

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

Venig Aurora*, Venig Adelina**, Sîrb Gheorghe Sebastian*

*University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048, Oradea, Romania, e-mail: venig_aurora@yahoo.com

** PhD student, University of Oradea, Faculty of Environmental Protection

Abstract

Since buckthorn is a relatively new crop in Europe its cultivation technology is still under investigation. Especially should be focused on more efficient harvesting method, new cultivars suitable to European climate, bigger yields by right cultivation methods and pest and disease control. The eco-pedoclimatic conditions and the adequate relief, make Romania the perfect homeland for growing valuable crop species. The assortment of sea buckthorn grown in Romania, obtained from the local gene pool, is valuable through the complex substances of the fruit and is well adapted to the Carpathian-Danubian-Balkan geographical region. From the business management aspect, the advantage of buckthorn production is that it provides better income and return at a planting cost which is similar to that of other small fruits and berries. At the same time, the disadvantage of sea buckthorn production is the fact that yields are harvested every two years due to the technological characteristics of harvesting. This paper resembles the importance of the buckthorn plantation from the technological and economical point of view.

Key words: buckthorn, super intensive, expenses, yield, economic return on investment

INTRODUCTION

The sea buckthorn (*Hippophae rhamnoides* L.) is a fruit bearing shrub from the Eleagnaceae family, existent both in the spontaneous flora and in plantation as cultivated system. The sea buckthorn is known in different areas of the world under several custom names, which are expressing always the origin place, the presence of thorns, fruits color and fruits effect upon the human body. (Dumitru, 2019). The sea buckthorn is remarkable by its incredible adaptation capacity to the soil and climate conditions, which are enabling her to grow on some lands or to occupy them.

The sea buckthorn presents like a 1.5-3.5 m high bush with many thorns. (Kovacs, 2016). Depending on the soil and climate conditions, she grows different under the shape of low crawling bushes in the dry areas and poor soils, or under the shape of shrub in height of 8-10 m on the fertile soils.

Sea buckthorn blossoms in the month April - May and begins to produce fruits after 2-5 years after planting. Following the fruits are produced yearly but only each second year the harvest is abundant.

The sea buckthorn fruits are ripe in September - October, but they stay on the shrubs until spring when they fall on the soil. As a consequence the harvesting period is very large.

The sea buckthorn is a unique and valuable plant in breeding system. The fruits and seeds are the main nutritional and therapeutic sources. Due to these beneficent effects, from the sea buckthorn are obtained a great diversity of products, especially oils and its derivative products.

MATERIAL AND METHOD

The buckthorn realizes big productions on lands of average fertility, light and permeability.

For setting up the chain plantation you can choose flat lands or terraces in unpowered slope. The orientation of the rows must be north-south, for the best exposure to the sun.

The distance of planting in the researched plantation is according to the soil vigor, the form of plant management, the mode of harvesting, the fertility and the configuration of the land, 3m/1,25 m (super intensive). In case of planting done on terraces, the distance between plants is calculated according to the size of the terrace.

In order to prepare the planting ground for the researched plantation, the rows are drawn and the planting place marked. The pitch is pitched from the edge, with the distances presented above. Before planting, the plants are prepared by refreshing the root cuttings, shortening the longest ones to 20-25 cm and removing the diseased and broken roots. After this operation, the roots move and settle in the pit with the roots broken. The plant is positioned in the middle of the pit in an upright position. The roots are covered, pressed for efficient contact with the substrate, a watering plate is made and it is abundantly moistened with 6-8 liters of water. (Paschold, 2012)

The chain plantation is kept clean of weeds and is regularly watered during the drought. (Gosch, 2014)

Repeated weeds are made, and in the middle of the chain rows other low-altitude plants, such as root vegetables, potatoes are grown. Also, to ensure optimal development, herbicides are applied within the first two years after planting.

The terrain between the rows is worked with the disc and the milling machine, at a depth of 8-10 cm. (Spiridon, 2008). In order not to destroy the roots that grow scratching, close to the surface of the soil the manually executed grass will be made at a depth of 6-7 cm.

The trunks of the buckthorn are covered in winter with strips of waxed paper, stems of sunflower or plywood. (Chira, 2014)

Irrigation of the chain plantation is very important in the first two years after planting, this prevents the drying of the plants, stimulates the growth and forms crowns, being the support of the production from the first years of fruiting.

For a rich harvest, in the soil there must be a humidity of 70-60%, on the medium and heavy soils, clay-clay and clay soils and 60-70% on the sandy and clay-sandy soils. It is recommended a watering standard of 300-400 m³/ha. (Botez, 1984)

Cutting the crown eases the picking, stimulates the growth of fruit branches. (Prat, 2016) It has been shown that, as soon as the cuttings are made earlier in the young trees, the tempering and limiting the growth in the case of vigorous varieties favors the fruiting. (Schmid, 2007)

Harvesting the fruit of the bitch is a laborious process, because the fruits are very small, with short and rigid tails, arranged in piles around the branches.

If the fruits are not picked in time, they will burst when picked or eaten by birds.

Depending on the method of use, the buckthorn is harvested more raw or after reaching full maturity. (Cociu, 1998)

The chosen varieties for the researched plantation are Clara and Mara. Clara is a pure variety, recommended for superintensive plantations, with large fruits, yellow-orange and a production potential of 15.3 t / ha in the 3rd year and 24.5 t / ha in the 5th year. (Braniste, 2007)

Mara is a plant with vertical growth, is suitable for mechanical harvesting. The fruits are large, bright yellow-orange, the production capacity being 14.7 t / ha in the 3rd year and 23.1 t / ha in the 5th year.

RESULTS AND DISCUSSION

Number of plants 2667/ ha

Plating distance 3m/ 1,25 m

Df= 18 years

De= 15 years

It= 77839,9 lei/ ha

Setting up expenses= 52221,5 lei/ ha

- Handmade works= 7822,5 lei
- Mechanical works= 8544,0 lei
- Materials= 35855,0 lei

Maintenance costs= 25618,4 lei/ ha

- Handmade works= 5373,2 lei
- Mechanical works= 3090,0 lei
- Materials = 17155,2 lei

Ca (annual depreciation rate) = 5189,3 lei/year

Operating expenses (Ce) = 18,275,6 lei

- Handmade works= 12563,2 lei

- Mechanical works= 1126,8 lei
- Materials= 4585,6 lei

$C_d = 23464,9$ lei/ha
 $C_i = 1407,9$ lei/ha
 $C_t = 24872,8$ lei/ year
 $P = 14000$ kg/ ha
 $C_p = 1,77$ lei/ kg
 $P_v = 4,0$ lei/kg
 $P_{ab} = 31127,2$ lei/ ha
 $I = 4980,3$ lei/ ha
 $P_n = 26146,9$ lei/ ha
 $R = 105,1$ %
 T (term of investment recovery) = 3 years
 $P_t = 392203,5$ lei
 Rec (economic return on investment) = 503,8 %
 C_d = annual direct expenditure
 C_i = annual indirect costs
 C_t =annual entire costs
 P =Production
 C_p =Cost of production = C_t/P
 P_v =Selling price
 V =Value of annual production
 P_{ab} =Gross annual profit
 I =Tax= $P_{ab} \times 16\%$
 P_n =Net annual profit $P_{ab} - I$
 R =Annual profit rate $P_n : C_t \times 100$
 T = Term of investment recovery= I_t / P_n
 P_t = Entire operating profit= $P_n \times D_e$

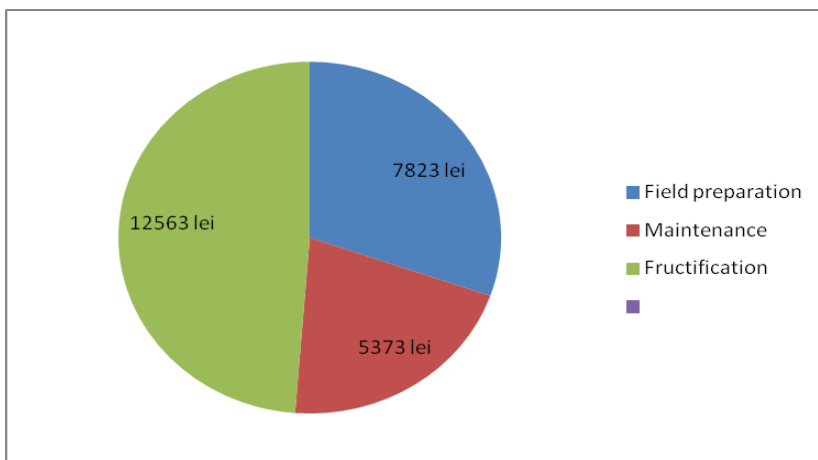


Fig.1. Labor costs from the establishment of the culture to the fructification

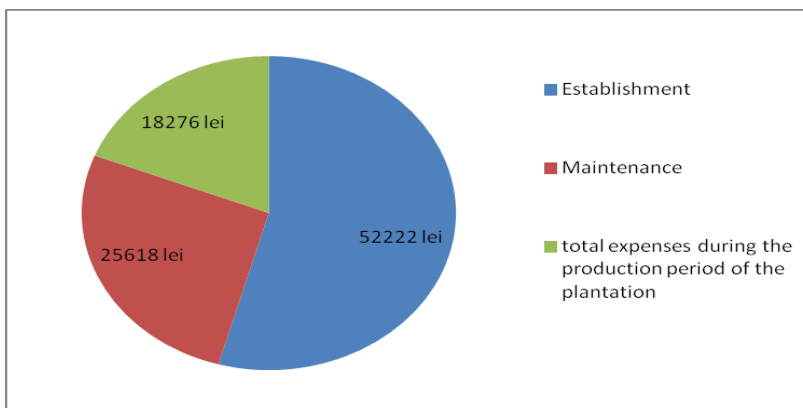


Fig. 2. Total expenses registered with the buckthorn plantation depending on the stages

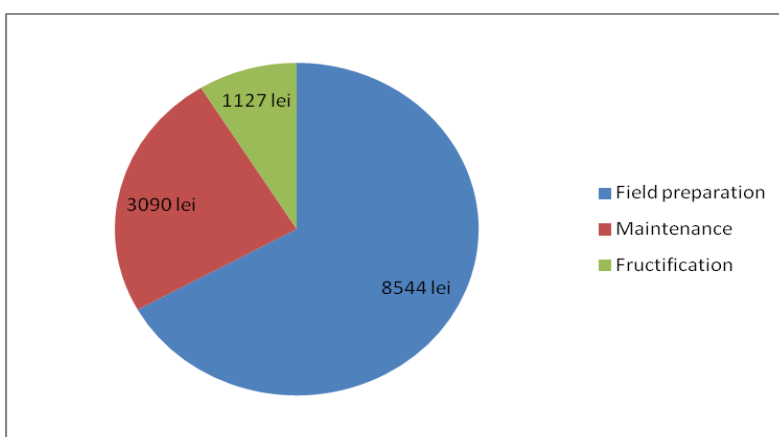


Fig. 3. The expenses with the mechanical works according to the stages of the plantation

CONCLUSIONS

The highest level of labor costs is reached during the fruitful period, when the highest expenses are recorded with the harvest of the buckthorn production. The highest level of total expenses is recorded at the establishment of the plantation, due to the value of the fruit planting material.

The highest values of the mechanical works are recorded during the period of preparation of the land for setting up the plantation, when performing more expensive mechanical works, with special machines.

The term of investment recovery for a 1 hectare buckthorn plantation is 3 years.

REFERENCES

1. Botez M.S., 1984, Cultura arbustilor fructiferi, Ed. Ceres, pg. 30
2. Braniste N., 2007, Soiuri de pomi, arbusti fructiferi si capsuni create in Romania, Ed. Paralela 45, pg. 23-27
3. Chira Lenuta, 2014, Cultura arbustilor fructiferi, Ed. MAST, pg. 45-49
4. Cociu V., 1998, Cum sa ingrijim pomii si arbustii fructiferi, Ed. Ceres, pg. 45
5. Dumitru A.N., 2019, Arbusti cu fructe comestibile, Editura Andreas, pg. 30-33
6. Gosch Theresia, 2014, Arbustii fructiferi- cultivare si ingrijire, Ed. Casa, pg. 17-19
7. Kovacs Szilvia, 2016, Specii de arbusti fructiferi in gradini si plantatii comerciale, Ed. Casa, pg. 16-18
8. Paschold P.J., 2012, Irigatii in culturile horticole, Ed. MAST, pg. 14-16
9. Prat J-Y, 2016, Taierile de formare si intretinere pentru pom, arbusti fructiferi si ornamentali, Ed. MAST, pg. 26-28
10. Schmid H., 2007, Pomii si arbustii fructiferei- lucrarile de taiere, Ed. MAST, pg. 15-17
11. Spiridon V.I., 2008, Arbustii fructiferi, Ed. Alex Alex, pg. 27
12. * Institutul de Cercetare- Dezvoltare pentru pomicultura, Pomi, arbusti fructiferi, capsun- Ghid tehnic si economic.