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Conference Paper

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Provided in Cooperation with:

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

Suggested Citation: Necula, Raluca Alexandra; Necula, Diana Maria; Drăghici, Manea; Tudor, Valentina (2018) : The main indicators evolution from the fruits and vegetables sector, In: Agrarian Economy and Rural Development - Realities and Perspectives for Romania. 9th Edition of the International Symposium, November 2018, Bucharest, The Research Institute for Agricultural Economy and Rural Development (ICEADR), Bucharest, pp. 303-315

This Version is available at:

<https://hdl.handle.net/10419/205124>

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THE MAIN INDICATORS EVOLUTION FROM THE FRUITS AND VEGETABLES SECTOR

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DRĂGHICI MANEA³, TUDOR VALENTINA⁴

Summary: *Romania is a country with a high production potential for the vegetables and fruits, due in particular to the high natural fertility of soils and to the climate diversity. Besides the favorable conditions for the production of fruits and vegetables, it should be mentioned that Romania is a country which is concerned with agriculture, to meet the economic and technical requirements characteristic of the market economy. In this paper we analyze, by comparison, the areas, the average and total production, the purchase and sales price, the incomes obtained from the sale and the trade balance on the main vegetable and fruit crops, in order to determine the evolution of these indicators and to determine the situation of this agricultural sector in Romania. By using specific indicators, the trend followed by the fruit and vegetable sector can be determined, which can be used to assess the actual real situation of Romanian horticulture and to determine the next steps to improve future results.*

Keywords: *surfaces, production, consumption, trade, evolution.*

JEL Classification: *E29, E30, F10*

INTRODUCTION

2007 was the year when the Common Market Organization for Fruit and Vegetables was implemented in Romania with the European sector reform.

This effort and EU financial support for producer groups and organizations has now reached 24 recognized producer organizations under EU law⁵.

In Romania, according to Eurostat publications, there is a high share of farms with no legal personality, with areas of between 2 and 5 hectares, thus justifying the low degree of farm technology, professional training of farmers, organization of production, as well as significant quantities of fruits and vegetables marketed at the farm gate or on street trading networks.

Also, in the MADR publications it is stated that the area with field vegetables has been decreasing continuously over the last years with the area covered with greenhouses in Romania (from 5000 ha in 1989 to 431 ha at the end of 2016).

The area of orchards and nurseries, in the 1980s, represented 2% of the country's agricultural area, and in the year 2016 it fell to 1%. Most of the fruit plantations are aged, older than 25 years, with low productive potential, declining or abandoned. According to the culture system, more than half of them are exploited in an extensive system (classic)⁶.

The degradation of the horticultural system has led to the entry of imported vegetables and fruits on the market due to substitution of demand, not to do something that does not grow in our country.

Consumption is increasing but the quantity of vegetables consumed is influenced by several tendencies that are present on the Romanian market (diet, European influences, taste, quality, health).

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⁵ Copa-Cogeca European Farmers and Agri-Cooeratives, 2008, Organizations of fruits and vegetable producers in EU: situation and perspectives, <http://www.copa-cogeca.be/Download.ashx?ID=1192082&fmt=pdf>, accessed on June, 2018

⁶ MADR, National strategy for operational programs in fruits and vegetable sector, 2018-2020, <http://www.madr.ro/docs/agricultura/legume-fructe/strategie-legume-fructe-2018-2020.pdf>

MATERIAL AND METHOD

The research was carried out by analyzing the available statistical data from the fruit and vegetables sector in the Eurostat and INS database.

The calculation formulas to calculate the indicators are as follows⁷ :

Annual Growth Ratio =

$$r_{2007-2016} = \sqrt[n]{\pi \left(\frac{p1}{p0} \right)} - 1; \text{ where:}$$

$r_{2007-2016}$ = average growth rate ; $\prod p1/p0$ = indices with a base chain

$$\text{Standard deviation} = \sigma = \sqrt{\frac{\sum(\bar{x}-x_i)^2}{n-1}} ; \text{ where :}$$

σ = standard deviation ; x_i = Average over a number of years

n = number of years analyzed

$$\text{Coefficient of variation} = C = \frac{\sigma}{\bar{X}} \times 100 , \text{ where :}$$

C - coefficient of variation - expressed as a percentage and may be small (0-10%, medium (10.1-20%) or high (greater than 20.1%).

RESULTS AND DISCUSSIONS

1. Cultivated surfaces and realized productions

Romania is an important producer of vegetables and fruit, ranking fifth in the EU after the cultivated area⁸.

According to the most recent study on the agricultural structure (2013), nearly 920,000 farms deal with fresh vegetables, which represents 12.4% of all European farms with arable land. Almost half (49.4%) of these holdings were in only three countries: Romania (22.1%), Poland (15.4%) and Spain (11.9%). However, 15 countries have shares of less than 1% each.

In 2015, nearly 2.2 million hectares of land in the EU were used to produce vegetables for fresh consumption and for processing. This represents 1.9% of all EU arable land. Almost half (47.2%) of the surface area of the vegetables was located in only three Member States. These were Italy (19.5%), Spain (16.6%) and Poland (11.1%). This first group was followed by a second group consisting of France (10.9%) and Romania (7.1%).

Vegetable production reached 3.3 million tons last year, down 8.1% year-on-year, according to the latest data submitted by the National Institute of Statistics (INS) (2017).

In 2016, grape production declined by 7.8% to 737,000 tonnes, due to a 8.3% decrease in yield per hectare.

Instead, orchard fruit production increased last year by 0.4% to 675,000 tons, even if the area fell by 0.7%.

Table 1. Comparative evolution of the areas cultivated on the main vegetable crops, at the country level, for the period 2007-2016 compared to 1990

Product, Years, UM	1990	Dates 2007-2016									Dates 2007-2016 vs 1990	
		2007	2010	2013	2016	Mediate	STDEV	Coefficient of variation		Growth rhythm		
	thousands ha	thousands ha	thousands ha	thousands ha	thousands ha	thousands ha	thousands ha	%	signif.	%	thousands ha	%
Tomatoes	50.6	46.0	49.8	48.4	41.0	47.5	3.58	7.53	small	-1.28	-3.1	94.0
Eggplants	5.6	5.5	10.3	9.4	8.8	9.2	1.44	15.53	Mid	5.41	3.6	164.6
Dry onions	27.2	34.1	33.8	32.2	30.3	32.8	1.79	5.45	small	-1.31	5.6	120.6
Dry garlic	9.7	11.5	12.8	10.6	10.2	11.7	1.21	10.38	Mid	-1.27	2.0	120.4

⁷ Ceapoiu, N., 1968, Applied statistical methods in agricultural experiments and statistical Ed. Agro-Silva, Bucharest

⁸ Cristina Roșca, Ziarul Financiar, 2017, România are cel mai mic preț la legume și fructe din UE, la jumătate față de media comunității, <https://www.zf.ro/companii/romania-are-cel-mai-mic-pret-la-legume-si-fructe-din-ue-la-jumatate-fata-de-media-comunitatii-16817994>, Accesat iulie 2018

White cabbage	27.2	46.1	47.0	54.9	46.2	48.4	2.52	5.20	small	0.03	21.3	178.2
Pepper	23.0	18.6	21.0	19.5	18.0	19.4	1.01	5.19	small	-0.38	-3.6	84.2
Edible roots	15.2	18.2	18.2	18.0	16.5	18.0	1.14	6.35	small	1.06	2.8	118.3

INS, 2018, TEMPO - HOM, AGRICULTURE, AGR108A

It is highlighted in the table above an analysis of the areas cultivated with the main vegetable crops during the period 2007-2016 compared to 1990.

It can be noticed that most of the areas diminished during the period 2007-2016, with a rate ranging from -0,375 in the case of pepper culture and -1,31% in the case of dried onions.

Significant increases were recorded in eggplant culture at a rate of 5.41% over the period under review.

Comparing this period with the year 1990 there are observed increases over this year in most crops, especially in white cabbage crop where the areas grow by 21.3 thousand ha (78.2%) and the eggplant with 3.6 thousand ha representing an increase of 64.6%.

The only crops where the cultivated area decreases in this period compared to 1990 are tomato and pepper crops with respectively -3.1 thousand ha and -3.6 thousand ha. Surface variations are in most small crops, except for areas planted with eggplants and dried garlic, where increases or decreases are more pronounced.

Among individual crops, tomatoes have occupied the largest area, accounting for 11.7% of the total vegetal area.

The areas used for tomato cultivation were predominant in Italy (41.9%) and Spain (22.8%), followed by Romania (9.5%), Portugal (7.3%) and Greece %).

Table 2. Evolution of the areas' share occupied by family gardens at country level over the period 2004-2016

Indicator	UM	2004	2007	2010	2013	2014	2015	2016
Total vegetables	thousands ha	308.2	253.4	262.7	259.0	239.5	239.5	228.1
Family gardens	thousands ha	110.9	83.0	92.4	93.2	90.0	88.3	86.0
	%	35.98	32.76	35.17	35.97	37.59	36.88	37.71
	%		91.04	97.74	99.97	104.47	102.49	104.80

INS, 2018, TEMPO - HOM, AGRICULTURE, AGR108A

Of the total area planted with vegetables, the family gardens represented 35.98% in 2004, decreasing in the next year by approx. 9% but towards the end of the period it increases by 4.8%, representing 37.71% of the total area cultivated with vegetables.

Table 3. The comparative evolution of the average yields of the main vegetable crops at the country level for the period 2007-2016 as compared to 1990

Product, Years, UM	1990	2007-2016									2007-2016 vs 1990	
		2007	2010	2013	2016	Averages	STDEV	Coefficient of variation		Rhythm of growth		
		t/ha	t/ha	t/ha	t/ha	t/ha	t/ha	t/ha	%	signif.	%	t/ha
Early, semi early and summer potatoes.	8.0	12.3	13.2	14.2	14.1	13.6	1.01	7.40	small	1.55	5.6044	169.7
Autumn Potatoes	11.5	13.9	13.4	16.2	14.6	14.7	2.08	14.14	Mid	0.60	3.2	128.1
Vegetables - total	10.9	12.3	14.7	15.3	14.7	14.7	1.08	7.39	small	2.02	3.7	134.3
Tomatoes	14.4	13.9	15.4	15.5	15.3	15.5	1.08	7.01	small	1.06	1.0	107.1
Dry onions	8.3	9.5	10.9	12.2	10.7	11.2	0.94	8.36	small	1.33	2.9	135.3
Dry garlic	3.1	4.4	5.3	5.9	5.3	5.3	0.50	9.28	small	2.25	2.2	169.5
White cabbage	15.9	19.4	20.9	21.1	21.5	21.1	1.23	5.82	small	1.15	5.2	132.4
Pepper	7.9	9.9	11.6	11.7	11.2	11.6	0.91	7.80	small	1.37	3.8	147.6
Green and yellow melons	11.2	13.2	21.1	20.9	19.3	19.1	2.36	12.32	Mid	4.37	7.9	170.3

INS, 2018, TEMPO - HOM, AGRICULTURE, AGR110A

Regarding the average yields on the main crops cultivated in Romania, increases are observed for all these crops, with a growth rate of 0.6% for autumn potato crops and 4.37% for melon culture. The highest increases in average yields over the period 2007-2016 compared to 1990

recorded the melon cultures with 70.3%, early, semi-early and summer potatoes with 69.7%, dry garlic culture with 69.5% % and pepper culture by 47.6%.

Table 4. The comparative evolution of total yields on main vegetable crops, at country level, for the period 2007-2016 compared to 1990

Product, Years, UM	1990	Dates 2007-2016									Dates 2007-2016 vs 1990	
		2007	2010	2013	2016	Mediate	STDEV	Coefficient of variation		Rhythm of growth		
	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	%	Signif.	%	Th. tons	%
Vegetables - total	2,357.5	3,116.8	3,863.6	3,961.0	3,358.4	3,720.9	310.49	8.34	small	0.83	1363.455	157.8
Tomatoes	813.6	640.8	768.5	749.1	627.2	735.8	84.41	11.47	Mid	-0.24	-77.8	90.4
Eggplants	52.0	63.7	144.4	123.3	116.2	131.2	29.43	22.43	high	6.91	79.2	252.5
Dry onions	225.4	325.0	369.1	391.8	325.1	367.2	27.36	7.45	small	0.00	141.8	162.9
Dry garlic	30.6	49.9	67.2	62.2	54.4	62.2	6.43	10.33	Mid	0.95	31.6	203.3
White cabbage	551.9	893.2	981.2	1,156.4	992.4	1,020.4	78.47	7.69	small	1.18	468.5	184.9
Pepper	182.0	184.9	243.5	227.7	201.9	225.8	21.72	9.62	small	0.98	43.7	124.0
Edible roots	158.6	209.0	241.6	242.3	219.2	238.8	21.74	9.10	small	0.53	80.3	150.6

INS, 2018, TEMPO - HOM, AGRICULTURE, AGR113A

The total production of the main vegetable crops cultivated in Romania increased during the analyzed period, with the exception of the tomato crop where the yields dropped by -0.24% and is lower by 9.6% in this period compared to 1990. The highest increases is recorded in the eggplant culture at a rate of 6.91% and in the white cabbage crop at a rate of 1.18%.

Cultures that recorded the highest increases in the period 2007-2016 compared to 1990 are: eggplant growing with 152.5%, dry garlic cultures by 103.3% , white cabbage crop by 84.9%, culture of onions with 62.9% and edible vegetable and root crops by 57.8% and 50.6%, respectively.

According to the survey on the structure of agriculture, about 1.55 million farms manage annual fruit groves at European level. This figure represents 14.6% of all European farms with "used agricultural area". Almost half (47.9%) of these holdings were in only three countries: Romania (18.7%), Spain (16.5%) and Poland (12.7%). In contrast, 15 countries accounted for less than 1% each (2013).

Table 5. The comparative evolution of the total yields of the main crops at the country level for the period 2007-2016 compared to 1990

Product, Years, UM	1990	Dates 2007-2016									2007-2016 vs 1990	
		2007	2010	2013	2016	Mediate	STDEV	Coefficient of variation		Rhythm of growth		
	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	Th. tons	%	Signif.	%	Th. tons	%
Total	1,453	1,086	1,420	1,300	1,242	1,268.4	123.00	9.70	small	1.50	-	87.3
Plums	450	373	625	512	513	502.1	70.76	14.09	Mid	3.62	52.6	111.7
Apples	683	475	553	514	467	505.8	50.46	9.98	small	-0.19	-	74.0
Pears	74	63	60	67	53	59.0	7.30	12.37	Mid	-1.93	14.8	79.9
Peaches	53	17	11	18	2.3	18.5	3.87	20.93	Mid	3.45	-34.5	34.9
Cherries and sour cherries	68	65	70	80	74	73.6	6.35	8.63	small	1.40	5.9	108.7
Apricots	48	28	24	28	31	31.2	5.21	16.66	Mid	1.21	-16.7	65.2
Nuts	26	26	34	32	34	32.7	3.35	10.26	Mid	3.27	6.7	125.6
Strawberries	18	16	21	2.3	2.3	20.6	2.60	12.66	Mid	3.76	2.4	113.0
Other fruits	31	2.3	20	24	2.3	24.3	2.34	9.64	small	0.06	-6.9	77.9

INS, 2018, TEMPO, HOME, AGRICULTURE , AGR115A

In the analyzed period, 2007-2016, total yields on main fruit crops increased except for apple and pear crops, where yields declined at -0.19% and -1.93%, respectively.

Significant increases in this period are recorded in strawberries with a growth rate of 3.76%, plums at a rate of 3.62%, peach crops by 3.45%, and walnut cultivation with a growth rate of 3.27%.

Comparing the level of production in the period 2007-2016 with 1990, we notice very high decreases in peach crops by about 65%, in apricot and 34.8% in crops, in apple production by 26%. The production of nuts, strawberries, plums and cherries and sour cherries rose by 25.6%, 13%, 11.7% and 8.7%, respectively.

In order to restore the fruit sector, a farm sub-program "Sub-measure 4.1a - Investments in fruit holdings", which aims at the establishment of plantations of fruit trees and shrubs, replacing aging and declining fruit plantations, with viable orchards to ensure quality productions. The competitiveness of a fruit farm depends to a large extent on the ratio between fresh production and processing⁹.

Table 6. Evol take take productions of fruits and vegetables per capita per day, at the country level for the period 2004-2016 compared to 1990

Indicator	UM	2004	2007	2010	2013	2014	2015	2016	2017	2016	2017
Vegetables production	kg / day / person	0.577	0.378	0.471	0.485	0.467	0.452	0.414	0.449	0.414	0.449
	%		65.6	81.5	84.1	80.9	78.3	71.7	77.8	71.7	77.8
Fruits production	kg / day / person	.211	0.132	0.173	0.159	0.160	0.151	0.153	0.131	0.153	0.131
	%		62.5	82.0	75.5	75.8	71.5	72.5	61.9	72.5	61.9

INS, 2018, TEMPO - HOM, AGRICULTURE, AGR113A

From the analysis of the evolution of the fruit and vegetable output per capita per day during the period 2004-2017, presented in table no. 6, the following is observed:

- at country level, vegetable production declined by 34.4% in 2007 compared to 2004, in the coming years it has experienced significant increases and decreases from year to year by 2017 to reach 22.2% lower compared to 2004, but 8.4% higher than in the previous year and 18.7% higher than in 2007.

- in terms of fruit production, it decreases in 2007 compared to 2004 by 37.5%, slightly increases in the next years, and towards the end of the period it decreases by 38.1% as compared to 2004, by 14.4% compared to the previous year, reaching almost the same level as in 2007.

Table 7. Evolution Average monthly income and vegetable consumption on a person, at t Miss the period 2004-2016

Indicator	UM	2007	2008	2010	2013	2014	2015	2016
Average Monthly Income	lei / month	577.71	731.53	795.31	895.85	937.65	1,010.67	1,112.22
	%		126.63	137.67	155.07	162.30	174.94	192.52
Average monthly consumption	kg / month, / pers.	18.3	19.1	18.6	18.8	19.9	20.5	21.0
	%		104.05	101.32	102.68	108.37	112.06	114.60

INS, 2018 , TEMPO - HOME, CLV104A; BUF1051

Analyzing average monthly earnings per person, Table 7 shows that it increased significantly over the period 2007-2016, so that in 2008 it were 26.63% higher than the reference year, increasing progressively each year until 2016 where the income registered in the first year of the period by 92.52% is exceeded.

There is also an increase in average monthly consumption per person, where in 2008 it grew by 4% compared to the reference year 2007, and by the end of the period there are increases of 12% and 14.6% respectively in the year 2015, 2016 compared to the same year.

Daily consumption of fruit and vegetables varies greatly between EU Member States, with those aged 15 or over not eating fruits and vegetables daily, from almost two thirds of the Romanian population (65.1%) to slightly above 15% in Belgium (16.5%).

⁹ MADR, Strategia națională pentru programele operaționale în sectorul de fructe și legume, 2018-2020, <http://www.madr.ro/docs/agricultura/legume-fructe/strategie-legume-fructe-2018-2020.pdf>

On the other hand, the proportion of those who eat at least 5 servings daily ranged from one-third in the United Kingdom (33.1%) to less than 5% in both Romania (3.5%) and Bulgaria (4.4%).

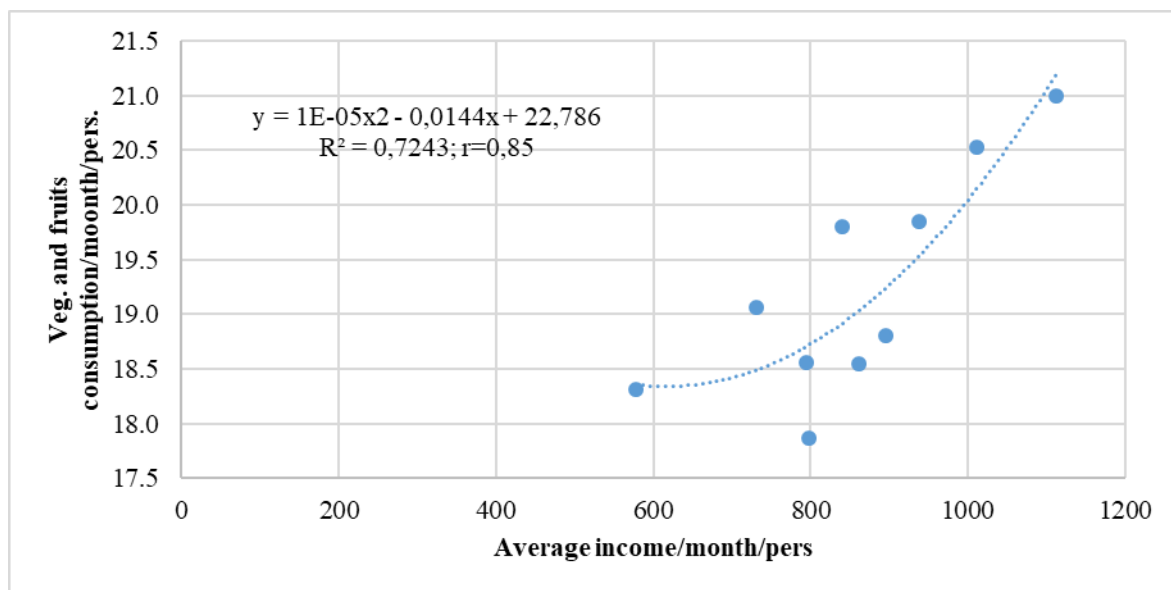


Fig1. The correlation between average monthly income per person and average monthly consumption of fruit and vegetables at country level over 2007-2016

The correlation between average monthly incomes and per capita consumption (Figure 1) shows that with the increase in average income, the consumption of vegetables and fruits is also increasing, contributing also their lower price compared to EU countries.

2. Marketing of fruit and vegetable productions

Prices for vegetables and fruits in Romania are at half of the EU average and also the smaller in the community, shows an analysis of the European statistical office Eurostat that considers 2016 data.

At the end of the ranking, Romania is alongside other countries in the region, namely Poland (62%), Bulgaria (66%), Czech Republic (75%) and Hungary¹⁰.

Table 8. The evolution of the purchase price for some agricultural products

Crop	2004	2007	2010	2013	2017	Average	St. dev.	Coeff. variation		Annual Rhythm
	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	%	signif.	%
Field tomatoes	0.57	0.82	1.80	0.98	1.88	1.32	0.63	47.99	high	9.69
Field Cucumbers	1.02	1.53	1.22	1.34	1.58	1.36	0.32	23.47	high	3.44
Bean pods	0.77	0.65	0.67	0.89	2.34	1.02	0.51	50.38	high	8.91
Long pepper - red type	0.90	0.90	1.12	1.49	2.17	1.31	0.43	32,80	high	7.00
Bell Pepper	1.11	1.00	2.14	1.26	1.81	1.29	0.37	28.39	high	3.85
Fibber	1.59	1.23	1.54	1.87	2.42	1.65	0.36	21.81	high	3.30
Grapes for wine	0.84	0.89	1.54	1.07	1.67	1.33	0.33	24.85	high	5.44

INS, 2018, TEMPO-HOME, PRICES, PPA102C

During the period 2004-2017, the purchase price of the agricultural products analyzed in table no. 8 increased, as follows:

¹⁰ Eurostat Statistics explained, 2018, Comparative price levels for food, beverages and tobacco, https://ec.europa.eu/eurostat/statistics-explained/index.php/Comparative_price_levels_for_food,_beverages_and_tobacco#Oils_and_fats.2C_fruits.2C_vegetables.2C_potatoes_and_other_food_products, accesat iulie 2018

- for field tomatoes, the purchase price in 2007 increased by 43.85% compared to the first year of the period, by 2017 it increased by 229% compared to 2004 and by 129% compared to 2007
- The purchase price of one kilogram of bean pods has been maintained until 2013 around 0.7-0.8 lei / kg that by 2017 it will reach three times higher than in 2004.
- in the same way, the pepper crops are presented, of which the highest increase in the purchase price of the red pepper culture, which was 24% higher in 2010, then increased by 141% in the year 2017 of 2004.
- and the purchase price of one gram of grape for wine increased during this period, from 0.84 lei / kg in 2004 to 2017 to 1.67lei, kg which means an increase of 98%.

Table 9. Evolution of the selling price of some agricultural products

Crop	2004	2007	2010	2013	2017	Average	St.dev.	Coeff. Var.		Annual Rhythm
	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	%	signif.	%
Field tomatoes	1.70	2.30	3.40	2.39	3.43	2.57	0.65	25.31	high	5.54
Early and summer potatoes	1.15	1.47	1.36	1.50	1.26	1.27	0.13	10.12	medium	0.72
Autumn potatoes	1.01	1.10	1.36	1.77	1.50	1.31	0.27	20.81	high	3.11
Cauliflower	1.88	2.89	3.77	3.73	4.13	3.23	0.73	22.67	high	6.26
Early and summer white cabbage	0.70	1.68	1.49	1.43	1.53	1.36	0.34	25.12	high	6.22
Autumn cabbage	0.52	1.42	1.40	1.00	1.57	1.22	0.37	30,74	high	8.87
Lettuce	3.22	4.16	4.56	6.67	6.56	5.38	1.18	22.00	high	5.62

INS, 2018, TEMPO-HOME, PRICES, PPA102C

As the purchase price increased during the period 2004-2017, the sales price also increased. A faster pace was suffered by the autumn cabbage crop, where the sales price grew at an annual rate of 8.87%, with the average selling price in this period being 1.22lei / kg.

And the selling price of one kilogram of cauliflower and early white and summer cabbage grew at a rate of 6.26% and 6.22%, respectively. On the opposite side, the selling price of one kilogram of early and summer potatoes had a slower annual growth rate of only 0.72%, with an average of 1.26 lei / kg.

Table 10. Comparative evolution of purchase price, sale price and commercial addition to field tomatoes

Price type	2004	2007	2010	2013	2017	Mediate	St dev	Coeff. Var.		Annual Rhythm
	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	lei / kg	%	signif.	%
Acquisition	0.57	0.82	1.80	0.98	1.88	1.32	0.63	47.99	high	9.69
Sale	1.70	2.30	3.40	2.39	3.43	2.57	0.65	25.31	high	5.54
Marketing	1.14	1.48	1.60	1.41	1.55	1.25	0.62	49.41	high	2.42

INS, 2018, TEMPO-HOME, PRICES, PPA102C

For field tomatoes, the purchase price and implicitly the sales price increased during this period with an annual growth rate of 9.69% and 5.54% respectively, the average of the period being 1.32 lei / kg and 2.57 lei / kg.

The capitalization of fruits and vegetables has proven to be the most difficult issue because there are no foundations for specific markets for the use of vegetables production. Those who produce vegetables in small quantities lower the price very much, which disadvantages those who practice vegetable growing as their main activity and live from the marketing of production.

The sale is done either directly from the farm gate or directly on the market or through intermediaries. Vegetables and fruit growers are threatened by large hypermarkets and by massive imports. On the one hand, large chain stores refuse to buy the merchandise at a fair price, and on the other hand, imports compete for domestic production.

Approximately 50-60% of the Romanian fruit and vegetable production is marketed in peasant markets organized in urban centers and at the gate of the farm. Although prices have an

increasing trend, even when farmers have entered into commercial contracts, the beneficiaries do not come to pick up the merchandise until the prices fall. ¹¹

3. Consumption of vegetables and fruit per person for 2007, 2013, 2017

Table 11. The comparative evolution of the average annual consumption of vegetables at the country level of the period 2007-2016 compared to 1990

Product, Years, UM	1990	Dates 2007-2016									2007-2016 vs 1990	
		2007	2010	2013	2016	Average	STDEV	Coefficient of variation		Rhythm of growth		
	kg	kg	kg	kg	kg	kg	kg	%	signif.	%	kg	%
Vegetables and vegetable products in fresh vegetables equivalent	110.8	149.9	155.7	152	155.9	155.2	4.56	2.94	small	0.44	44.39	140.1
Tomatoes	44.1	46.4	40	35.4	38.4	39.4	3.07	7.78	small	-2.08	-4.71	89.3
Dry onions	12.2	18	19.7	20.6	20.4	20.0	0.97	4.82	small	1.40	7.84	164.3
Cabbage	22	40.8	42.5	44.7	41.1	42.4	1.60	3.77	small	0.08	20.43	192.9
Edible roots	7.4	11.6	12.7	12.4	13.5	13.1	1.33	10.12	Mid	1.70	5.7	177.0
Pepper	7.5	9.2	12.4	11.5	11.3	11.6	1.02	8.85	small	2.31	4.06	154.1
Peas green	4	1.2	1.3	1	1.6	1.3	0.25	19.49	Mid	3.25	2.71	32.3
Green beans	1.3	2.3	2.3	2.8	3.2	2.8	0.29	10.43	Mid	3.74	1.48	213.8
Cucumbers	3.3	5.9	7.9	7.2	9.5	8.0	1.06	13,14	Mid	5.44	4.74	243.6
Other vegetables	9	14.5	16.9	16.4	16.9	16.6	1.28	7.71	small	1.72	7.56	184.0

INS, 2018, TEMPO - HOME, CLV104A

The average annual consumption of vegetables and vegetable products in fresh vegetable equivalents at country level analyzed during 2007-2016 increased at a year-on-year rate of 0, 44% and compared to 1990, increased significantly, with 44.39 kg representing an increase of 40.1%.

In the period 2007-2016, the consumption of most vegetables increased, but especially the consumption of cucumbers at a rate of 5.44%, green beans at 3.74% and, compared to 1990, the consumption of cucumbers and beans have doubled.

And the consumption of green peas grew at an annual rate of 3.25% in the analyzed period but compared to 1990 it decreased by 67.7%. Table 11 shows that at the country level the consumption of tomatoes decreased in the period 2007-2016 with an annual rate of -2.08% and compared to 1990 it is 10.7% lower.

Concerning the consumption of fruit and fruit products in fresh fruit equivalents, there is an increase in the analyzed period 2007-2016, from 69.9 kg annually in 2007 to 96 kg annually in 2016, representing an increase of 37.3 % at an annual rate of 3.59%. Comparing the total consumption of fruits in this period with that of 1990, there is an increase of 16.09 kg, representing 27%. In the analyzed period, the consumption increases for most fruits, except for the consumption of cherries - the ones that fall during this period at a rate of -1.11%, so in 2016 it is 9.5% lower than in 2007, but increased in this period compared to 1990 by 27%.

Table 12. Comparative evolution of the average annual fruit consumption at country level for the period 2007-2016 compared to 1990

Product, Years, UM	1990	2007-2016									Dates 2007-2016 vs 1990	
		2007	2010	2013	2016	Average	STDEV	Coefficient of variation		Growth rhythm		
	kg	kg	kg	kg	kg	kg	kg	%	signif.	%	kg	%
Fruit and fruit products in fresh fruit equivalent	59.5	69.9	67	73.7	96	75.6	9.71	12.85	Mid	3.59	16.09	127.0
Apples	27	23.6	22.5	23.5	28.4	23.8	3.07	12.92	Mid	2.08	-3.24	88.0
Plums	5.8	3.1	5.1	4.5	5	4.5	0.60	13.28	Mid	5.46	-1.29	77.8
Apricots	2	1.5	1.3	1.6	1.8	1.7	0.25	14.61	Mid	2.05	-0.31	84.5
Cherries - Sour cherries	3	4.2	3.5	4	3.8	3.7	0.36	9.85	small	-1.11	0.69	123.0
Peaches - Nectarines	3	2.3	1.6	3.1	6.2	3.4	1.64	47.61	high	11.65	0.44	114.7

¹¹ MADR, Strategia națională pentru programele operaționale în sectorul de fructe și legume, 2018-2020, <http://www.madr.ro/docs/agricultura/legume-fructe/strategie-legume-fructe-2018-2020.pdf>

Grapes	7.4	5.5	5.4	6.7	6.9	6.5	0.71	10.86	Mid	2.55	-0.86	88.4
Meridional and exotic fruits	4.9	22.8	20.9	23.1	34.4	24.2	4.90	20.26	high	4.68	19.3	493.9
Other fruits	6.4	6.9	6.7	7.2	9.5	7.8	0.92	11.81	Mid	3.62	1.36	121.3

INS, 2018, TEMPO - HOME, CLV104A

Although in the analyzed period the consumption of fruits increases compared to 1990, there are decreases in plums consumption by 22.2%, apricots by 15.5%, apples by 12% and grapes with 11.6%, and the consumption of meridional and the increase of exotic fruits was impressive by 393.9%.

4. Import and export of vegetables and fruits in Romania

Table 13. Monthly and annual evolution of the import of vegetables , plants, roots and tubers at country level for 2011-2017

Year, UM	Month												Total year mil.€
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
2011	12.8	17.6	28.8	23.0	19.5	10.2	4.7	5.2	5.0	6.1	8.8	10.6	152.2
2012	10.3	12.8	22.6	17.7	18.1	9.8	5.8	8.3	8.7	11.7	16.1	16.6	158.6
2013	20.5	20.7	25.7	27.1	20.8	8.4	5.4	5.7	7.3	10.8	15.0	18.7	186.1
2014	21.1	26.5	34.9	30.9	25.4	12.7	8.0	7.6	10.8	12.5	16.3	20.9	227.5
2015	21.6	28.1	37.0	34.3	27.4	16.0	8.2	10.6	13.7	17.5	26.3	34.2	274.7
2016	31.8	43.8	52.4	54.1	37.1	19.1	11.9	13.4	14.7	20.8	29.1	36.9	365.0
2017	37.1	47.8	65.0	53.4	45.8	22.1	16.9	14.1	18.5	23.3	30.4	36.1	410.6
Monthly Average (Mil. €)	22.2	28.2	38.1	34.3	27.7	14.1	8.7	9.3	11.3	14.7	20.3	24.8	253.5
St dev (mil €)	9.6	13.1	15.4	14.3	10.2	5.2	4.4	3.6	4.7	6.1	8.2	10.7	101.7
Coeff. Var.(%)	43.1	46.5	40.4	41.6	36.9	36.9	50.3	38.5	41.7	41.5	40.6	43.0	40.1
Signif.	High	High	High	High	High	High	High	High	High	High	High	High	High
Annual Rhythm (%)	19.5	18.1	14.5	15.1	15.3	13.8	24.0	18.2	24.3	25.1	22.8	22.7	18.0

INS, 2018, TEMPO - HOME, FOREIGN TRADE, EXP102J

Imports of vegetables, plants, roots and tubers increased over the period 2011-2017, from € 152.2 million in 2011 to € 410.6 million in 2017.

It can be seen from the data of the table that the value of the import is the highest in February - May 2011 with a maximum in March of 28.8 million €, as in 2013 the period of import is higher from December to May with a maximum of 27.1 million € in April, and in 2017 we import vegetables, plants, roots and tubers in February, March, April, amounting to € 47.8 million, € 65 million and € 53.4 million respectively , representing an increase of 171%, 125% and 132%, respectively, compared to the same months of 2011.

Table 14. Evolution of monthly and annual imports of fruit at the country level for the period 2011-2017

Year, UM	Month												Total year mil. €
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
2011	16.4	16.6	23.4	15.9	16.1	16.5	12.7	10.6	8.5	12.6	15.5	20.5	185.4
2012	12.8	15.3	17.7	17.5	19.6	20.5	19.2	18.5	16.0	18.8	25.4	33.6	235.1
2013	30.4	24.2	26.6	27.6	24.7	22.2	18.4	18.1	16.4	18.0	28.2	39.3	294.2
2014	31.6	29.6	28.3	29.9	30.1	25.8	21.3	21.8	22.3	25.8	32.5	43.2	342.2
2015	39.8	35.4	42.1	36.3	36.2	41.6	33.2	35.8	33.7	37.8	44.5	60.7	477.1
2016	47.3	45.8	51.0	51.7	47.3	45.7	40.8	41.3	36.9	41.5	52.1	62.5	563.7
2017	55.9	48.3	56.9	51.1	68.6	53.2	41.8	45.0	38.7	51.1	60.4	67.4	638.4
Monthly Average (Mil. €)	33.4	30.7	35.1	32.9	34.7	32.2	26.8	27.3	24.7	29.4	36.9	46.8	390.9
St dev (mil €)	15.6	13.2	14.9	14.5	18.3	14.3	11.7	13.2	11.8	14.3	16.0	17.3	171.7
Coeff. Var. (%)	46.7	42.8	42.5	44.1	52.7	44.5	43.5	48.5	48.0	48.7	43.2	37.0	43.9
Signif.	high	high	high	high	high	high	high	high	high	high	high	high	high
Annual rhythm (%)	22.7	19.4	16.0	21.5	27.3	21.5	21.9	27.3	28.7	26.3	25.5	21.9	22.9

INS, 2018, TEMPO - HOME, FOREIGN TRADE, EXP102J

The situation of the import of fruit during the period 2011-2017 is the same as described in table 13, with significant increases for the analyzed period from 185.4 million € in 2011 to 638.4 million € in 2017, representing an increase of 244%. If in 2011 the import value reaches maximum rates in March of € 23.4 million and December of € 20.5 million, in 2012 in December it reached € 33.6 million, € 25.4 million in November, and in June € 20.5 million. In the last years of the analyzed period throughout the year, the value of fruits imports is high, in 2017 it reaches very high values during the 5th month of 68.6 mil. €, and December 67.4 mil. € representing a growth of 45% and respectively 8.8% versus the previous month and 326%, respectively 228.7% compared to the same months of 2011.

Table 15. Monthly and annual evolution of exports of vegetables, plants, roots and tubers at country level for the period 2011-2017

An, UM	Month												Total year mil. €
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €	mil. €
2011	2.1	2.1	3.0	2.4	4.9	5.4	6.5	8.2	8.2	4.4	3.9	1.9	53.1
2012	2.1	2.1	2.1	2.0	3.6	5.5	4.8	7.4	5.8	8.7	5.3	2.7	52.1
2013	2.6	2.5	2.7	4.2	4.9	8.7	10.2	6.7	14.9	10.2	8.1	4.3	80.0
2014	2.9	2.5	2.2	2.4	4.7	7.1	13.1	15.6	16.1	11.6	5.7	4.4	88.3
2015	3.2	3.3	2.6	2.8	4.7	7.8	8.9	9.9	18.3	16.7	8.5	3.6	90.3
2016	2.4	2.3	2.0	1.9	4.3	6.5	17.9	16.1	12.7	9.6	7.2	3.5	86.4
2017	2.2	2.1	2.1	1.9	3.9	6.4	39.9	27.4	19.2	21.4	10.2	4.0	140.6
Monthly Average (Mio €)	2.5	2.4	2.4	2.5	4.4	6.8	14.5	13.0	13.6	11.8	7.0	3.5	84.4
St dev (mil €)	0.4	0.4	0.4	0.8	0.5	1.2	12.0	7.4	5.0	5.6	2.2	0.9	29.6
Coeff. Var. (%)	17.7	17.8	15.8	32.6	11.5	17.5	82.9	56.7	37.1	47.3	30.9	25.4	35.1
Signif.	Mid	Mid	Mid	high	Mid	Mid	high	high	high	high	high	high	high
Rate annually (%)	0.8	-0.3	-5.5	-3.8	-3.8	3.0	35.1	22.2	15.3	30.0	17.4	13.1	17.6

INS, 2018, TEMPO - HOME, EXTERIOR TRADE, EXP102J

As regards the export of vegetables, significant increases are observed on months, starting in May and culminating in September and October, where the highest values are recorded, these being the months in which most vegetables, plants and tubers are harvested. An export detriment in Romania is that there are few warehouses and greenhouses for crops in protected areas to benefit from a better-valued export also in November-April. Exports in 2011 recorded € 53.1 million, with successive increases until 2017 when € 140.6 million was recorded. In July of 2017, the export capitalized to € 39.9 million euros, with 33.4 million € more than in July 2011.

Table 16. Monthly and annual evolution of exports of edible fruit, plants, roots and tubers at country level for 2011-2017

Year, UM	Month												Total year Mill. €
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €
2011	3.1	2.5	2.6	2.2	3.7	4.2	5.4	9.6	9.9	9.3	10.2	7.6	70.2
2012	3.5	3.7	4.4	3.1	3.9	4.4	9.1	9.8	5.8	8.5	10.6	8.0	74.9
2013	3.2	3.7	3.8	2.6	3.2	3.9	6.0	8.0	7.4	13.2	13.9	10.4	79.4
2014	5.5	7.8	7.4	4.7	5.5	4.7	6.7	10.7	5.7	10.1	15.0	11.7	95.5
2015	6.6	8.0	7.1	4.7	3.6	4.5	5.6	6.1	6.0	12.3	10.7	6.6	81.9
2016	4.0	3.1	3.2	2.9	2.0	4.3	5.7	5.9	5.7	5.9	6.5	4.8	54.0
2017	3.4	2.9	4.9	3.3	3.4	4.9	7.5	6.5	8.4	8.1	7.4	4.3	64.9
Monthly Average (Mill. €)	4.2	4.5	4.8	3.4	3.6	4.4	6.6	8.1	7.0	9.6	10.6	7.7	74.4
St dev (mil €)	1.3	2.4	1.8	1.0	1.1	0.3	1.3	2.0	1.7	2.5	3.1	2.7	13.2
Coeff. var (%)	31.8	52.2	38.6	28.8	29.2	7.4	20.1	24.5	23.7	26.1	29.1	35.5	17.8
Signif.	high	high	high	high	high	small	Mid	high	high	high	high	high	Mid
Annual growth rhythm (%)	1.7	2.7	11.3	6.6	-1.6	2.5	5.6	-6.3	-2.7	-2.3	-5.1	-9.0	-1.3

INS, 2018, TEMPO - HOME, EXTERIOR TRADE, EXP102J

Regarding the export of fruits, plants, roots and tubers, there are large oscillations of values over the analyzed period. If at the level of year 2011 Romania exports fruits worth 70.2 million Euro, maximum in August-November, approx. 9.9 million / month euro, reaches a maximum of 95.5 million euro in 2014, with the largest exports in October-December. At the end of the period, exports fell to 54 million euro in 2016 and 64.9 million euro in 2017, with higher values in September and October. As with vegetables, more spaces with a controlled atmosphere for storage are needed to benefit from a better-valued and balanced export over months and years.

Table 17. Monthly and annual average balance of foreign trade in fruit and vegetables for the period 2011-2017 of Romania

Year, UM	Month												Total year Mill. €
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €	Mill. €
2011	-24	-30	-47	-34	-27	-17	-5	2	5	-5	-10	-22	-214
2012	-18	-22	-34	-30	-30	-20	-11	-10	-13	-13	-26	-39	-267
2013	-45	-39	-46	-48	-37	-18	-8	-9	-1	-5	-21	-43	-321
2014	-44	-46	-54	-54	-45	-27	-9	-3	-11	-17	-28	-48	-386
2015	-52	-52	-69	-63	-55	-45	-27	-30	-2.3	-26	-52	-85	-580
2016	-73	-84	-98	-101	-78	-54	-29	-33	-33	-47	-67	-91	-788
2017	-87	-91	-115	-99	-107	-64	-11	-25	-30	-45	-73	-95	-843

INS, 2018, TEMPO - HOME, EXTERIOR TRADE, EXP102J

Thus, if the balance shows a difference of -214 million euros in 2011, it reaches -843 million in 2017, representing an increase of almost 4 times, the differences between months being even 30 times higher (November 2013 compared to November 2017).

5. Performance indicators of the production and marketing of vegetables and fruits

Table 18. The main indicators that characterize the enterprises that grow vegetables and fruits in 2015 and 2016

Indicator	UM	2015	2016	2016 vs 2015		
				UM	%	
Enterprises	No	1,264	1,577	313	124.8	
Average number of employees	No	4,430	4,484	54	101.2	
Fiscal value	Total	million lei	783.5	904.2	120.68	115.40
	On the enterprise	mil / lei	0.62	0.57	-0.05	92.50
	per employee	thousand lei / employee	17.69	20,16	2.48	114.01

INS, 2018 TEMPO - HOME, Statistical Yearbook IN -enterprises, RSI101A

The number of enterprises for growing vegetables and fruits in the year 2016 increased by 313 enterprises compared to 2015, representing an increase of 24.8%. Also, the total turnover and the one per employee increased by 15.4% and 14.01% respectively, but the turnover on enterprises decreased by 0.05 million lei in 2016 compared to 2015, representing a decrease of 7.5%.

Table 19. Main indicators characterizing wholesalers of vegetables and fruits for 2015 and 2016

Indicator	UM	2015	2016	2016 vs 2015		
				UM	%	
enterprises	No	1,514	1,475	-39	97.4	
Average number of employees	No	5,214	5,123	-91	98.3	
Fiscal value	Total	million lei	4,806	5,478	671.79	113.98
	On the enterprise	mil / lei	3.17	3.71	0.54	116.99
	per employee	thousand lei / employee	92.18	106.93	14.75	116.00

INS, 2018 TEMPO - HOME, Statistical Yearbook IN -enterprises, RSI101A

In the case of the number of wholesalers of vegetables and fruits, the situation is different from those that produce them, which is down by year 2016 compared to 2015, with 39 enterprises, which represents a decrease of 2.6%. The number of employees decreased by 1.7% in 2016 as

compared to 2015, but the total turnover increased by 13.98%, the one on the company by 16.99% and the one on the employee by 16%.

Table 20. The main indicators characterizing the retailers for vegetables and fruits in the years 2015 and 2016

Indicator	UM		2015	2016	2016 vs 2015	
		No			UM	%
Enterprises		No	1,170	1,179	9	100.8
Average number of employees		No	2,131	2,097	-34	98.4
Fiscal value	Total	million lei	423	482	59.28	114.02
	On the enterprise	mil / lei	0.36	0.41	0.05	113.15
	per employee	thousand lei / employee	19.84	22.98	3.15	115.87

INS, 2018 TEMPO - HOME, Statistical Yearbook BUSINESS, RS1101A

An increase in the number of enterprises is seen in 2016 compared to 2015 in the case of fruit and vegetable retail trade with 9 enterprises, but the number of employees decreases by 1.6%. Total turnover increases by 14.02%, per employee by 15.87% and by enterprise by 13.15%.

CONCLUSIONS

The demand for vegetables / fruits is continuous, while the offer is seasonal. For this purpose it is necessary to produce the vegetables throughout the whole year. For this purpose, it is possible to resort to realize the production of vegetable products in a protected system, in greenhouses and solariums, or by storage in spaces with natural or forced ventilation, equipped with boxes, chambers and equipment for monitoring the environmental conditions (temperature, humidity, dioxide carbon). Vegetables can also be stored in silos from the ground, after the harvest, to be used the following year (carrot, parsley, celery, potatoes, red beet, cabbage, radishes etc.).

The analysis made in the fruit and vegetable sector in Romania highlighted the following issues, which continuously affect the production potential of the sector:

- There are a large number of small and very small farms; a plus being, however, that there are numerous holdings with a large assortment of fruit and vegetable species and varieties;
- These farms have in a great extent a low degree of modern technical means of production and harvesting;
- Vegetable and fruit trees have a high degree of fragmentation, thus highlighting the lack of a coherent land consolidation strategy;
- Areas cultivated with some vegetables and fruits are decreasing during the analyzed period, thus affecting the production and the consumption from own production, being necessary to import; there is also an increase in areas cultivated with competitive varieties of vegetables;
- Romania has favorable pedo-climatic conditions for the cultivation of vegetables, trees and fruit trees, and the increase in yields can be made using modern technologies, the results of the last years being at most of species encouraging.
- The reduction of imports could be done by diversifying domestic production, increasing the number and modernizing the processing units.

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