTION

In the maize crop, due to not complying with the crop hygiene measures, application of incomplete or incorrect crop technologies, it creates optimal conditions for maintaining of an old pest, but in actuality, corn borer (*Ostrinia nubilalis* Hbn.) in crops over the economic limit of damage. In the recent years, an increasing of population of this pest occurred, recording in many areas of Transylvania (west, northwest, centre of the country), an attack from 27.1 to 97.3%, which resulted in direct damages, by significantly reducing of the productive potential, and indirect, by breaking and fall of plants, appearing diseases as: Fusarium, blight and mechanical harvesting is performed with great difficulty; this information has been received from the farmers in those areas.

To combat this pest, or reduce pest populations below the economic threshold of damage (ETD), "the integrated management of plant protection" must accompany us, which means: selective methods of protection, increasing the role of agro-technical and biological measures, permanent control of hazardous agents and keeping them under ETD, environmental protection and conservation of biodiversity in nature. Under the pressure of pollutants, not complying with the crop hygiene measures, the integrated control concept is required, consisting, in this case, in using of *Trichogramma* spp. (MUREȘAN, 2000; 2001; ÖZTEMİZ et al., 2001 FURLAN, 2001) and of different selective products for useful fauna (PONS et al., 2000; VOS, 2004). This paper is a synthesis of the results obtained in a long time period (1998-2005), on the effectiveness of biological (*Trichogramma* spp., biological products) and chemical treatments (different insecticides) in reducing attack of *Ostrinia nubilalis* Hbn. to corn genotypes created at SCDA Turda.

<sup>1</sup>PhD Eng. MUREȘANU Felicia, SR I, Agricultural Research and Development Station Turda, e-mail: [diabrotica22@yahoo.com](mailto:diabrotica22@yahoo.com)

<sup>2</sup>PhD Eng. HAȘ Voichița, SR II, Agricultural Research and Development Station Turda

<sup>3</sup>Eng. IGNEA Mircea, SR III, Agricultural Research and Development Station Turda



## MATERIAL AND METHOD

At SCDA Turda in interdisciplinary collaboration between breeders and entomologists have been addressed a number of researches on the behaviour of various corn hybrids at borer attack, in the crop of genetic improvement (GIs), contest comparative crops (CCC) and orientation comparative crops (OCC).

Studies and research carried at SCDA Turda referred to:

- the influence of biological treatments with *Trichogramma maidis* on the attack of *Ostrinia nubilalis* and production of maize genotypes created at SCDA Turda; were used 10 corn hybrids (Elan, Turda 200, Turda 200 Plus, Turda Super, Turda SU182, Turda SU 210, TurdaMold.188, Turda Favorit, Turda 165, Turda 201) in three repetitions, each with two variants: untreated control and three applications with *T.maidis*, dose of 200 000 pieces / ha, administrated fractionated (50 000 + 100 000 + 50 000; a variant size was 14 square meters.;

- efficacy of the biological and chemical treatments in reducing the attack of *Ostrinia nubilalis* Hbn; for this aspect, the experiment consisted of 6 variants in 3 repetitions, according to the method of randomized blocks, the variant size being 14-square meters; the biological treatments were carried out with *T.maidis*, *T. evanescens*, *T. dendrolimi*, the launching dose being 200 thousand pieces / ha, divided doses: first release -50 000, the second - 100 000 and the third -50 000 pieces / ha; the chemicals with the products Decis Mega 50 EW in dose of 0.25 l / ha and Calypso 480 SC in dose of 0.15 l / ha.

Both chemical and biological treatments have been applied starting with the occurring of the first adults of corn borer registered at sex pheromone traps, repeating every 8 days. The observations made have been related to the frequency of the attack of *Ostrinia nubilalis* and production obtained, which were carried out at harvest.

Calculation methods used were: chi-square test (X<sup>2</sup>) and analysis of variance. *Trichogramma spp.* biological treatments were analyzed in terms of their economic effect compared with chemical treatments with the product Calypso 480 SC.

## RESULTS AND DISCUSSIONS

At the 10 maize hybrids created at Turda, after 3 applications with *Trichogramma maidis*, the corn borer attack was significantly and very significantly reduced, depending on the hybrid tolerance to pests (Fig. 1). Reducing attacks, were obtained significant production increases (Elan, Turda 200, Turda 165), distinctly significant (Turda SU 182, Turda 201) and very significant at Turda SU210 and Turda Favorit. (Fig. 2).

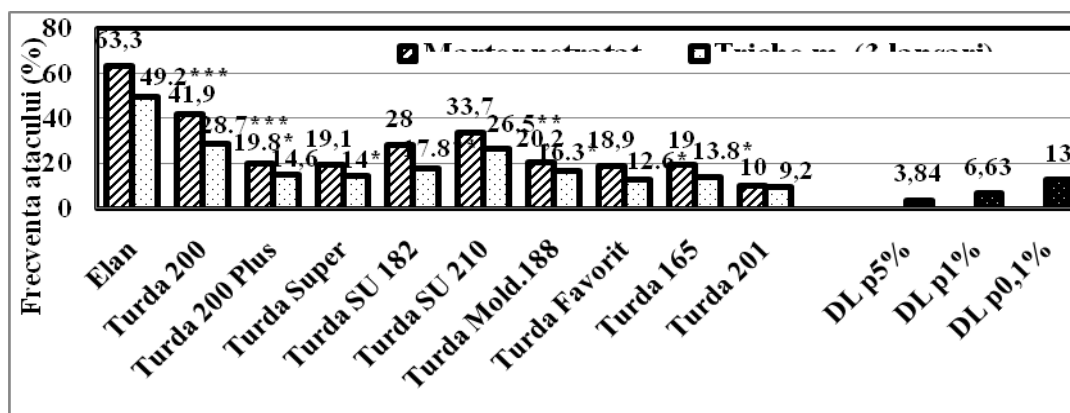


Fig. 1. The effect of treatments with *Trichogramma maidis* on the frequency of the attack of *Ostrinia nubilalis* Hbn. at maize genotypes created at SCDA Turda

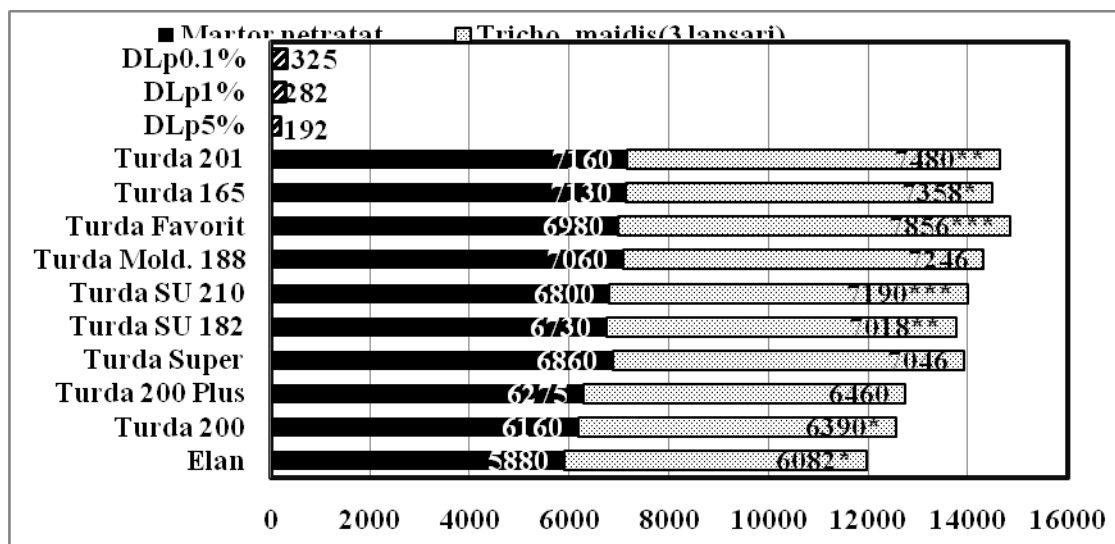


Fig. 2 The effect of treatments with *Trichogramma maidis* on the production obtained at maize genotypes created at SCDA Turda

The corn borer attack was significantly and very significantly reduced also after chemical treatments with the products Decis Mega 50 EW and Calypso 480 SC (from 59.6% at untreated control to 39.5 and 33.4% respectively). Very significant reduction was recorded at the biological treatments with the three species of *Trichogramma*: *T. maidis* very significant, *T. evanescens* distinct significant and *T. dendrolimi* distinct significant, depending on the species of *Trichogramma* specific for the pest to be controlled; in our case for the corn borer - *Ostrinia nubilalis*, *T. maidis* then *T. evanescens* were more appropriate.

Reducing the attack was confirmed by reducing the length of galleries from plants, which in the case of treatments with *T. maidis* were very significantly reduced (from 9.5 cm to 2.7 cm), the non-existence proof of corn borer larvae, the egg being parasitized by the parasite before the larvae hatching. (Fig.3). Production increases were obtained in the variants treated with Decis Mega 50 WG product (0.25 l / ha) and Calypso 480 SC (0.15 l / ha), significant and very significant, compared to the untreated control (2, 6 to 7.0%). (Figure 4).

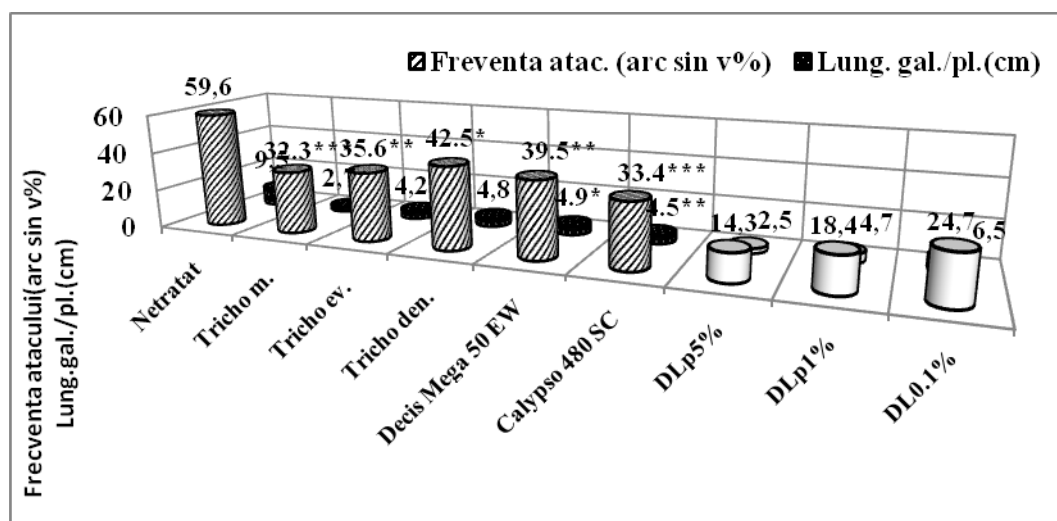


Fig. 3 The influence of biologic and chemical treatments on the attack frequency (%) of *Ostrinia nubilalis* Hbn. and of the lengths of galleries (cm) in the corn plants

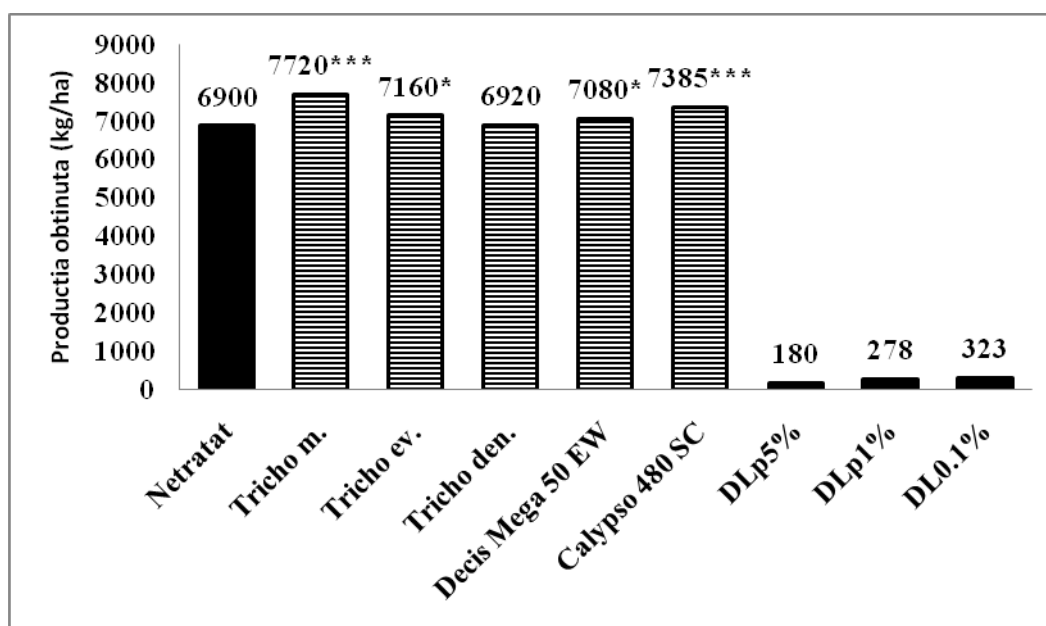


Fig.4. The effect of biological and chemical treatments on the production obtained (kg/ha) at SCDA Turda

From the economic calculation made based on the results obtained in maize crop experiences with the method of biological control, the parasite *Trichogramma spp.* and the chemical method with the insecticide Calypso 480 SC, at cost of 2012, resulted in certain economic advantages in using the method of biological control, both in terms of reducing costs per hectare and production of the production growth realized. Thus, total expenditures incurred by biological treatment were 1.124 lei / ha, representing 51.3% compared to chemical treatment, the costs for this treatment being 2.190 lei / ha. (Table 1).

Table 1

Costs with the method of combating per hectare / variants

Method of combating	Expenses/ha/technological sequence			Total lei	
	Mechanized works (lei)	Manual works (lei)	Materials and supplies (lei)		
Biological	-	198	926	1.124	-
Chemical	328	62	1800	2.190	1.066

Also, the effect of biological control to combat corn borer, materializes through the achieved production growth, compared to chemical control; this production increase obtained is justified compared to chemical treatment with the insecticide mentioned, because the pest does not reach in the corn stalk and / or cob, because the parasite *Trichogramma* destroys the pest egg before the larvae hatch and enter the corn plant. (Table 2).

Table 2

The effect of treatments on the grains production for an average production of 4000 kg/ha

Method of combating	Production gain (%)	Returns in absolute production gain (kg/ha)	Average absolute production gain obtained (kg/ha)		Average value of the production gain obtained (lei/ha)	
Biological	3,2 – 12,5	228-876	552	220	6.072	2.420
Chemical	2,6 -7,0	180-485	332	-	3.652	-

According to calculations resulted that by the biological treatment, the quantity and value of production obtained is superior to that obtained by chemical treatment, which is materialized by

220kg/ha, ie 2,420 lei / ha; is recommended to use entomophagous treatment where possible, resulting in certain economic benefits and more.

## CONCLUSIONS

Among the species *Trichogramma* used, a good efficiency in reducing the attack of *Ostrinia nubilalis* was presented by *T. maidis* (80.0%), followed by *T. evanescens* (78.0%) - 3 applications. The applications with entomophagous in the maize crops should be carried out at a distance up to 8 m / row to enable an uniform dispersion and a high degree of pest.

- Biological treatments with *T.maidis* performed at the corn hybrids created at SCDA Turda, have reduced very significantly the corn borer attack, recording production increases from 3.2 to 12.5% at most hybrids, and after chemical treatments with the products mentioned the production increases were significant, but with lower values (2.6-7.0%) than after biological treatments.

- Basic conditions for achieving high efficiency in reducing *Ostrinia nubilalis* attack, with biological method, respectively *Trichogramma spp.* are: currently conducting applications at the proper moment and ensuring optimum densities correlated with the density of the pest.

- The total expenditures incurred by biological treatment were reduced very significantly compared to those with chemical treatment, resulting also that, by the biological treatment, the quantity, quality and production value obtained is greater than that obtained by chemical treatment; besides the economic benefits, the application of entomophagous in different agro biocenosis for 3-4 consecutive years, lead to their accumulation in those agrobiocenosis, thus changing the ratio with the pests to combat in their favour, managing that populations pest to be controlled and kept below the economic threshold of damage.

## BIBLIOGRAPHY

1. FURLAN, L.,GIROLAMI, V., PAVONI,A.,BIANCHI,M.( 2001).*Ostrinia n ubilalis* population leveles in North Eastern
2. Italy: long period data and practical considerations. Proceedings of the XXI IWGO Conference and of the VIII
3. DSM,(21),365,Venice, Italy.
4. MUREȘAN Felicia.( 2000). Investigations the efficacy of biological and chemical methods against the pests of maize with reference to ECB (*Ostrinia nubilalis* Hbn.) in Western of Transylvania. Proceedings of the VII the European Congres of qaaDSM, (8),335, Venice, Italy.
5. ÖZTEMİZ, S., KORNOSOR,S.( 2001). The effect of different irrigation system on inundative release of *T. evanescens* Westwood (*Hymenoptera: T richogrammatidae*) against *O. n ubilalis* Hubner (*Lepidoptera: Pyralidae*) in the Mediterranean Region of Turkey. Proceedings of the XXI IWGO Conference and of the VIII DSM, (8),333, Venice, Italy.
6. PONS, X., EIZAGUIRE, M.( 2000). IPM on maize and winter cereals in the North – Eastern Spain.Proceedings of the VII
7. the European Congres of Entomology,97), 202, Salonic, Greece.
8. VOS, J.( 2004 ). IPM knowledge transfer-current developments and needs in farmer training for IPM implementation. Abstract-IWGO and DSM Conference, (2),64, Engelberg, Switzerland.