

Petre, Ionut Laurentiu

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# ANALYSIS OF THE RENTABILITY OF THE SUNFLOWER PRODUCTION SYSTEM – NON IRRIGATED OR IRRIGATED

PETRE IONUȚ LAURENȚIU<sup>1</sup>

**Summary:** *Although it is still argued that crop irrigation brings higher yields and higher incomes, it does not always take into account the costs of these additional works. Thus, there may be some cases where the level of these expenditures exceeds the productivity gain, and therefore there is a disadvantage (loss). The question that arises from this context is the following: is it worth to irrigate the sunflower culture in order to increase yield? In order to determine the efficiency (profitability) of the two crop systems (irrigated and non-irrigated) data from ADER 13.1.2 will be used to calculate the economic indicators in order to determine the level of profitability between the two systems. These data will refer to crop technology and the income and expenditure budget for setting up and operating a hectare of sunflower.*

**Keywords:** *irrigation, non-irrigation, sunflower, profitability*

**JEL Classification:** *Q12, Q15.*

## INTRODUCTION

Sunflower culture is one of the most common oleaginous crops in our country. Its importance is given by the finished product resulting from the processing, namely the sunflower oil with a high demand on the market, being the most widespread and used product of this kind.

From 2013 to the present, according to Eurostat, Romania holds the first place in the European Union in total sunflower production; at the same time, Romania, is one of the world's leading and leading venues. In the last year, 2017, Romania's total production exceeded the 2 million tons threshold.

Sunflower crop is widespread because it has a wide degree of use in both human and fodder nutrition, and this culture contributes to economic development through its industrial and energy uses.

The main geographic areas where sunflower is grown in Romania are: the Dobrogea, the Romanian Plain and the West, with the most suitable conditions for the development of this plant.

By processing sunflower seeds, in addition to the aforementioned oil, the by-product is the feed used to feed the animals, and sunflower cakes can also be used.

Another feature of the importance of culture is the fact that sunflower is a melliferous plant, so it is also used to produce honey.

Hulls of sunflower seeds can be harvested by processing to obtain: fibro-wood, pellets, ethyl alcohol, carbon dioxide, fodder yeast.

These aspects of the role of sunflower culture in the Romanian agricultural sector lead to the fact that this culture has a wide use framework, it is very well acclimated in our country, which leads to the high level of production, according to the statistics; at the same time, there is a decent value pricing that ensures the profitability of the culture.

Reaching the profitability term, this paper seeks to analyse this profitability between two irrigated and non-irrigated crop systems. In the literature it is stated that the sunflower will have a high production if properly maintained. Also in the specialized works, the technical ones, indicate that although this crop is resistant to drought conditions, 1-4 watering of 400-800 cubic meters per hectare can be applied.

All these additional works to ensure production under more unfriendly conditions with the plant record a series of specific expenses when the culture budget is being implemented, so the study wishes to examine whether these costs are justified to be met to meet the culture maintenance requirements.

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<sup>1</sup> Scientific Researcher - Research Institute for Agriculture Economy and Rural Development, Project ADER 13.1.2, email: [petre.ionut@iceadr.ro](mailto:petre.ionut@iceadr.ro)

## MATERIAL AND METHOD

In order to achieve the research, the data on sunflower crop technology and its income and expenditure budget will be analysed. These data will be taken from research project ADER 13.1.2, coordinated by the Research Institute for Agriculture Economy and Rural Development.

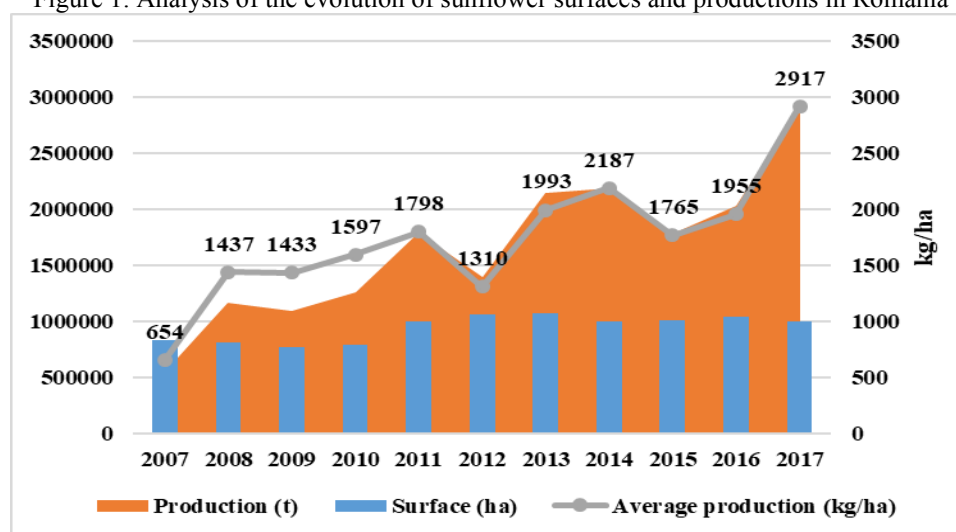
These data are structured on two levels of production, depending on the system, irrigated and non-irrigated, thus a comparative analysis will be carried out and a series of economic indicators will be calculated on the profitability of each system and the differences between them will be assessed.

## RESULTS AND DISCUSSIONS

Although there is no statistical evidence on the irrigated area in Romania, structured on agricultural crops, in order to evaluate it for sunflower, one can analyse from the point of view of evolution the total irrigated agricultural area. Analysing from the moment Romania joined the European Union, it can be noticed that this area (actually irrigated with watering) recorded a decrease from year to year on average of 4.06%. During this period, on average, an agricultural area of 190,000 hectares was irrigated each year, of which 188.7 thousand hectares are arable land, respectively 99,3%.

Considering the tendency of irrigated areas to evolve in the same crop irrespective of culture, the evolution of sunflower surfaces and crops will be analysed.

Figure 1. Analysis of the evolution of sunflower surfaces and productions in Romania



Source: Data processed on [www.insse.ro](http://www.insse.ro)

As can be seen in Figure 1, the sunflower area in Romania oscillated in the analyzed period, having a downward trend in the first part of this period, reaching a peak in the middle of the period, and again declining. The total area recorded an increase, with an average annual growth rate of 1.79%, with an average of 945 thousand hectares each year.

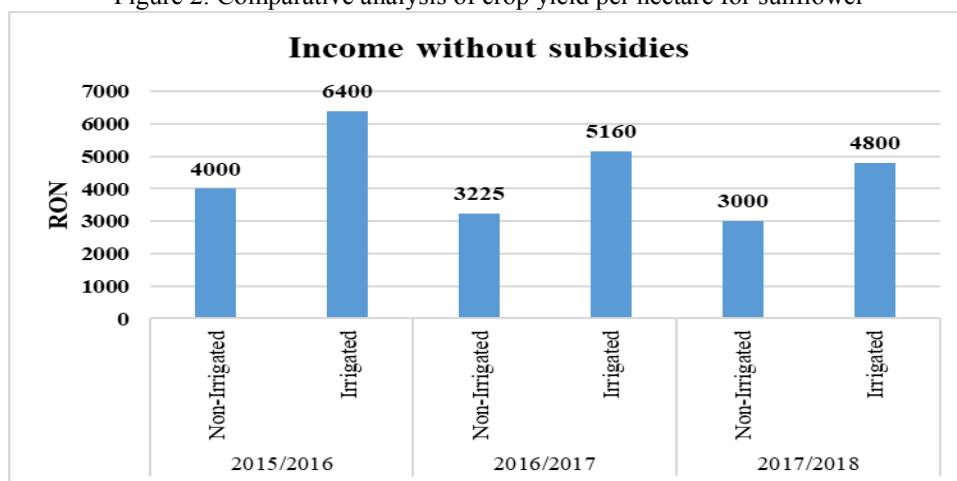
Regarding the total sunflower production, we can see a more pronounced increase from the surface, decreasing in the first period and in 2012, when it was the worst agricultural year of the last period. On average, there is an average annual growth rate of 18.2% and a total annual average production of 1.666 million tonnes.

In terms of average yield per hectare, it can be seen that it retains the trend of total production. The average yield level has grown quite a lot, considering that in 2007 it was 654 kilograms per hectare, and in 2017 it reached 2917 kilograms per hectare, reflecting an intensive increase in sunflower crops. The annual growth rate was quite high, respectively, of 16.12%, and on average the yield per hectare for the whole period was 1763 kilograms.

These considerations show the importance of sunflower crops and the importance of increasing average productivity per hectare. Next, we will analyse the economic efficiency in terms of increasing the yield per hectare by changing the irrigated crop and irrigation system respectively.

According to the technical reports developed by the Research Institute for the Economy of Agriculture and Rural Development, ADER 13.1.2 has determined the level of the following indicators for the sunflower crop for both systems: income per hectare, cost and profit. These indicators were set for three agricultural years, namely 2016, 2017 and estimates for 2018, and the average yields of the irrigated and irrigated crop system were 2500 and 4000 kilograms of sunflower per hectare, respectively.

Figure 2. Comparative analysis of crop yield per hectare for sunflower

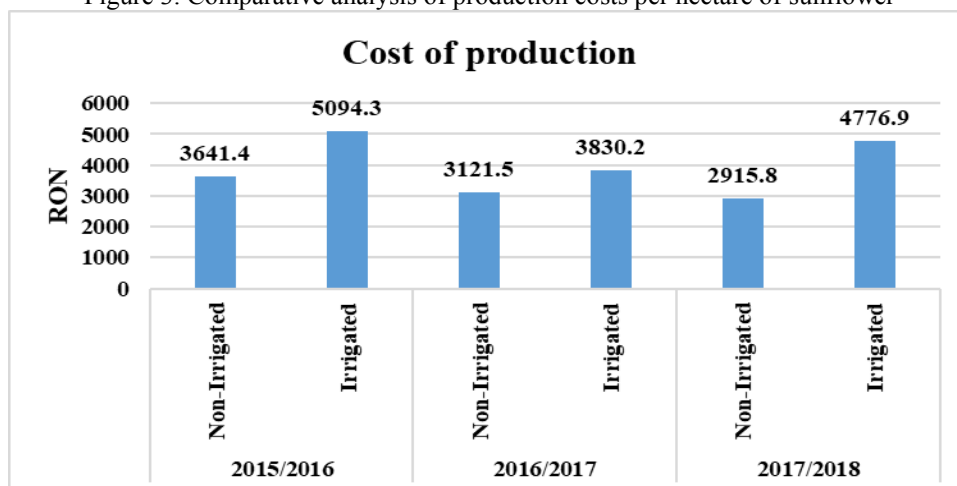


Source: Data processed on ADER project 13.1.2

Although the sunflower seed yield price varies from year to year, it remains constant for a safe year irrespective of the system used (irrigated or irrigated), so the relative difference between irrigated and non-irrigated is the same every year respectively 60%. However, the absolute difference between the income obtained from the cultivation of one hectare of irrigated sunflower and another non-irrigated is different depending on the price of recovery.

In the agricultural year 2015-2016 there was a difference in income between the two irrigated and non-irrigated systems of 2400 lei. In the next agricultural year, the farmers' income gap between the two crop systems was lower and 1935 lei, being 19.38% lower than in the previous year. In the last agricultural year, an income difference between the irrigated and the non-irrigated system is estimated at 1,800 lei, this difference decreasing from one year to the next, being less than the previous year by about 7%.

Figure 3. Comparative analysis of production costs per hectare of sunflower



Source: Data processed on ADER project 13.1.2

As regards the hectare expenditure for sunflower crops, their levels were shown in Figure 3, compared to each of the two crop systems analysed, over the reference period.

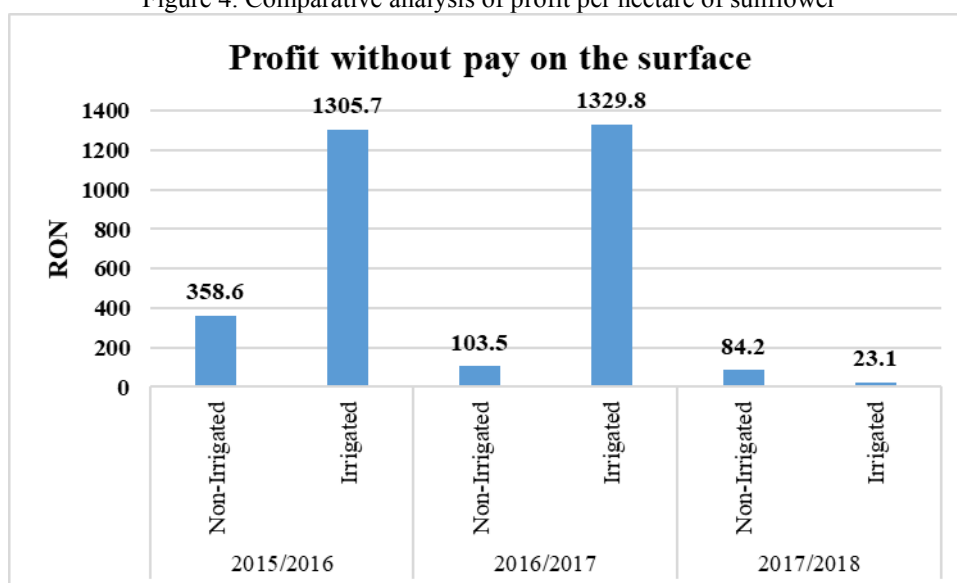
In the first agricultural year, the difference in expenditures in order to increase productivity was of 1453.2 lei, respectively the level of expenditures for the irrigated system was higher by 39.9%. Thus, the difference in expenditures this year is less than the income gap, which was previously analysed by approximately 950 lei.

In the agricultural year 2016-2017, there was the smallest difference in terms of expenditure per hectare of sunflower, between the irrigated and non-irrigated system, respectively of 708.7 lei, or by 22.7% higher. It can be seen that the difference in spending for this year is less than the income gap.

However, in the last year it is estimated that the level of the irrigation expenditure and the increase of the productivity of the sunflower crop will be higher than the non-irrigated system, by 1861.1 lei, ie 63,8%, a very high threshold exceeding the benefit earned, as measured by the revenue earned.

In order to be able to analyse the most relevant profitability level, the level of gross profit was determined and analysed in a similar manner in Figure 4:

Figure 4. Comparative analysis of profit per hectare of sunflower



Source: Data processed on ADER project 13.1.2

It can be seen in Figure 4 that in the first two years of agriculture considered, the profit level for the irrigated system of the sunflower crop is higher than the non-irrigated, with 947.1 lei and 1226.3 lei per hectare respectively. In the second year, the difference in profitability is a significant one given the fact that the profit level for the non-irrigated sunflower crop is only 103.5 lei per hectare.

In the last year we can see that the profit level is very small, below the threshold of 100 lei per hectare for the non-irrigated system, and for the irrigated one it is observed that it is lower, 3.6 times, respectively 23.1 lei. Thus, we can say that in the agricultural year 2017-2018 it is not economically justified to increase the average productivity per hectare by irrigating the land, because the benefit is lower than the lack of application of the intensive development works of culture.

## CONCLUSIONS

In the present study, it was desired to analyse the economic efficiency of increasing average productivity per hectare of sunflower by irrigating the crop, and to analyse whether the variable costs specific to intensive crop growth do not exceed incomes.

In the comparative analysis between the two irrigated and non-irrigated systems, the income gap has been shown to have a decreasing trend due to the ever lower prices of consumption, and the expenditure gap is fluctuating from year to year in very large lines, with differences between 708 lei per hectare and 1861 lei per hectare. This can be a risk when deciding to irrigate the crop in order to increase the average yield per hectare.

Of these expenditures mentioned and analysed in the study, those specific to the production increase, the irrigation expenditures represent weights between 20.9% and 50.8%. Thus, the specific expenditures specific to crop growth are not only composed of irrigation expenditure but also of variable ones that increase with the level of production.

Depending on the situation, it may be appreciated that the irrigation of sunflower crops is not always profitable, given that for the year 2017-2018, the rate of return for non-irrigated crops was 2.89%, and for the irrigated was more respectively, of 0.48%.

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