EVALUATION OF INNER CONTENT OF PROMISING APRICOT VARIETIES FOR PROCESSING IN INDUSTRIAL RIPENING TIME

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ABSTRACT

The apricot (*Prunus armeniaca* L.) is an important stone fruit species due to its inner content, specific flavor and fragrance. Globally fresh apricot production is about 3 million tons annually the industry uses about 85 000 tons for producing dried apricot a year from the total production. The EU counties produce about 602 000 tons apricots (fresh and dried) yearly. In Hungary about 40 000 tons of apricot is produced annually. The Hungarian processing industry was used about 3 200 tons apricots last year.
The consumers require high-class fruit products. The inner content of basic commodity influences the grade of food industrial products. The total soluble solids, titratable acids and ratio of these compounds have an important effect on quality of fruit juices as well as the high β-carotene content plays an important role in health care. Apricot is a special source of beta-carotene.
In our study we aimed to compare the new apricot varieties ('Laycot', 'Goldrich', 'Veecot') to the traditional Hungarian variety 'Gönci magyar kajszi' which contains balanced sugar/acid ration and it is the standard variety in Hungary. We examined the acid and sugar content furthermore β-carotene content in industrial ripening time. Samples were taken from the experimental and research orchard of Department of Pomology of Corvinus University of Budapest in Budapest-Soroksár, as well as from showing and research orchard of Vitamór Ltd. in Mór (Hungary). We experienced significant difference in the varieties. The minimum value of sugar content is 10.2 °Brix according to AIJN in the fruit juice industry. The examined varieties exceeded this value. Inner content of the examined varieties neared or exceeded the result of traditional 'Gönci magyar kajszi' variety.

1. INTRODUCTION

Nowadays the production and distribution of functional foods become more important. The juices and foods with high fruit content are in request of customers. Therefore the processing industry needs fruit varieties with excellent inner content value.
Apricots are a rich source of carotenoids, 50% of which consist of β-carotene (Radi et al., 1997). The carotenoid compounds of apricots are unique, are quite different from all analyzed pumpkin varieties (Kurz et al., 2008). The human diet comprises different compounds with high antioxidant capacity, are the carotenoids, ascorbate, flavonoids and polyphenols, which play role in the balance between oxidative and antioxidant processes in tissues (Diplock et al, 1998). Several experimental studies have found that people who consume more carotenoids in their diets have a reduced risk of several chronic diseases according to the reviews of Mayne (1996). Ugras et al. (2010) found that the ROS-related effects of low-dose radiation on testis tissue of rats are amended by apricot diet. The main compounds of apricot juice include carbohydrates, organic acids (Guerrieri et al, 2001), and antioxidant compounds (Ruiz et al, 2005) too.

2. MATERIALS AND METHODS

We have investigated four apricot varieties from mid-June to early July in 2010, one standard Hungarian variety ('Gönci magyar kajszi') and three new varieties ('Laycot', 'Goldrich', 'Veecot'). Samples were taken from the experimental and research orchard of Department of Pomology of Corvinus University of Budapest in Budapest-Soroksár, and the research orchard of Vitamór Ltd. in Mór. A homogeneous pulp was prepared from 30 fresh fruit of each variety at each sampling date and stored frozen at –25°C until analysis.
The total soluble solids, expressed as °Brix, was measured from homogeneous filtered fruit juice using an ATAGO Palette PR-101 refractometer (Codex Alimentarius 3-1-558/93). The titratable acid content was expressed in terms of malic acid equivalent (Hungarian Standard, 1998). The sugar/acid ratio was calculated from the total soluble solids and the titratable acid content.
The β-carotene content was determined using the method of De Ritter and Purcell (1981), as modified by the Canning Research and Development Co. Ltd. (KPKI, 1990). After thawing, the β-carotene was extracted from 1 g fruit samples using methanol and acetone, followed by separation with diethyl ether. The absorbance of the ethereal solution was measured with a Hitachi U-2800A spectrophotometer at 450 nm.

3. RESULTS AND DISCUSSION

The quality of fruit juices are influenced significantly by the adequate sugar and acid contents. In our study fruits of four apricot varieties ('Laycot', 'Goldrich', 'Veecot', 'Gönci Magyar kajszi') were examined at same ripening stage, we measured the total soluble solids, the titratable acids and ratio of these compounds. The results are shown in Table 1.
We detected the biggest soluble solid content in 'Veecot' variety (18.59 °Brix), the °Brix value of 'Laycot' cultivar was also high (16.35 °Brix). The less amount of soluble solid content (13.84 °Brix) was detected at the traditional Hungarian variety 'Gönci magyar kajszi'.
According to the nutrient tables published by Bíró and Lindner (1999), the average soluble solid content of apricots is 10.2 °Brix, Holland et al. (1992) gives less amount 7.2 °Brix value. A minimum value of sugar content is required for fruit juice processing is 10.2 °Brix (AIJN, 1997), a value surpassed by all four varieties were investigated. Štampar et al. (1999) examined the total soluble solids at commercially mature fruits of 'Laycot' and 'Goldrich'. They measured fewer amount (15.2 and 14.2 °Brix) than us in both varieties. The reason of the different might be the variant environmental conditions. Bureau and colleagues (2006) examined the soluble solid content of 'Goldrich' during the ripening, which increased from 6.2 to 12.3 °Brix value. Guerrieri et al. (2001) also analysed the fruits of 'Goldrich' variety, they detected 10.9 °Brix. These values are exceeded by investigated samples of 'Goldrich'.
We examined the total acid content in all varieties. The acid content of apricots ranged from 1.43 to 1.79 mg 100 g^{-1}. We detected the highest acid content in 'Gönci Magyar kajszi', and the fewer amounts were measured in 'Laycot'. 'Veecot' and 'Goldrich' cultivars had same quantity of acids. The total acid content was 1.40 mg 100 g^{-1} on average in the Souci–Fachmann–Kraut (2008) nutrient table. This value was exceeded by all the varieties were involved in this work.

A balanced sugar–acid ratio is important to achieve a harmonious flavour. A higher soluble solid content raises the value of this ratio, thus making fruit juices sweeter (Taylor, 2005). The highest values were in 'Laycot' and 'Veecot' varieties.

Table 1. Total acidity, total soluble solids and total soluble solids / total acidity ratio in flesh of different apricot varieties, 2010

Cultivar	TA (% malic)	TSS (°Brix)	TSS/TA
Gönci magyar kajszi	1.79 ± 0.57 c	13.84 ± 0.07 a	5.27
Veecot	1.60 ± 0.76 b	18.59 ± 0.06 c	7.91
Laycot	1.43 ± 0.67 a	16.35 ± 0.05 b	7.76
Goldrich	1.56 ± 0.65 b	15.83 ± 0.06 b	6.91

mean ±standard error, $p<0.05$

The β-carotene content of the fruit in industrial ripening time is illustrated for the different varieties in Figure 1. The most β-carotene content was found in sample of 'Goldrich' variety (3.32 mg 100 g^{-1}). The β-carotene content was much less in the samples of the other varieties. We analysed the second most amount in 'Laycot' (2.67 mg 100 $g^{-1)}$. The β-carotene content of traditional Hungarian 'Gönci magyar kajszi' and Canadian 'Veecot' varieties were similar to each other; however it was not near to prominently high content of 'Goldrich'.
Souci, Fachmann and Kraut (2008) reported that the β-carotene content of apricots ranges from 0.6 to 6.4 mg 100 g^{-1}, so the values established in the present work fell within this interval. A β-carotene content of 2.1 mg 100 g^{-1} was reported in apricot by Curl (1964, cit. Kläui and Bauernfeind, 1981).
Carotene content of the 'Magyar kajszi' (syn: 'Hungarian best') variety was analysed in two regions of Croatia by Dragovic-Uzelac et al. (2007). Samples were taken in commercially mature stages and values of 1.075 and 1.376 mg 100 g^{-1} were reported. These values were exceeded by 'Gönci magyar kajszi' (2.16 mg 100g-1), which variety derived from 'Hungarian best' cultivar group.

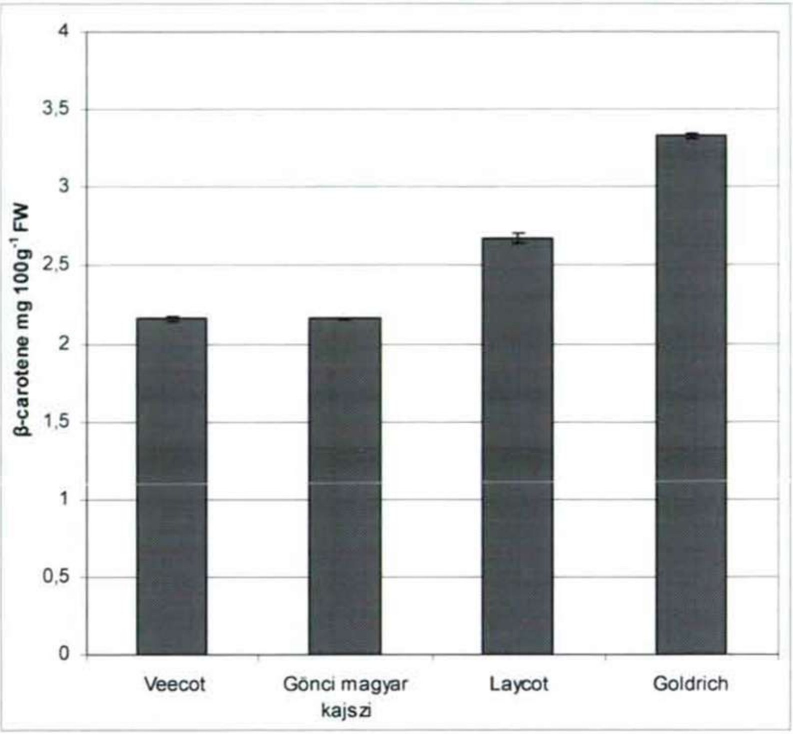

Figure 1. The β-carotene content during ripening in flesh of different apricot varieties, 2010

4. CONCLUSION

In our study we aimed to compare the new apricot varieties ('Laycot', 'Goldrich', 'Veecot') to the traditional Hungarian variety 'Gönci magyar kajszi' which contains balanced sugar/acid ration and it is the standard variety in Hungary. We examined the acid and sugar content furthermore β-carotene content in industrial ripening time.
Based on the results we can determine the inner content of the examined varieties neared or exceeded the result of traditional 'Gönci magyar kajszi' variety. The 'Goldrich' variety had prominent β-carotene content. We have advised to introduce 'Goldrich' to Hungarian production because of its important influence on humane physiology.

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