Fruit quality parameters of three apple cultivars in western Kosovo

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Abstract

The goal of this research was to define the quality of the apple fruits through some parameters in three different cultivars: Gala Buckeye’, ‘Golden Delicious’ (Reinders) and ‘Red Chief’, that have been recently introduced in Kosovo. Quality parameters investigated in a trial in Western Kosovo were diameter, height, weight, firmness and the sugar content. The survey was carried out in four repetitions, where the results were statistically processed by analyses of variance ANOVA test. The results obtained for the diameter of the fruit showed in average that the highest values were found in cv. ‘Golden Delicious’ (83.85 mm) while, the lowest values were found in cv. ‘Gala Buckeye’ (70.66). Concerning the height of the fruit the highest values were found in cv. ‘Red Chief’ (79.90 mm), whereas the lowest values were belonging to cv. ‘Gala Buckeye’ (60.65 mm). Regarding the average weight of the fruit, cv. ‘Red Chief’ showed apparently higher difference (256 g.) while, lower values were found in cv. ‘Gala Buckeye’ (152 g.). Furthermore, the highest values of the firmness of the fruit were found in cv. ‘G. Delicious’ (9.50 kg/cm²), whereas cv. ‘Red Chief’ (8.87 kg/cm²) reached the lowest values, although for the sugar content of the fruits the highest values were found in cv. ‘Gala Buckeye’ (14.50), while the lowest in cv. ‘Red Chief’ (12.37).

Key words: apple fruit, diameter, height, weight, firmness, sugar content

Introduction

Apple fruits have very high nutritional values making them very helpful to the human body and therefore are cultivated all over the world. In Kosovo apple is the most widespread fruit crop. According to statistical data of the Kosovo Ministry of Agriculture, Forestry and Rural Development (MAFRD); the Y2012 production area of apple is 1680 ha.

To apple growers, fruit size is strongly correlated with profits. Size, together with shape and colour, is one the most important fruit quality characteristics to consumers (Schotzko, 1985). Zajmi et al., (2007), show that in practice there is a considerable number of methods for determining the maturity of the fruit, in order to respond to customer requests and processing industry. In practice mainly used are these methods: the number of days of full flowering until fruit picking (harvest), the total amount of temperature from full flowering until harvesting, separation of the stalk of the fruit from the branch, changing of the colour of the fruit, the changing of the seed colour, the determination of fruit firmness with (penetrometer) - spectrophotometric method, determination of the presence of starch.

A great number of authors write about the methods for determining the optimal moment of fruits but we are mentioning the authors (Trillot et al., 2002; Zajmi et al., 2007), who point out that one of the methods for determining fruit firmness is penetrometer.

According to Shqahu (2007), apple can be adapted in different soils; it grows in cool climate, warm and optimum air moisture but. Apple is susceptible to the high temperatures, while low temperatures can survive until - 30 °C.
Authors Vaysse and Landry (2004) provided some facts for the fruit quality of many cultivars. According to these authors, Gala cultivar performed with calibration 70/75 mm, weighing 145-175 g., while Golden Delicious cultivar fruit with calibration 80/85 mm, weighing 211-246 g., while fruits of the Red Chief cultivar have calibration 80/85 mm weighing 219-254 g. Cultivar Red Chief is mutation of the Starkrimson cultivar. It has the same ripening time as Golden Delicious and is distinguished from Red Delicious by having reddish floral hole. Fruits are moderately big, with white pulp and very tasty. Is part of the autumn cultivars, harvested in the middle of September (Thomaj et al., 2013). Buckeye Gala cultivar fruits are 65-80 mm in size. Fruits have sweet taste and juicy. This cultivar gives very high yields. The color is intensive red and shiny. Fruits of the Golden Delicious cultivar (Reinders) 70-85 mm in size; it has very good rapport between sugars and acids. Fruits have light lenticels; their taste is very good when are grown in appropriate locations.

Material and methods
The research was conducted in an apple orchard of 3 hectares located in the Budisalc village in Klina, Kosovo. Three cultivars were evaluated under the research reported here: ‘Gala Buckeye’, ‘Golden Delicious’ (Reinders) and ‘Red Chief’. Planting distances were 3.5 m between rows and 1 m distance in the row. Standard cultural care and technology was applied in the entire orchard including drip irrigation and hail protection using a anti-hail net. The experimental design included four repetitions of each cultivar and five trees per repetition, totalling 60 trees. Samples analysed consisted of 5 fruits per tree or 100 fruits per cultivar, totalling 300 fruits. Samples were taken on different dates depending on the harvesting time; i.e. for cv. ‘Buckeye Gala’ on August 24, for cv. e ‘Golden Delicious’ (Reinders) on September 09 whereas cv. ‘Red Chief’ was harvested on September 10, 2013.

Fruit diameter was determined by slide-gauge tool, making measurements on the size of the fruit equator. Fruit height was determined as well by slide-gauge tool, by performing measurements on the highest point of the fruit (the tail dimpling and floral dimpling). Fruit weight was determined by analytical scales. Firmness is a primary measure of apple fruit texture, the key determinant of eating quality of apples (Saei et al., 2011). Fruit firmness was determined by digital penetrometer twice per fruit: on the sunny side and the shaded side along the greatest transversal. Fruit sugar content was determined by refractometer.

Results and discussion
Research results presented in Table 1. indicate that the cv. ‘Golden Delicious’ (Reinders) has reached higher value of fruit diameter (83.85 mm). On the other hand, cv. ‘Red Chief’ has reached a slightly lower value (83.45 mm). When it comes to the height of the fruit, cv.
‘Red Chief’ has reached a higher value (79.90 mm), whereas the cultivar ‘Gala Buckeye’ has significantly lower value (60.56 mm). Regarding the weight of the fruit, again ‘Red Chief’ (256 g.) came up with the highest value compared to the cultivar ‘Gala Buckeye’ (152 g.). ‘Golden Delicious’ (Reinders) has reached the highest value 9.50 kg/cm² of fruit firmness, compared to the lowest value reached by the cv. ‘Red Chief’ (8.87 kg/cm²). In relation to the sugar content, the highest value was reached by cv. ‘Gala Buckeye’ (14.50), whilst ‘Red Chief’ came up with the lowest value (12.37), which is consistent with the results of Salvador et al., 2006. Results related to both fruit diameter and weight confirms those of other authors (Vaysse and Landry, 2004). Also our results for the weight of ‘Golden Delicious’ (Reinders) coincide with the author (Racskó et al., 2006). Analyses of Variance found significant differences between cultivars in terms of fruit diameter, height, weight and sugar (brix) but no differences in relation to fruit firmness.

Table 1. Complete Parameters of the Fruit at harvesting time.

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>Diameter of Fruit (mm)</th>
<th>Height of Fruit (mm)</th>
<th>Weight of Fruit (g.)</th>
<th>Firmness of Fruit(kg/cm²)</th>
<th>Sugar of Fruit (Brix%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Gala Buckeye’</td>
<td>70.66</td>
<td>60.56</td>
<td>152</td>
<td>9.01</td>
<td>14.50</td>
</tr>
<tr>
<td>‘G. Delicious’ (Reinders)</td>
<td>83.85</td>
<td>75.57</td>
<td>246</td>
<td>9.50</td>
<td>12.40</td>
</tr>
<tr>
<td>‘Red Chief’</td>
<td>83.45</td>
<td>79.90</td>
<td>256</td>
<td>8.87</td>
<td>12.37</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>2.59</td>
<td>1.29</td>
<td>2.15</td>
<td>0.81</td>
<td>0.76</td>
</tr>
<tr>
<td>0.01</td>
<td>3.92</td>
<td>1.95</td>
<td>3.26</td>
<td>1.23</td>
<td>1.15</td>
</tr>
</tbody>
</table>

Conclusions

The research presented yielded some results which have an impact on intensive growing technology of apples in the particular climatic region of western Kosovo (Budisalc), namely in Dukagjini field. All fruit quality parameters observed such as diameter, height, weight, firmness and sugar (Brix) for cultivars ‘Gala Buckeye’, ‘Golden Delicious’ (Reinders) and ‘Red Chief’, prove that under the agro-ecological conditions in Budisalc the inherited properties were presented for the cultivars subject to this research. Based on the results obtained by analysis of variance it can be ascertained that there were significant differences between the fruit diameter and height and weight and sugar (brix), but there were no differences in relation to the fruit firmness.

References:


