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## RESEARCH REGARDING OIL SEEDS CROPS DEVELOPMENT IN ROMANIA IN THE EU CONTEXT

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### Summary

*The paper aimed to present the dynamics of sunflower, soybean and rape cultivated area, yield and production in Romania in the period 1990-2009 and established the 2012-2015 forecast. In this respect, the statistical data have been processed based on fixed indices and average annual growth rate. Romania is an important oilseeds producer contributing by 8.22% to the EU-27 production. In 2009, Romania oilseeds production counted for 1,764 thou tons of which sunflower seeds 62.24 %, rapeseeds 32.29 % and 5.47 % soy beans. In 2015, it is forecast as oilseeds production to reach 7,850 thou tons, of which 73.84 % sunflower seeds and 25.26 % rapeseeds.*

**Keywords:** *rape, soybean, sunflower, cultivated area, yield, production, Romania*

**JEL:** *Q10, Q01*

### Introduction

Oil seeds crops have become more and more important worldwide and in Romania too [11, 12].

In 2011, world oil seeds production counted for 264.22 million MT for soybean, 60.50 million MT for rapeseed and 32.93 million MT for sunflower seed being by 20.34%, 24.74% and, respectively 20% higher in comparison with the records in 2008, reflecting a continuous increasing trend of production [2].

In 2009, the EU-27 cultivated area with major oil seeds totalized 10,952 thousand ha, of which: rapeseed 6,498 thou ha (59.33%), sunflower 3,900 thou ha (35.60%) and soybean 304 thou ha (2.77%). All these three crops represented 97.70 % of oil seeds area in the EU-27 [2]. In 2009, the EU-27 registered the top oilseeds production counting for 29,729 thou tons of which: 21,446 thou tons rapeseeds (72.13%), 7,000 thou tons sunflower seeds (23.54%) and 863 thou tons soybeans (2.90%). According

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to the international expert reports, the expectation for the EU-27 oilseeds area is 11.45 mil ha of which 6.73 mil ha rapeseed, 4.24 mil ha sunflower and 0.30 mil ha soybean, because of the high interest to produce more energetic crops for producing bio fuel. Oil seed production is expected to reach 29.4 mil tons in 2012 of which 20.8 mil tons rapeseeds, 7 mil tons sunflower seeds and 1.1 mil tons soybeans [14].

Therefore, rape will remain the most important oils seed crop followed by sunflower and soybean in the EU-27[15].

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 fibers and plastics produced by textile industry, the whole plant utilized in building industry [1, 6]. Soybeans are processed into a large variety of products for human consumption such as: soybean oil flour, milk, tofu, textured vegetable protein (for meat and dairy analogues), soy sauce, fermented bean paste, also soy meal utilized as an excellent cheap source of protein for animals [1]. Rape has become more and more important as source of bio diesel and green fertilizer with an essential role in environment protection [3, 16].

Sunflower and rape are considered low input crops and also low production cost crops a reason to stimulate farmers to cultivate them on larger surfaces but without forgetting of the limits imposed by crop rotation [8].

Romania has a long tradition in vegetable oil production, sunflower keeping the 1<sup>st</sup> position with 66% of cultivated area, being followed by rape and soybean, linseed etc [3].

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 [8].

In this context, the purpose of this paper was to analyze the dynamics of oilseed cultivated area, yield and production during the period 1990-2009 in order to identify the main trends and prospects for sunflower, rape and soybean development in Romania. Finally, a forecast for the period 2012-2015 was estimated based on average growth rate of the cultivated area and yield in the studied period [10].

## Material and Method

The main indicators used in this analysis have been: cultivated area, yield, production, producer's price and price indices. The data regarding the period 1990-2009 have been provided by National Institute for Statistics and 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 [7, 10].

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

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

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

## Results and Discussions

**Oil seeds cultivated area** has continuously increased in the analyzed period from 654.7 thousand ha in 1990 to 1,253.8 thousand ha in 2009 compared to total cultivated area which has declined by 16.15%. In 2009, Romania's oilseeds cultivated area represented 11.44% of the EU-27 cultivated area with oilseeds crops.

In the same year, sunflower cultivated area reached 766.1 thousand ha, being by 94.09% higher than in 1990. Rape cultivated area registered the most spectacular increase being placed on the 2<sup>nd</sup> position with 419.9 thousand ha. In 2009, rape cultivated land was 32.05 times higher than in 1990.

Soybean cultivated area has varied from a period to another but generally it has continuously decreased from 190.2 thousand ha in 1990 to 48.8 thousand ha in 2009. This happened due to the EU decision to forbid cultivating of Roundup Ready cultivar [8].

In 2009, the weight of sunflower, rape and soybean in oilseeds cultivated area represented 98.48% in comparison with 91.33% in 1990 (Table 1).

**Table 1.** Oil seeds cultivated area structure, 1990-2009 (thousand ha)

	1990	1995	2000	2005	2009	2009/1990 %
Oilseeds cultivated area - total	654.7	806.8	1,067.4	1,205.5	1,253.8	191.50
Sunflower	394.7	714.5	876.8	971.0	766.1	194.09
Rape	13.1	0.5	68.4	87.8	419.9	3,205.34
Soybean	190.2	73.4	117.0	143.1	48.8	25.65

Source: National Institute for Statistics. Own calculations

In 2009, the cultivated area with sunflower, rape and soybean totalized 1,234.8 thou ha representing 15.65% of Romania's cultivated area compared to 6.96% in 1990 (Table 2).

**Table 2.** Share of oilseeds crops in Romania's cultivated area (%)

	1990	1995	2000	2005	2009
<b>Cultivated area ( ha)</b>	9,402.1	9,224.6	8,499.8	8,467.9	7,884.1
<b>Sunflower</b>	4.29	7.74	10.31	11.46	9.71
<b>Rape</b>	2.02	0.79	1.37	1.69	0.62
<b>Soybean</b>	0.13	0.005	0.80	1.03	5.32

Source: National Institute for Statistics. Own calculations

Rape has become a more and more attractive crop for farmers due to the EU subsidy (Euro 45/ha) provided since 2005 for encouraging bio fuel production [8].

Sunflower cultivated surface has continuously increased because to the importance of its seeds for oil production in a country where sunflower oil is still in the top position in human consumption.

**Oilseed yield** has substantially increased, despite that it is still low compared to the one recorded in other EU countries [8].

Sunflower yield registered the lowest gain, only 1.70% reflecting a relatively constant performance per surface unit. 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 [8].

Soybean yield has achieved the highest gain in the analyzed period. In 2009, 1,726 kg soybeans have been harvested per hectare, meaning 2.32 times more than in 1990. Soybean yield also achieved a large variation from 0.6 tons/ha in the dried years to 2.4 tons in the years with normal climate conditions. In 2007, the driest year, soybean yield was the smallest one.

Rape yield has increased by 63.29% from 831 kg/ha in 1990 to 1,357 kg/ha in 2009.

**Oilseeds production** has been 2.38 higher in 2009 compared to 1990, mainly because of the positive impact of the increased yield. In 2009, it reached 1,764 thou tons in comparison with 739.3 thou tons in 1990. Romania's production registered in 2009 represented 8.22% of the EU-27 oil seeds production (Table 3).

**Table 3.** Yield by oilseed crop, 1991-2009 (kg/ha)

	1990	1995	2000	2005	2009	2009/1990 %
<b>Sunflower</b>	1,409	1,304	821	1,381	1,433	101.70
<b>Rape</b>	831	1,178	1,113	1,681	1,357	163.29
<b>Soybean</b>	742	1,470	594	2,186	1,726	232.61

Source: National Institute for Statistics. Own calculations

Sunflower production has increased from 556.2 thou tons in 1990 to 1,098 thou tons in 2009, meaning 97.41% production gains in the analyzed period. The increased sunflower production was imposed by the demand of oil industry able to process 70 % of domestic seeds. This situation has been encouraged by the EU higher and higher needs for fats and oils of vegetable origin. For these reason, farmers have been stimulated to produce more sunflower seeds. They are aware as sunflower is a low input and cost crop as long as it requires a small amount of seeds and fertilizer per surface unit [1].

Romania is situated among the top sunflower producers in Europe contributing by 23% to the EU-27 sunflower production [13]. It comes on the 1<sup>st</sup> position in the EU-27, being followed by France (21%), Bulgaria (18%) and Hungary (17%). These 4 producers cover 79% of the EU-27 production [8].

Rape production has recorded a continuous increasing trend in the analyzed period. In comparison with 10.9 thou tons carried out in 1990, in 2009, Romania achieved 52.25 times more, i.e. 569.6 thou tons rapeseeds. Rape seeds production has started increasing since 2007 at the moment when the EU decided to expand energetic crops for bio fuel. Therefore, production performance has been determined both by the increased cultivated surface as well as by the increased yield (Table 4).

**Table 4.** Oilseeds Production, Romania, 1990-2009 (thousand tons)

	1990	1995	2000	2005	2009	2009/1990 %
<b>Sunflower</b>	556.2	932.9	720.9	1,340.9	1,098	197.41
<b>Rape</b>	10.9	0.4	76.1	147.6	569.6	5,225.68
<b>Soybean</b>	141.2	107.9	69.5	312.8	84.3	59.7
<b>Total</b>	739.3	1,055.4	868.5	1,803.1	1,764	238.60

Source: National Institute for Statistics. Own calculations

Despite that rape seed crop does not need irrigation, it could perform high production under normal climate conditions. In the dried year, the lack of water may have a negative impact on its production. Romania's contribution to the EU-27 rapeseed production is very small representing just 1% [4, 5].

Soybean production has registered a continuous decline imposed by the EU interdiction to cultivate genetically modified cultivars. The measure is not justified as long as the EU purchases soybean protein from other countries in order to balance the diminished internal production and this aspect has also a negative impact on food safety [8]. For this reason, in 2009, Romania produced 84.3 thousand tons soybeans by 40% less than in 1990.

**Producer's oilseeds price** has varied from a year to another but in general registered an increasing trend in the period 2001-2009. In 2009, sunflower price reached Euro 0.23/kg (Euro 1= Lei 3.73) being by 82.97% higher than in 2001. In the same year, one kilogram of soybeans was sold for Euro 25, a price by 65.51% higher than in the first year of reference (Table 5).

*Oil seeds price indices* 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.

**Table 5.** Oilseeds Producer’s price, 2001-2009 (Lei/kg)

	2001	2002	2003	2004	2005	2006	2007	2008	2009
<b>Sunflower</b>	0.47	0.66	0.60	0.77	0.72	0.70	0.84	1.12	0.86
<b>Soybean</b>	0.58	0.71	0.71	0.79	0.63	0.57	0.78	0.97	0.96

Source: National Institute for Statistics. Own calculations. No statistical data for rape seeds price

**Table 6.** Oils seeds Price indices (%) 2000=100, 2005=100

	2004	2005	2006	2007	2008	2009
<b>Sunflower</b>	218.1	202.7	99.2	118.3	157.3	118.2
<b>Soybean</b>	214.9	167.1	94.8	124.0	181.5	148.5

Source: National Institute for Statistics. Own calculations. No statistical data for rape seeds price

*Supply Balance* has pointed out the resources and uses, showing the increased production and decreased import, as well as the increasing export and domestic use (Table 7).

**Table 7.** Sunflower, Soybean and Rape Supply Balance (thousand tons)

	2000/2001			2005/2006		
	Sunflower	Soybean	Rape	Sunflower	Soybean	Rape
<b>RESOURCES</b>	778.7	126.5	76.0	1,377.3	323.0	149.3
<b>-Production</b>	720.9	69.5	76.0	1,340.9	312.8	147.6
<b>-Import</b>	57.8	57.0	-	36.4	10.2	1.7
<b>USES</b>	778.7	126.5	76.0	1,377.3	323.0	149.3
<b>-Export</b>	34.6	8.1	73.8	260.8	49.8	130.0
<b>-Stock variation</b>	-4	-	-	-94.7	17.0	-
<b>-Initial stock</b>	4	-	-	672.4	30.0	-
<b>-Final stock</b>	-	-	-	577.7	47.0	-
<b>-Domestic use</b>	748.1	118.4	2.2	1,211.2	256.2	19.3
<b>-Seeds</b>	9.8	6.1	-	4.8	10.0	0.7
<b>-Forages</b>	2.0	6.4	-	1917	14.0	-
<b>-Losses</b>	4.2	1.4	-	20.0	0.2	0.3
<b>-Industrial processing</b>	-	-	-	-	-	18.3
<b>-Transformation</b>	732.1	104.5	2.2	933.0	225.3	-
<b>-Human consumption</b>	-	-	-	61.7	6.7	-

Source: National Institute for Statistics: Reference period I-VII (previous year) – 30 VI (current year)

**Oilseeds trade.** 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. Because of the increased rape seeds in the EU market, Romania's rape seeds export has deeply developed. In the period 2001-2007, it increased by 70 %. The EU regulations regarding the mixture of essence with 2 % ethanol will stimulate Romania's export opportunities. 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 [8].

**Forecast for Oilseeds cultivated area, yield and production, 2012-2015** has been determined based on the achievements in 2009 and annual growth rate calculated for the period 1990-2001 whose values have been the following ones: (a) *for cultivating area*: 3.50% for sunflower, -7.10 % for soybean and 20 % for rape; (b) *for yield*: 27.50% for sunflower, 4.50% for soybean and 2.60% for rape.

In 2015, it is expected as oilseeds cultivated area to reach 2,226.8 thousand ha, of which: 941.7 thou ha sunflower (42.28 %), 31.4 thou ha soybean (1.41%) and 1,253.7 thou ha rape (56.31%). Also, in the same year, it is expected as production per surface unit to reach: 6,156 kg sunflower seeds, 2,247 kg soybeans and 1,582 rape seeds.

In consequence, in 2015, oilseeds production will account for 7,850.9 thou tons, of which 73.83% sunflower seeds, 25.28% rape seeds and 0.89% soybeans (Table 8).

**Table 8.** Forecast for Oilseeds cultivated area, yield and production, 2012-2015

	Achieved 2009	Annual average growth rate (%)	Forecast			
			2012	2013	2014	2015
<b>Cultivated area (thou ha)</b>						
<i>Sunflower</i>	766.1	3.50	849.3	879.1	909.5	941.7
<i>Soybean</i>	48.8	-7.10	39.1	36.3	33.7	31.4
<i>Rape</i>	419.9	20.00	725.5	870.6	1,044	1,253.7
<b>Yield (kg/ha)</b>						
<i>Sunflower</i>	1,433	27.50	2,970	3,786	4,828	6,156
<i>Soybean</i>	1,726	4.50	1,969	2,058	2,150	2,247
<i>Rape</i>	1,357	2.60	1,465	1,503	1,542	1,582
<b>Production ( thousand tons)</b>						
<i>Sunflower</i>	-	-	2,522.7	3,328.2	4,391	5,797.1
<i>Soybean</i>	-	-	76.9	74.7	72.4	70.5
<i>Rape</i>	-	-	1,062.8	1,308.5	1,611	1,983.3

Source: Own calculations

## Conclusions

Romania oilseeds surface is expected to reach 2,226.8 thousand ha in 2015, being by 70.60% higher than in 2009. Important changes will take place in crop structure: rape will pass on the 1<sup>st</sup> position and its share in cultivated area will be 56.30% and sunflower will pass on the 2<sup>nd</sup> place with 42.28%.

Oilseeds production is expected to attain 7,850.9 thou tons in 2015. Sunflower seeds will remain on the 1<sup>st</sup> position contributing by 73.83% to oilseeds production and rape will come the 2<sup>nd</sup> contributing by 25.26%.

As a conclusion, in the coming years Romania will continue to become a more and more important oilseeds producer and exporter in the EU-27.

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