

THE INFLUENCE OF TECHNOLOGY ON THE ECONOMIC INDICATORS IN A CLASSIC AND INTENSIVE WALNUT CULTURE

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Abstract: A grafted walnut orchard is an excellent long-term and very long-term investment. On the territory of our country, walnut trees have favorable conditions for growth and fruiting in all areas. Walnuts generally bear fruit 5-8 years after planting. These trees can produce fruit for 30 to 100 years, being the longest-lived native fruit species, with important ecological and economic values. The establishment of a professional orchard involves the performance of works, the costs of which are presented in this paper.

Keywords: walnut trees, economic efficiency, harvest, expenses

INTRODUCTION

A fruit species with important ecological and economic values, walnut has been appreciated since ancient times for the nutritional and therapeutic value of fruits, but also for the quality, fineness and resistance of wood.[2] Walnut has a special economic and social importance, due to the special nutritional value of fruits, the superior quality of wood, its use as a decorative and eco-ameliorating species, as well as the use of other tree organs (leaves, bark, endocarp, shoots) in the chemical and pharmaceutical industry. The fruit value of the walnut is given mainly by the nutritional value. Walnuts are a complete and concentrated food, containing fatty substances (52-77%), protein substances (12-25%), carbohydrates (5-24%), mineral substances (1.3-2.5%), vitamins etc. [4]

Walnut is important in agroforestry improvements, effectively combating soil erosion and landslides. It is also the main species used in making protective curtains. As a fruit species, walnut has many other advantages. Although it grows slowly and bears fruit relatively late, having a rapid growth in the first years after planting, it is very long-lived, on average, 50-80 years, and after 10-12 years it offers high yields. [5] Modernization of walnut culture by genetic improvement it follows the fruiting on lateral branches, basic property for the varieties of high productivity and early fruiting; late budding and flowering, to reduce the danger of late frosts; tolerance to the attack of bacterium, frequently in the most frequent plantations with stronger growth of the shoots, and to anthracnose; enlargement of the fruit (over 15 g) and high percentage of the core (over 40%) of the total weight of the fruit, thin skin, easy to break, woody, with good valve welding. [1]

MATERIALS AND METHODS

Analysis and synthesis, analogy are the main research methods used, we have also used analysis of graphic representations.

RESEARCH RESULTS

Walnut is a species of medium vigor. However, due to their long longevity, the isolated trees form voluminous crowns with a diameter and height that often exceed 20-25 m. The grafted trees, which bear fruit faster, have a slightly lower vigor. [3] The dimensions of the crowns during the period of maximum fruiting reach the grafted trees at

10-14 m. In the orchard, by carrying out the formation works, maintained at 8-10 m maximum size because for this size the antiparasitic treatments and the other maintenance works are applied more difficult and with low productivity. [6] In the first two years after planting, the growth force of the stem is low, and in the 3-10 years after planting, the growth of the stem is maximum. Walnuts are among the species with the highest light requirements. [8] In conditions of insufficient lighting, the tree registers low growths, differentiates few female flowers, the productions are low and inferior in quality, and the frost resistance of the trees is considerably reduced. Insufficient light favors the evolution of pathogens and especially bacteria, which cause significant damage. [9]

Walnut grows and bears fruit satisfactorily only in areas with an average annual temperature of 8-10 C, average temperature in the warmest month of 20-22 ° C, mild winters average temperature in the coldest month -1-2 ° C. For walnut, temperatures higher than 35 ° C are harmful, which produce burns on shoots, leaves and fruits, weaken the trees and depreciate the quality of the fruit. [7] However, the low temperatures during winter and spring are much more harmful for walnut cultivation, the limit varying between -25 and -36 ° C. Walnuts grow and bear fruit quite well in areas where annual rainfall amounts to 600-700 mm / sqm, thus falling into the group of species with moderate requirements. [11]

Increasing walnut production involves the intensification of culture. The regularity of the annual production, important on the production potential, is related to the late budding and flowering, because there is a risk of late spring frosts. Resistance to diseases, especially bacterium, is today a problem of walnut cultivation that can reduce production by 89 -100%. [12] The damage caused by anthracnose (*Gnomonia leptostyla*) is minor in some countries, but can cause significant damage in certain areas in our country. In most countries, the culture system is extensive (with the exception of the USA and France). In order to increase the walnut production per hectare, it is necessary to switch to the intensive cultivation system, this being possible by using varieties with lateral fruiting. [10]

In Romania, walnut has special perspectives due to its hardiness and the fact that it can be grown without special technology. Walnut is a fruit plant with real possibilities to grow production areas worldwide, due to the progressive requirements of society to ensure food needs. [15] Therefore, fruit growers and especially walnut growers must look at this crop in terms of economic and commercial prospects.

To the advantages offered by the walnut culture is added the financial support offered by international and domestic programs for the development of this fruit crop in different areas of the country. [16] Fruit growers who want to set up walnut plantations must know precisely and in detail the costs for all the technological links specific to the crop, the productions and the incomes obtained on the devaluation directions. [13] The value of the investment and its recovery term, the volume of physical production and the life cycle of the plantation, as well as the period in which the production costs are realized, the net income and the work volume are also criteria that must be taken into account. Investment expenses can be partially offset in the first five years after fruiting, or after the eighth year after planting.

The profits that are made are different depending on the variety, as well as the skill, perseverance with which the cultivation technique is applied and especially the capitalization of the realized production. It is recommended to choose several varieties, so as to achieve a continuous technological flow for a longer period of the year (harvesting should be done during at least 3-4 weeks), so as to avoid the peaks of work and to make a maximum profit. For the superior capitalization of the fruits, processing capacities can also be developed (fruit dryers, vacuum packing line of walnuts), temporary storage warehouse.

Table 1

Economic aspects regarding a walnut plantation

	Unit	Classic plantation	Intensive plantation
Entire trees number/ha	Pieces	140	240
Planting distance	meters	9 x 8	7 x 6
Operating time	years	35	30
Exploitation time	years	27	24
Investment value	Ron	58424	77756
Setting up expenses	Ron	23061	35086
a) Handmade works	Ron	1980	2750
b) Mechanical works	Ron	5845	6224
c) Materials	Ron	15236	26112
Maintenance costs	Ron	26582	32616
a) Handmade works	Ron	3215	4628
b) Mechanical works	Ron	11219	13862
c) materials	Ron	12148	14126
Annual amortization rate	Ron	2164	3240
Annual operating costs	Ron	8781	10054
a) handmade works	Ron	2430	3052
b) mechanical works	Ron	2325	2485
c) materials	Ron	4026	4517
Annual direct costs	Ron	10945	13294
Annual indirect costs	Ron	1095	1329
Annual entire costs	Ron	12040	14623
Production	Kg	2000	2800
Cost of production	Ron/kg	6,02	5,22
Selling price	Ron/kg	10,00	10,00
Value of annual production	Ron	20000	28000
Gross annual profit	Ron	7960	13377
Tax	Ron	796	1338
Net annual profit	Ron	7164	12039
Net annual profit	Euro	1462	2457
Annual profit rate	%	12,3	15,5
Term of investment recovery	Years	8	6
Entire operating profit	Ron	193428	288936
Economic return on investment	%	331	371

Source: own representation

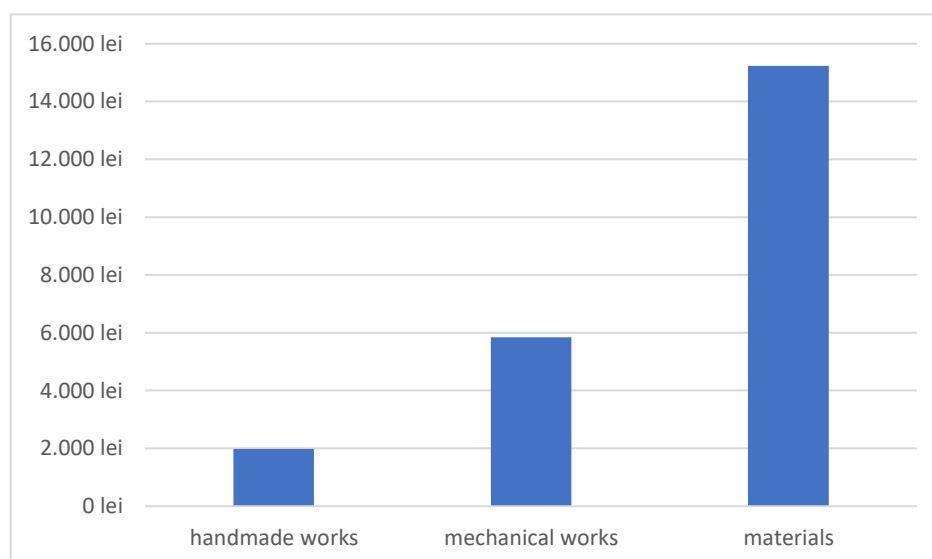


Figure 1. Setting up expenses for a classic walnut plantation

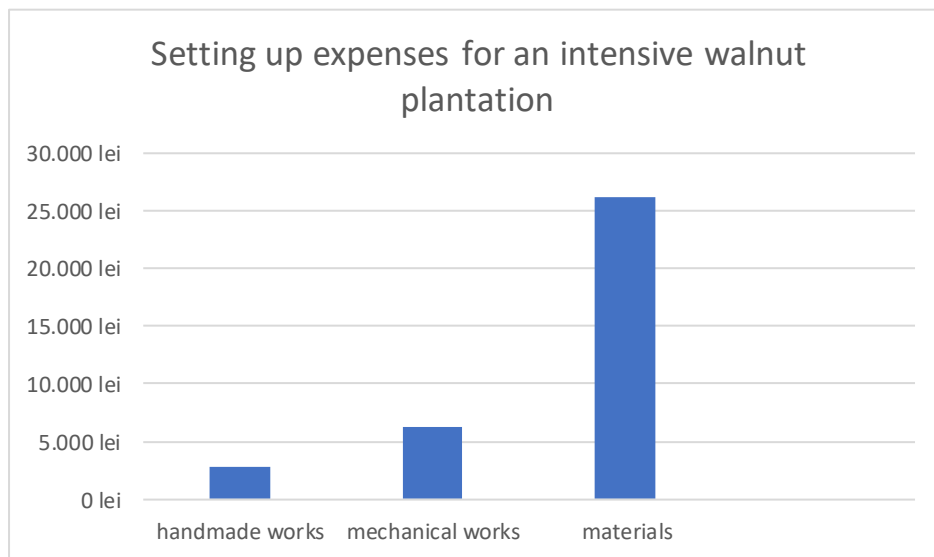


Figure 2. Setting up expenses for an intensive walnut plantation

In both cropping systems, the largest share is represented by the expenses with the materials, which is given by the value of the fruit planting material necessary for the establishment of the plantation. The highest level is represented by the material costs incurred with the establishment of the intensive plantation, where a higher number of trees per hectare is needed.

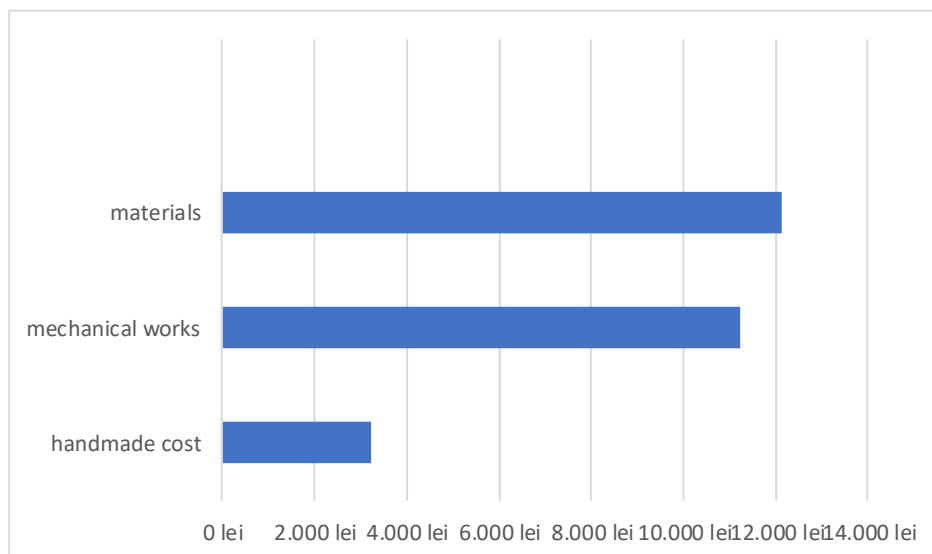


Figure 3. Maintenance costs for a classic walnut plantation

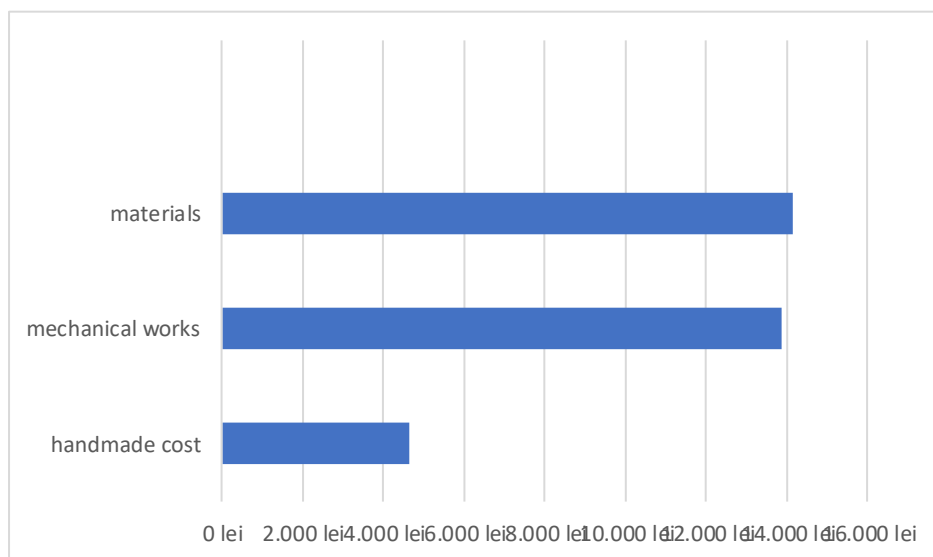


Figure 4. Maintenance costs for an intensive walnut plantation

In the structure of the expenses with the maintenance of the plantation until the fruiting, the ones with the materials (diesel, pesticides) and the expenses with the mechanical works have more weight (maintenance works of the orchard, mowing the grass and spraying in the orchard).

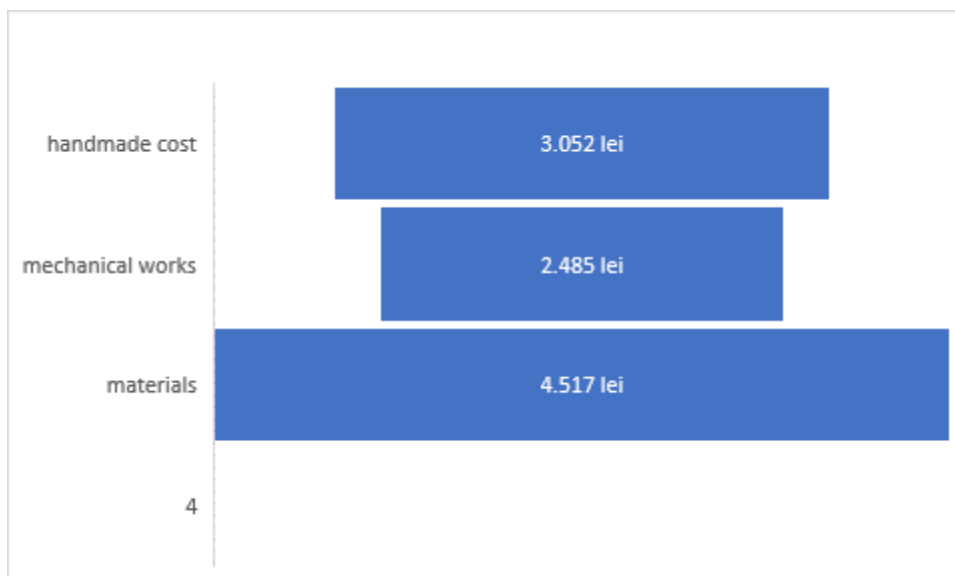


Figure 5. Annual operating costs for a classic walnut plantation

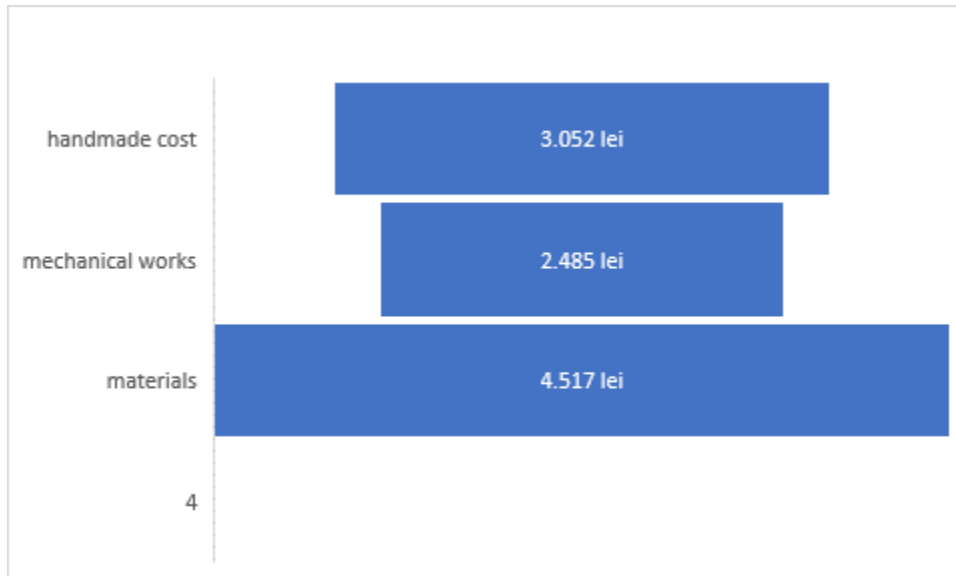


Figure 6. Annual operating costs for an intensive walnut plantation

During the period of exploitation of the plantation, the largest share in the total expenses has the expenses with raw materials and materials (45%). This is also due to the value of fuels and pesticides.

CONCLUSIONS

In the case of both technologies (classic and intensive) the material expenses predominate. This is due to the value of the fruit planting material used to set up the plantation.

In the case of intensive planting, the value of material expenses exceed those of the classic plantation because the number of trees / ha is higher by 100 trees / ha. Both in the case of plantation maintenance costs up to the fruit set and in the case of annual operating costs, material costs predominate due to the value of phytosanitary substances used in plantation maintenance.

The production obtained from 1 intensive hectare is 40% higher than from the classic 1 hectare and at a lower cost price (5.22 lei / kg compared to 6.02 lei / kg from the classic plantation). The annual net profit on 1 intensive hectare is 68% higher than the one obtained on 1 classic hectare. The term of recovery of the investment is 6 years for the intensive plantation and 8 years for the classic plantation. The profit realized during the entire exploitation period is 193428 lei / 35 years for the classic plantation and 288936 lei / 30 years for the intensive plantation. The duration of exploitation at the intensive plantation is shorter by 5 years, because in the case of intensive plantation the fruiting is done earlier and the entry in the period of decline is earlier. (The plantation is no longer economically profitable and must be abolished).

Being at the same time a very complex plant (fruit, technical, forestry, medicinal), walnut remains one of the most important fruit species in our country.

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