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ORGANIC CROPS' ECONOMIC EFFICIENCY BASED ON A CASE STUDY FROM THE CĂLĂRASI COUNTY

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Abstract

The development of organic agriculture in the past years has placed Romania among the first 25 countries that have cultivated areas under organic systems. In this field, there are over 9 thou producers, with over 500 thou hectares. In the Călăraşi County, in 2010 were only 19 authorized operators. On the basis of field observations, we generated technological and economic charts for the budgets of five different crops: wheat, sunflower, maize, lucerne and peas. For each crop we will monitor the input quantities, yield, costs and prices and we will calculate crop budgets finalised with efficiency rates, which will be compared to the budget forecasts for conventional agriculture. This paper aims at showing that organic crops are economically more efficient than the crops obtained within conventional agriculture, while their yield per hectare is lower.

Key words: *organic agriculture, efficiency rate*

INTRODUCTION

The area under organic cultivation in Romania has increased in the last years, reaching almost 568 thou hectares in 2011. The number of registered operators reached over 9 thou, over 50% of which were concentrated in the Suceava and Bistrita-Năsăud Counties. In the Călărasi County the area under organic cultivation in 2010 had the following characteristics: 6.4 thou ha; 19 operators; four operators over 700 ha with 70% of total area. The sector been increasing continuously due to the implemented support measures but the important issue is that the majority of ecological farms are subsistence farms with under 20 ha. In these circumstances, the purpose of the present paper is to present the economic efficiency achieved by a 700 ha farm in the 2007-2010 interval.

MATERIAL AND METHOD

The research was conducted in an organic farm of over 700 ha in the Călărasi County in the interval 2007-2010 and on the basis of the field observations we created technological charts and economic budgets for five crops: wheat, sunflower, maize, lucerne and peas [1]. In our approach we monitored input quantities, yield, costs and prices and calculated crop budgets finalized with efficiency rates that were compared to budget forecasts for conventional agriculture.

RESULTS AND DISCUSSIONS

SC Auger Petrus SRL is the fourth largest producer of organic crops in the Calarasi County in terms of cultivated area. The company had a number of 42 plots in place in the interval 2007-2010. The company policy in this interval was to ensure the proper rotation of crops and provide rest periods for land restoration. This policy was implemented in a model of cultivating the land which provided profitability even under drought conditions.
The company opted for the permanent cultivation of five main crops: wheat, corn, sunflower, peas and lucerne. These crops were grown on about 80-90% of the total certified organic area. Also, some crops such as barley and soybeans were cultivated as a necessity of crop rotation so as to ensure higher productivity and a range of crops such as potato, mustard and fenugreek were grown for experimental purposes.

Table 1. Cultivated organic area during the inteval 2007-2010

Crops	2007	2008	2009	2010
Potato	1		0.75	
Sunflower	304.07	184.3	221.2	249.82
Wheat	164.19	342.6	264.18	298.06
Lucerne	38.58	86.7	82.95	29.6
Peas	73.23	14.57	21.85	58.04
Maize	139.22	96.08	125.43	96.8
Beans	11.76	94.94		
Barley			103.36	20.65
Soybeans		18.2	26.6	27
Fenugreek		4.3	0.75	
Medicinal plants		1		
Vetch				0.75
Mustard	20.73			
Oats	35			
TOTAL, of which :	787.78	842.69	847.07	780.72
Main crops (5)	719.29	724.25	715.61	732.32
%	91,31	85,95	84,48	93,80

The rotation model used by the company for the five main crops was as follows:

Table 2. The rotation patterns for the main five crops during the interval 2007-2010

Type	Years			
4-year model	I	II	III	IV
1	Maize	Wheat	Wheat	Sunflower
2	Maize	Wheat	Sunflower	Peas
3	Wheat	Wheat	Maize	Wheat
4	Peas	Wheat	Maize	Wheat
5	Sunflower	Sunflower	Maize	Wheat
6	Sunflower	Maize	Wheat	Wheat
7	Peas	Wheat	Wheat	Sunflower
8	Lucerne	Lucerne	Lucerne	Wheat
3-year model	I	II	III	
1	Maize	Wheat	Sunflower	
2	Sunflower	Lucerne	Lucerne	
3	Maize	Maize	Wheat	

To highlight the economic efficiency of organic crops, we calculated the main efficiency indicators for five crops (wheat, sunflower, maize, lucerne and peas) for the interval 2007-2010, and we made a comparison with the estimated values for the same crops but grown in conventional systems. Note that for the years 2006 and 2007, the estimated budgets for sunflower, peas and maize were for irrigated systems. Under these circumstances, we noticed for starters that wheat and lucerne crops yields per hectare were lower in the ecological system than those obtained in the conventional one. For maize, sunflower and peas the yields obtained were higher, even without irrigation.

Wheat efficiency

The wheat gross margin obtained in the ecological system was higher in 2007 and 2008, responding well in drought conditions (2007) due to a higher amount of nutrient and treatments per hectare. In 2009 and 2010, taking into consideration that the input quantities used increased and the yields per hectare were lower, the ecological efficiency rates were lower than the rates obtained in the conventional system.

Table 3. Wheat main indicators during the interval 2007-2010

Indicators	UM	2007	2008	2009	2010
Average yield	kg/ha	3500	4500	3700	3500
Unit cost	lei/to	737.7	636.7	788.7	894.3
Unit price	lei/to	850.0	850.0	900.0	1000.0
Specific consumption					
Diesel fuel	l/ha	128.5	128.5	128.5	128.5
Phosphate rock	kg/ha	300	300	300	300
Seed	kg/ha	300	300	300	300
Treatments	kg/ha	5	5	6	6
Electricity	Kw/ha	45	45	45	45
Technological expenses					
Total expenses	lei/ha	2486.9	2770.4	2823.4	3035.0
Mechanical work	lei/ha	1095.0	1181.0	1181.0	1181.0
Share	%	44.0	42.6	41.8	38.9
Manual work	lei/ha	130.0	130.0	130.0	150.0
Share	%	5.2	4.7	4.6	4.9
Raw materials and supplies	lei/ha	1261.9	1459.4	1512.4	1704.0
Share	%	50.7	52.7	53.6	56.1
Budget indicators					
Gross margin	lei	523.1	1089.6	541.6	520.0
Return rate	%	12.8	28.1	11.8	9.9
Conventional farm indicators					
Average yield	kg/ha	5000	5000	5000	5000
Gross margin	lei	774.9	1247.4	1162.0	1497.4
Return rate	%	9.6	14.6	14.5	12.6

Maize efficiency

Maize responded unfavourably in terms of gross margin and profit rate in the analyzed interval. Without irrigation, the efficiency obtained is seven times lower than in conventional agriculture. Along with the increasing amounts of fertilizers and treatments and the use of irrigation, the production per hectare obtained increased, allowing to obtain a return rate of 27.1% in 2010 compared to the return rate in conventional agriculture (10.6%).

Table 4. Maize main indicators during the interval 2007-2010

Indicators	UM	2007	2008	2009	2010
Average yield	kg/ha	5500	7500	7000	7000
Unit cost	lei/to	305.8	484.4	578.7	657.8
Unit price	lei/to	350.0	500.0	700.0	870.0
Specific consumption					
Diesel fuel	l/ha	80.5	130.5	180.5	180.5
Phosphate rock	kg/ha	250	300	300	300
Seed	kg/ha	25	25	25	25
Treatments	kg/ha	2.5	2.5	2.5	2.5
Technological expenses					
Total expenses	lei/ha	1587.1	3537.7	3955.7	4509.9
Mechanical work	lei/ha	954	1684	1704	1904
Share	%	60.1	47.6	43.1	42.2
Manual work	lei/ha	50	520	520	540
Share	%	3.2	14.7	13.1	12.0
Raw materials and supplies	lei/ha	583.1	1333.7	1731.7	2065.9
Share	%	36.7	37.7	43.8	45.8
Budget indicators					
Gross margin	lei	292.9	637.3	1369.3	2025.1
Return rate	%	12.1	2.7	17.6	27.1
Conventional farm indicators					
Average yield	kg/ha	4000	6000	6000	6000
Gross margin	lei	611.2	1354.3	1890.5	1888.3
Return rate	%	4.8	19.7	17.8	10.6

Table 5. Sunflower main indicators during the interval 2007-2010

Indicators	UM	2007	2008	2009	2010
Average yield	kg/ha	2500	3000	2000	2000
Unit cost	lei/to	642.5	903.4	1336.8	1390.8
Unit price	lei/to	800.0	1200.0	1500.0	1800.0
Specific consumption					
Diesel fuel	l/ha	80.5	132.5	132.5	132.5
Phosphate rock	kg/ha	0	300	300	300
Seed	kg/ha	170	170	170	170
Treatments	kg/ha	0	2.5	2.5	2.5
Technological expenses					
Total expenses	lei/ha	1511.2	2615.3	2578.6	2686.6
Mechanical work	lei/ha	670	1130	1130	1130
Share	%	44.3	43.2	43.8	42.1
Manual work	lei/ha	460	460	460	460
Share	%	30.4	17.6	17.8	17.1
Raw materials and supplies	lei/ha	381.2	1025.3	988.6	1096.6
Share	%	25.2	39.2	38.3	40.8
Budget indicators					
Gross margin	lei	853.8	1349.7	786.4	1278.4
Return rate	%	20.6	27.6	10.3	24.7
Conventional farm indicators					
Average yield	kg/ha	1600	2200	2200	2200
Gross margin	lei	450.2	688.1	860.1	1349.6
Return rate	%	6.1	9.8	10.8	10.6

Sunflower efficiency

Sunflower is also a crop that has responded very well to organic cultivation even without irrigations. The gross margin per hectare obtained in 2008 was almost twice as much as the one achieved in conventional agriculture.

Table 6. Peas main indicators during the interval 2007-2010

Indicators	UM	2007	2008	2009	2010
Average yield	kg/ha	3500	4000	2500	3000
Unit cost	lei/to	521.7	639.4	1068.9	956.8
Unit price	lei/to	600.0	750.0	1200.0	1200.0
Specific consumption					
Diesel fuel	l/ha	63	114.5	119.5	124.5
Phosphate rock	kg/ha	0	200	250	300
Seed	kg/ha	500	290	290	290
Treatments	kg/ha	2.5	2.5	2.5	2.5
Technological expenses					
Total expenses	lei/ha	1731.0	2462.7	2577.2	2775.5
Mechanical work	lei/ha	677	1102	1172	1172
Share	%	39.1	44.7	45.5	42.2
Manual work	lei/ha	90	90	90	90
Share	%	5.2	3.7	3.5	3.2
Raw materials and supplies	lei/ha	964.0	1270.7	1315.2	1513.5
Share	%	55.7	51.6	51.0	54.5
Budget indicators					
Gross margin	lei	364.0	532.3	417.8	819.5
Return rate	%	12.6	14.5	10.3	21.3
Conventional farm indicators					
Average yield	kg/ha	3000	4000	4000	4000
Gross margin	lei	650.0	592.9	719.5	1123.3
Return rate	%	8.8	7.4	6.6	7.2

Lucerne efficiency

The lucerne yield per hectare was very low compared to forecasts for conventional agriculture, but the return rates were higher each year.

Table 7. Lucerne main indicators during the interval 2007-2010

Indicators	UM	2007	2008	2009	2010
Average yield	kg/ha	12000	13000	14800	16000
Unit cost	lei/to	500.5	474.0	441.9	452.5
Unit price	lei/to	600.0	630.0	650.0	700.0
Specific consumption					
Diesel fuel	l/ha	146	146	146	146
Phosphate rock	kg/ha	400	400	400	400
Seed	kg/ha	20	20	20	20
Treatments	kg/ha	2	2	2	2
Technological expenses					
Total expenses	lei/ha	5911.5	6066.5	6445.6	7145.7
Mechanical work	lei/ha	3300	3190	3585	3689
Share	%	55.8	52.6	55.6	51.6
Manual work	lei/ha	350	300	350	350
Share	%	5.9	4.9	5.4	4.9
Raw materials and supplies	lei/ha	2261.5	2576.5	2510.6	3106.7
Share	%	38.3	42.5	39.0	43.5
Budget indicators					
Gross margin	lei	1543.5	2328.5	3429.4	4309.3
Return rate	%	16.7	27.7	39.5	45.9
Conventional farm indicators					
Average yield	kg/ha	25000	25000	25000	25000
Gross margin	lei	897.6	1376.5	1412.6	1512.6
Return rate	%	13.5	24.4	23.9	26.6

CONCLUSIONS

The organic crops are generally more efficient than the crops under conventional farming but the yields obtained per hectare are lower. The situation is specific to a 700-hectare farm in the Călărasi County that observed the crop rotation and implemented at the farm level a management system that aimed at increasing soil fertility and plant quality.

The principal characteristics observed are:

- the applied technologies undergo very few changes;
- the modifications in technologies concern the specific consumption of seed, fuel, phosphate rock and treatment substances;
- the irrigations were introduced gradually during the analysed interval.

The main conclusions that result from the research are:

- Wheat crop: return rate between 9.9-28.1%; over 50% of expenses are raw materials and supplies expenses; the gross margin is 0.5 thou lei per ha;
- Maize crop: return rate between 2.7-27.1%; over 45% of expenses are raw materials and supplies expenses; the gross margin is 2.0 thou lei per ha;
- Sunflower crop: return rate between 10.3-27.6%; over 42% of expenses are mechanical work expenses; the gross margin is 12.8 thou lei per ha;
- Peas crop: return rate between 10.3-21.3%; over 54% of expenses are raw materials and supplies expenses; the gross margin is 0.8 thou lei per ha;
- Lucerne crop: return rate between 16.7-45.9%; over 50% of expenses are mechanical work expenses; the gross margin is 43.1 thou lei per ha.

The main conclusion that we reach following our research is that even with a lower yield, the organic crops obtain a higher return rate and therefore better efficiency than those obtained in conventional agriculture.

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