

## THE ECONOMIC EFFICIENCY FOR A SUPER-INTENSIVE IRRIGATED BLUEBERRY CULTURE

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**Abstract:** Fruit growing is one of the main horticultural branches and deals with the research, study and knowledge of the organic and ecological peculiarities of the fruit species, aiming to establish appropriate technological measures in order to obtain high, constant and high quality crops. Fruit tree culture is important from the economical and social point of view. The tree culture is the main source of the existence, significant part of the population of the country is working directly in the plantations of trees, in the fruit-processing industry, in the fruit trade, in the transport enterprises and in the machinery industries, insecticides, packs, etc. Fruit plantations represent an investment with long lifetime exploitation, so mistakes in setting up are not acceptable, as they are practicable and are spread over the entire exploitation period. In Romania, horticulture continues to hold a particularly important status, although it goes through one deep process of property restructuring and exploitation system. The performance of the horticultural sector has been low. Lack of competitiveness is reflected by low productivity, low economic growth and a balance deficit agro-food trade, given that agriculture and horticulture are failing to keep the step with the increasing demand for food, driven by rapid general economic growth, and unable to cope with foreign competition, especially in the European Union. This paper is intended to be a technical (theoretical and practical) basis on establishment and maintenance of the species studied (blueberry), including economic efficiency as well as special references to the studies carried in Bihor County, both results and concrete references on how to set up and maintain plantations, under the climatic conditions in Bihor County area, as well as calculation the economic efficiency of these in the following years until harvest. It can be a starting point for preparing young people to better understand the principles of super-intensive culture systems and their economic significance and efficiency.

**Keywords:** harvest; economic efficiency; fruit productivity; super-intensive culture system; horticulture.

**JEL Classification:** Q19.

### 1. Introduction

From a geomorphologic point of view, the studies were carried out in the part of the Northern group of the Western Carpathians. The research area belongs to the Bihor Mountains group, more precisely the Crișul Negru Depression. The dominant reliefs

in the area are piedmont hills. The studied area is in the climatic formula after Koppen C.f.b.x. - moderate continental temperate climate with warm summers and relatively mild winters, with precipitations spread throughout the year.

From the vegetation point of view, the studied perimeter falls within the area of quercinee and deciduous forests. The forests in the area are made up of the following species: *Quercus robur*, *Fagus silvatica*, *Carpenus betulus*, *Fraxinus excelsior*, *Acer campestre*, etc. Natural grass vegetation is represented by *Cynodon dactylon*, *Lotus corniculatus*, *Trifolium* sp., etc. The natural vegetation of the crop (weeds) is represented by *Setaria glauca*, *Setaria viridis*, *Agropyron repens*, *Amaranthus retroflexus*. Under conditions of relief, climate, vegetation, the soil type encountered in the studied territory is districambosol.

### **1.1. Land organization and arrangement**

The land organization and arrangement is aimed at ensuring the conditions of mechanization (Venig A., 2006), fast transportation and the possibility of applying a high and simple technological level, mainly: land partitioning, establishing the network of roads and return areas. (Santerre A., 2018) The area actually planted is 10,000 square meters. There are used 3 blueberry varieties. The planting distances are 1m on the row and 2,5m between the rows. The plantation was set up in 2012 and is super-intensive.

### **1.2. Assortment and need for planting material**

Blueberry is a bushy species with a strong dynamics in recent years (Charles B., 2014), growing more and more in many countries, due to the high demand on the market that is growing in Europe. Blueberry is well suited both in plains, but especially in hill and mountain areas, being a rustic species resistant to strong winter frosts and foliar diseases with fewer pathogens than other more sensitive species. (Botez et al, 1984).

In a correct crop technology and optimal soil conditions, blueberry plantation can produce over 7-8 tons of fruit per hectare, the price of capitalization being very good. (Braniste, 2009).

For the research, it was used Bluecrop variety, with a medium growth rate, green leaves that change to red on red stems in the fall provide ornamental appeal through the winter. (Reich L., 2009). Most importantly, the firm, medium-sized light blue fruit is known for its excellent flavor, and berries are resistant to cracking. (Chira L., 2003). This type prefers organically rich soil, with constant moisture and good drainage (Gough E.R., 1991). Known for its disease resistance, Bluecrop is drought tolerant when mature. This variety is known for having shallow roots. (Gosch T., 2014)

## **2. Material and method**

The used material is one hectare Bluecrop blueberry variety, in a super-intensive system ( 4000 bushes/ hectare), with support system, anti-hail net, drip irrigation system. The used method is the economic calculation over the financial result, obtained from this plantation.

The costs from the first two years are shown in the following tables. In the third year of culture, there are registered the first incomes.

Based on the technological culture sheet, in every year are registered the following direct costs: workmanship, machinery, materials, transport.

**Table 1.** Entire direct expenses, establishment and maintenance in the 1<sup>st</sup> year

Specification	Cap.I Workmanship	Cap.II Machinery	Cap.III Materials	Cap.IV Transport	Entire direct expenses
For one hectare	11245,0 Ron	2256,0 Ron	47234,2 Ron	456,33 Ron	61191,53 Ron

Source: obtained from own calculations

**Table 2.** Entire direct expenses, establishment and maintenance in the 2<sup>nd</sup> year

Specification	Cap.I Workmanship	Cap.II Machinery	Cap.III Materials	Cap.IV Transport	Entire direct expenses
For one hectare	4753.0 Ron	360.0 Ron	2817.6 Ron	16.3 Ron	7946.9 Ron

Source: obtained from own calculations

**Table 3.** Entire direct expenses, maintenance in the 3<sup>rd</sup> year and exploitation

Specification	Cap.I Workmanship	Cap.II Machinery	Cap.III Materials	Cap.IV Transport	Entire direct expenses
For one hectare	44376 Ron	360.0 Ron	2576.0 Ron	200.1 Ron	47512.1 Ron

Source: obtained from own calculations

From the obtained results, from establishing the plantation until the first harvest, there can be made the following economic analysis:

Df= 27 years

De= 25 years

It (Entire investment) = 69138,43 Ron

Setting up expenses= 61191,53 Ron

- Handmade works= 11245,0 Ron
- Mechanical works= 2256,0 Ron
- Materials = 47234,2 Ron
- Transport= 456,33 Ron

Maintenance costs= 7946,9 Ron

- Handmade works= 4753,0 Ron
- Mechanical works= 360,0 Ron
- Materials = 2817,6 Ron
- Transport = 16,3 Ron

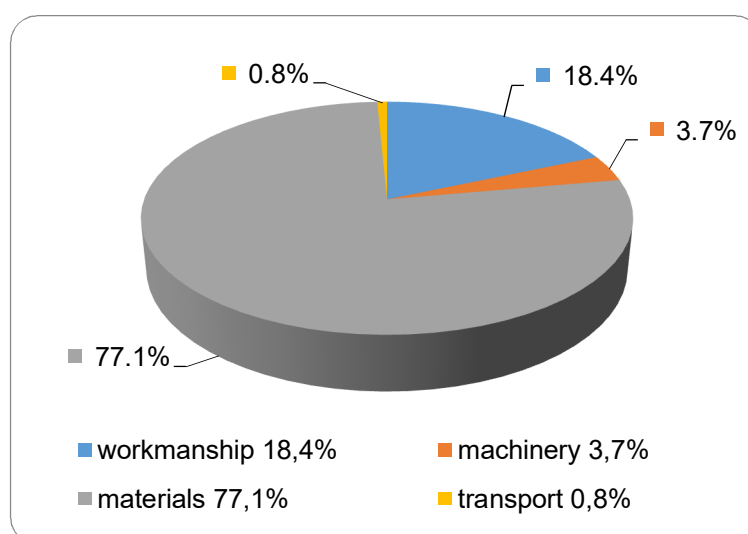
Ca (annual amortization rate)= 2765,5 Ron/ year

Ce (annual operating costs)= 47512,1 Ron

- Handmade works= 44376,0 Ron
- Mechanical works = 360,0 Ron

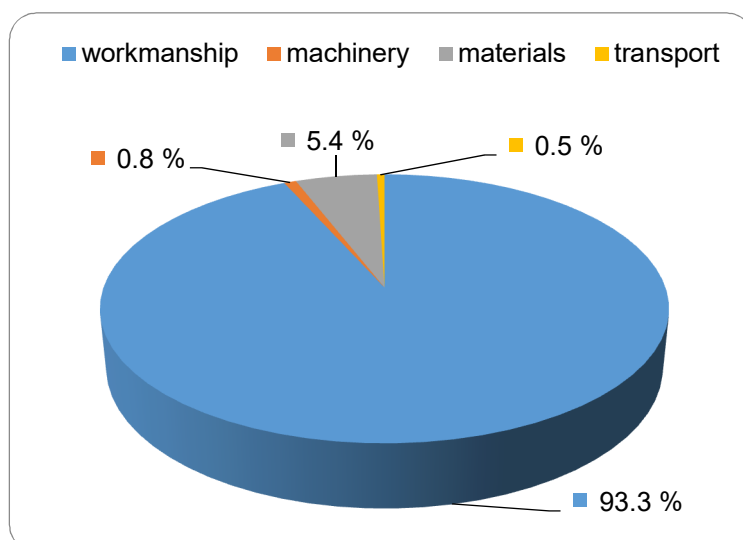
- Materials= 2576,0 Ron
- Transport = 200,1 Ron

$C_d$  (annual direct costs)= 50277,6 Ron/ year  
 $C_i$  (annual indirect costs)=  $C_d \times 6\%$ = 3016,6 Ron/ year  
 $C_t$  (Annual entire costs) = 53294,2 Ron/ year  
 $P$  (Production) = 7000 kg/ ha  
 $C_p$  (Cost of production) = 7,6 Ron/kg  
 $P_v$  (Selling price) = 10 Ron/kg  
 $V$  (Value of annual production) = 70000 Ron/ year  
 $P_{ab}$  (Gross annual profit )= 16705,8 Ron/ year  
 $I$  (Tax) = 2672,9 Ron  
 $P_n$  (Net annual profit) = 14032,9 Ron/ year  
 $R$  (Annual profit rate)= 26,3 %  
 $T$  (Term of investment recovery) = 5 years  
 $P_t$  (Entire operating profit)= 350822,5 Ron  
 $Rec$  (Economic return on investment)= 500%.



**Figure 1:** Chart of entire direct expenses, establishment and maintenance in the 1<sup>st</sup> year

Source: obtained from own calculations



**Figure 2:** Chart of entire direct expenses, maintenance in the 3<sup>rd</sup> year and exploitation

Source: obtained from own calculations

### 3. Results and discussion

Analyzing the obtained results, the total investment value is 69138,43 Ron. The annual operating expenses are 47512,1 Ron, the annual entire costs are 53294,2 Ron.

At a production of 7000 kg/ ha, sold at a price of 10 Ron/kg, it is obtained a value of annual production of 70000 Ron/ year.

The financial results of this culture for one year is 16705,8 Ron ( gross profit/ year).

Related to the obtained net annual profit and the entire operating profit, it is obtained and economic return on investment of 500%.

### 5. In conclusion

The value of the entire investment from establishing until the first harvest of a blueberry plantation can be recovered in five years of harvest.

The highest costs with the materials are registered in the first year, at the establishing, due to the materials value (bushes price).

The highest costs with workmanship for harvesting are registered in the 3<sup>rd</sup> year from planting, when the harvest takes place.

Direct costs could be lower when there is registered a large amount of precipitation and irrigation is no more used.

The return on investment is 500%, that means culture is profitable, brings high income in short time.

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