

PROFITABILITY OF HAZELNUTS PRODUCTION IN SERBIAN ENCLAVES IN KOSOVO

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Abstract

Moderate continental climate of Kosovo provides opportunities for successful cultivation of hazel. Hazel nut production is not represented in the area of Serbian enclaves in Kosovo, but due to the increasing market demand for this product certain agricultural holdings show interest for this type of production. Favourable natural conditions should contribute to raising new modern plantations in considerably larger areas. For fitting 1 ha of intensive plantations of hazels (land preparation costs, planting, irrigation, the cultivation costs in the I, II, III and IV year of growing it is necessary to invest from seven to ten thousand euros, depending on what the grower wants to achieve. In the year full-yield the expected core yield is four kg per tree or two thousand kg per hectare, the yield providing income of ten thousand euro. The initial investment per hectare is extremely high, but taking into account the fertility of hazel tree of fifty to seventy years we come to the conclusion that the investment is profitable and cost effective thereby contributing to raising standards and ensuring the existence of Serbian enclaves in Kosovo.

Key words: *hazelnut, production, costs, profitability*

Introduction

According to the importance and attractiveness hazel is a very important fruit species in nut group. Its fruits are especially popular in the confectionery industry, primarily due to the aroma and a number of other properties. Due to such actuality worldwide there is great interest in expanding and growing this fruit. In Turkey, there is a special cult to the fruit crop. Vast areas are under hazel on various soils and wide open spaces from the Black Sea level to the mountain ranges of 1200 m above sea level. In numerous steep slopes hazel is cultivated in the most extreme conditions, but is expanding in order to preserve from erosion. In contrast to such terrains, hazel is also grown in significantly favourable conditions where with the use of notable agricultural measures (fertilization, irrigation, pruning, cultivation, dense plantings, mechanized harvesting), considerably higher yields are achieved (Mitrovic, 2002). Serbian enclaves (by districts: Kosovo, Kosovska Mitrovica, Kosovo Pomoravlje district, Peć, Prizren district.) in Kosovo and Metohija are the places populated by Serbs, the population not completely ethnically cleansed in 1999 and 2004. The enclaves population live in to a less or greater extent isolated from the surrounding Albanian population under very difficult conditions. The Serb population is seeking economic survival perspective in the efficient agricultural performance (Maksimovic, 2013,2014). Determination to invest in the hazel production stems from the fact that there are good climatic and other conditions for this type of intensive production in the Serbian enclaves in Kosovo and Metohija. Past experience has shown that this production is very profitable and that demand exceeds supply. Investing in this type of production is an ideal investment and good income of agricultural holdings in the Serbian enclaves for the following reasons:

- tolerance to agro-ecological conditions,
- the gap between the actual needs for fruit and the state of the production,
- favourable market price,

- long fertility of hazel
- regular fruitfulness,
- increasing the standards and providing livelihoods for the household members.

The main goal of this research is to determine the economic viability and profitability of hazel plantations in one hectare in Serbian enclaves in Kosovo.

Material and methods

Moderate continental climate of Kosovo provides opportunities for successful cultivation of hazel. There are two systems of cultivation of hazel tree, one is grafted hazels when one of the varieties that are commercially viable is grafted on the base of Corkscrew hazel (*Corylus avellana*), that is on the stem plant. The second system is the hazelnut shrub that is often used in intensive production because of its benefits (healthier and more resistant to insects and disease in relation to grafted hazelnut). A good selection of varieties and their distribution in the plantation provides a good pollination. The main variety should be present in about 60% and other pollinating varieties with 40%, and accordingly the authors propose the following varieties: Istrian 60%, Apolda (Rome) 10%, Davijana (Fihtverder) 10%, Ludolf 10% , Avelino (Helsinki) 10%. The varieties arrangement in the plantation should be set so that the main variety and pollinators alternate in a row. Based on the proposed recommended varieties planted at a distance of 4 meters between rows and 4 m between trees, since it is about medium lush varieties, the spacing between rows and plants in the row is determined. It is best that the direction of rows is north - south for better lighting, the most appropriate time for planting hazels is in autumn because the root system has significant activity during the winter period. After planting the plants are truncated to 15-30cm, the number of primary branches depends on the vigour of the variety, and the leaves are left as long as necessary for the formation of the bush (bush consists of 3-6 main branches). Pruning is performed for thinning and leaving only the branches needed for the formation of the bush and for regular removing of shoots. In order to make the orchard enter the full yield as soon as possible and to give the expected results, it is necessary to promptly and fully implement cropping practices.

In the past three years the authors monitored the production of hazelnut plantations around Gornji Milanovac (Serbia) and based on the collected data performed economic analysis, provided the table of hazelnut plantation investment, spreadsheets of hazel yield presented by years, planned calculation of hazelnut production and sensitivity analysis of hazelnut production.

Results and discussion

Hazel is characterized by high capital investments required to raise seedlings. The hazelnut plantation investment period is four years, i.e. until the moment when the production makes profit, thus progressing the hazel from investment into regular production. High investment per unit area is justified in a very long and profitable full yield period which can last over fifty years (Milic and Radojevic, 2004). The investment value of hazelnut plantations include costs of preparing the land and planting pesto seedlings, costs of plantations cultivation during the first four years (in the fifth year revenues cover the production costs). In modern intensive production of hazelnuts irrigation is also necessary and due to it in the investment summary of hazel plantation raising we have predicted a system of drip irrigation, as well as the cost of building a fence to prevent the intrusion of unwanted visitors and animals.

Table 1 Investment summary of hazelnut plantations rising.

	Types of costs	Amount (Euro/ha)
1.	Bedding of land and planting	3200
2.	Cultivation in first year	600
3.	Cultivation in second year	600
4.	Cultivation in third year	700
5.	Cultivation in fourth year	800
6.	Building a fence	1900
7.	Drip irrigation (approximate price)	2000
8.	Total	9800

Table 2. Overview of the hazelnut yield per year.

Year from planting	Yield in % from full fruitfulness
III	10%
IV	20%
V	40%
VI	80%
VII	100%

In the planned calculation all cost groups are included that charge the operating hazel planting in full yield in the seventh year and therefore the average yield is planned and the purchase price is provided on the basis of which the expected production gains are calculated.

 Table 3. Planned calculation of hazelnut production in the 7th year of planting.

Types of costs	Unit	Per 1 ha	Price (Euro)	Amount (Euro/ha)
1	2	3	4	5
A: MATERIAL				
Fertilizer				
1.Urea	kg	200	0,35	70
2.NPK 8:16:26	kg	350	0,30	105
3. Pesticides	kg	4	90	360
4. TOTAL				535
5.B: SERVICES				
6. Atomizer protection (5x)	w.day	0,7	60	42
7. Chisel plowing (2x) -Tillage	w.day	0,6	30	18
8. Transportation and distribution of urea	w.day	0,15	25	4
9. Harrowing	w.day	0,6	20	12
10. Transportation and distribution of NPK	w.day	0,15	25	4
11. Cultivation of fertilizers	w.day	0,3	30	9
12. Fruit harvesting (by shaking)	w.day	2	30	60
13. Costs of drying fruit	w.day			250
14. TOTAL				399
15. C: LABOUR				
16. Labour work	w.day	6	10	60
17. Pruning	w.day	6	10	60
18. Manual cultivation	w.day	10	10	100
19. Fruit collecting	w.day	15	10	150
20. TOTAL:				370
21. Total direct costs (A+B+C)				1.304

22. Indirect costs (10% to direct)				130
23. Depreciation of planting and fence (50 years)				143
24. TOTAL COSTS				1.577
25. ACHIEVED RESULTS	pcs	500x4kg=2.00 0kg	5	10.000
26. PROFIT (25-24)				8.423
27. Production cost-effectiveness (25:24)				6.34
28. The rate of profit (profitability income) (Investment) x 100				8,423 (gain) / 9.800 85,95%

Cost effectiveness of production shows that on every euro of costs incurred in the seventh year of hazelnut production the production value of 6.34 euros is realized. The rate of profit that is the income profitability shows that in the seventh year of hazelnut on every euro invested in the production and cultivation of planting 85.95% euro profit is achieved. Taking also into account that even before the seventh year we have incomes we come to the conclusion that the production of hazelnuts is extremely cost effective and profitable.

Sensitivity analysis: (gross margin)

Yield (kg)	The product market price (euro/kg)			Change of yield +/- 20%
	4,00	5,00	6,00	
1.600	6.400	8.000	9.600	Market price changes +/- 20%
2.000	8.000	10.000	12.000	
2.400	9.600	12.000	14.400	

The sensitivity analysis shows the movement of gross margin depending on the change in yield and selling price of the product for a total of +/- 20%. It is clear that achieving positive margin is not affected, because even by reducing the yield and reducing prices by 20% we have the cost-effectiveness of production - on one euro invested in the production we realize 4,06 euros of production value.

Intensification of nut fruit production and especially of walnuts and hazelnuts is a significant prerequisite for achieving satisfactory production and economic results. Highly intensive production of walnuts and hazelnuts should ensure enriching the invested capital and high cost effectiveness of production that is high profitability of raised plantations, regardless of the high initial investment and a longer period before the entry of full-fruited (Milic and Prekic, 2001).

Conclusion

For the investment in hazelnut plantations in one hectare, it is necessary to invest 9,800 euro, and this investment includes the cost of preparing the land and planting pesto seedlings, costs of plantings cultivation during the first four years (in the fifth year the revenues cover the production costs). In modern intensive production of hazelnuts irrigation is also necessary and due to it in the investment summary of hazel plantation rising we have predicted a system of drip irrigation, as well as the cost of building a fence. Costs and planned and the expected value of production in the year of full yield are predicted by the planned calculation. Cost effectiveness of 6.34 and profit rate of 85.95% is achieved by hazels production. The benefits of growing hazelnuts are seen from the performed calculations in relation to other types of fruits and they are reflected in the fertility of hazels for fifty to seventy years, thus leading to the conclusion that the investment is profitable and economically viable, which contributes to raising standards and ensuring the existence of Serbian enclaves in Kosovo.

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