QUALITY STUDY ON THE PARAMETERS OF PLUM VARIETIES AND JAMS AFTER STORAGE

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Abstract

Nowadays producing jams is considered a traditional way of plum processing in Hungary. Plum jams without added sugar can be stored for several years due to its high natural sugar content. My research aimed to determine analytically which quality parameters of the jams and to what extent they change during storage. Furthermore, I tried to find out whether a concious consumer can presume any difference between varieties or the year of harvest, or whether a one-time customer should suspect differences in quality parameters of the different products. This study focused on those differences or alterations in the parameters that occur in the jams made from several different plum varieties produced in different years.

I analyzed the classical chemical parameters (dry matter content and ash content) and physiologically important components of nutrition (contents of phenolic and flavonoids antioxidants and vitamin C). In this research I used jams which were produced from 6 varieties grown in 2009 (President, Tophit, Bluefre, Elena, Presenta, Stanley), 4 varieties from 2010 (President, Bluefre, Elena, Presenta) and 6 varieties from 2011 (President, Tophit, Bluefre, Elena, Presenta, Stanley). Jams were produced by traditional technology in cauldrons without added sugar. Jams were placed into a relatively dark and cool place and were stored there until the analysis.

Having regard to the results, when consumers choose amongst the different products they also choose quality since the processed plum variety and the year of production/processing determine the nutritional value of the certain product. This could be used for market positioning and promotion of the product, however, further research is needed to gain more information from the differences that derive from the varieties, year of harvest or other factors. This way fruit and jam producers could turn these informations into market advantage.

Key words: jams, plum, penolic, flavonoids antioxidants, vitamin C

INTRODUCTION

The healthy diet is essential for the human consumption of fruits and processed fruit. Quality parameters are very important because the plum has curative effect. It is impressive contrast to cancer. The fruits and jams have high vitamin (vitamin C) and mineral content with high dietary effect (Tanács, 2005; Marosi, 2010).

To make plum jams as Hungaricum we must follow the traditional processing method using ancestor. So the plum's ancestor had known 2000 years ago (Mohácsy, 1960). Plant and selective breeding was made by cognomen (antique roman). The plum spread in Europe from the 13th to the 15th century. At medieval it was used in palates, burgs, cloisters (Surányi, 2006).

The nutrient-rich fruits have low energy content (120-150 kJ/100g) exception grapes, tropical fruits, nuts. They include proteins, fats and significant amounts of organic acids (Barta, 2007). The dry matter content of ripe fruits is full with fats and sugars. Carbohydrate content of mono- and disaccharides are built (Erdélyi, 1995, Keim-Havel, 2005). They contain high amount of antioxidants, vitamins (vitamin E, vitamin C), carotenoids, flavonoids (Sohár, 2008).

The fresh plums edible from July to October, but we can eat it all year as far as we make products out of it. For example: jam, jelly, prune, canned plum or spirit (Ball-Olson, 1957; Grassin, 1990). A jam made from fruit pieces or cut through, contains sugar, jelly, spices, and additives. Preserving single storage accepts it usually heat happen (MÉ 2-33/1/03).

MATERIAL AND METHOD

The aim of my study was to analyze the quality parameters of various plum jams after storgage. I analyzed the classic chemicals parameters (dry matter content, protein content, sugar content) and physiologically important nutritional components (phenolic and flavonoids antioxidants). I tested the parameters of jams after one, two and three storeage years.
I had six plum varieties:

1. Stanley: or Santa Clara, from New York, the plum is big (40g), elongate, juicy, middle tasty
2. Tophit: very big plum (60g), good quality parameters, sweet, very tasty, good self-life
3. President: from England, heavy crops, very big plum (50g), elogante, middle tasty
4. Bluefre: from USA, Stanley and President's crossing, big plum (50g), oblique fruit, good tasty
5. Elena: from Germany, middle plum, juicy, very sweet, virus resistant
6. Presenta: early ripening, big fruit, very tasty, well-moving (Kállay, 2000)

I made the plum jams in a cauldron. This is a simple, traditional homemade technology; the plum jam is a traditional homemade product. The products do not contain conservatives and added sugar, because the plum has originally high sugar content.

During the tests the following parameters were measured:

- dry matter and moisture content (MSZ 6367-3:1983)
- ash content (MSZ EN 1135:1995)
- total phenolic antioxidants content (Meda et al., 2005)
- total flavonoid antioxidants content (Kim et al., 2003)

- Vitamin C (α-α-dipiridil method)

I analysed my results with SPSS statistical program (version 19). Analysis of variance was used to reveal the different of the products and Tukey method for the post-hoc tests (0.05 level of significance).

RESULTS AND DISSCUSIONS

Table 1. summarizes the results on the dry matter content and ash content. There are not significant differences amongst the years. In 2009 and 2010 the average dry matter contents are between 45 and 51%. President showed the maximum value in 2011. Similar values were measured for two varieties (the President and Bluefre).

During storage the ash content is almost unchanged. Values of homemade jams are the same in 2011 (8-11%). The significant analysis does not show difference amongst the production years.

Table 1

Dry matter content and ash content (%) in jams

	Dry matter content %			**Asc content %**		
	2009	2010	2011	2009	2010	2011
President	49,39	44,70	56,62	8,13	7,71	7,64
Tophit	45,08		41,73	7,43		6,95
Bluefre	45,19	45,10	42,42	9,49	8,37	11,68
Elena	50,49	50,11	42,64	8,37	9,48	10,72
Presneta	49,86	49,77	51,27	14,79	13,12	7,31
Stanley	50,20		45,54	8,93		9,96

Figure 1. shows the total phenolic antioxidants content (mg gallic acid equalent (GAE)/100g). In 2010 the jams showed higher values than in 2009 and 2011 jams. There were no significant differences amongst the production years but the readings of varieties were statistically different. Tukey test reported that the phenolic antioxidants content of Presenta differ from other jams.

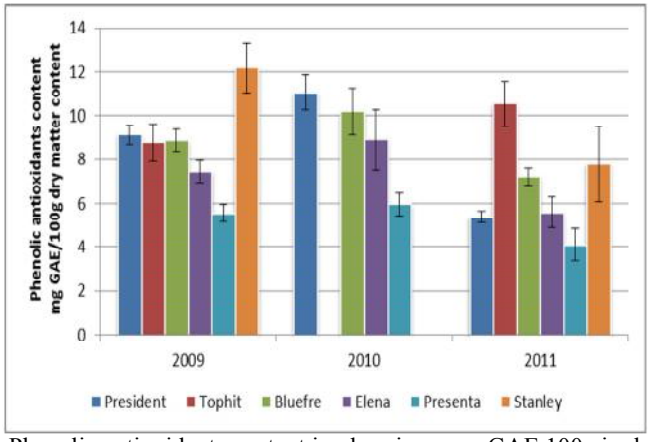

Figure 1.Phenolic antioxidants content in plum jams mg GAE 100g in dry matter content

The next physiologically important parameter is the flavonoid content (mg catechin eq/100g). As the figure 2 shows, the average value was 7 mg catechin eq/100g. The statistical analysis showed differences between Presenta – Tophit and Presenta – Bluefre. The effects of differences between years were not proved.

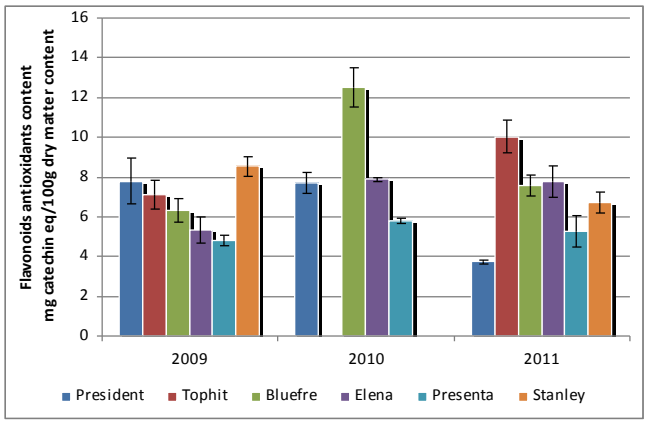

Figure 2. Flavonoid content of jams mg/catechin eq/100g in dry matter content

The last examined parameter is vitamin C. Unfortunately, the vitamin C decays in high temperature, this content is low in jams. Between years the statistical analysis shows difference (2011 differed from 2009 and 2010), but the Tukey test convinced we did not find difference between year 2009 and 2010. In 2011 the average value was 13 mg/100g.

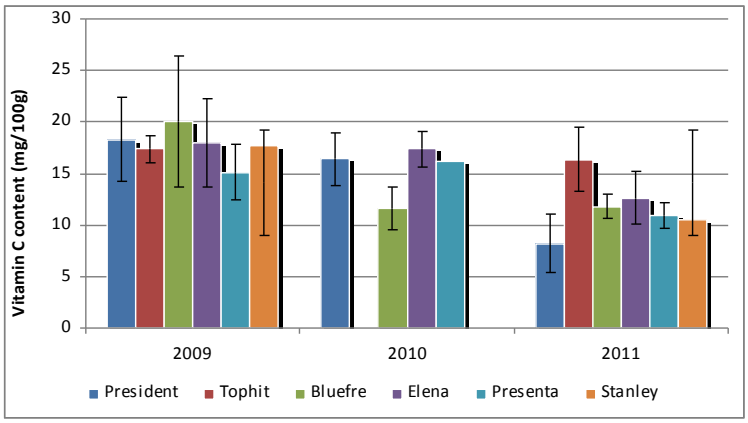

Figure 3. Vitamin C content of plum jams (mg/100g) in dry matter content

CONCLUSIONS

Ecological factors influences the chemical quality attributes of plum and therefore the jams. This crop year effect was found on the analysis of plum jams made in different years and stored for 1 to 3 years. After 1 or 2 years the parameters does not change in jams. The variety of plum used for jam making influenced significantly the examined parameters except the Vitamin C content. The jams retain quality characteristics during storage and they do not change for several years. Plum jams without added sugar can be stored for years without significant quality losses due to its high natural sugar content.

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