Biblid: 1821-4487 (2010) 14; 1; p.36-39
UDK:658.14: 664.854:634.14

Original Scientific Paper
Originalni naučni rad

PRODUCTION CHARACTERISTICS AND ECONOMIC ASPECTS OF QUINCE PRODUCTION
PROIZVODNE KARAKTERISTIKE I EKONOMSKI ASPEKTI PROIZVODNJE DUNJE

Dušan MILIĆ, Veljko VUKOJE*, Zorica SREDOJEVIĆ***
**Faculty of Agriculture, 21000 Novi Sad, Trg D. Obradovića 8, Serbia*
*** Faculty of Agriculture, 11080 Beograd-Zemun, Nemanjina 6, Serbia*
e-mail: milic@polj.uns.ac.rs

SUMMARY

In spite of the very favourable natural conditions and modest requirements regarding the use of agricultural techniques for growing quince, it is very difficult to explain the fact that quince is very little represented in the fruit industry of Serbia as well as other countries. In the period 1999-2008, the quince was grown on average on the area of 57,557 ha in the whole world, while the realized production was 442,747 t. In the world, in Europe as well as in the Republic of Serbia, there is a tendency of increasing of both the quince growing area and its production. Although the number of fruitful trees has been decreasing in the Republic of Serbia (the change rate is -1.04%), the quince production has been increasing by an average annual change rate of 1.99%.

The overall investment value of the intensive quince plantation amounts 3,630 €/ha. The planting cost of 1,490€/ha accounts for the greatest part (41.1%) in the overall cost of setting up a quince plantation. The realized profit, calculated as the difference between the production value and the production cost, amounts 8,580€/ha.

***Key words**: quince production, investment value, profitability.*

REZIME

I pored veoma povoljnih prirodnih uslova za njeno uspevanje i skromnih zahteva u pogledu primenjene agrotehnike, teško je objasniti malu zastupljenost dunje u voćarskoj proizvodnji, ne samo u Srbiji nego i u drugim zemljama. U proseku za period 1999-2008. godine površine dunje u svetu su iznosile 57.557 ha, a ostvarena proizvodnja 442.747 t. U svetu, Evropi i Republici Srbiji je ispoljena tendencija povećanja i površina i proizvodnje dunje. U Republici Srbiji i pored smanjenja broja rodnih stabala (stopa promene -1.04%) ostvarena proizvodnja dunje se povećava po prosečnoj godišnjoj stopi promene od 1.99%.

Ukupna investiciona vrednost intenzivnog zasada dunje iznosi 3.630 €/ha. Troškovi sadnje sa iznosom od 1.490 €/ha zauzimaju najveće učešće (41,1%) u ukupnim troškovima podizanja zasada dunje. Ostvarena dobit, izračunata kao razlika između vrednosti proizvodnje i troškova proizvodnje je 8.580 €/ha.

***Ključne reči**: proizvodnja dunje, investiciona vrednost, profitabilnost.*

INTRODUCTION

Fruit growing, as a field of plant production, is characterized by a series of comparative advantages in relation to other branches of agriculture. Therefore, production of fruit and fruit products deserves special attention. The production of fruit and fruit products can be very profitable, especially in terms of the export of fruit and fruit products. However, this issue requires introduction of important measures regarding intensifying of fruit production as well as modernisation and specialization of fruit processing facilities. (Milić and Radojević, 2003).

The issue of quality is very important hence the quality itself provides the means of market conquest and advantage over competition. The quality should be managed in production, processing, transport, storage, packaging, i.e., in all the stages through which a product must go to reach the final consumer. With well-organised management and managing, the competitiveness is established as well as the increase in profit and satisfaction of the customer's demand (Milić et al., 2009).

Intensification of fruit production should result in both the increase of the yield per area unit and the increase of the volume of the fruit production. At the same time, it is necessary to implement gradual changes of production structure in favour of deficient fruit species, including quince. The priority should be given to the fruit production which is based on the principles of integral production. Such production provides high quality fruit, and its priorities are the ecological aspects of fruit production in the process of setting up and exploitation of orchards. (Ćejvanović, 2007). Integral fruit production could be represented as the production based on the scientific and ecological principles and strictly controlled, which generally protects the nature from pollution, provides a man with healthy products, thus ensuring that the investment made by agricultural housing is cost-efficient.

The quince is one of the oldest fruit species. It is rather widespread, but relatively little used in production. In Serbia, it is usually grown on individual fruit trees, on the boundary fruit trees between parcels, or on homesteads. Although the natural conditions for growing quince are very favourable, it is difficult to explain why this fruit is so little present not only in Serbia but in other countries as well.

The quince has been unjustifiably a neglected fruit species. Compared to other continental fruit species, it has many advantages, especially in the conditions of sustainable development. It has no special requirement regarding the soil, it is practically resistant to late frosts due to its late blossoming, it is not much susceptible to plant diseases and pests, it arrives to the market late in the season, it is easily and quickly picked because of its big fruits, and it is easily processed, especially for drying.

The quince fruit is of strong yellow colour, hard, having nice odour and pungent taste. In warmer areas the fruit is softer and juicer, and in colder areas it has nicer shape, rich yellow colour, and a rather hard odour. According to Babić et al., (2008) the fragrance, as an important indicator of the quince quality, is the reason for its processing, mostly for the production of distilled drinks (brandy) and of clear juices based on quince fragrance.

MATERIAL AND METHOD

The available statistical data on the most important production properties of quince have been used as a solid base for understanding the production tendencies of quince world-wide, as well as in Europe and in the Republic of Serbia in the period 1999-2008. For better understanding of the situation and tendencies of the researched phenomena during a longer period of time, the analytical-comparative methods have been used. A detailed interpretation of the analyzed properties of quince production has been performed using the basic indicators of mean values and variations, as well as the indicators of relative changes of the phenomena in time. To determine the regularities appearing in the phenomena variations during a period of time, an analysis has been done by the application of the exponential trend.

The modest requirements regarding the natural conditions should cause the increase of production capacities, first of all, as the result of the producers being more interested in this fruit species. Therefore, on the basis of the internal documentation of one producer from the area of Vojvodina, the investment value and the profitability of quince production per area unit were determined.

RESULTS AND DISCUSSION

Situation and quince tendencies world-wide

The quince is very interesting for growing not only in gardens and homesteads, but also on large plantations, because it has a number of advantages in comparison to other fruit species. It blossoms very late in season (beginning of May), thus avoiding late spring frosts. By application of the adequate agricultural technique, the quince bears fruits regularly, which is not the situation with many other tree fruit species; it has a very big fruit (50-200gr), which makes the time of picking significantly easier, as it lasts only two to three weeks. The fruit is rich in different chemical matters necessary for human health, so this fruit is recommended to be used fresh. In the blossoming season, the trees are very colourful with large white blossoms, which make the environment nice. These are all the facts in favour of the increase of its production.

In the period 1999-2008, the world area covered by quince trees was approximately 57,557 ha, varying per analysed years from 51,268 ha in the first researched year, to 64,073 ha in 2007 (Table 1). The areas covered by quince trees in the world, in Europe and in Serbia have the tendency of increasing, while the intensity of the increase is the largest in the world (the change rate is 2.42%). With 9,140 ha Europe accounts for approximately 15.88% in the total areas covered by quince trees. The areas covered by quince trees in Serbia are stagnating at the level of 1,810 ha and have a slight tendency of increasing per average change rate of 0.47% per year.

In the researched period (1999-2008), the realized world production of quince was 442,747 t. With the average production of 63,187 t Europe accounts for 14.27% in the total world quince production. With 11.446 t Serbia accounts for 18.11% in the total European production of quince. Quince production shows an increasing tendency in the world in general (change rate of 2.01%) as well as in Europe (change rate 2.47%) and in Serbia (change rate of 1.13%).

In the period 1999-2008 the average number of fruitful quince trees was 912,900 in Serbia, varying from 859,000 in 2007 to 1,012,000 in 1997 (Table 2). The number of the fruitful quince trees decreases by annual change rate of -1.04%. The realized average quince production was 11,065 t with the tendency of decreasing (change rate of -2.34%).

Table 1. Tendencies of quince production in the period 1999-2008

Indicators	Area (ha)	Yield (kg/ha)	Production (t)
World			
Average 1999-2008.	57,557	7,706	442,747
minimum	51,268	7,047	400,464
maximum	64,073	8,030	480,456
Change rate (%)	2.42	- 0.40	2.01
Coefficient of variation (%)	7.94	4.09	6.30
Europe			
Average 1999-2008.	9,140	6,932	63,187
minimum	7,973	6,169	52,509
Maximum	11,810	7,670	70,633
Change rate (%)	1.29	1.17	2.47
Coefficient of variation (%)	11.51	7.80	10.90
Republic of Serbia			
Average 1999-2008.	1,810	6,555	11,446
minimum	1,500	5,416	8,067
maximum	2,000	8,370	15,066
Change rate (%)	0.47	- 0.09	1.13
Coefficient of variation (%)	7.57	12.05	17.16

Source: Calculation based on the data from www.fao.org

With the average yield of 12 kg/tree, quince production in Serbia was 11,065 t. The realized quince production has the increasing tendencies (change rate of 1.99%), primarily as the result of production intensification (increase of yield per tree).

Table 2. Tendencies in the number of fruitful quince and the realized productions of quince in the Republic of Serbia in the period 1999-2008

Indicators	Number of fruitful trees	Yield per tree (kg)	Production (t)
Average 1999-2008.	912,900	12	11,065
minimum	859,000	7	7,100
maximum	950,000	16	14,400
Change rate (%)	-1.04	3.85	1.99
Coefficient of variation (%)	3.64	21.52	18.56

Source: Statistical Office of the Republic of Serbia (www.statserb.sr.gov.rs)

Investment Value of Quince Plantation

The setting up an orchard is a very complex, responsible and professional task, which lasts for several years (usually between 2 and 5 years); it includes not only setting up of the plantation, but also taking care of the young orchard until it begins to bear fruits (Milic and Assoc., 1993). The lifetime of an orchard includes both the period of its setting up and the period of its exploitation. The period of exploitation is divided into the period of the growing fruitfulness, the period of full fruitfulness and the period of decreasing fruitfulness. As orchards are exploited in production in almost the same way for many years, these are long-term investments and the invested capital will be tied up in the process of production for a longer period of time.

The investment process includes the financial investment in the present with the aim of achieving the economic benefits or certain affects in future. The realisation of agricultural investments is usually an expensive and long-lasting process, while the expected benefits come after a number of years, sometimes 50 or more, depending on the type and the value of investment. Hence, different types of agricultural activities affect the type, value and importance of the investment. For example, investments differ if they are in the sectors of fruit growing, grape growing, animal

husbandry, agricultural engineering, melioration, etc. (Sredojević, 1998).

Quince is a long-lasting fruit species and it can live for over 50 years. It starts bearing fruit in its second year and it becomes fully fruitful 5 or 6 years after planting (Gvozdenović et al., 1987). The investment value of quince plantation per unit of area (ha) is shown in the Review 1.

Review 1: Recapitulation of the Investment Value of Quince Plantation

Setting-up period: 2 years Exploitation period: 45 years Full fruitfulness after 5 years Planting density (4 x 3 m) (833 fruit seedlings/ha)			
		Amount €/ha	Share (%)
1.	Cost estimate of the project	250	6.9
2.	Cost estimate of soil preparation for setting up the plantation	890	24.5
	- Manure cost (30 t/ha)	230	6.3
	- Mineral fertilizer cost (1.000 kg/ha)	380	10.5
	- Channel cost (50-60 cm)	200	5.5
	- Tilling cost (2x)	80	2.2
3.	Planting estimate cost	1.490	41.1
	- Cost of fruit seedlings (833 pcs.)	1.250	34.5
	- Planting cost (marking, hole digging, seedling preparation with planting, watering)	240	6.6
4.	Estimate cost of tending in year 1 – winter ploughing, tilling (3x), cultivation attachment tilling (2x), mineral fertilizes spreading (200 kg/ha), protection, cross cutting of seedling, summer cutting, watering	480	13.2
5.	Cost estimate of tending in year 2 the same as in year 1, plus cutting (2)	520	14.3
	TOTALLY(1-5)	**3.630**	**100.0**
II Profitability of Quince Production			
- Average yield in the period of full fruitfulness		35.000 kg/ha	
- Selling price		0.35 €/kg	
- Production value		12.250 €/ha	
- Production cost (30% of realized production value)		3.675 €/ha	
- Profit (Production value – Production cost)		8.580 €/ha	

NOTE: This research has been done with the financial support of the Ministry of Science and Technological Development of the Republic of Serbia, the Project reg. no. 20065 called "The Quality of Dried Fruit Production" within the Project of the Technological Development in Biotechnology.

The total investment value of the intensive quince plantation is 3,630 €/ha. The cost of planting of 1,490€/ha account for 41.1% in the total cost of setting up a quince plantation. Then, there is the cost of soil preparation for setting up the plantation (24.5%).

With the average production of 35,000 kg/ha in the full fruitfulness and the average selling price of 0.35 € /kg, the production value of 12,250 € /ha can be realized. As quince has modest requirements regarding the application of agricultural techniques, it is assumed that the production cost amounts 30% of the realized production value, i.e. 3,675 € /ha. The realized profit of 8,580 €/ha is calculated as the result between the production value and production cost. However, it is necessary to stress that the buying-up price has been very unstable, even very low in some years, which significantly diminished the realized economic effects of the production.

CONCLUSION

In the period researched (1999-2008), the total world area covered by quince trees was on average 57,577 ha, and the realized production was 442,747 t. With the area of 9,140 ha and the realized production of 63,187t Europe accounted for 15.88% on average in the world area with quince trees, i.e. for 14.27% of total world production of the quince. With average production of 11,446 t Serbia accounted for 18.11% in the European production of quince. Quince production is increasing in the world as a whole (change rate of 2.01%), in Europe (rate change of 2.47%) and in Serbia (change rate of 1.13%0, as well.

In Serbia the number of fruitful quince trees was 912,900 in the period 1999-2008 with the deceasing tendency per average annual change rate of -1.04%. The realized average production of quince was 11,065 t with the increasing tendency (change rate of 1.99%), first of all, as the result of the production intensification (yield increase per tree).

The total investment value of quince intensive plantation was 3,630 €/ha. The planting cost of 1,490 €/ha account for 41.1% in the total cost of the setting up a quince plantation. The cost of the buying of fruit seedlings represents the main item of the total planting cost. The cost of the soil preparation for setting up a plantation accounts for 24.5% of the total cost. As quince is an average life-lasting fruit variety, it can live for over 50 years, so the mistakes made during the setting up of a plantation can hardly be repaired.

With average production of 35,000 kg/ha and the average selling price of 0.35 €/ha, the production value of 12,250 €/ha is attainable. Considering the modest requirements of this fruit regarding the agricultural technique, the production cost is 30% of the realized production value, i.e. 3,675 €/ha. The realized profit is calculated as the difference between the production value and the production cost, and it amounts 8,580 €/ha.

Due to the shortage of quince fruit and the increasing demand for it in some years, its price is increasing, so setting up a plantation in Serbia is becoming more realistic. With the purpose of improvement of quince production in Serbia, the following should be performed: introduce new highly productive varieties, provide subventions for setting up new plantations, increase the production of new fruit seedlings, inform the customers about the importance of quince, and open new processing facilities.

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Received:13.03.2010. Accepted:25.03.2010.