

## THE STUDY OF THE ECONOMIC INDICATORS REGARDING THE ESTABLISHMENT AND MAINTENANCE OF A SUPER INTENSIVE HAZELNUT PLANTATION IN IRRIGATED SYSTEM

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### **Abstract**

*In the development of agriculture, especially fruit, it can be said that the least attention paid nut fruit species, which includes hazelnut. Our land settled mainly in import and annually tens of millions of dollars are allocated for importing hazelnuts. However, we have very good ecological and economic conditions for growing cultivated hazelnuts. The fact that in Romania the plantation of the peanut has not been extended is explained by the ignorance of the qualities of this tree and of the benefits derived from its features. Hazelnut fixes soil by preventing erosion, purifies the air, is a valuable medicinal plant, and peanut kernel is an extremely valuable food. With rational use of land capacity, we can get rid of import hazelnuts with the promise to become significant exporters. Hazelnut plantation is one of the most profitable agricultural businesses in our country, as it requires an average investment, which is amortized over a relatively short period of time compared to other crops, and generates profits. This paper resembles the importance of cultivating hazelnut and its costs including the establishing and maintaining the culture.*

**Key words:** economic investment, super-intensive yard, hazelnut, harvest, expenses

### **INTRODUCTION**

From the economic point of view, the favorable environmental conditions and with relatively modest economic investment relative to other types of fruit trees, hazelnut gives good yields, and hence a huge contribution. Hazelnut fruit is widely used in both the food industry and household, as well as confectionary industry, where the core of hazelnuts is used as raw material. The hazelnut fruit has great nutritional value and on that basis has the most important place in relation to other types of fruit trees. Hazelnut core contains a high percentage of high quality and easily digestible nutrients such as protein, fat, sugar, vitamins (A, B, and E) and minerals and other bioactive substances (Berar, 2012). It should be noted a very important development in areas with favorable environmental conditions for its development and that is the use of culture erosion field, as hazelnut has a shallow root system that binds land and on abandoned steep terrain can play an important role in the reorientation of the land and hiring labor to care and harvest the fruit hazelnut. With rising living standards especially in advanced industrial countries, the market consumes more fruits of hazelnut. There fore, a number of European countries (Spain, Italy,

Greece, Turkey, France, and Russia) that have favorable environmental conditions for growing hazelnuts, recently significantly increased areas under plantations of hazelnut. These countries along with the United States produce 90% of world production. Hazel has a very high success rate, and due to high energy and low prices as well as the shortage on the world market, many countries are trying to grow the hazel tree plantations over large areas. In our country, several hazelnut plantations were built that are designed for industrial and household use. However, due to deficiency of suitable grounds around, it is necessary to raise plantations of hazelnut throughout the country in order to minimize imports. Just to satisfy Romania's processing capacities it is necessary to raise at least 7,000 hectares of hazelnut plantations. The continuous increase in the consumption of hazelnuts in the world points to the existence of broad prospects for exports. Under natural conditions, hazelnut grows mainly on limestone substrate up to about 1500 meters above sea level. Also in cultures, hazelnuts can breed up to 600 meters in conditions where other fruit varieties and other crops provide less economic impact. Hazelnut requires light and heat to the lowest possible annual and daily temperature amplitude. Average annual air temperature should be above the 9<sup>o</sup> C and annual rainfall exceeding 1000 mm (Mihaiescu, 1989). In conditions of severe frosts attention should be paid to the preparation of pollinators that are resistant to low temperatures. Hazelnuts are planted in loose, moist, deep permeable soil which should not be sour (Rosengarten F. jr., 1984).

#### **MATERIAL AND METHOD**

Taking into account climate, soil and economic and organizational conditions and the possibility of processing and marketing of hazelnut, we need to choose the most suitable varieties. Main focus is to cultivate a native varieties for industrial processing and combined varieties traits that can be used for industrial and for fresh consumption, and also as a pollinator of main varieties. Planting will be done with a well-rooted plants.

The hazelnut variety used for the researched plantation is Gentile Romana. Is of Italian origin. Tree (bush) is a medium-vigorous and develops many offshoots. Blossoms medium early, initially produces very little and later on generously and regularly. It ripens in late August. Shell is light brown with dark stripes. Provides a lot of fruit that are empty or shriveled core. The shell of the fruit is slightly longer than the fruit with deep notches and holes which allows the fruit to fall out easily. The shape of the core is irregular and flat, weighing approximately 1.4 grams. Fruit weight is 3.7 grams. The taste of the core is sweet and without any flavor. Percentage of rancid core after a year and a half is about 4%, and after 3 years 22%. For processing can only be used with other varieties due to lack

of flavor. A good pollinator. Self-sterile variety is well-pollinated by Istria Long and Hallesche Reisen.

For the researched plantation there is used a distance of 4,5 meters between rows and between the terrace and 3 meters between plants . The entire number of planted seedling is 741/ha ( super intensive). The most suitable time for planting hazelnut is in autumn, because the root system has significant activity during the winter. It is not rare for hazelnut to flourish in February, under favorable weather conditions (Adams M., 2019) Considering that terraces are made, by pushing and stretching the thick layer of soil with subsequent plowing, there is no need to dig holes in the classic sense. After preparation of soil, there are performed measurings and markings the places for planting. After that pits are digged, deep enough and wide enough to place root system. Care should be taken that the seedlings from the time of removal from the trap to the planting do not stay more than an hour uncovered to avoid drying the hair roots that are very sensitive. Since the plants are placed in a pit on a depth at which one was in the nursery area, over the hair roots a layer of fine earth is placed (10 to 15 cm). This land is stepped on and over it again, another layer of earth is placed. If the soil is prepared without trenching but ordinary plowing, it is necessary to dig a hole the size of 60x60 cm. (Goian M.& co, 2002).

Crown system for the planted hazelnuts is established in the form of three branch system - branches that depart from one place. In the spring of the first year after planting, the trees are trimmed at 30 cm (Cociu V., 2007). Above the ground in order to foster the outbreak of two to three offshoots that will form the future shape of the crown to form three branch system. In the second year after planting the best secondary branch is selected, which follows the further growth of the shoots shortened to equalize the amount of growth. In the coming years unnecessary branches are removed (Crawford M.,2016). The goal is to provide enough sunlight in all fruiting. From the fifth year onwards, it is considered that the nut has entered in the full yielding potential. Hazelnuts from year 7 to 15 can give yield per tree from 3 to 5 kg, and from year 15 to 25 from 5 to 10 kg per tree. Fertilizer doses depends on the results of the analysis of hazelnut leaf and soil in the plantation. Land in the plantation is maintained in a state of barren fallow discing and herbicide application. The destruction of shoots is done by mechanical or chemical means (Himmelhuber, 2013).

Harvesting should be done as late as possible, at the stage of maximum physiological maturity. For the hazel tree the characteristic is that all the fruits on one tree do not ripen at the same time (Rutter, 2015). That is why waiting for the fruits to reach their physiological maturity is needed and that's when the shell is easily separated from the fruit and the fruit

massively starts to fall to the ground. Then the trees should be shaken with a previously placed sheet under them (Wilkinson, 2005).

## RESULTS AND DISCUSSION

Df= 22 years

De= 19 years

It= 95053,43 lei/ ha

Setting up expenses= 47578,15 lei/ ha

- Handmade works= 3580,00 lei
- Mechanical works= 4869,15 lei
- Materials= 39129,00 lei

Maintenance costs= 47475,28 lei/ ha

- Handmade works= 4527,5 lei
- Mechanical works= 2082,78 lei
- Materials = 40865,0 lei

Ca ( annual depreciation rate) = 5002,81 lei/year

Operating expenses (Ce) = 21278,05 lei

- Handmade works= 9719,0lei
- Mechanical works= 1310,05 lei
- Materials= 10249,0 lei

Cd = 26280,85 lei/ha

Ci = 1576.85 lei/ha

P = 2000 kg/ ha

Cp= 13,93 lei/ kg

Pv= 20,00 lei/kg

V= 40000 lei/ ha

Pab= 12142,3 lei/ ha

I= 1942,77 lei/ ha

Pn= 10199,53 lei/ ha

R= 36,60 %

T ( term of investment recovery) = 9 years

Pt= 193791,07 lei

Rec (economic return on investment) = 204 %

C<sub>d</sub>= annual direct expenditure

C<sub>i</sub>= annual indirect costs

C<sub>t</sub>=annual entire costs

P=Production

C<sub>p</sub>=Cost of production =C<sub>t</sub>/P

P<sub>v</sub>=Selling price

V=Value of annual production

P<sub>ab</sub>=Gross annual profit

I=Tax= P<sub>ab</sub> x 16%

$P_n = \text{Net annual profit } P_{ab} - I$   
 $R = \text{Annual profit rate } P_n : C_t \times 100$   
 $T = \text{Term of investment recovery} = I_t / P_n$   
 $P_t = \text{Entire operating profit} = P_n \times D_e$

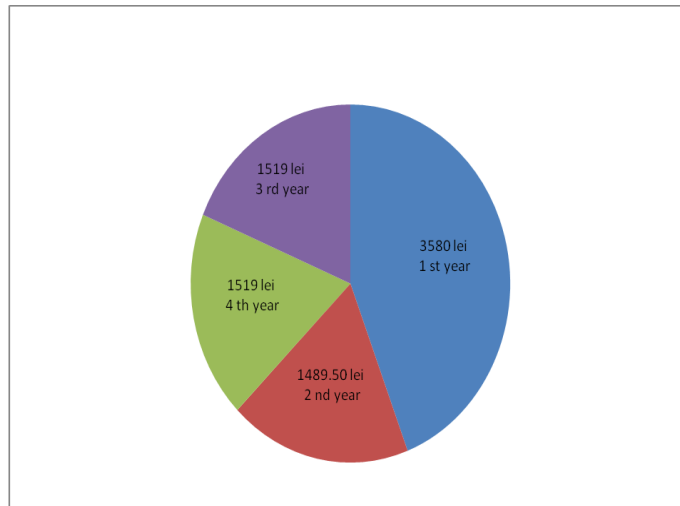


Fig. 1. Labor costs from the establishment of the culture to the entry on the fruit

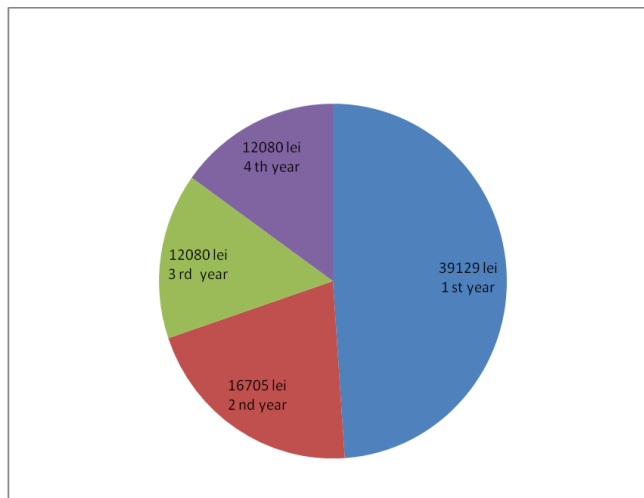


Fig. 2. Material expenses from the establishment of the culture to the entry on the fruit

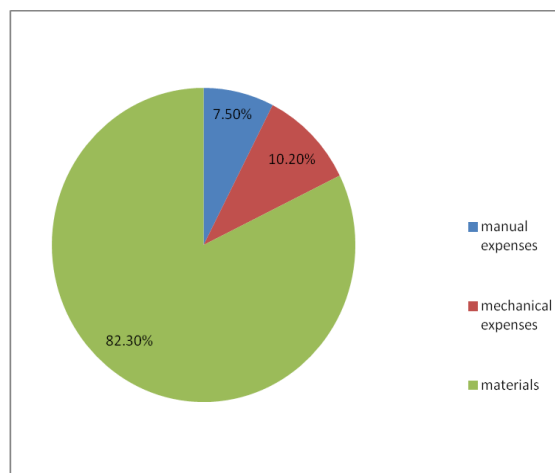


Fig. 3. Direct expenses recorded during the establishment of the hazelnut plantation

## CONCLUSIONS

The highest labor costs are recorded at the establishment of the plantation, due to the planting of the seedlings. The highest material expenses are recorded in the 1<sup>st</sup> year, due to the value of the planting material and in the 2<sup>nd</sup> year it is maintained at higher values due to the value of the planting material used to fill gaps. The highest weights in total direct expenses, incurred when setting up a hazelnut plantation, have the material ones due to the value of the fruit planting material.

The term of investment recovery for 1 hectare hazelnut plantation is 9 years.

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