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THE EVOLUTION OF SUNFLOWER CROPS IN ROMANIA IN THE CONTEXT OF THE PRE- AND POST-ACCESSION TO THE EUROPEAN UNION

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Abstract: *The agricultural sector holds a major place in the Romanian economy, with an important contribution to Gross Domestic Product (GDP), Romania being an important pawn over oilseeds market because it produces a significant quantity of sunflower for export. The main purpose of the paper is to study the dynamics of sunflower cultivated area, the registered productions, the average yield per hectare, prices, import and export, all of these in the context of the pre- and post-accession to the European Union. The statistical data have been processed based on fixed indices and average annual growth rate. Oilseeds cultivated area has continuously increased in the analyzed period from 654,7 thousand ha in 1990 to 1.629,5 thousand ha in 2016. In the same year, sunflower cultivated area reached 1.039,8 thousand ha, being by 263,44% higher than in 1990 and 124,4% than 2007, after the post-accession to the European Union. Evolution of the cultivated area (thousand ha), yield (kg/ha) and total sunflower production (thousand tons) has been determined based on the achievements in 2007 and annual growth rate calculated for the period 2008-2016 whose values have been the following ones: for cultivated area: 2,82%; for yield: 16,42%; for production: 15,77%. Sunflower prices reflected a large variation from a year to another, but mainly a continuous increase starting from the year 2007. The increased price is justified by demand/offer ratio and by the increased demand of oilseeds in the internal and external markets.*

Keywords: *production, cultivated area, fixed basis index, average annual growth rate, price*

JEL Classification: *Q17*

INTRODUCTION

Romania is the 7th largest country in the European Union (EU) in terms of population and the 2nd largest in Central and Eastern Europe (CEE) after Poland. It equals the population of the Czech Republic and Hungary combined, making it one of the largest consumer markets in Europe and an attractive manufacturing and outsourcing hub. As EU member since 2007 and a NATO member since 2004, Romania is currently one of the most dynamic large markets in Europe.

Agriculture is an important economic sector assuring food for population, raw materials for processing industry and agro-food products for export. Its contribution to GDP is 5.6%. It registered a continuous development in the last decade, and its future depends on a modern technical endowment, investments, employment of high qualified persons, a corresponding farm structure able to assure a higher productivity, economic efficiency and competitiveness (8).

The Romanian agricultural competitiveness is a debate full topic in the context of the late sectorial reforms during the country accession and convergence to the EU-28 agricultural model (6).

The agricultural sector holds a major place in the Romanian economy, with an important contribution to Gross Domestic Product (GDP) creation and also a key role in international trade. The importance of agriculture in Romanian economy results from its share in GDP, labour force and rural community's impact (3).

In Romania, the land is cultivated with crops which are competitive on world market: maize, wheat, oil crops and barley. These four categories accounts for almost 80% of arable land and have high competitiveness indices of 7.94, 7.52, 3.51 and, respectively, 9.81. Triticale and

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tobacco are also competitive on world markets, with Balassa indices of 6.65 and, respectively, 4.8, but their shares in arable land are lower 0.87% and, respectively, 0.01. The same products: maize, wheat, oilseeds and barley account for significant shares in agro-food exports: wheat holds the main share of 19%, followed by oilseeds, with 15%, and maize with 14.3% (6).

Romania is the EU's leading sunflower producer. MY (marketing year) 2017/18 total oilseed area planted reached nearly 2 million hectares (ha), a 15% increase over last year. Post expects total oilseed output at almost 5.0 million metric tons (MMT), up by 21% over last season. Precipitation levels improved soil moisture throughout the country and created excellent conditions for germination and spring development. Farmers throughout Romania reported this year's sunflower crop to be exceptionally good, although some farmers in south eastern and western regions reported 10-25% yield losses from last year. Nevertheless, Romanian sunflower production improved in volume and quality over the previous year (14).

Romania is an important pawn over oilseeds market because it produces a significant quantity of sunflower for export. One of the main risk factors in obtaining sunflower crop with stable production is the appearance and evolution of the broomrape.

In Romania, more than 60% of the sunflower cultivated area is infested with broomrape. There are three important areas, as the presence of the broomrape races and infestation degree, situated in Brăila, Constanța and Tulcea locations. The three more spread broomrape populations in the largest area cultivated with sunflower, are very different regarding the virulence and dissemination of the parasite. The race G was definitely found in Tulcea and Constanța counties in Romania and latest surveys showed possible appearance of even more virulent race (7).

As (Pricop, Cristea, 2011) the race identification must be a continuous process to support farmers, by recommending sunflower hybrids based on the information concerning the parasite spread and virulence throughout the territory. The identification of the parasite physiological races also supports breeders to develop strategy for improvement programs (9).

Romania's foreign trade with vegetable oils and fats has been developing rapidly during the last 10 years and mainly after the country entry into the EU. In 2007, Romania's export with vegetable oils and fats counted for Euro million 55 being by 10% higher compared to 2006. Also, Romania's import reached Euro mil 108, being 5.4 times higher than in 2006 (12).

Sunflower, rape and soybean are the major oilseeds crops in Romania because of their importance for human food, animal feed and industry. Their high fat content (sunflower 50%, rape 34 % and soybean 20%) make them useful for oil and bio fuel industry. Sunflower main products are represented by refined oil used in human consumption and food industry (margarine, canned products, soap, lecithine, etc.), high protein meals destined to animal feeding, artificial fibres and plastics produced by textile industry, the whole plant utilized in building industry (4, 11).

MATERIALS AND METHODS

The purpose of this paper consisted of the research, analysis and interpretation of the statistical data provided by the National Institute of statistics in Romania, on the surfaces cultivated with sunflower, the registered productions, the average yield per hectare, prices, import and export, in the context of the pre- and post-accession of Romania to the European Union. The main indicators used in this analysis have been processed using the usual statistical methods such as: fixed basis index, average and average annual growth rate, as presented in the formulas given below (5):

$$\text{Fixed Basis Index (FBI): } FBI = \frac{X_n}{X_0} \times 100 ;$$

$$\text{Average (A): } A = \frac{X_1 + X_2 + X_3 + \dots + X_n}{n} ;$$

$$\text{Average annual growth rate (\%): } R = \left(\sqrt[N-1]{\frac{X_n}{X_0}} - 1 \right) \times 100.$$

RESULTS AND DISCUSSIONS

Romania is a traditional agricultural country and plays a unique and important part in European agriculture. The soil is fertile and the climate is favourable for agriculture, animal husbandry and horticulture. With a total area of 238,000 sqm, Romania is one of the countries of the most pronounced agrarian profile in the European Union. Having about 15 million ha of farmland, of which more than 9 million ha devoted to arable crops, Romania owns almost 1/3rd of the total agricultural land in the EU (33,5% of all EU farms - EU Commission updates, April 2017)(15). Thus Romania could be (after Poland with 17 million ha of agricultural area) the second largest producer of agricultural products in the CEE region. It is known that agriculture has been and continues to be a sector of prime importance in Romania and at the same time, the sector's contribution to the economy and share of employment, play a significant role in the overall Romanian economy (13).

Table 1. Oilseeds cultivated area structure, 1990-2016 (thousand ha)

| | 1990 | 1995 | 2000 | 2005 | 2006 | 2007 | 2008 | 2009 |
|-----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Oilseeds cultivated - total | 654,7 | 806,8 | 1.067,4 | 1.205,5 | 1.297,6 | 1.340,4 | 1.239,4 | 1.253,8 |
| Sunflower | 394,7 | 714,5 | 876,8 | 971,0 | 991,4 | 835,9 | 813,9 | 790,0 |
| | | | | | | | | |
| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | |
| Oilseeds cultivated - total | 1.409,7 | 1.472,5 | 1.261,1 | 1.426,9 | 1.496,5 | 1.514,7 | 1.629,5 | |
| Sunflower | 790,8 | 995,0 | 1067,0 | 1074,6 | 1001,0 | 1011,5 | 1039,8 | |
| Oilseeds cultivated - total | | | | | 248,89 | | | |
| Sunflower | | | | | 263,44 | | | |
| Oilseeds cultivated - total | | | | | 152,66 | | | |
| Sunflower | | | | | 118,59 | | | |
| Oilseeds cultivated - total | | | | | 121,57 | | | |
| Sunflower | | | | | 124,40 | | | |

Source: Romania's National Institute for Statistics Report, 2016 (10). Own calculations

Oil seeds cultivated area has continuously increased in the analyzed period from 654,7 thousand ha in 1990, 1.067,4 in 2000, 1.340,4 in 2007 to 1.629,5 thousand ha in 2016. In the same year, sunflower cultivated area reached 1.039,8 thousand ha, being by 263,44% higher than in 1990, 118,59 than 2000 and also, 124,4% than 2007, after the post-accession to the European Union. In 2016, the weight of sunflower in oilseeds cultivated area represented 63,81% in comparison with 60,29% in 1990, 82,14% in 2000 and 63,7% in 2007 (Table 1).

Table 2. Share of sunflower crops in Romania's cultivated area, 1990-2016 (%)

| | 1990 | 1995 | 2000 | 2005 | 2006 | 2007 | 2008 | 2009 |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Cultivated area (ha) | 9.402,1 | 8.224,6 | 8.499,8 | 8.467,9 | 7.884,0 | 7.777,0 | 7.798,1 | 7.884,1 |
| Sunflower | 4,20 | 7,75 | 10,32 | 11,47 | 12,58 | 10,75 | 10,44 | 10,02 |
| | | | | | | | | |
| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | |

| | | | | | | | |
|----------------------|---------|---------|---------|---------|---------|---------|---------|
| Cultivated area (ha) | 7.807,4 | 8.081,6 | 8.058,3 | 8.166,8 | 8.232,4 | 8.265,4 | 8.409,2 |
| Sunflower | 10,13 | 12,32 | 13,25 | 13,16 | 12,16 | 12,24 | 12,37 |

Source: Romania's National Institute for Statistics Report, 2016 (10). Own calculations

In 2016, sunflower cultivated area reached 1.039,8 thousand ha representing 12,37% of Romania's cultivated area compared to 4,20% in 1990, 10,32% in 2000, 10,75% in 2007 (Table 2.). Cultivated surface with sunflower has continuously increased because of the importance of its seeds for oil production in a country where sunflower oil is still in the top position in human consumption.

Table 3. Yield (kg/ha) and total sunflower production (thousand tons), Romania, 1990-2016

| | 1990 | 1995 | 2000 | 2005 | 2006 | 2007 | 2008 | 2009 |
|----------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Yield (kg/ha) | 1.409,0 | 1.304,0 | 821,0 | 1.381,0 | 1.540,0 | 654,0 | 1.437,0 | 1433,0 |
| Total production (thousand tons) | 556,2 | 932,9 | 720,9 | 1.340,9 | 1.526,2 | 546,9 | 1.169,9 | 1.098,0 |
| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | |
| Yield (kg/ha) | 1.597,0 | 1.798,0 | 1.310,0 | 1.993,0 | 2.187,0 | 1.765,0 | 1.955,0 | |
| Total production (thousand tons) | 1.262,9 | 1.789,3 | 1.398,2 | 2.142,1 | 2.189,3 | 1.785,8 | 2.032,3 | |
| Yield (kg/ha) | | | | | 138,75 | | | |
| Total production (thousand tons) | | | | | 365,39 | | | |
| Yield (kg/ha) | | | | | 238,13 | | | |
| Total production (thousand tons) | | | | | 281,92 | | | |
| Yield (kg/ha) | | | | | 298,93 | | | |
| Total production (thousand tons) | | | | | 371,61 | | | |

Source: Romania's National Institute for Statistics Report, 2016 (10) . Own calculations

Sunflower yield in 2016, registered the lowest gain, only 138,75% reflecting a relatively constant performance per surface unit compare to 1999 and 298,93% compare to 2007. However, sunflower yield was directly influenced by climate conditions. The climate change has resulted in different yield levels. The most serious droughts have been noticed in the years 2000 and 2007 when sunflower production per hectare was the lowest one (12).

Table 4. Evolution of the cultivated area (thousand ha), yield (kg/ha) and total sunflower production (thousand tons), during the post-accession of Romania to the European Union

| Sunflower | Achieved 2007 | Annual average growth rate (%) | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|----------------------------|---------------|--------------------------------|--------|-------|--------|--------|--------|--------|--------|--------|--------|
| Cultivated area (thou. ha) | 835,9 | 2,82 | 813,9 | 790,0 | 790,8 | 995,0 | 1067,0 | 1074,6 | 1001,0 | 1011,5 | 1039,8 |
| Yield (kg/ha) | 654 | 16,42 | 1437 | 1433 | 1597 | 1798 | 1310 | 1993 | 2187 | 1765 | 1955 |
| Production (thou. tons) | 546,9 | 15,77 | 1169,9 | 1098 | 1262,9 | 1789,3 | 1398,2 | 2142,1 | 2189,3 | 1785,8 | 2032,3 |

Source: Romania's National Institute for Statistics Report, 2016 (10). Own calculations

Evolution of the cultivated area (thousand ha), yield (kg/ha) and total sunflower production (thousand tons) has been determined based on the achievements in 2007 and annual growth rate calculated for the period 2008-2016 whose values have been the following ones: (a) *for cultivated area: 2,82%*; (b) *for yield: 16,42%*; (c) *for production: 15,77%*.

In Table 5. it is presented the evolution of Romania's sunflower imports, during 2007-2016. The quantitative import of sunflower varied between 66,6 and 197,2 thousand tons, and the value one oscillated between EUR millions 32,5 and 138,4.

Table 5. Evolution of Romania's sunflower imports, during 2007-2016

| Sunflower | 2007 | | 2008 | | 2009 | | 2010 | | 2011 | |
|-----------|---------------------------|----------------------|---------------------------|----------------------|---------------------------|----------------------|---------------------------|----------------------|---------------------------|----------------------|
| | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) |
| | 66,6 | 32,5 | 89,5 | 52,2 | 141,0 | 72,9 | 208,2 | 109,7 | 237,3 | 142,6 |
| | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | |
| | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) |
| | 131,2 | 108,9 | 93,3 | 101,3 | 118,9 | 99,2 | 189,2 | 127,7 | 197,2 | 138,5 |

Source: Romania's National Institute for Statistics Report, 2016 (10). Own calculations

As (Arghiroiu, Cristea, 2015), Romania was a net importing country of agricultural products. In 2013 the total trade balance has become a surplus. However, we can say that Romania has become conjectural self-sufficient, because we are surplus to only 5 of the 24 groups of agro-food products. We know a positive balance for cereals, oil seeds and oleaginous fruits, tobacco, live animals, products with raw material nature, and for the remaining agro-food groups we import massive, especially meat, sugars and sugar confectionery, fruits etc. (2).

In the international market, Romania is recognized as a net exporter of oilseeds, oils and meals especially of sunflower origin. Sunflower export has continuously increased, exceeding import and resulting a positive trade balance. In 2020, it is estimated as bio fuels to represent 10 % of all fuel consumed in the EU. Unfortunately, for farmers the subsidy for encouraging energetic crop was available only till 2010 (12).

Table 6. Evolution of Romania's sunflower exports, during 2007-2016

| Sunflower | 2007 | | 2008 | | 2009 | | 2010 | | 2011 | |
|-----------|---------------------------|----------------------|---------------------------|----------------------|---------------------------|----------------------|---------------------------|----------------------|---------------------------|----------------------|
| | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) |
| | 382,6 | 105,4 | 471,3 | 192,2 | 564,2 | 146,1 | 557,4 | 214,8 | 1.182,8 | 508,3 |
| | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | |
| | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) | Quantity (thousands tons) | Value (millions EUR) |
| | 652,4 | 335,6 | 1.420,1 | 550,7 | 1.321,9 | 452,5 | 1.099,3 | 452,2 | 1.183,7 | 489,9 |

Source: Romania's National Institute for Statistics Report, 2016 (10). Own calculations

The exported quantity of sunflower seeds varied between 382,6 and 1.420,1 thousand tons. In terms of value, the year 2013 registered the highest income from sunflower seeds export (550,7 EUR millions). The lowest income from sunflower seeds export was recorded in 2007 (105,3 EUR millions) (Table 6.).

Romania's main trading partners in trade with oilseeds are the EU States members, but also we can observe that we export sunflower in South Africa and Pakistan (1).

Table 7. Average purchasing prices for sunflower, during 2007-2015 (Ron/kg)

| Specification | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Average (RON/kg) (%) |
|---------------|------|------|------|------|------|------|------|------|------|----------------------|
| Sunflower | 0,84 | 1,12 | 0,86 | 1,19 | 1,58 | 1,84 | 1,59 | 1,26 | 1,5 | 1,31 |

Source: Romania's National Institute for Statistics Report, 2016 (10). Own calculations

Sunflower prices presented in Table 6. reflect a large variation from a year to another, but mainly a continuous increase starting from the year 2007. The increased price is justified by demand/offer ratio and by the increased demand of oilseeds in the internal and external markets.

CONCLUSIONS

Oilseeds cultivated area has continuously increased in the analyzed period from 654,7 thousand ha in 1990, 1067,4 thousand ha in 2000, 1340,4 thousand ha in 2007 to 1629,5 thousand ha in 2016. In the same year, sunflower cultivated area reached 1039,8 thousand ha, being by 263,44% higher than in 1990, 118,59 than 2000 and also, 124,4% than 2007, after the post-accession to the European Union.

In 2016, the weight of sunflower in oilseeds cultivated area represented 63,81% in comparison with 60,29% in 1990, 82,14% in 2000 and 63,7% in 2007. In 2016, sunflower cultivated area reached 1039,8 thousand ha representing 12,37% of Romania's cultivated area compared to 4,20% in 1990, 10,32% in 2000, 10,75% in 2007.

Sunflower yield in 2016, registered the lowest gain, only 138,75% reflecting a relatively constant performance per surface unit compare to 1999 and 298,93% compare to 2007.

Evolution of the cultivated area (thousand ha), yield (kg/ha) and total sunflower production (thousand tons) has been determined based on the achievements in 2007 and annual growth rate calculated for the period 2008-2016 whose values have been the following ones: (a) *for cultivating area: 2,82%*; (b) *for yield: 16,42%*; (c) *for production: 15,77%*.

The quantitative import of sunflower varied between 66,6 and 197,2 thousand tons, and the value one oscillated between EUR millions 32,5 and 138,4 and the exported quantity varied between 382,6 and 1420,1 thousand tons. In terms of value, the year 2013 registered the highest income from sunflower seeds export (550,7 EUR millions). The lowest income from sunflower seeds export was recorded in 2007 (105,3 EUR millions)

Sunflower prices reflected a large variation from a year to another, but mainly a continuous increase starting from the year 2007. The increased price is justified by demand/offer ratio and by the increased demand of oilseeds in the internal and external markets.

In the coming years Romania will continue to become an important oilseeds producer and exporter in the EU-28.

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