

Research regarding influence of some postharvest change of apricot genotypes

Beinsan Carmen^{1*}, Sumalan R.¹, Velicevici Giancarla¹

¹USAMVB Timisoara, Faculty of Horticulture and Forestry

*Corresponding author. Email: hortico2002@yahoo.com

Abstract The research objectives was to determine the biometrics and biochemical changes in the main indices during postharvest processes of apricot fruits.

The biological material was represented by three varieties of apricots, having the following origin Turcia, Serbia and Romania (Periam). During the experiment the following parameters were studied: fruit's dimensions (diameter, fruit length, weight, and fruit color), maturity test with starch-iodine, pulp consistency, fruit juice acidity, soluble carbohydrate content and dry matter. Storage conditions were: temperature 4 °C and 25 °C, for 5 and 10 days.

After 10 days of storage, due to post-maturation processes, especially respiration (degradation of the organic substrate) there was a reduction of the length, the diameter of the fruits and their color as changed. As regarding the biochemical characteristics, after 5 days of conservation it can be see a reduction in fruit firmness, however there is an increase of soluble carbohydrate content, while fruit juice acidity and dry matter percentage recorded no significant changes.

In case of biochemical parameters after 10 days of conservation there is a continuous trend to increase the soluble carbohydrate content due to conversion of starch into glucose after enzymatic hydrolysis processes and also there is a sharp decrease in fruit firmness, but also a slight decrease of the fruit juice acidity.

In this experiment we studied the influence of storage conditions on some quality indices of three apricot genotypes, Periam, Turcia and Serbia.

Apricot (*Prunus armeniaca* L.) is one of the most widely spread *Prunus* species cultivated in the temperate zones and it is an important source of vitamins, sugars, and organic acids. Apricots also contain some phytochemicals that have beneficial effects on human metabolism [1].

Apricot plays an important role in human nutrition, and can be used as a fresh, dried or processed fruit such as frozen apricot, jam, jelly, marmalade, pulp, juice, nectar, extrusion products etc. [3]. Additionally, fruit apricot is rich in phytochemicals, i.e. primary and secondary metabolites such as sugars, organic acids, phenolic compounds, carotenoids, fiber, vitamins and mineral matter [9]. For this reasons, apricots had high dietary and human health capacity [6].

Worldwide, the nutritional value and health benefit of apricot fruit (*Prunus armeniaca* L., Rosaceae) has been known [10].

Key words

apricot, pH, postharvest, firmness, dry matter

Apricot has an important place in terms of human health. Apricot is rich in mineral content, such as potassium,

copper manganese, magnesium, and phosphorous. Apricots are also a very good source of dietary fiber, like most fruits. The impressive health benefits of apricots are due to the content of vitamins, including vitamins A, C, K,E, and niacin in significant amounts, as well as a number of other essential vitamins in trace amounts (less than 5% of daily requirement), as well as their mineral content. Apricot has an important place in terms of human health [4].

Quality control analysis have become of fundamental importance in the last few years to ensure the supply of high quality fruits and have underscored how important it is a harvest fruit at the proper degree of maturation. [7].

Apricot fruit quality is a multicomponent concept, defined by physical, biochemical and physiological attributes such as color, texture, sugars, organic acids, pigments, phenolic compounds, volatiles, ethylene concentration and respiration rate. Most instrumental techniques currently used for measuring these parameters are

destructive, expensive, and involve a considerable amount of manual work and time consuming. For these reasons, there is a demand for new and rapid analytical methods for assessing fruit quality attributes. [8].

A characteristic of apricot fruit ripening is very short maturation phase together with a fast post harvest evolution. The physiological maturity of apricot fruit at harvest greatly influences the final fruit quality. Over mature fruits are likely to become soft and mealy and have insipid flavor soon after harvest. Ethylene is responsible for fruit maturation and quality and its well known role in controlling fruit respiration, flesh softening and color changes [8].

Fruit maturation represent the vegetative phase from the beginning of fruit ripening and continuing with maximum accumulation of organoleptic qualities, in other words, the achievement of consumption maturity [2]. In all this time, in fruits occur a lot of physiological and biochemical processes from which result modifications of color, consistency, juicy and taste of fruits. Fresh fruits and vegetables are highly perishable commodities that can easily spoil or deteriorate during produce handling along the supply chain from the producer to the final retailer [5].

Material and Method

The biological material was represented by three varieties of apricot Turcia, Periam and Serbia (Fig. 1).

During the experiment the following parameters were studied: fruit's dimensions (diameter, weight, fruit length), starch-iodine test, pulp firmness, fruit juice acidity, soluble carbohydrate content and dry

matter

[http://www.acsa.md/public/publications/532252_md_458206_md_proto.pdf].

Starch-iodine maturity (AI) test is a safe method for determining the maturity of most varieties and is the simplest maturity indicator. Once cooked, the naturally accumulated starch turns into glucose. This test measures the level of transformation from starch to glucose, which is correlated with the evolution of ethylene.

To determine fruit firmness we used a digital penetrometer. Soluble carbohydrate content was achieved with digital refractometer, Brix degrees was equated to the percentage depending on the temperature determination. The percentage of dry fruit pulp was determined using Kern thermobalance. Storage conditions were: temperature 4 °C and 25°C, for 5 and 10 days.

Results

From the results shown in figure 2, regarding the main physical characteristics of fruits (length, diameter and weight) we not found significant changes after keeping for 5 days at 25 °C. After 14 days of this storage, due to post-harvest processes, in particular the respiratory (degradation of the organic substrate) there is a reduction in length, diameter and weight of fruit. The Serbian genotype registered the largest weight, length and diameter. The average of these parameters was 56.84g for weight, 43.33 mm for length and 39.66 mm in diameter after storage at 4 °C for 10 days (Fig.3).

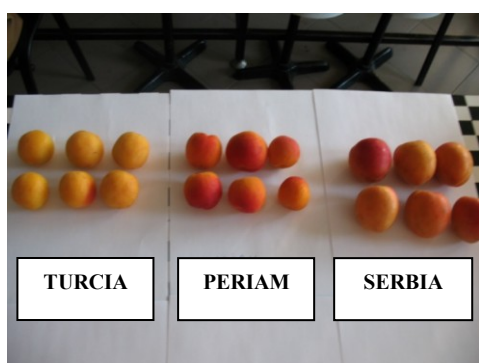


Fig. 1 Apricot genotypes studied

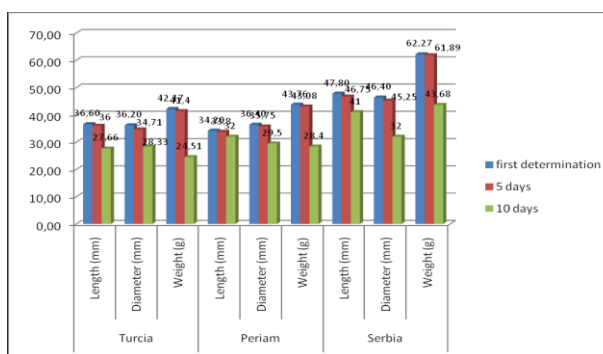


Fig. 2 The biometric characteristics of fruit from the apricot varieties (25°C)

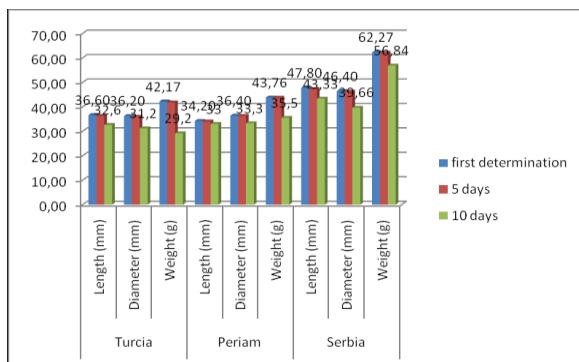
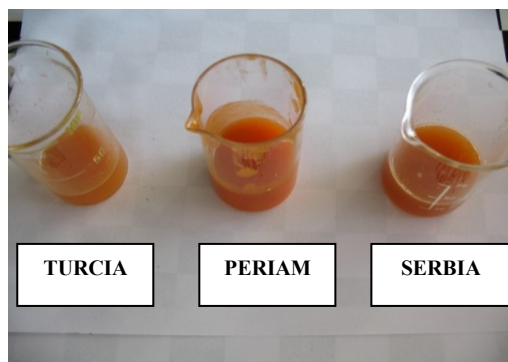


Fig. 3 The biometric characteristics of fruit from the apricot varieties (4°C)



Apricot genotypes studied

Unimportant changes in key physical parameters after storage reflect the quality of the standards. The uniformity of the marketed fruit, from this point of view, falls into the "extra" category. During the experiment, the starch-iodine test was

performed to assess the fruit maturity of the three studied varieties. Looking at the charts, it was found that all the fruits fall into the "super-matured" in terms of the stage of development (Fig. 4).

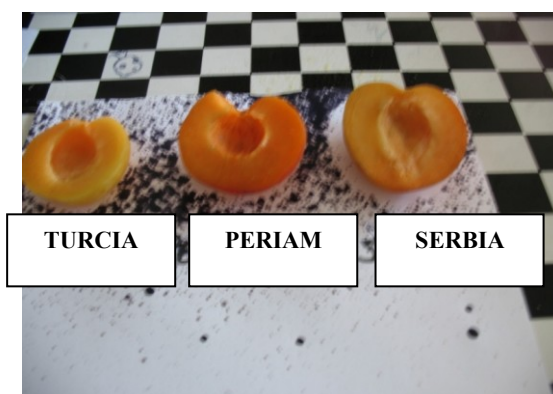


Fig. 4 The fruit maturity degree with starch-iodine test (after 10 days of storage)

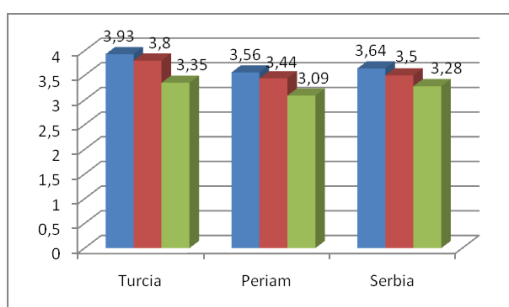


Fig. 5 Results regarding the fruits acidity in tested genotypes (25 °C)

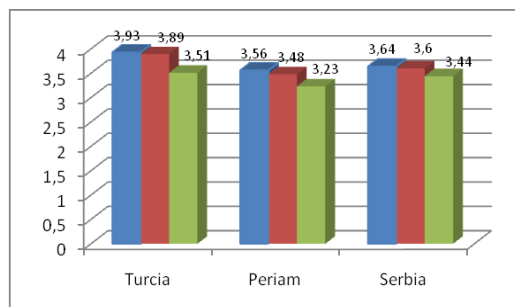


Fig. 6 Results regarding the fruits acidity in tested genotypes (4 °C)

In terms of acidity, the values obtained from the pulp of fruit preserved at 4 °C and 25 °C were different in the three genotypes. During the storage, a decrease in acidity was observed, the highest value being recorded in Turkey genotype (from 3.35 to 25

°C, after 10 days of storage) (Fig.5). The lowest fruit acidity was recorded in the Periam genotype, at both 25°C and at 4°C (3.09 respectively 3.23, after 10 days of storage) (Fig.6).

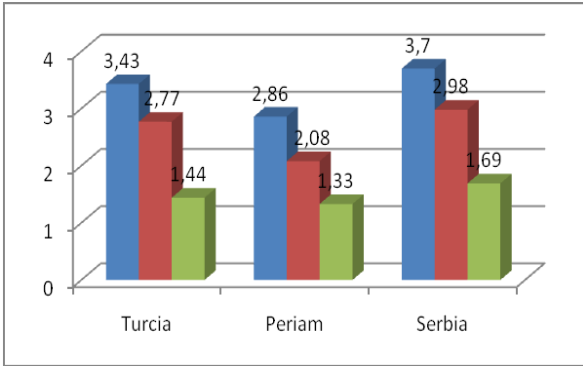


Fig. 7 Results regarding the fruits firmness at tested genotypes (25 °C)

Regarding the firmness of the fruits after 5 and 10 days of preservation at different temperatures, one can notice a reduction of the fruit in all tested genotypes (Fig. 7 and 8). At 4 ° C, the most pronounced was the Periam genotype, with 1.42 lb

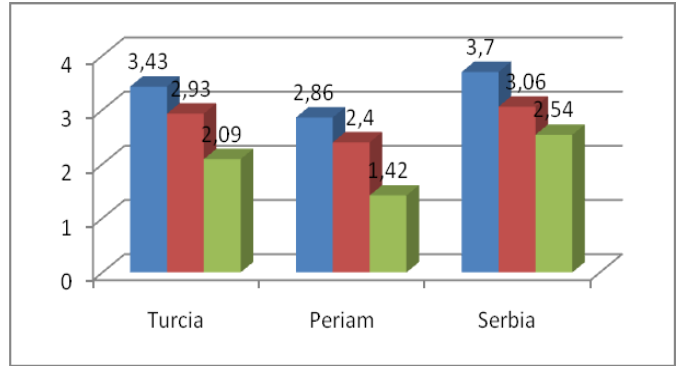


Fig. 8 Results regarding the fruits firmness at tested genotypes (4 °C)

after 10 days of conservation, while the genotype in Serbia showed a less drastic reduction in firmness (2.54 lb), which leads to the possibility of preservation for a longer period of time (Fig. 8).

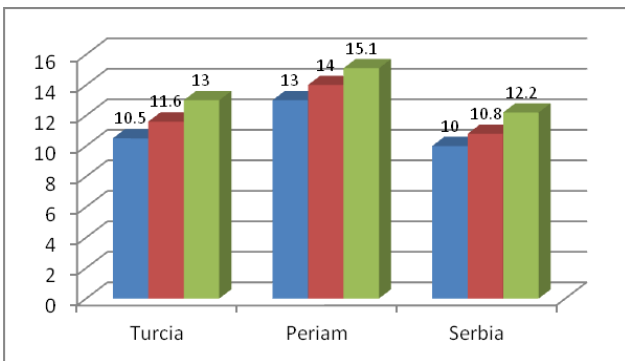


Fig. 9 Results regarding the total content of soluble glucyds in tested fruits (25 °C)

The maturity degree of fruit, based on the Brix index reveals that the Periam genotype showed the highest percentage of soluble carbohydrates after 10 days of storage with 15.1 % at 25 °C (Fig. 9) and

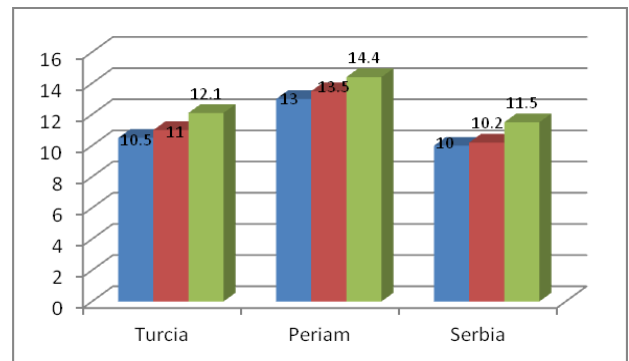


Fig. 10 Results regarding the total content of soluble glucyds in tested fruits (4 °C)

14.4% at 4 °C (Fig. 10). At the opposite end, was the genotype from Serbia with 11.5% at 4 °C and 12.2% at 25 °C.

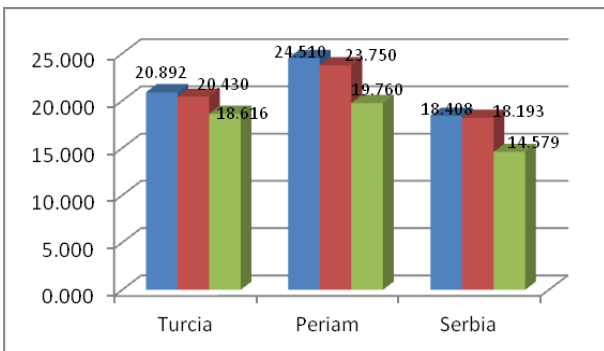


Fig. 11 Results regarding the dry matter percent in tested fruits (25 °C)

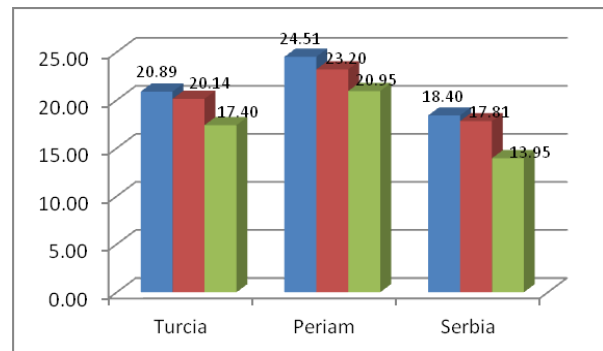


Fig. 12 Results regarding the dry matter percent in tested fruits (4 °C)

Experiments have shown that apricot tested are a decrease during preservation in terms of dry matter content. As regards the percentage of dry matter at 25 ° C, the lowest value was found in the genotype from Serbia by 14,579% and the highest value was recorded in the Periam genotype by 19,760% after 10 days of storage (Fig.11).

Conclusions

After analyzing the main biometric characters (diameter, length, weight), after 10 days of storage, due to post-maturation processes, especially respiration (organic substrate degradation), a reduction in diameter, length and weight of all apricot varieties tested.

Regarding acidity, the values obtained from the pulp fruit, stored at 4 °C and 25 °C, were different in these genotypes. During fruit preservation, a natural tendency to reduce the firmness of the fruit pulp was observed, the clearest reduction was observed in Periam genotypes after 10 days of storage at 25 ° C, while the Serbia genotypes showed a less drastic reduction in firmness, resulting in that it is suitable for preservation for a longer period of time.

Concerning the soluble carbohydrate content, at the beginning of the experiment, the Periam genotype contained good glucose content, while the genotypes from Turkey and Serbia showed lower values.

Experiments have shown that apricot fruit tested are a decrease in dry matter content during preservation.

In the case of biochemical parameters, after 10 days of storage, both at 4 ° C and 25 ° C, the tendency to continuously increase the carbohydrate content of glucose-soluble starch due to the processes of transformation in enzymatic hydrolysis is observed. There is also a sharp decline in firmness and dry matter, as well as a slight decrease in the acidity of the juice from the pulp of the fruit.

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