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COMPARATIVE LABOR FORCE ANALYSIS IN CONVENTIONAL AND ECOLOGICAL AGRICULTURE – OLEAGINOUS PLANTS

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Summary: *This paper seeks to analyse from a comparative point of view the efficiency of the use of manual labour as well as the mechanized works in the cultivation of oil plants in order to obtain profit and the profitability of this activity from the point of view of conventional and ecological crops. The main source of data to be analysed in this paper was the technical reports submitted by the Research Institute for Agriculture Economy and Rural Development through the ADER 13.1.2 project to the Ministry of Agriculture and Rural Development, data referring to the technological value of the three crops (sunflower, rape, soybean) but also with reference to the income and expenditure budget. These data are calculated per unit area and one hectare respectively. Finally, the efficiency of the use of resources, namely labour and mechanized works, will be analysed according to the crop system to see whether the transition to sustainable agriculture is economically viable.*

Keywords: *labour productivity, oil plants, conventional, ecological*

JEL Classification: *Q12*

INTRODUCTION

It is more and more common to say that the labour force in agriculture is getting smaller and aging because of the exodus of young people in the country, but not only. Thus, it can be considered that this resource is becoming more and more valuable but also more expensive.

Regarding the two systems of agriculture, namely the conventional and the ecological ones, one can discuss very many themes on these systems, regarding the advantages and disadvantages. Among the technological differences between the two types of agriculture can be mentioned the degree of utilization of the labour force. This is at a higher level in organic farming than in the conventional one, since not all mechanized works in the conventional way can be done in an environmentally friendly way, and thus the manual labour force intervenes.

By presenting these two issues, is a question of research being developed, ie economically efficient as a farmer, going to organic farming, taking into account the high level of labour force and the related costs?

For this, the level of labour force required and the related costs, as well as the total expenditure and income of oil crops, both in conventional and ecological systems, will be presented.

The importance of oil crops can be revealed in many aspects, both technically and economically, some examples may be: From the total area cultivated in the agricultural sector, it is estimated according to the National Institute of Statistics that almost 85% is cultivated with two large product groups, cereals, and oily plants. On average, over the past 10 years, a little over 65% of the area cultivated with the main crops is owned by the cereal group, and about 18% is owned by the oil plants. However, for oleaginous plants there is an increasing trend, in 2007 their area had a weight of 17.23%, and in 2017 this weight was 21.26%. In addition to this finding, it is also important to specify the usefulness of the product, both the first and the processed, but also their positive characteristics for animals, humans and the environment. From the other point of view, the economic one can analyse the value of agricultural production for the two product groups, namely grains and oily plants. According to the NIS, the value of cereal production at the producer price has increased since its accession to the European Union, about 3 times in the last year worth about 15.5 billion lei. In the case of oil products, the value of production at producer price increased much more in 2016, it was 6.3 times higher than in the reference year 2007, but the value retains the proportion of cultivated areas of 5, 5 billion less than grain. In 2007, of the total value of the vegetal

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production, about 19% was owned by the cereal group and only 3% of the oil crops in the last analysed year both increased, but not by the same trend, so the group of cereals represented 34, 3% and oilseeds 12.1%.

MATERIAL AND METHOD

The main data analysed in this study refers to the technology of oilseed crops (sunflower, rapeseed and soybean) as well as the income and expenditure budgets related to these technological devotes for the agricultural year 2016-2017. These data were taken from the technical reports of the ADER 13.1.2 project contracted by the Research Institute for Agriculture Economy and Rural Development.

In order to highlight the differences, advantages and disadvantages between the two systems of agriculture, respectively conventional and ecological, regarding the allocated resources, the labour force and the obtained income, a comparative analysis of both technical and economic indicators was made.

RESULTS AND DISCUSSIONS

As described above, we used indicators from the income and expenditure budget, but also from the technological value of the three large types of oil plants cultivated in Romania. Thus, for both conventional agriculture and organic farming, we have analysed comparatively indicators such as: production, production value, production costs, manual and mechanized labour costs, labour consumption, labour productivity, profit and rate of return.

Taking into account the agricultural year 2016-2017, a comparative analysis of the previously presented indicators for oily crops was carried out in a conventional and ecological system.

Table 1. Comparative analysis of the economic efficiency of oilseeds

Specifications	UM	Sunflower		Rape		Soy	
		CONV	ECO	CONV	ECO	CONV	ECO
Production	kg/ha	2500	2000	2500	1700	3000	1500
Value of production	RON/ha	3225	2720	3727.5	2920.6	4005.0	2547.0
Production Expenses	RON /ha	3121.5	2652.1	3714.8	3021.5	4625.3	3543.7
Labour costs	RON /ha	51.5	199.6	70.2	355.8	115.2	195.4
Expenditure on mechanized works	RON /ha	1478.8	1274.8	1585.2	1189.5	1734.0	1408.3
Labour consumption	ore-om/ha	18.1	35	21.9	56.5	28.8	37.1
Labour consumption	ZO/ha	2.3	4.4	2.7	7.1	3.6	4.6
Labour productivity (physics)	ore-om/tonă	7.2	17.5	8.8	33.2	9.6	24.7
Labour productivity (of value)	RON/ore-om	178.2	77.7	170.2	51.7	139.1	68.7
Gross profit	RON /ha	103.5	67.9	12.7	-100.9	-620.3	-996.7
Rate of return	%	3.3	2.6	0.3	-3.3	-13.4	-28.1

Source: Project ADER 13.1.2

Comparative analysis of sunflower crop

Analysing from the point of view of the differences between conventional agriculture and organic farming, we can determine the absolute differences for sunflower crops. The yield from cultivating one hectare of sunflower was higher by 500 kilograms per hectare for conventional agriculture, as it is well known that organic farming has lower yields. Regarding the value of production, this is higher in the conventional system with 505 lei per hectare. As you can see, the expenses are lower than the value of production in both cases, but those in the conventional system are higher by about 470 lei.

By reaching the labour costs one can notice significant differences between the two systems of culture, so the ones recorded in the ecological system are higher by 148 lei per hectare

than the conventional one, given that, as will be possible see later, the need for manual labour is higher.

Expenditure on mechanized works is higher in the conventional system than in the organic one, by 204 lei per hectare. Labour consumption is almost double in the ecological system than conventional, ie a difference of 16.9 hours per person per hectare or 2.1 days.

As far as labour productivity is concerned, both physical and value, it is noted that the physical one is larger in the ecological system, which means that for a ton of sunflower it takes several hours-man and the productivity value is more large in conventional system, with about 100 lei per hour.

The gross profit obtained from one hectare of sunflower was higher for the conventional one by 35.6 lei per hectare. Both rates of return are positive, but they are higher for the conventional system.

Comparative analysis of rape crop

Conventional rapeseed production increased by 800 kg per hectare compared to the organic one, so even if the recovery price is higher for the organic product, there is a constant difference of about 807 lei between the values of the production in conventional to organic.

The expenditure gap is of 693.3 lei, between the conventional and the ecological cultures, but it should be noted that the level of the ecological expenses exceeds that of the revenues. As expected, labour costs are higher for the organic system, with respectively 285 lei per hectare, given that the level of labour consumption is significantly higher, with 34.6 hours per person per hectare or respectively 4.3 days. It can be appreciated that the differences in the manual labour force are compensated by the reduction of the expenditures for the mechanized works, which are higher for the conventional system by 396 lei per hectare.

As far as labour productivity is concerned, there is an absolute difference for the physical one, of 24.5 hours per person per ton, given the high consumption of manual labour, and for the value of the difference is in favour of the conventional system with 1185.5 lei per hour.

It can be noticed that the gross profit is low in conventional system (13 lei per hectare), and in the ecological system there is a loss of 100 lei, for a production of 1.7 tons per hectare. Thus, the rate of return on the conventional system is very low by only 0.3% and the one for the ecological system is negative, ie -3.3%.

Comparative analysis of soybean culture

As regards the third oleaginous crop and soybean, there can be noticed a difference between the yields of 1,500 kg / ha, the organic one being half that of the conventional one, and this difference is estimated to be a difference in income of 1458 lei per hectare, and in terms of total expenditures they are above the income level for both crop systems, with a difference of 1082 lei per hectare.

The labour costs are higher in the ecological system with 80.2 lei per hectare and the ones for mechanized works are higher in the conventional system with 325.7 lei per hectare. Thus the labour consumption is higher in the ecological system with 8.3 hours-man, ie a little over a day.

The productivity of soybean work is similar to the others, meaning that there are more man-hours per ton of organic soybean, and higher labour productivity for the conventional system.

For both crops, a loss for soybean culture was estimated for 2017, respectively 620 lei for the conventional system and 997 lei per hectare for the ecological system. Profitability rates were negative, ie -13.4% and -28.1%.

For a complete comparative analysis, the relative differences between the two crop systems, respectively conventional and ecological, were determined for oil plants, in order to determine the labour and resource requirements and the influence on the economic efficiency.

Figure 1. Comparative analysis of relative differences between oil plant culture systems



Source: data processed on project ADER 13.1.2

Analysing the relative differences between the two systems of olive plant culture, the main technical-economic indicators, in the crop year 2016-2017, the following can be appreciated.

For sunflower, organic production is 20% less than conventional and 15.66% less, so you can see from the start a different price for the two outputs. The difference in expenditure is similar to income, so spending on organic production is lower by 15.04%. Labour costs are higher in the organic system of 3.87 times those in the conventional system, but the physical labour consumption is only 93.37% higher in ecological (ie approximately 2 times). Expenditure on mechanized works is lower in the organic system by 13.79% compared to the conventional one. Productivity of work expressed in physical units is considered to be weaker in the organic system, requiring 2.4 times more hours per person per ton of product and the value is also weaker because the value a man produces in one hour it is 56% less in the ecological system. The relative difference between gross registered profits showed that in the organic system a profit was achieved 34.4% lower than in a conventional system and the rate of profitability was 22.78% lower.

For rape crops, the production obtained in the organic regime was lower by 32%, for which the value was lower by 21.65%. Total spending was lower for the eco-system by 18.6%. But those with the labour force were higher in this culture system 5 times, for a 2.6 times higher physical labour consumption. Those with mechanized work were smaller by only 25%. In terms of labour productivity, it took about 3.8 times more hours of work to get a ton of rapeseed for the eco-system, and 69.6% less lei obtained by providing a man-hour for work. Given that for the conventional system the gross profit is slightly above zero, and for the ecological system this is negative, the relative difference is high, the profit in the ecological system being less than about 10 times, and there is a similar difference for the rate of profitability.

For the last analysed oily crop, ie soybeans, there is a difference of 50% in production compared to the ecological system, with a difference of 36.4% in this production. Total spending on organic farming is 23.4% lower than for the conventional system, but labour-related expenditure is 69.6% higher, with 28.8% physical labour consumption higher, and those related to mechanized works are lower in the ecological system by 18.8%. Labour productivity is negatively affected by this higher consumption of organic workforce, so one tonne of soy is obtained with a man-hours contribution greater than 2.5 times, and the value is 50% higher little by hour. For the gross profit indicator, there is actually a loss for both production systems, but the one recorded for the eco system is 60% higher and the rate of profitability is 2.1 times lower.

CONCLUSIONS

In this paper, a comparative analysis of the conventional and organic farming systems for oil plants (sunflower, rape, soybean) was approached in the agricultural year 2016-2017, based on the results of the ADRE 13.1.2 project related to the estimate technologically and the income and expenditure budget for each of the listed crops.

It was desirable to analyse from the point of view of economic efficiency the opportunity to move from conventional agriculture to organic farming, given the additional consumption of certain resources which are increasingly difficult to find in rural areas, or in the agricultural sector, with reference in particular to manual labour.

It can be seen that the production obtained for organic oil plants is less, by 20% to 50%. The revenue and expenditure on these productions maintains the trend of the latter. Although the relative differences between the two labour cost systems are quite large, looking at the absolute differences, the situation changes, in the sense that, assuming that there is this resource, the extra difference that the farmer has to pay organic farming, the difference in the cost of mechanized works that are lower in this system is offset. Thus, if the reduction of the labour force was not a social problem, from an economic point of view, the shift from conventional agriculture to organic farming would not negatively influence the activity of the farm with regard to labour costs.

We can conclude that the economic efficiency of organic crops is lower than that for conventional oil crops in the crop year 2016-2017, given the level of production, which is quite different between these two systems, and the level of the pricing price that does not have much influence value of production between these two systems.

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