International Journal of Horticultural Science 2010, 16 (2): 39–41.
Agroinform Publishing House, Budapest, Printed in Hungary
ISSN 1585-0404

Changing of inert content values of apricot varieties

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Summary: The consumers have been exigent increasingly about excellent quality. The specific flavour and fragrance of apricot evolve during ripening. We need to be acquainted with changing of inert content during ripening to the choosing of optimal harvest time. The Regional University Knowledge Centre – Research and Development in Foodstuff Chain project had presented an opportunity to study the inner content of apricot. Our aim was to study evaluation of health care attributes of apricot fruit. We investigated different ripeness samples of four apricot varieties ('Mandulakajszi', 'Pannónia', 'Gönci magyar kajszi', 'Harcot') in our study of 2007–2009. Samples were taken the orchard of Sóskútfruct Ltd, Hungary. We had measured the water soluble antioxidant capacity, polyphenol-, β-carotene content and the dissimilar sugar- and acid-fractions during ripening. We had experienced significant different in inert content between varieties.

Key words: *Prunus armeniaca* L., inner content, β-carotene, polyphenol, quality

Introduction

Apricot has significant importance in Hungarian fruit production. Many apricot varieties have been developed in the Carpathian Basin for centuries. The excellent properties of Hungarian apricot are received in other countries; it is marketable as fresh or processed into various products. Choice and homogenous fruits are needful to the establishment of our market position.

The quality optimal harvest time is very important, because the apricot fruit has a very short storage life due to rapid ripening process. The rapid deterioration impedes their commercialization. Apricot is generally marketed soon after harvest; it can be stored for 3–4 weeks or more by proper harvest time and packaging.

The apricot is an important stone fruit due to its inert content, specific flavour and fragrance. Organic acids, sugar content (*Wills* et al., 1987; *Bartolozzi* et al., 1997; *Guerrieri* et al., 2001; *Németh* et al., 2008), phenolic- (*Fernandéz de Simón* et al., 1992) and β-carotene content (*Ruiz* et al., 2006) are among the major constituents of apricot fruits and juices. In particular, certain fruits contain a significant level of biologically active compounds such as antioxidants.

Materials and methods

We have investigated four apricot varieties from 2007 to 2009, three Hungarian varieties ('Mandulakajszi', 'Pannónia', 'Gönci magyar kajszi') and a Canadian variety ('Harcot'). Samples were taken from the orchard of Sóskútfruct Ltd, Sóskút, Hungary.

The inner content values were determined in each ripening stage at Corvinus University of Budapest, Department of Pomology. Weight, size parameters, stone/flesh ratio, pH, water soluble solid (Brix%) and titratable acid content of the investigated apricot varieties were determined under laboratory conditions. We measured water soluble antioxidant capacity, β-carotene and polyphenol content of the apricot fruits. Water soluble antioxidant capacity (FRAP) was determined on γ=593 nm according to the method of Benzie and Strain (1996). U-2800A spectrophotometer was used for this purpose. Polyphenol content was measured on γ=765nm in the presence of Folin-Ciocaltens reagent. For this measurement gallic acid calibration curve was used according to the method of Singleton and Rossi (1965). Âeta-carotene content was measured on γ=450nm, after acetone and methanol colour extraction and diethyl ether separation (KPKI, 1990, 2/4. method). Sugar and acid fraction were measured with HPLC during the ripening process.

Results

Antioxidant compound changes of apricot in different ripening stages were described with water soluble antioxidant capacity (FRAP) *(Fig. 1.)*, total polyphenol- and β-carotane content. It can be stated that antioxidant compound concentration shows different patterns during ripening in each variety. 'Harcot' has outstanding FRAP value in during the ripening. FRAP value increased constantly during ripening in the case of 'Mandulakajszi'; while no significant differences were found in the case of 'Gönci magyar kajszi'. The 'Mandulakajszi' and 'Harcot' showed similar FRAP value (3,11-3,35 mmol AS /L) in 100% ripening stage. Polyphenol content of apricot fruit was measured with spectrophotometer during ripening *(Fig. 2.)*. According to our results we can state that polyphenol content increased during ripening. 'Harcot' (916.68 mg/l) had outstanding polyphenol content; while 'Pannónia' (546.05 mg/l) and 'Mandulakajszi' (519.51 mg/l) had lower values.

Beta-carotene content of apricot fruit was measured with spectrophotometer; which showed constant increase during ripening in the case of the investigated varieties *(Fig. 3.)*. 'Gönci magyar kajszi' (3.84 mg/100 g) and 'Harcot' (3.14 mg/100 g) had outstanding values. There is a significant difference in the β-carotene content between 60 and 80% ripened fruits of 'Gönci magyar kajszi'; while no significant differences were found among the fruits of 'Harcot' in different ripening stages.

We had measured organic acid- and sugar-fractions in four varieties during ripening by HPLC *(Table. 1; 2.)*. The biggest part of total acid-content was the citric acid. The others, succinic, malic and fumaric acids resided in less degree. The citric acid showed decreasing trend, while the fumaric acid increased during the ripening. But the difference was not statistically demonstrable. The malic, oxalic and succinic acids concentrations remained constant. The total acidity is decreasing. The most value of citric acid was in 'Mandulakajszi'.

Sucrose is the most significant carbohydrate fraction in apricot among the detected types (sucrose, raffinose, glucose, fructose and sorbitol), which increased linear during ripening. The glucose concentrations remained constant. Fructose was decreasing in a small degree, as fructose transforms into sucrose. Raffinose content was in trace. The total sugar content is increasing. The less amount of sucrose was in 'Mandulakajszi'.

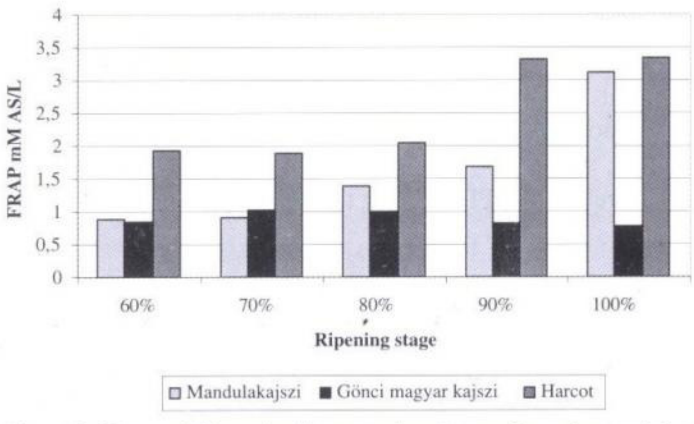

Figure 1. Water soluble antioxidant capacity changes in apricot varieties during ripening

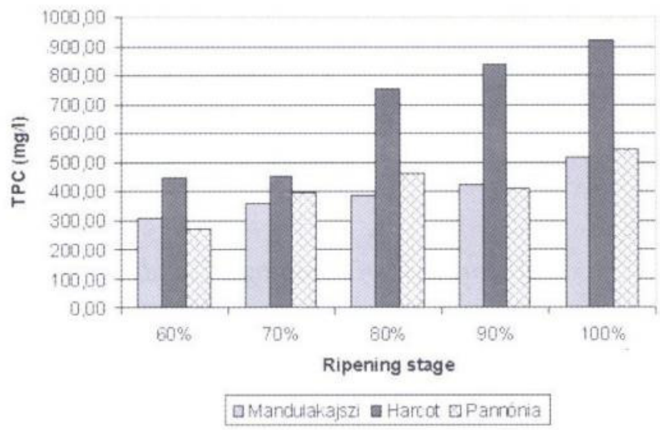

Figure 2. Total polyphenol content changes of apricot varieties during ripening

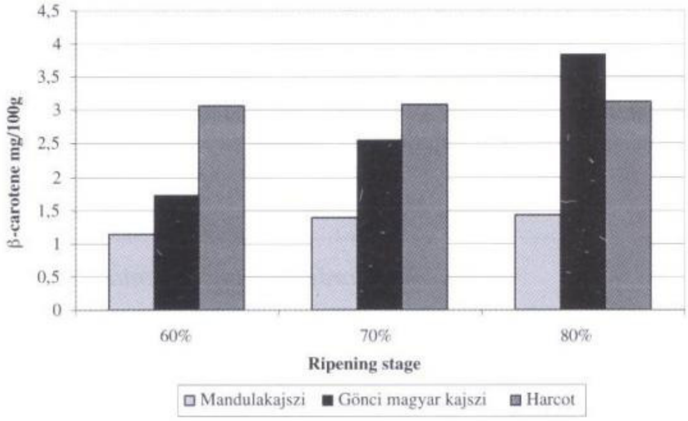

Figure 3. β-carotene value changes of apricot varieties during ripening

Table 1. Total sugar-content of four varieties in 90% ripeness

Varieties	Sucrose	Glucose	Fructose	Sorbitol
	Sugar fractions (mg/g)			
Mandulakajszi	116.84	8.75	1.35	2.66
Gönci magyar kajszi	109.73	13.93	2.26	0.68
Harcot	83.32	12.15	3.64	1.36
Pannónia	106.48	15.06	2.63	1.37

Table 2. Total acid-content of four varieties in 90% ripeness

Varieties	Citric	Malic	Fumaric	Succinic
	Acid fractions (mg/g)			
Mandulakajszi	15.97	0.73	1.16	4.98
Gönci magyar kajszi	9.39	0.79	2.0	3.56
Harcot	9.74	0.60	0.96	2.56
Pannónia	11.18	0.917	2.16	3.55

Discussion

The antioxidant capacity is very important for industrial food processing. The values of β-carotene are similar to *Souci* et al. (2008). The knowledge about the antioxidant composition is an important aspect to define the quality and nutritional properties of apricot fruits.

Level of citric acid is in line with *Lo Voi* et al. (1995), but malic and succinic acids showed different results, however they analyzed other varieties. *Dolenc-Šturm* et al. (1999) measured different values for these acid-fractions in other varieties. Contrary to our results malic and fumaric acid was present in the highest degree. *Dolenc-Šturm* et al. (1999) published dissimilar values of sugar-fractions, although they observed only one ripening stage: "commercial maturity".

In conclusion, the fruit juice industry needs details of inert content to the perfect products. The HPLC provides an important tool for research and for analysis. Of course additional researches are needed. It is important to get more insight the interaction between the genetic and the environmental variability, the growing condition and the processing on the composition of apricot fruits and juices.

We determined the most important features for the industrial process (refraction, pH and acidic content and sugar fractions).

Acknowledgments

The above research has been supported by the Regional University Knowledge Centre – Research and Development in Foodstuff Chain (project number: RET-04/2006).

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