

Comparison of Economic Results between Separate Growing of Walnut and Mixed Growing Walnut and Peach

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Keywords: mixed plantation, intercropping, additional costs, return, profitable.

Abstract

Trees in traditional walnut orchards enter the period of full production capacity 10-12 years after being planted in Bulgaria - that is why payback period is slower compared to the payback period of other fruit species. Therefore, ways for more effective cultivation are researched. One of those approaches is growing walnut in mixed cropping. For this purpose in the period 2003 – 2010 in the experimental field of the Fruit Growing Institute – Plovdiv a trial was conducted. Peach was selected for an intercrop because it starts fruiting early and has short life, which would allow the peach trees to have naturally died and to be uprooted before walnuts begin fruiting. The aim of the study was to compare and evaluate the economic results of separate cultivation of Bulgarian walnut cultivars ‘Izvor 10’, ‘Sheinovo’ and ‘Silistrenski’, grafted on rootstock (*Juglans regia* L) at 10x10 m planting distance with mixed growing of walnut and peach. The variant with mixed growing was planted with the same walnut varieties at the same distance and intercrop peach was planted between walnut rows at 5x3 m. The peach is cultivar ‘Glohaven’, grafted on rootstock (*Persica vulgaris* Mill). The results showed that mixed cropping of walnut with peach is economically more profitable. This approach of cultivating provides producers with additional income necessary for the normal output of the manufacturing process in the years in which walnut has not started to generate revenue and allows rapid payback of the plantation. The year of positive net cash flow in case of separate cultivation of walnut is the 8th growing year, while in the mixed growing of walnuts and peaches it happens on the 3rd growing year. Net present value of mixed plantation exceeded by 18 to 22 times such received from separately grown walnuts (for 7th and 8th growing season).

INTRODUCTION

Common Agricultural Policy of the EU, which Bulgaria started to implement in 2007, stimulated the establishment of plantations of nuts species, including walnut. Trees in traditional walnut orchards, however, start full yielding later than other fruit crops. Producers receive no revenue during this initial, unproductive period which causes significant difficulties for them. This is a serious issue and that is why ways should be sought to overcome it, for more efficient use of the plantation area and for receiving additional income. One way is planting of intercrop in walnut plantations. There were publications on the cultivation of legumes, fodder and other crops in the free area in the years before the walnut enters full bearing period (Garrett et al., 1986; Garrett et al., 1987; Garrett et al., 1991). Applying of integrated agro forestry practices aimed at providing greater flexibility and better land use has been reported (Gordon et al., 1991; Garrett et al., 1994). Planting of other fruit types (cherry, apricot, almond, chestnut, hazelnut,

raspberry, black currant, etc.) as intercrops has also been studied (Chepurnoi et al., 1991, Korac et al., 1993). According to Korac et al. (1993), by the tenth year the average profit of walnut/apricot intercropping exceeded by 4.2 times that from wheat. In recent years the use of intercrops in horticulture is seen as a way of developing sustainable agriculture, diversification of farming systems and more efficient use of resources (Ouma et al., 2010). The purpose of the study is to compare and evaluate the economic performance of separate growing of walnut and mixed orchard of walnut with peach as intercrop.

MATERIALS AND METHODS

An experiment with separate cultivation of walnuts and mix cultivation walnut-peach was conducted in Fruit Growing Institute – Plovdiv in the period 2003 - 2010 in search for a more effective way of growing walnut. The experimental orchard was established in 2003. The variant with separate growing of walnut was planted with Bulgarian cultivars ‘Izvor 10’, ‘Sheynovo’ and ‘Silistrenski’, which were grafted on rootstock *Juglans regia* L at 10x10 m distance. The variant with mixed growing was planted with the same walnut varieties at the same distance and intercrop peach was planted between walnut rows. This way there was a 5 m distance between rows. The distance in row between peach trees was 3 m. The peach is cultivar ‘Glohaven’ and was grafted on rootstock *Persica vulgaris* Mill. The peach was chosen as an intercrop because of its early entering in fruit bearing and its short life for the Bulgarian conditions. The peach trees will thus naturally die and will have been uprooted by the time walnuts enter full bearing period. The main technological parameters were: drip irrigation, fertilizers were imported with a drip system, soil surface was maintained clean by herbicides treatments and soil cultivation. The financial performance of the two investment solutions was assessed – separate cultivation of Bulgarian walnut varieties and mixed cultivation of walnut and peach. The main method of dynamic assessment of investment projects was used: the method of Net present value (NPV). The main advantage of this approach is that it takes into account the declining value of money, which is essential for sustainable long-term projects such as those in fruit growing. The assessment was made for a 9-year period, since eradicating of the peach trees was planned to be done on the ninth year. Expected yields were determined based on the results of the experiment. Investment costs and expected net cash flows were calculated based on the applied technology and cost of materials, labor and services at market prices by 2010. The costs of establishment and cultivation included the basic variable and fixed costs: planting material, fertilizers, herbicides, water, mechanization, labor, drip system, insurance and management. The planting material was calculated at prices: 10 BGN/seedling for walnut and 5 BGN/seedling for peach. Fruit production was calculated at prices: 0.7 BGN/kg for peach and 2.0 BGN/kg for walnut. Exchange rate: 1 EUR = 1.95583 BGN.

RESULTS AND DISCUSSION

Conducted trials confirmed the possibility of growing peach as an intercrop in a walnut plantation in the conditions of Bulgaria. The capital necessary to be invested in the two ways of growing walnut (separate and mixed growing of walnut and peach) is presented in figure 1. Capital investment for establishment of a mixed plantation was 10, 830 BGN/ha, which was 2 times greater than the capital investment for separate establishment of walnut orchard. However, the total costs for establishment and growing until fruit-bearing are almost the same. The mixed peach-walnut orchard had only 7%

higher total costs than the cost in separate cultivation of walnut. This could be explained by the fact that peaches in the mixed plantation began to fruit-bear in the fourth year, while walnuts in both cases: in mixed cultivation of walnut with peach and separate cultivation started fruit bearing on the seventh year. The producer only invested and did not generate revenue until the seventh year in case of separate cultivation of walnut.

Expected yields for both variants of cultivation are presented in table 1 and table 2. It appeared that in mixed cultivation of walnut and peach, the area was used more efficiently. Growing walnut with intercrop peach is expected to ensure 118,000 kg/ha more fruit than separate growing of walnut for the total period. The results of the Net present value analysis (table 1, 2) showed that investment in a mixed planting peach and walnut was financially profitable, since the Net present value of the project is a positive number. Investing in a separate plantation is, however, financially unprofitable, as evidenced by the negative Net present value of the project. The year of positive net cash flow in the case of separate cultivation of walnut is the 8th growing year, while in the mixed growing walnut-peach it happens on the 3rd growing year, which is 2.6 times faster. It is important to note that the absolute values of positive net cash flows of a mixed growing were much higher than that of the separate growing of walnut.

The economic performances showed that the cultivation of walnuts with intercrop is economically more cost-effective than cultivation of walnuts separately. According to our study, growers could receive revenue on the 3rd growing year which is one year earlier from what previous data reported (Korac et al., 1993). Net present value of mixed plantation exceeded by 18 to 22 times that received from separate growing of walnuts (for 7th and 8th growing season). The received revenue significantly facilitates operating costs of producers.

CONCLUSIONS

Comparison and evaluation of economic performance between growing of walnut with peach as intercrop and growing solely walnut indicated that mixed cropping was economically the more profitable decision.

It allowed more efficient use of the plantation area and provided significantly more production and revenue for the farmer at an early stage (even during the fourth year). These revenues supported the operating costs of the producer in the years in which walnut had not started cropping.

Discounted payback period for the mixed plantation occurs earlier – on the 8th year, while in the case of separate cultivation of walnut the capital investment was not redeemed.

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Tables

Table 1. Net present value analysis for the separate growing of walnut

Year	Yield, walnut kg/ha	Investment costs	Growing costs	Gross income	Net cash flow	Discount factor (10%)	Present value of Net cash flow
0	0	5,980	0	0	-5,980	1	-5,980
1	0	1,730	0	0	-1,730	0.9091	-1,573
2	0	1,940	0	0	-1,940	0.8264	-1,603
3	0	1,810	0	0	-1,810	0.7513	-1,360
4	0	1,840	0	0	-1,840	0.683	-1,257
5	0	1,870	0	0	-1,870	0.6209	-1,161
6	1,300		2,630	2,600	-30	0.5645	-17
7	1,900		3,250	3,800	550	0.5132	282
8	2,000		3,330	4,000	670	0.4665	313
Total:	5,200	15,170					-12,356

Table 2. Net present value analysis for the mixed growing walnut-peach

Year	Yield, peach kg/ha	Yield, walnut kg/ha	Investment costs BGN/ha	Growing costs BGN/ha	Gross income peach BGN/ha	Gross income walnut BGN/ha	Gross income BGN/ha	Net cash flow BGN/ha	Discount factor (10%)	Present value of Net cash flow BGN/ha
0	0	0	10830	0	0	0	0	-10830	1	-10830
1	0	0	2460	0	0	0	0	-2460	0,9091	-2236
2	0	0	2620	0	0	0	0	-2620	0,8264	-2165
3	17000	0		3250	11900	0	11900	8650	0,7513	6499
4	17000	0		3250	11900	0	11900	8650	0,683	5908
5	21000	0		4300	14700	0	14700	10400	0,6209	6457
6	21000	1300		6100	14700	2600	17300	11200	0,5645	6322
7	21000	1900		6400	14700	3800	18500	12100	0,5132	6210
8	21000	2000		6800	14700	4000	18700	11900	0,4665	5551
Total:	118000	5200	15910	30100			93000			21716

Figures

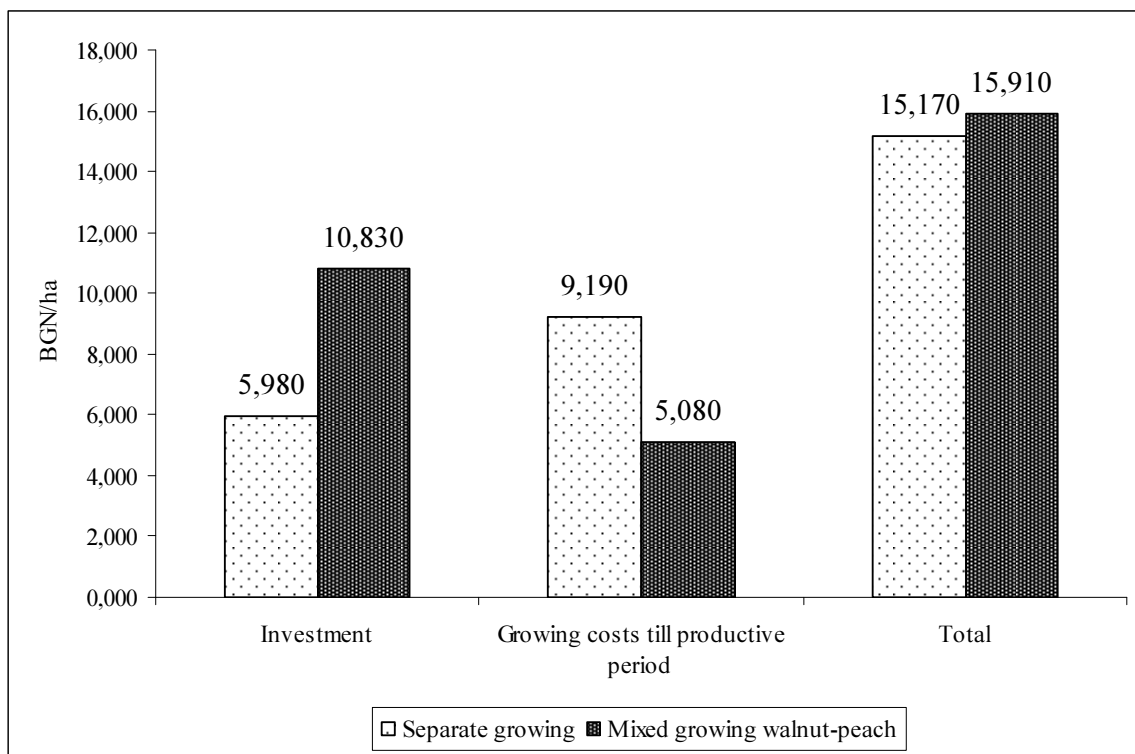


Fig. 1. Costs for establishment of one ha of plantation, BGN/ha