

THE ECONOMIC EFFICIENCY OF FIELD CROPS CULTIVATION IN SOUTH ROMANIA: TRENDS AND ACTIONS FOR IMPROVEMENT

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ABSTRACT: *The South of Romania experiences important climate changes, with important effects over the traditional crops, as wheat, sunflower, and especially maize, affected very negative by the summers' draught. These evolutions led to a diminution of the agricultural farms economic efficiency in this area. Given this situation, the farmers had to introduce new field crops in order to improve the agricultural exploitations profitability. This paper presents an analysis of the evolution in the area cultivated with traditional crops vs. industrial crops and their comparative economic efficiency. Also, the unequal competition with the American genetically modified imports and the commodities' market underdevelopment are pointed out, as the necessary actions to improve the situation of the farmers engaged in traditional crops cultivation.*

Key words: *Efficiency analysis, traditional crops, industrial crops*

JEL codes: *G31*

The South of Romania is the area with the most important agricultural potential of the country; here is concentrated about 45% in total agricultural area. According to the *Romanian Statistical Yearbook*, in 2006, the main crops were: wheat (67% in cultivated area and 65% in national production), maize grains (53% in both cultivated area and production) and sunflower (75% in cultivated area and 77% in national production). This zone, being cultivated over 50% with these crops, was always considered as the main agricultural area of the country. This perception is reinforced because these crops are preponderant in Romanians' consumption. But, the area experiences very draught summers and the specialists in meteorology and climatology have an almost unanimous opinion in qualifying these changes as climate changes. As a result, these crops were affected, and the farmers tend to avoid their cultivation (table 1).

Table no.1

Cultivated area with traditional crops in South Romania (ths. hectares)

Crops Year	2000	2001	2002	2003	2004	2005	2006
Wheat and rye	1315	1726.2	1575.7	1077.5	1394.5	1650.6	1353.4
Barley and two-row barley	171.8	161.4	320.1	117.8	223.9	260.2	154.2
Oats	57.6	51.9	57.2	63.3	60.8	57.2	56.7
Maize grains	1661.3	1523.6	1489.8	1279.6	1767	1345.2	1331.9
Sunflower	692.9	596.1	673.2	907	717.4	688	747.5

Source: Authors' elaboration using data provided by the National Institute of Statistics, Romanian Statistical Yearbook, editions 2001 – 2007.

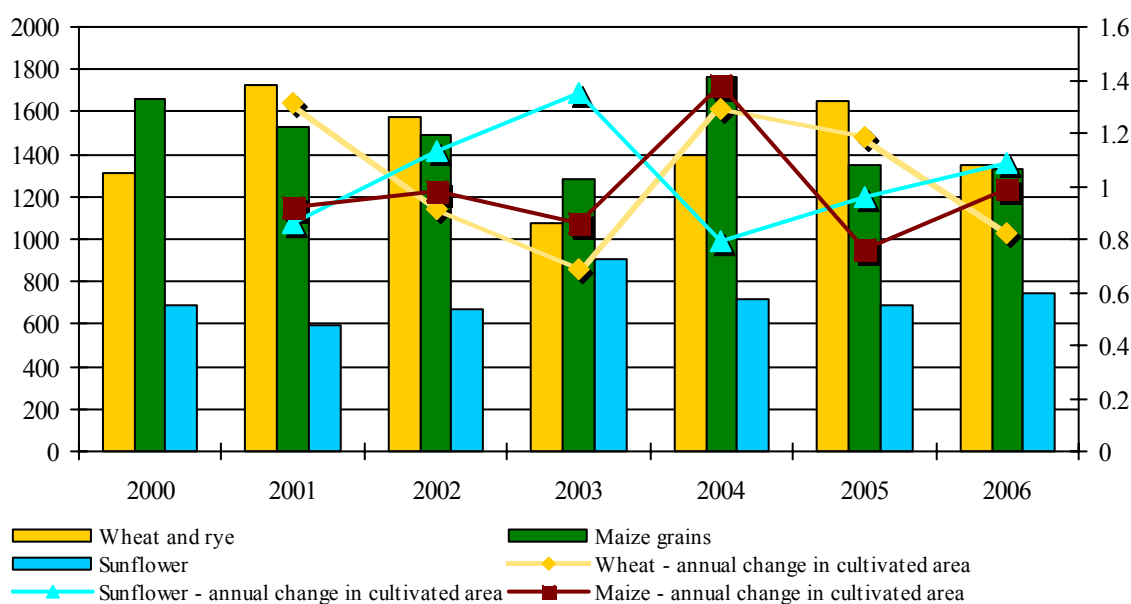


Fig. no. 1 - Cultivated area with traditional crops it's and trends in Romania (ths. hectares)

First, one may observe the diminishing trend of area cultivated the main crops in this area. Except year 2004 the areas cultivated with traditional crops were constantly reduced. This evolution might be explained by the average yields reduction trends (table 2).

Table no.2

Cereals Year	2000	2001	2002	2003	2004	2005	2006
Wheat and rye	2336	2911	1684	1765	3377	2232	2674
Barley and two-row barley	2543	2388	1779	1586	2842	2061	2284
Oats	1445	1829	1269	1258	2365	1805	1784
Maize grains	4280	2856	2595	3853	4741	4148	3533
Sunflower	1388	1085	950	1179	1630	1383	1567

Source: Authors' elaboration using data provided by the National Institute of Statistics, Romanian Statistical Yearbook, editions 2001 – 2007.

These two trends (reduction either of cultivated area and average yields) conducted to a diminution of the total productions of traditional crops (table 3).

Table no. 3

Total production – traditional crops (thousands tones)

Cereals Year	2000	2001	2002	2003	2004	2005	2006
Wheat and rye	3071.8	5025.0	2653.5	1901.8	4709.2	3684.1	3619.0
Barley and two-row barley	436.9	385.4	569.5	186.8	636.3	536.3	352.2
Oats	83.2	94.9	72.6	79.6	143.8	103.2	101.2
Maize grains	7110.4	4351.4	3866.0	4930.3	8377.3	5579.9	4705.6
Sunflower	961.7	646.8	639.5	1069.4	1169.4	951.5	1171.3

Source: Authors' elaboration using data provided by the National Institute of Statistics, Romanian Statistical Yearbook, editions 2001 – 2007.

This trend (that is, the diminution of areas cultivated with traditional crops), might be explained due to diminution trend in average crops. In order to understand the underlying matters of these evolutions, come into focus the necessity of an economic efficiency analysis.

Analysis of economic efficiency

The economic efficiency analysis is based on the costs per area unit (ha) for every crop and the average delivery prices. The costs on the surface area unit (€/ha) are presented in table 4.

Table no.4

Costs on the surface area unit ((€/ha)

Cereals Year	2001⁽¹⁾	2002⁽²⁾	2003⁽³⁾	2004⁽⁴⁾	2005⁽⁵⁾	2006⁽⁶⁾
Wheat and rye	254.3	295.2	281.3	262.3	403.2	454
Barley and two-row barley	214.2	202.5	198.2	188.8	280.3	325.2
Oats	156.4	188.3	175.4	162.3	282.5	335.5
Maize grains	252.1	290.5	274.3	257.0	320.6	405.2
Sunflower	257.6	289.5	272.4	262.5	299.8	405.3

⁽¹⁾ 1€ = 2.6026 RON; ⁽²⁾ 1€ = 3.1255 RON; ⁽³⁾ 1€ = 3.7555 RON; ⁽⁴⁾ 1€ = 4.0532 RON;

⁽⁵⁾ 1€ = 3.6234 RON; ⁽⁶⁾ 1€ = 3.5245 RON.

Source: Authors' field research

This continuous augmentation of cost per hectare was mostly a result of the euro depreciation process deployed especially from 2004 up to 2007. The average delivery prices are shown in table 5.

Table no.5

Average delivery prices for traditional agricultural products (EURO/t)

Cereals	2001	2002	2003	2004	2005	2006
Year						
Wheat and rye	114.84	97.46	134.71	88.82	99.35	96.47
Barley and two-row barley	96.90	83.03	127.94	86.35	96.59	102.14
Maize grains	119.07	88.50	122.83	76.48	85.55	85.12
Sunflower	180.43	212.00	160.77	177.64	198.71	198.61
Soybeans	222.62	227.87	187.88	155.43	173.87	161.73

Source: Authors' elaboration using data provided by the National Institute of Statistics – Romanian Statistical Yearbook 2007.

In efficiency analysis we will consider the yearly mean of cultivated area, the average costs, and the average delivery prices per ha for every crop (table 6).

These results prove the difficult situation of traditional agriculture, based on wheat (with an average of 37% in south Romania area) and maize cultivation. Indeed, one may observe that, the annual wheat fluctuations in average yield conducted to a negative total result. On the other hand, the final result (of 71938.7 ths. €) for the considered crops, covering 3587 thousands hectares, is equivalent with a return of 10,276 thousands € per annum. This result means an annual gain of about 3 € per ha and depicts in a very suggestive manner the inefficiency and the huge potential of area cultivated in present with these crops. That is just the producers' explanation for reduction of the areas cultivated with traditional crops. In fact, the situation of the South Romanian agriculture producers is that they use capitals from other industries which allow them to support this activity, often practiced as a hobby, by persons with a great confidence in the future.

Table no. 6

The efficiency analysis, by crops cultivated in south Romania

Crop	Average cultivated area (th. ha)	Average crop (t/ha)	Average Cost (€ha)	Average Cost (€/t)	Average delivery price (€/t)	Return/ha (€)	Total return (th. €)	Return/t (€)	Rate of return (%)
Wheat	1441.8	2.425	275.4	113.57	105.27	-20.1	-29010.2	(8.30)	(7.31)
Barley	201.3	2.212	197.7	89.38	98.83	20.9	4210.5	9.45	10.58
Maize	1485.5	3.715	271.8	73.16	96.26	85.8	127485.1	23.10	31.6
Sunflower	717.4	1.312	289.5	220.70	188.03	-42.9	-30746.6	(32.67)	(14.8)
TOTAL							71938.7		

(* The negative results are between parenthesis

New trends in field crops

But, in the last years there may be observed a new trend: among the usually crops as field crops begin to be more and more spread some crops which, twenty years ago had a marginal importance, such as: the soybeans (*Glycine max*), the mustard (*sinapis hirta* or *sinapis alba* L.) and the canola (*brassica napus*). All these crops have in common that they are used for industrial purposes and are congenial with the new climate of the area. The evolution of cultivated area with these crops is presented in the table 7 and depicted in the graph 2.

Table no. 7

Cultivated area with energetic crops in Romania (thousands hectares)

Crops Year	2000	2001	2002	2003	2004	2005	2006	2007	2008 ⁽¹⁾
Canola	68.4	82.4	74.6	17.1	49.7	87.8	110.1	340	460
Soybeans	117.0	44.8	71.8	128.8	121.3	143.1	190.8	137	51

Source: Authors' elaboration using data provided by the National Institute of Statistics – Romanian Statistical Yearbook, editions 2000 – 2007; National Institute of Statistics – press release no. 64 / April 1st, 2008 .

⁽¹⁾ Forecast – Ministry of Agriculture

Also, according to the European Commission directions, Romania will replace 5.75% in fossil fuels consumptions used in transportation with bio fuels, up to 2010, equivalent to about 300,000 tones yearly. More, up to the end of the year 2020, the ratio will rise up to 10%. But, for the market operators in this field, to put on the market only a mix of bio fuels and conventional fuels is obligatorily beginning from the summer of the last year. The standards are in a continuous growth, as follows: from the beginning of 2008, the Diesel fuel is delivered with a minimum bio content of 3% volume, and form July 1st 2008, the minimum bio content volume grew to 4%. July 1st 2009 is the starting date for petrol fuel deliveries with a minimum bio content of 4% volume.

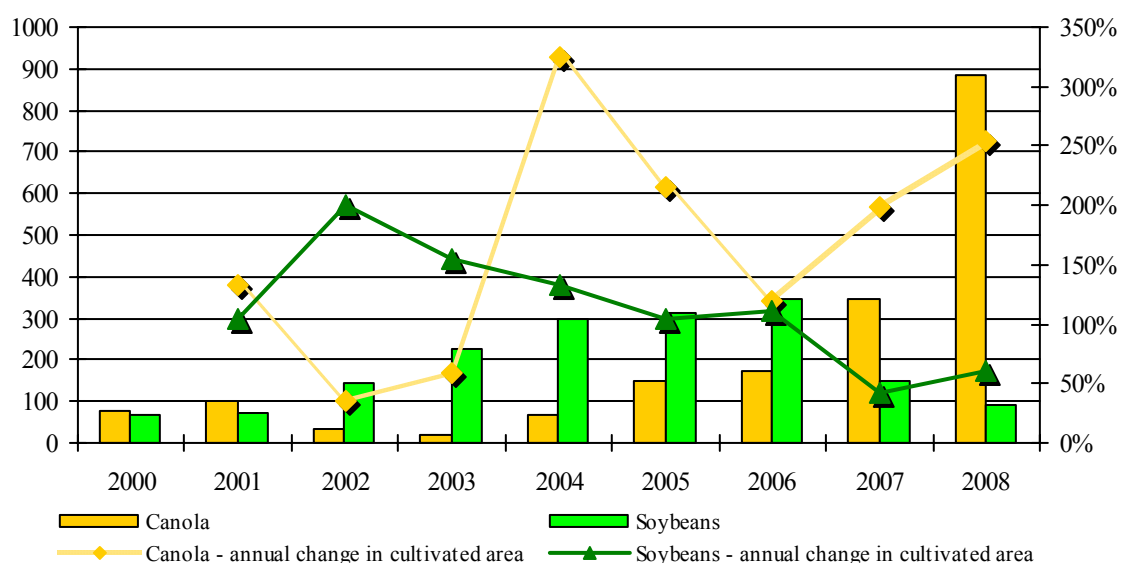


Fig. no. 2 - Cultivated area with energetic crops it's and trends in Romania (ths. hectares)

Following the cultivated area trend, the total productions recorded divergent evolutions: a remarkable growth for canola and an accelerated decrease for soybeans for the reasons above presented (see table 8 and graph 5).

Table no.8

Total production – energetic crops (thousands tonnes)

Year Crops	2000	2001	2002	2003	2004	2005	2006	2007	2008 ⁽¹⁾
Canola	76.1	101.8	35.9	8.1	98.7	147,6	175,1	348	885
Soybeans	69.5	72.7	145.9	224.9	298.5	312,8	344,9	147	90

Source: Authors' elaboration using data provided by the National Institute of Statistics – Romanian Statistical Yearbook, editions 2000 – 2007; National Institute of Statistics – press release no. 64 / April 1st, 2008 .

⁽¹⁾ Forecast – Ministry of Agriculture

Analysis of economic efficiency

The economic efficiency analysis regards the period 2001 – 2007 (due to the lack of some data) being structured on its relevant elements:

- the average yield, presented in the table 8 and in the graph 6;
- the average costs per hectare presented in the table 9;
- the average delivery prices.

Table no. 9

Average production – energetic crops (kg/ha)

Crops Year	2000	2001	2002	2003	2004	2005	2006	2007	2008 ⁽¹⁾
Canola	1113	1235	481	474	1984	1681	1590	2540	1924
Soybeans	594	1623	2033	1746	2462	2186	1807	1073	1765

Source: Authors' elaboration using data provided by the National Institute of Statistics – Romanian Statistical Yearbook, editions 2000 – 2007; National Institute of Statistics – press release no. 64 / April 1st, 2008

⁽¹⁾ Forecast – Authors' elaboration using data provided by Ministry of Agriculture

In the table 9, there are presented the mean costs per ha.

Table no.10

Costs on the surface area unit ((€/ha)

Crops Year	2001 ⁽¹⁾	2002 ⁽²⁾	2003 ⁽³⁾	2004 ⁽⁴⁾	2005 ⁽⁵⁾	2006 ⁽⁶⁾	2007 ⁽⁷⁾	2008 ⁽⁸⁾
Canola	156.4	188.3	175.4	162.3	282.8	315.5	330.2	370
Soybeans	252.1	290.5	274.3	257.0	283.6	324.2	388.1	354.2

⁽¹⁾ 1€ = 2.6026 RON; ⁽²⁾ 1€ = 3.1255 RON; ⁽³⁾ 1€ = 3.7555 RON; ⁽⁴⁾ 1€ = 4.0532 RON; ⁽⁵⁾ 1€ = 3.6234 RON; ⁽⁶⁾ 1€ = 3.5245 RON; ⁽⁷⁾ 1€ = 3.3373 RON; ⁽⁸⁾ 1€ = 3.6389 RON (2008: Jan. 1st – Sept, 30th).

Source: Authors' field research

Table no.11

Average delivery prices for energetic agricultural products (EURO/t)

Crops Year	2001	2002	2003	2004	2005	2006	2007	2008
Canola	188.3	264.0	259.5	261.3	288.2	299.7	227	397.2
Soybeans	222.6	227.9	187.9	155.5	173.9	161.7	221.3	227.3

Source: Authors' elaboration using data provided by the National Institute of Statistics – Romanian Statistical Yearbook 2007

Table no.12

The efficiency analysis, by industrial crops cultivated in south Romania

Crop	Average cultivated area (th. ha)	Average crop (t/ha)	Average Cost (€/ha)	Average Cost (€/t)	Average delivery price (€/t)	Return per ha (€)	Total return (th. €)	Return per t (€)	Rate of return (%)
Canola	152.7	1.4469	247.6	171.12	273.2	147.7	22552.7	102.08	59.65
Soybeans	111.1	1.6898	303	179.31	197.3	30.4	3377.2	17.99	10.03
Mustard^(*)	320 ^(**)	1.428	175.6	122.97	486	518.4	165.890	363.03	295.22

^(*) Source: Authors' field research

^(**) Hectares

^(***) Euro

There are remarkable rates of return: this has to be the explanation for the important producers tends to get the sense of occasion, especially in terms of profit. The limited area for industrial crops cultivation (e.g.: the mustard is not mentioned in statistical yearbooks) is due to specific harvesting requirements which make that these crops to be suitable if the cultivated area per emplacement exceeds 50 hectares. These areas are available only in the case of holdings or of the associative structures for land use. Given the mean dimension of South Romanian agricultural exploitations, of about only 2 ha, this kind of farms is not very often met. But, if the oil price remains at quotations over 100USD/barrel, this will give the producers the momentum to associate and the cultivated area with these crops will grow.

There are some concerns among specialists and researchers about the risk that the areas cultivated with cereals to become insufficient, given the exponential growth of the area cultivated with industrial crops, generally, and with energetic crops, especially. In 2007, at the Agriculture Payments and Intervention Agency (APIA), there were applications for subsidies only for 148.3 hectares with energetic crops; this area represents only 1.6% in total Romanian arable area (9.4 million ha). This is still a much reduced ratio and demonstrates that the cereals production for food is not affected by the crops having as final destination bio diesel or bio ethanol production. In fact, the main menace remains the much reduced productivity per ha, which determines losses for many producers. The breakeven production point is 1,500 kg per hectare cultivated with canola. Given the serious draught of the year 2007, the average national production was of only 1,035 kg per hectare. From this point of view, there is an important risk coming from the producers which tend to use the land preponderant extensive; this approach might conduct to diminishing areas cultivated with cereals. For those producers which ensure an intensive use of the land, there is an elevated profitability potential, because the average cost per hectare for canola is about 370 €, respecting all the control tag. This may ensure an average production of 2,000 – 2,500 kg/hectare, ensuring a return of about 550 – 670 € per hectare.

As there is mentioned above, the increasing trend of the areas cultivated with industrial crops, may be explained as an effect of the low yields which determines low levels of efficiency.

On the other hand, the agricultural products are in an unequal competition with the genetically modified (GM) products from United States and Brazil. The producers' associations are tend to see such crops as a way of efficiency growth. In fact, some of the most fervent supporters of the GM crops in Romania, recognize that the efficiency growth would appear not particularly in terms of average yields (especially if refers to the tested varieties), but rather in terms of pesticide consumption (for instance, the maize MON 810 produces by itself a pesticide which kills one of its pests, making the specialists to wonder if the obtained corn is not itself a pesticide). We do not

intend to enter in this unfinished debate, but recent studies prove that, even the GM plants are very resistant to some pesticides, unsupportable for any other plant (the producers usually “forget” to mention that the herbicide resistant character of a GMO is uniquely specified, that is, this herbicide resistance is manifested only at the herbicide which has been produced by the transgenic seeds company [7]), these pesticides have a high degree of toxicity and conduct to some weeds mutation apparition [7]. To control herbicide resistant weeds, there are necessary new mixes of pesticides, in growing amounts, implying increasing risks for consumers and environment. It seems that, *in case of consumption for a long time of GM corn, there are some evil influences over human health, conducting to diminished weight of kidney, an increase in liver weight and could raise the level of blood fats with 40%*, after one of the most famous specialists in the field of the molecular biology, the French Gilles-Eric Séralini. This was the carry weight argument for France in the decision to absolute suppression the cultivation of this corn variety. Regarding Romania, even the Ministry of Agriculture banned the cultivation of GMO, there were press information, in May 2008 which tried to accredit that the cultivated area with GM corn would be of 500,000 ha. [1] But, this information was promoted just during the spring sowing period, so it can be assigned to the powerful lobby played by the producers of such seeds. Romanian has an important Community position on the maize market (the biggest area cultivated with corn and the third producer, after France and Italy), and in the in preceding years the national authorities had difficulties in the field of GMO traceability assurance. Moreover, giving the contamination risk of near crops through the pollination (far bigger than in the case of soybeans), we consider that the economic loses are uncounted, because the future possibilities for ecological agriculture will be definitely compromised. [2].

Another factor which turns the producers to alternative crops is the underdevelopment of the regional commodities markets. The absence of such a market makes difficult for the majority to have a transactions guide. If the American commodities markets might be considered such a guide, the Anglo-Saxon measurement system used on these markets represents, generally, an important drawback. This market underdevelopment determines regional prices are often lower than those of the American commodities markets (tables 5, 10 and 12). This price difference might be widely attributed to the transport costs, with made these markets inaccessible to above mentioned products. In table 12, there are presented the mean quotations in 2004 and 2008 (in these two years there were recorded maximal average quotations in the last decade) for some of most traded commodities at Chicago Board of Trade (CBOT).

There is obviously that these quotations are, more often than not, more elevated than the average delivery prices on the Romanian market in the same periods. But, these quotations refers to American crops obtained usually by the genetically manipulation techniques, with great yields and reduced costs.

Table no.13

Average quotations of agricultural products in 2004 and 2008 (CBOT)

Commodities Year	2004 (€/bu)	2008 (€/bu)	Kg/b u	Bushel /t	2004 (€/t)	2008 (€/t)
Wheat	350 ⁽¹⁾	850	103. 5	202.8	113.7	202.8
Barley	205 ⁽²⁾	240	81.4	71.6	89.0	71.6
Maize grains	250	600	79.2	140.6	79.2	153.4
Canola	400 ⁽³⁾	600	133. 1	171.8	133.1	171.8
Soybeans	750	1370	221. 9	326.9	221.9	326.9

⁽¹⁾ August 2002 – July 2004; ⁽²⁾ Year 2002; ⁽³⁾ July 2002 – May 2004.

Source: Authors' elaboration using data provided by www.cbot.com and www.bnro.ro

As a consequence, in order to ensure the reduction trend of growing areas cultivated with energetic crops and the efficiency improvement for the traditional crops oriented exploitations, we consider necessary directed efforts to ensure the activation of the Romanian Commodities Market in Bucharest and turn it in a powerful regional cereals market. These efforts have to come from the producers' associations and of all the interested forces (adjacent industries, even the Government) in correct prices settlement of the agricultural products.

Fortunately, from the field researches resulted that the producers, no matter the dimension, are very connected to the traditional crops, and they cultivate industrial crops only in a limited ratio, of about 10 – 15%, and these crops are seen only as a way to balance the high expenses and the reduced delivery prices of the traditional products.

Concluding, the energetic crops cultivation is an efficient way of Romanian arable land use in nowadays conditions. To avoid future restrictive measures against these crops proliferation, instead of the traditional ones, we consider as necessary the limitation of GM products imports, only for energetic purposes and under a strictly supervision, the creation of a powerful regional cereals market, and using a coherent mix of governmental policies, which may facilitate the continuity of traditional crops, ensuring the national food safety.

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