Abstract: Apricots have an important place in fruit production in Serbia. They are deficient on both the domestic and foreign markets. The apricot production potential of Serbia has not been sufficiently exploited. Given the above, an analysis was conducted aimed at examining a number of related indicators, including production, yields, total number of trees and number of productive apricot trees in Serbia over 1995-2007 as well as some phenomena and tendencies in apricot production.

Key words: apricot, production, yields, productive trees.

Introduction

World apricot production shows a slight tendency to increase, the highest being achieved on the Asian and European continents accounting for 51.7% and 29.3%, respectively, of the total global production. Specific importance in apricot production is attributed to Mediterranean countries which have substantially facilitated and intensified apricot production under highly favourable agricultural and environmental conditions. Leading Asian countries include Turkey, Iran and Pakistan, with Turkey producing more than half of the crops and accounting for 16.3% of the world apricot production. The high-ranking European producers include Italy, contributing 6.28% to the total world production, followed by France, Spain and Greece (Veljković et al. 2009). Italy is also a large exporter of fresh apricot. The first fresh apricots are imported to Serbia mainly from Italy. Early fresh apricots on the Serbian market command the highest prices (ranging from RSD 250 to 300 per kg.

This study is part of the research project Ref. No. 20099 funded by the Ministry of Science and Technological Development.
Serbia has a history and tradition of apricot production which has gradually developed and increased, faring particularly well under favourable conditions in some regions.

The Šumadija village is traditionally marked by vigorous apricot trees growing in the yards for dozens of years and bearing abundant choice aromatic fruit that is used to make a variety of homemade specialties (jams, preserves, juices etc.) every year. The cultural operations used in apricot production have been improved over time, the production has become intensified and commercialized on some estates and practised mostly (96%) on private farms (according to data reported by the Serbian Chamber of Commerce). Apricot cultivar and rootstock selection has received much attention, and apricot breeding has helped solve and overcome some problems related to apricot production.

Material and Method

Standard methods of statistical analysis and official statistical databases on Serbia were used in this study. The data on the total number of trees, number of productive trees, production and yield of apricot were obtained from the Republic Bureau of Statistics publications (Statistical Yearbooks for the period 1995-2007). The data analyzed were given in tabular and graphic forms. Basic indicators of mean values, standard deviation, coefficients of variation and average annual change rates were used in the analysis. The dynamics of change in apricot production and yields for the said period was represented by the trend analysis for the Republic of Serbia, Central Serbia and Vojvodina regions, the analysis being conducted using the exponential trend equation.

Results and Discussion

The greatest apricot production is supplied by the Mediterranean countries that are also large exporters of fresh and processed apricots (Turkey, Italy, France, Spain and Greece), followed by the Balkan countries in continental Europe, including, among others, Serbia which holds an important place in apricot production.

Over 1995-2007, the apricot production in the Republic of Serbia showed a tendency to increase at an average rate of 5.94%, the increase in central Serbia and Vojvodina being 7.16% and 4.78%, respectively (Table 1). The production in all of these regions had high coefficients of variation, being its inherent characteristic (Milošević et al. 2008, Veljković et al. 2009.). The variations in apricot production or irregular productivity are associated with the high impact of specific climate conditions in apricot-growing regions. Apricots are highly susceptible to low winter temperatures leading to the winter killing of generative buds. A study conducted by Miletić et al. (2006) revealed that apricots grown in Serbia are tolerant of low temperatures ranging from – 20 to -25 °C during biological dormancy and those up to -18 °C during environmental dormancy. Apricot production is also adversely affected by late spring frosts.
which can kill flower buds. Frosts occur periodically in some years at some locations, causing great damage and, hence, subsequent fruit failure. Negative effects of late frosts (occurring at the beginning of April) were reported for Čačak in 2003 and 2006 by Milošević et al. (2007).

A sudden dieback of apricot trees, which is generally vaguely termed apoplexy, is a frequent phenomenon in apricot cultivation both in Serbia and Europe caused by bacteria (*Pseudomonas syringae*), fungi (*Cytospora sp.* and *Verticillium sp.*), incompatibility between the rootstock and cultivar used, high amounts of ground water etc. The causal agents of the disease must be controlled in order to prevent the disease and intensify apricot production. They include three groups of factors: (1) environmental factors (winter and spring frosts, ground waters in poorly permeable soil inducing root asphyxiation, dry summer periods leading to tree exhaustion and subsequent pathogen and frost susceptibility); (2) biological factors (a poor choice of rootstock and cultivar, incompatibility, height of grafting, plant density etc.) and (3) biological factors of parasite origin (parasitic bacteria, fungi, mycoplasma and viruses).

The above factors induce substantial variations in apricot production, both in terms of yield and quality; nevertheless, it showed an increasing tendency during the period of observation. Some microlocations in Central Serbia and Vojvodina provide favourable conditions for apricot production enabling intensive crop culture.

Central Serbia and Vojvodina account for 70.8% and 29.2%, respectively, of the total apricot production in the Republic of Serbia, resulting in an average of 19,230 tons during the period of observation, with the highest level being reached in 2004 and the lowest in 1998 (Table 1).

<table>
<thead>
<tr>
<th>Analysis parameters</th>
<th>Total production</th>
<th>Average production</th>
<th>Stand. Dev.</th>
<th>CV</th>
<th>Rate</th>
<th>Contribution %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rep. Serbia</td>
<td>250.0</td>
<td>19.23</td>
<td>9.91</td>
<td>51.51</td>
<td>5.94</td>
<td>100.0</td>
</tr>
<tr>
<td>Centr.Serbia</td>
<td>176.9</td>
<td>13.61</td>
<td>7.22</td>
<td>53.07</td>
<td>7.16</td>
<td>70.8</td>
</tr>
<tr>
<td>Vojvodina</td>
<td>73.1</td>
<td>5.47</td>
<td>3.02</td>
<td>55.22</td>
<td>4.78</td>
<td>29.2</td>
</tr>
</tbody>
</table>

Apart from analyzing the total apricot production in Serbia, this study also evaluated the total number of apricot trees and the number of productive trees over the said period. The average total number of apricot trees in 1995-2007 was 1.83 million, i.e. 1.35 million in Central Serbia and 463,000 trees in Vojvodina. The total number of trees showed a tendency to decrease in all regions excepting Vojvodina. The analysis also included a separate period of 2001-2007 suggesting a negative rate of change in apricot tree number over the last years and in all regions, resulting in a decrease in the total number of apricot trees (Table 2).

In addition to the total tree number, the analysis included the number of productive apricot trees, which amounted to 1.57 million in Serbia, showing an increasing tendency. Over 2001-2007, all three regions were marked by a tendency of the number of productive apricot trees to decrease, as indicated by
the change rate value given in Table 3. Furthermore, the differences between the total tree number and number of productive trees decreased. The analysis did not consider the unfavourable age structure of fruit trees, given the insufficient proportion of intensive young orchards.

Central Serbia and Vojvodina contributed some 74% and 25%, respectively, to both the total tree number and number of productive trees.

Tab. 2. Total number of apricot trees (10³) in Serbia over 1995 – 2007

<table>
<thead>
<tr>
<th>Analysis parameters</th>
<th>Average tree number over 1995-2007</th>
<th>CV</th>
<th>Rate</th>
<th>Average tree number over 2001-2007</th>
<th>CV</th>
<th>Rate</th>
<th>Contribution % 1995/2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rep. Serbia</td>
<td>1,835</td>
<td>1.87</td>
<td>-0.27</td>
<td>1,821</td>
<td>2.11</td>
<td>-0.47</td>
<td>100.0</td>
</tr>
<tr>
<td>Centr. Serbia</td>
<td>1,354</td>
<td>2.31</td>
<td>0.05</td>
<td>1,355</td>
<td>2.65</td>
<td>-0.55</td>
<td>74.50</td>
</tr>
<tr>
<td>Vojvodina</td>
<td>463</td>
<td>1.96</td>
<td>5.16</td>
<td>465</td>
<td>0.70</td>
<td>-0.23</td>
<td>25.50</td>
</tr>
</tbody>
</table>

Tab. 3. Number of productive apricot trees (10³) in Serbia over 1995 – 2007

<table>
<thead>
<tr>
<th>Analysis parameters</th>
<th>Average number of productive trees over 1995-2007</th>
<th>CV</th>
<th>Rate</th>
<th>Average number of productive trees over 2001-2007</th>
<th>CV</th>
<th>Rate</th>
<th>Contribution % 1995/2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rep. Serbia</td>
<td>1,579</td>
<td>1.57</td>
<td>4.67</td>
<td>1,584</td>
<td>1.48</td>
<td>0.11</td>
<td>100.0</td>
</tr>
<tr>
<td>Centr. Serbia</td>
<td>1,168</td>
<td>2.73</td>
<td>0.52</td>
<td>1,190</td>
<td>2.01</td>
<td>-0.12</td>
<td>74.70</td>
</tr>
<tr>
<td>Vojvodina</td>
<td>396</td>
<td>2.38</td>
<td>-0.14</td>
<td>393</td>
<td>1.03</td>
<td>-0.29</td>
<td>25.30</td>
</tr>
</tbody>
</table>

The analysis of the above tables suggested that the apricot production during the period of observation increased, irrespective of the number of productive trees showing a tendency to decrease; furthermore, modern cultural operations were introduced in apricot growing, apricot production became increasingly intensified and higher yields per tree were produced.

The analysis of the obtained apricot yields revealed that the average yield over the period of observation was 12.14 kg per tree in Serbia and 13.7 kg per tree in Vojvodina. The yields increased at a rate of 5.88%, the rate being higher in Central Serbia (Table 4).

Tab. 4. Apricot yield in Serbia over 1995 – 2007 (kg / tree)

<table>
<thead>
<tr>
<th>Analysis parameters</th>
<th>Average yield</th>
<th>Stand. Dev.</th>
<th>CV</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rep. Serbia</td>
<td>12.14</td>
<td>6.19</td>
<td>50.98</td>
<td>5.88</td>
</tr>
<tr>
<td>Centr. Serbia</td>
<td>11.47</td>
<td>5.95</td>
<td>51.84</td>
<td>6.74</td>
</tr>
<tr>
<td>Vojvodina</td>
<td>13.7</td>
<td>7.55</td>
<td>55.10</td>
<td>4.96</td>
</tr>
</tbody>
</table>
Similarly to apricot production, the analysis of apricot yields showed high values of coefficient of variation, confirming the yield variability. The observed tendencies in apricot production during the analyzed period are presented in Figure 1.

The demand for apricots on both domestic and foreign markets facilitates commercial apricot production, but the observed variations in the production are discouraging, leading to apricots being grown in combination with other fruit species. The lack of adequate apricot and peach processing and cold storage facilities in intensive fruit growing regions has caused increasingly serious problems for fruit growers. It is noteworthy that the apricot delivery price in 2009 – being RSD 20 per kilogram - was considerably more unfavourable than in 2008, when it was RSD 35 per kg. Additionally, apricot harvest dates coincide with those of a number of other agricultural operations during the season, leading to problems related to the lack of labour during the harvest season.

![Fig.1. Apricot production in Serbia](image)

**Fig.1. Apricot production in Serbia**

The cultivation of apricots is a widespread practice in Serbia, primarily in the hilly regions, but as the total yield and quality obtained are far from satisfying the market demand, priority should be given to the micro-locations where apricots are grown successfully as well as to intensive production involving adequate cultural operations. The important fact to bear in mind is that advantages of a location are essential for apricot growing, the apricot tree being a good example of a fruit tree suitable for cultivation at micro-locations (Milošević 1997, Veljković et al. 2007).

In the Municipality of Čačak, apricots are successfully cultivated at different locations in the villages of Miokovci, Prijevor and Lipnica characterized by highly favourable agricultural and environmental conditions for apricot growing as well as
by good yields and high quality of fruit. The local tradition of apricot growing and a wealth of related experience have been used by the Miokovci village dwellers for the rural development programme that includes, among other things, the annual Apricot Days event and contributes to apricot production becoming a distinguishing feature of the region.

Despite the risk of apricot cultivation, growers producing apricots at suitable micro-locations focus on commercial production and obtaining good crop performance. Milić and Vukoje (2008) report that a hectare of intensive apricot orchard requires an investment of EUR 4,000 and a planting density of 5x5 m, produces full crops in the fourth year of growth and ensures exploitation for a period of 25 years.

Conclusion

The improvement and development of apricot production in Serbia must be seriously addressed and supported by large investments. Priority should be given to regions in Serbia that have already showed major tendencies in apricot production. Intensive apricot production necessitates adequate cultural and pomological operations, continuing grower training and education and exchange of experience. Careful attention should be given to proper rootstock and cultivar selection and seedling health. To secure better marketing and higher delivery and purchase prices in the production of apricot and other fruit species, the GlobalGap quality control system should be introduced to ensure apricot fruit safety, the system being a necessary requirement for fruit exports to the world market.

References

NEKI ASPEKTI PROIZVODNJE KAJSIJE U SRBIJI

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Rezime


Rad je deo istraživanja projekta evidencionog broja 20099 finansiranog od strane Ministarstva za nauku i tehnološki razvoj