THE CALCULATION OF ECONOMIC INDICATORS FOR SETTING UP A BILBERRY PLANTATION

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Abstract

Berries have always been a precious delicacy for foreigners, but also a chance to make a profit for local producers. Taking a risk and investing in a bush business is rewarding. From this point of view, bilberry is one of these crops, which deserves to be cultivated by farmers. Cultivation of bilberries is currently one of the best agricultural investments on small areas. The good production yield, but also the high demand on the market make the bilberries to bring to the farmers a consistent annual profit. The investment in such a plantation is worth it because it is a long-term one. A bilberry farm offers productions for up to 50 years. The establishment of the plantation is a very big investment, but it is compensated with the fact that the fruits have a great search on the Romanian market, the capitalization price is the highest of all the small fruits and the productions are high. This paper resembles the importance of the bilberry plantation from the tehnological and economical point of view.

Key words: bilberry, expenses, production, profit rate, investment value

INTRODUCTION

The bilberry or the American blueberry, is a shrub species with a special dynamic in the last years, it is extending more and more in the culture in our country due to the high demand on the market that is growing in Europe (Chira, 2014). Bilberry adapts well both in lowland areas but especially in hilly and mountainous areas being a rustic species resistant to severe winter frosts and foliar diseases with fewer pathogens than other more sensitive species. (Branişte N., 2007) Bilberry is part of the Ericaceae family, genus Vaccinium, which includes over 200 wild and cultivated species. Bilberry (Vaccinium Uliginosum L.), Bilberry (Vaccinium Myrtillus L.) and Red Bilberry (Vaccinium vitis idaea L.) are among the spontaneous species in our country and are found, especially, in the pre-mountainous hilly areas in the form of short bushes (between 20-50 cm tall and, very rarely, up to 80 cm), with creeping stems and small fruits (Dumitru, 2019). Cultivated bilberry varieties (with tall shrubs, which can reach 1 to 3 m in height) have fruits 2-4 times larger than those produced by

wild bilberries and generally come from three American species: Vaccinium Corymbosum (mainly Vaccinium Lamarckii and Vaccinium Angustifolia).

MATERIAL AND METHOD

Bilberry with tall bush is a species of temperate climate, with moderate temperature requirements. Prefer cool and humid climate. The optimal hourly temperatures of the species are between 18 and 30^0 C, and the absolute minimum is 7^0 C and maximum 42^0 C. Temperature is a major factor in production, the heat requirements are high in order to obtain high yields (Eaton & co., 2004). Bilberries are affected by extremely high summer temperatures, especially if they are associated with severe atmospheric drought. Temperature affects both plants and fruits. In the Northern areas with long days and cool nights during the ripening of the fruits are more fragrant and tastier (Hoza, 2008). Although concerning the light bilberry has moderate pretensions, it also supports semi-shade, but it achieves the best productions in full light conditions, having maximum requirements during the flowering and fruiting period. In partial shade the stems grow shorter and thinner, bear less fruit, and the fruit remains smaller and less colored. Bilberries have high water requirements, with maximum consumption during fruit growing and ripening. Requires a constant humidity in the soil, not tolerating drought and prolonged excess water in the soil (Moon, 2020).

Soil is one of the most important environmental factors for the success of bilberry cultivation, both in its physical properties (texture) and in its chemical properties. The optimal limits of the soil reaction for bilberries, expressed in pH values are between 4.3 and 5.5 (James, 2019). Bilberries can grow and develop well on a wide range of soils, provided they are acidic, well-drained, rich in organic matter and well exposed to light. It does not tolerate water stagnation in the soil for several days (Kovacs, 2016). The establishment of a plantation requires compliance with the climatic and soil conditions that must meet the ecological requirements of bilberries. The preparation of the land for the establishment of bilberry cultivation consists in clearing woody vegetation and removing the roots, after which the surface leveling is performed in the direction of the slope (Venig, 2012).

After leveling, a clearing plow is applied, at 40-50 cm, 120 -150 kg of P_2O_5 per hectare are incorporated. On soils with a pH above 5.5, an additional 2-4 tons of sulfur powder / ha is administered. In soils with low permeability, scarification is performed at 60-80 cm to ensure internal drainage of water (Mateescu, 2002).

Planting distances are determined by the crop system and soil vigor. The optimal distances for the correct development of the plants are 2.5-3.0 m between rows and 1.0 m between plants per row.

Bilberries are planted in autumn, in October, in November, and in drier areas in early spring, or in March in April, in wetter areas (Retamales, 2018)

Some aspects must be taken into account when planting, namely: planting is done in pits of 40x40x40 cm, in which 15-20 kg of acid peat is administered and only on poor soils 5-7 kg of well-fermented manure / pit are added. . Due to the very fine root system that can be easily broken, the handling of the plants is done with great care. The planting will be done with the bale of soil fixed on the roots following the abundant watering of the pots in which the plants were placed. The plants are placed in the pit 4-5 cm deeper than in the fortification field, taking care to evenly distribute the roots and cover with the above-mentioned soil mixture (Retournad & co., 2021). After planting, the plants are watered with 10-15 l of water per plant and mulched with loose soil.

Cultivation is conducted in the form of a bush, because it corresponds to the peculiarities of growth and thus requires minimal interventions for its formation and management. It is also possible to adopt the fruit fence, without a support system, by removing the stems that tend to develop towards the interval between the rows. In this case, the distances between plants in a row will be greater, namely 1.2-1.5 m.

In the first year after planting, sometimes in the 2nd it is recommended to maintain the soil in a black field clean of weeds. This can be done by superficial work at a depth of 5-10 cm in a row and 10 -15 cm in intervals. Another way to keep the soil clean of weeds is by mulching. Vegetable waste, straw leaves are used as mulch, but the best results are the use of softwood sawdust and acid peat. The mulch is applied in summer, after the first tillage or after the ripening of the fruits, in a thick layer of 6.0-8.0 cm, on a wide strip of 0.6 -1.2 m between the plants (Schmid, 2007).

Acid peat can also be used successfully as mulch, the application is done in the same way as sawdust, with the exception that the peat must be ground. The amount used per hectare is 6-10 to / ha.

In the first year after planting the 2-year-old plants, the 2-4 branches with which the plant came for their branching, all vigorous growths, upright, and well placed in the bush, are shortened, removing half to 1 / 3 of their length. The weaker branches with lateral position are removed. Any stems that appear from the basal area and favorably complete the skeleton are preserved, shortened for branching. In the next 2-3 years, pruning is applied only to half of the vigorous growths, for the staged arrangement of the fruit production and the lighting of the crowns (Spiridon, 2008).

The fruit ripens in a period of 4-7 weeks, depending on the variety, the cultural area and the climatic conditions of the respective year. Harvest maturity is considered when the fruit acquires the color specific to the variety (blue, shiny, blackish, etc.), and the skin becomes elastic when pressed. The ripening of the fruits in bunches takes place in the order of their formation, namely from the base to their top.

Harvesting can be done manually, mechanized or semi-mechanized. Manual harvesting is recommended for fresh fruit. It is carried out in dry weather, avoiding the hours of strong sunshine during the day.

Harvesting is done on varieties in plastic baskets (pots) with a capacity of 0.5 kg, placed in a row in crates with a capacity of 3 or 5 kg. During harvesting, the fruit packs are kept under shade or sheds, protected from rain and sun.

Bilberries are temporarily stored in cool rooms, protected from rain and sun, at temperatures of 10-12^{0}C, where they can be stored for 4-5 days. Mechanized harvesting is performed with the combine. There are quantitative and qualitative losses, so production is destined for industrialization.

Semi-mechanized harvesting consists of harvesting bilberries by hand and collecting them in a common bunker. At the same time, the bushes are hit with short rubber tubes and the fruit is collected in baskets placed under the bush (Westhumble Mary, 2014).

Bilberries are characterized by a good storage capacity. This ability is closely linked to the fact that healthy berries remain intact after peeling and do not lose easily their juice during handling or transport. Keeping them fresh for consumption or industrialization can be done for 4 weeks in cold storage, at temperatures of 0-2^{0}C.

RESULTS AND DISCUSSION

Number of plants = 5714/ ha
Exploitation Period (De) = 25 years
Investment value (It) = 145195 Ron
Setting up expenses = 120836 Ron

- Handmade works = 7729 Ron
- Mechanical works = 8848 Ron
- Materials = 104259 Ron

Maintenance costs = 24359 Ron

- Handmade works = 5391 Ron
- Mechanical works = 6364 Ron
- Materials = 12604 Ron

Ca (annual depreciation rate) = 5808 Ron/year

Operating expenses (Ce) = 30942 Ron

- Handmade works= 22771 Ron
- Mechanical works= 3562 Ron
- Materials= 4609 Ron

Direct annual expenses (Cd) = 36750 Ron
Indirect annual expenses (Ci) = 3675 Ron
Entire yearly expenses (Ct)= 40425 Ron
Production (P) = 8000 kg/ ha
Production cost (Cp) = 5,05 Ron/ kg
Selling price (Pv) = 8,0 Ron/kg
Annual production value (V) = 64000 Ron
Gross annual profit (Pab) = 23575 Ron
Tax (I) = 3772 Ron
Net annual profit (Pn) = 19803 Ron
Annual profit rate (R) = 49 %
Term of investment recovery (T) = 7,3 years
Total profit during exploitation (Pt) = 495075 Ron
Economic return on investment (Rec) = 340 %

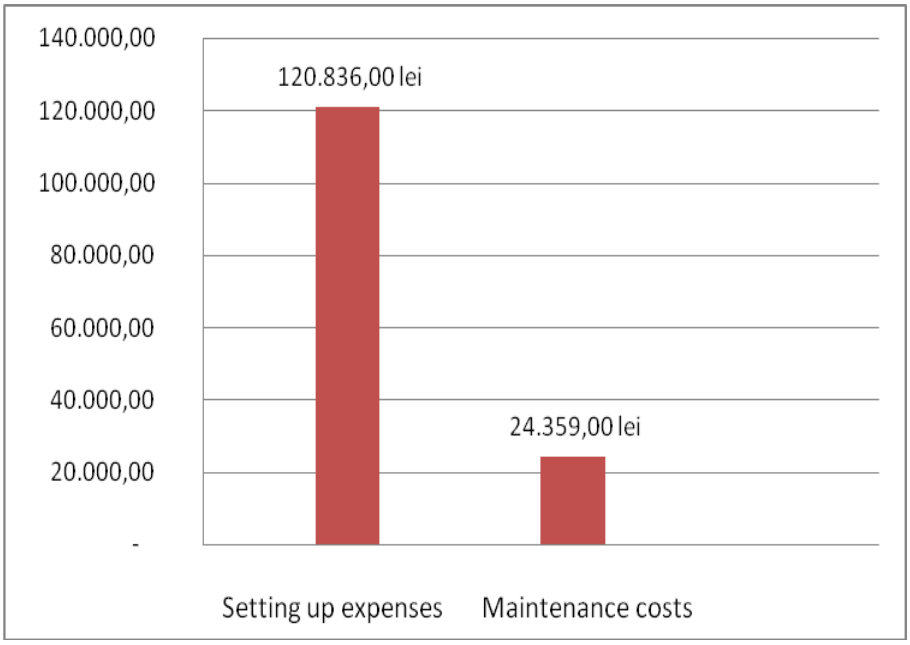

Fig. 1. Entire investment value

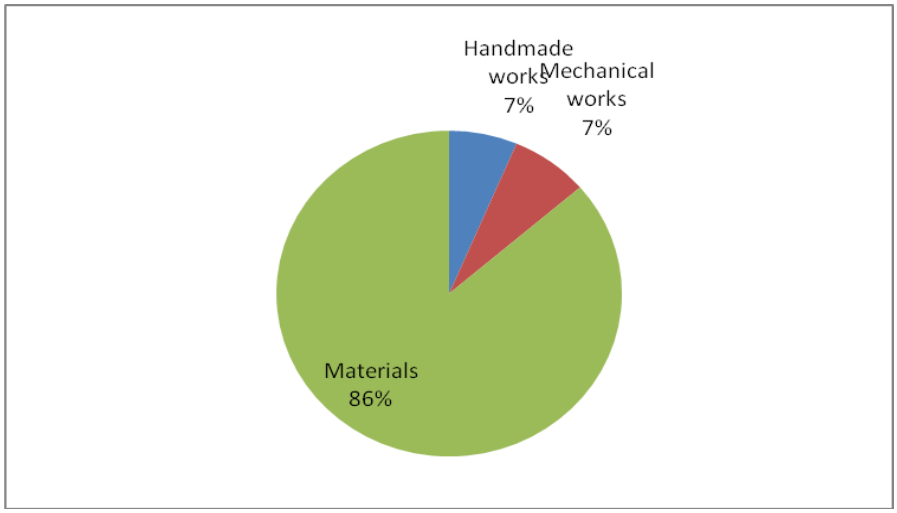

Fig. 2. The structure of setting up expenses and plantation establishment

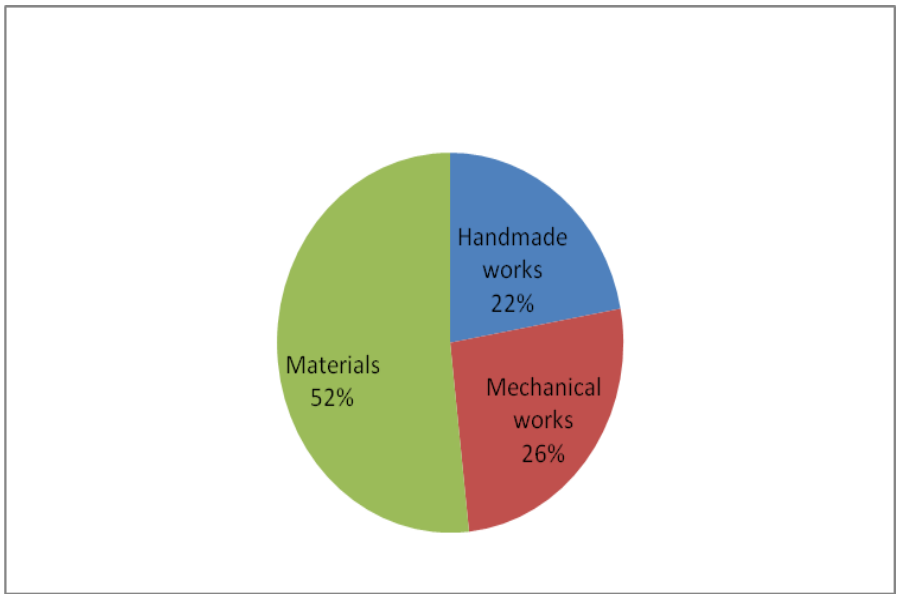

Fig. 3. The structure of the plantation maintenance expenses

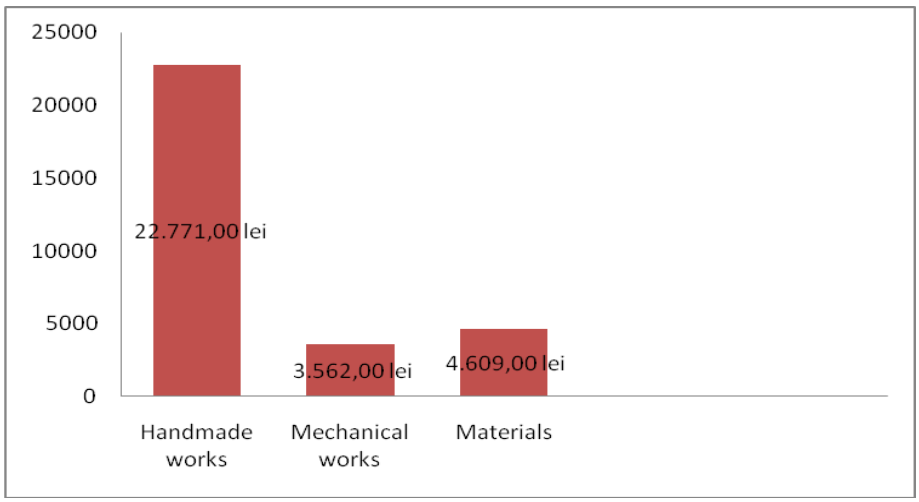

Fig. 4 . The structure of the annual operating expenses

CONCLUSIONS

In the entire investment value, the largest share is the cost of land preparation and the establishment of the culture (83.2%). In the structure of the costs for the land preparation and the establishment of the plantation, the largest share is represented by the material expenses (86.3%) due to the cost of the planting material.

In the structure of the annual operating expenses, the highest value is represented by the handmade work expenses (73.6%) due to the fruit harvesting works.

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