THE ECONOMIC EFFICIENCY OF THE IRRIGATION DEVELOPMENT FROM SC LIVADA MERE DE ITESTI BACĂU

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Abstract

The evaluation of the investment regarding the arrangement of the irrigation system within SC Livada mere de Iteşti SRL is made by calculating the economic efficiency. This is a fairly modern concept, that helps to substantiate decisions within the firm, in order to use resources as favorably as possible. The decision to invest in a complex set of measures, meant to bring production increases, as is the case with the irrigation system, was taken after an analysis of the evolution of the economic situation of the company. Any irrigation method used in a crop or plantation has the role of reducing the risks of the agricultural business. Therefore, especially in times of drought, crop yields and quality increase, creating additional incomes and, implicitly, profit. The economic efficiency assessment was calculated for the 2020 and 2021 crop years, because the plantation is young and has entered fruition in year 2 of planting. Important production increases were obtained, obtaining a 5% higher profit rate in year 4 of planting, compared to an non-irrigated orchard, which is in full fruit.

Key words: irrigation system, fruit plantation, economic efficiency

The apple tree is a crop with high water requirements, demanding 70-75% of the field capacity.The insufficient amount of water in the soil has a negative effect on the fruit plantation, especially in the first years after planting: the growth of the shoots is reduced, the development of the leaves is affected, the roots do not develop enough, and the entry on the fruiting is delayed. (Cimpoieş Gh., 2012)

The most widespread method of irrigation in superintensive apple orchards is local drip irrigation. It consists in the localized wetting of the soil area, in which most of the active roots of the trees are extended, by slowly administering the water in the given area, based on the physiological requirements of the trees. (Grădinariu G., 2002)

This method allows saving water and fuel, over 50% compared to other methods, saving energy when pumping, labor force at service, allows practicing on any type of relief and, at the same time, mineral fertilizers (fertigation) can be given through this installation. In the soil, favorable conditions are created for the development of the root system, the leaves and air from the plantation are not moistened, it is suitable for programming the optimal irrigation regime with the help of the computer (Popa S., 2017).

At the same time, the number of maintenance works is reduced because this irrigation system does not foster the formation of crusts on the soil surface nor the cryptogamic diseases (Yildirim F. *et al*, 2016). Due to the fact that the weeds develop quite difficult, the number of hoeing is reduced.

MATERIAL AND METHOD

Applying a project for the reconversion of the apple orchard from Bereşti-Bistriţa commune, SC Livada de meri Iteşti SRL managed to make an extensive investment, which includes: the replacement of the 30-year-old plantation, which is in an advanced stage of physiological degradation, presenting 35% gaps, the development of a drip irrigation system, the construction of a concrete platform, the purchase of machinery and agricultural installations. (Cantoriu P., Tudorache A., 2016). The implementation period of the project is 3 years, and the trees begin to fructify in year 2 after planting.The economic and financial analysis was carried out taking into account the investment expenses with the irrigation system, as well as the operating expenses.

Data from the company's accounting records were used to calculate revenues and expenses.

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Table 1

Investment expenditure on the development of the irrigation system

Item No.	Name	Value (lei)
1	Expenditure on the irrigation tank	348835
2	Expenditure related to the irrigation system	310980
3	Expenditure on water supply	160409
4	Expenditure related to design and engineering, consultancy and technical assistance	41217
5	Other expenditure	2002
Total expenditure		863443

Table 2

Production costs for apple cultivation (lei/ha)

Item no.	Name of the work	Irrigated culture Cost (lei/ha)		Non-irrigated culture Cost (lei/ha)	
		2020	2021	2020	2021
1	Tree maintenance works	4120	4200	4120	4200
2	Basic fertilization works	102	105	102	105
3	Large screed per row	350	355	350	355
4	Irrigation of the crop	1200	1200	0	0
5	Maintenance of the drip irrigation installation	928	952	0	0
6	Application of foliar fertilizers	265	272	265	272
7	Fruit harvesting	2850	2920	2630	2700
8	Phytosanitary treatments	1820	1860	1820	1860
9	Other maintenance work	550	560	550	560
10	Materials	2300	2360	2300	2360
11	Wage expenses	45120	45120	43260	43260
	Total	59605	59904	55397	55672

Table 3

Average yields obtained (t/ha)

Year	Average production obtained in the irrigated system (t/ha)	Average production obtained in the non-irrigated system (t/ha)
2020	26.8	27.5
2021	31.4	28.1

Table 4

Average income from the sale of fruits (lei/ha) and registered profit (lei/ha)

Year	Irrigated plantation		Non-irrigated plantation	
	Income (lei/ha)	Profit (lei/ha)	Income (lei/ha)	Profit (lei/ha)
2020	67000	7096	68750	13353
2021	78500	18596	70250	14578

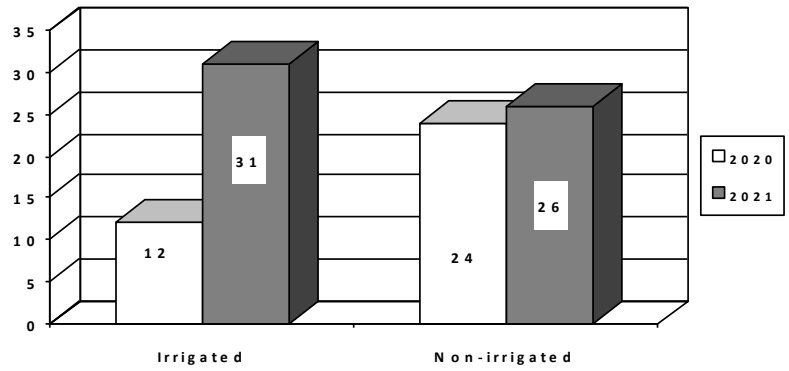

Figure 1. **Profit rate (%)**

RESULTS AND DISCUSSIONS

Analyzing the consumption of apples, both nationally as well as internationally, it is noticed that Romanians have the lowest consumption of apples among the European states, of only 220 g / person / day. WHO recommends a consumption of at least 440 g fruits and vegetables per person /

day, for a healthy intake of nutrients to the human body.

The agricultural market comprises both producers and those who sell the products – either fresh or industrialised. The apple can be consumed both fresh and industrialized, in the form of juice, nectar, jams, but also used in pastries and confectionery. The demand for apples on the market will always be constant (MADR, 2014).

By ensuring the optimal water intake, due to the installation of the irrigation system, the productions will be of quality and in a sufficient quantity to cover the local market, as well as to provide raw materials to the processing companies in the area.

The market and marketing strategies are related to distribution, so that by correctly establishing the criteria for the qualification of the distributors, the discount policy and the types of distribution channels, the company will be able to efficiently and profitably capitalize on its apple harvests. (Mihăescu G., 2007).

The managerial policies of SC Livada mere de Iteşti SRL are based on practicing an average price, compared to those practiced by other local producers, for similar products.

Setting the price at 2.5 lei/kg took into account the commercial value of apples from the young orchard, more qualitative than those from the previous orchard (which is in physiological decline).

The total value of the investment is 3851.915 thousand lei, including all expenses generated by the activities carried out during implementation, according to the general estimate (Cantoriu P. *et al*, 2016).

The investment costs related to the development of the irrigation system are shown in *table 1*.

For the tank and the water supply there were expenses generated by the constructions, in addition to the expenses for materials and installation.

The irrigation system only generated expenses for materials and installation.

The watering norm for the drip irrigation system (sqm) is lower than the norms applied to the other watering methods, because it is calculated only for wetting an area smaller than the volume occupied by the entire crop.

In the case of drip irrigation, it is optimal to wet the soil in a proportion of 20% of the volume of soil that reaches to the roots of plants, in sub-humid areas (Yildirim F. *et al*, 2016).

In the years of production 2020 and 2021, 2 irrigations were applied annually, with a norm of 4 liters/tree, the first in the period 15-25 July, the second in the period 5-15 September, which meant a consumption on the entire plantation of 446 cubic meters.

The water and electricity costs necessary for the operation of the irrigation system are 1200 lei/ha, annually.

The maintenance costs of the installation, which amounted to 928 lei/ha in 2020 and 952 lei/ha in 2021, add to the mentionned costs.

The personnel expenses, both permanent and seasonal, calculated for 1 ha were 45120 lei, in both years under analysis.

The works for the maintenance of the crop as well as the cost of materials have been calculated per unit of area, for each year, and are presented in *table 2*.

Irrigated production was compared with the non-irrigated production in the same local producer organisation, where there are the same environmental conditions, the same cropping system (superintensive) and the same varieties grown (*table 3*).

The only difference was that the non-irrigated plantation, the reference one, is in full fruit, being at the 9th and, respectively, the 10th year of fruiting.

The years 2020 and 2021 meant the 3rd and 4th years of crop of the young, irrigated orchard, so the trees did not reach the maximum fruiting potential, and therefore, the average yields obtained are lower.

However, very large differences in production are recorded from one year to the next. This is due to the fact that some varieties later came into fruiting, only in the 4th year after planting (2021), with a rather modest fruiting.

Compared to the non-irrigated tree plantation, but which is already in the stage of maximum productivity, the young, irrigated orchard has achieved higher yields.

The proceeds from the sale of the fruit and the profits made are shown in *table 4*.

The rate of profit of irrigated and non-irrigated crops is shown in *figure 1*.

In 2020, being the third year of cultivation, the average yield was quite low, so that the profitability of the crop was also modest.

In the following year, higher production was achieved, the profitability of the irrigated plantation already exceeds the profitability of the non-irrigated plantation.

CONCLUSIONS

The demand for apple fruits is constantly increasing in Romania, with the development of

small fruit and vegetable processing enterprises, the apple being a basic raw material.

Preferred in consumption both fresh and processed, the nutritional and curative principles of the apple are known for a long time.

Lately, the apple has become a raw material for confectionery and pastry products, so that the market has diversified.

The expenses for the investment in the development of the irrigation system are of 863443 lei.

Production costs were higher in the second year under review, mainly due to higher input costs, with average production almost 5 t/ha higher compared to the previous year.

In the first years of fruiting the yields are small, the full capacity being reached only from the 6th year after planting.

However, revenues from the sale of production are starting to cover the budget deficit caused by the investment with the irrigation system and the planting of the new orchard.

Compared to the non-irigated apple plantation, where the trees are at the maximum fruiting potency, the young plantation, thanks to the drip irrigation system, suceeds to obtain higher yields in 2021.

Thus, the rate of profit of the young apple orchard exceeded the rate of profit of a plantation in full fruit, but not irrigated.

The increase in production due to irrigation is very high and the revenues from the sale of production are increasing. This is the premise for a faster coverage of the investment made.

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