

COMPARATIVE STUDY OF PROCESSED PRODUCTS FROM CULTIVARS OF THE NATIVE APRICOT

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Abstract

The paper aimed to present the suitability of processing the seven native apricot cultivars grown at the Research Station for Fruit Growing Constanta: 'Tudor', 'Sirena', 'Orizont', 'Olimp', 'Neptun', 'Augustin' and 'Litoral', results leading to the establishment of the fruit valorization direction. Apricots were processed at the Research and Development Institute for Processing and Marketing of the Horticultural Products - Bucharest (micro lab) as compote, jam, confiture and nectar. The cans' quality assessment was performed using Method A - STAS 12656-8, the state standard that regulates the analysis methods with unitary score scales, used to evaluate the organoleptic characteristics of food. The results show that these cultivars have in common a sweet, pleasant, aromatic flavor (which is why they are highly appreciated for fresh consumption), characteristics that, at the same time, influence the quality of processed products. Out of the studied cultivars, 'Olimp' was particularly highlighted, which is very well suitable to all processing into four types of canned analyzed: confiture, jam, compote and nectar; the resulting product having remarkable sensory qualities. Apricots in the 'Tudor' cultivars are less suitable for processing, preferably as being able to consume as fresh fruits or, possibly, as confiture or nectar. In conclusion: for getting canned compote, the 'Orizont', 'Olimp', 'Neptun' cultivars are recommended; for confiture, cultivars 'Tudor', 'Olimp', 'Augustin', 'Litoral'; 'Orizont', 'Neptun', 'Litoral' cultivars for jam; for nectar, the 'Sirena', 'Orizont', 'Olimp', 'Neptun' cultivars.

Key words: compote, confiture, jam, nectar, quality.

INTRODUCTION

Apricots are very popular with consumers, both as a dessert fruit and as well as processed in various ways.

The high demand for fruits is determined by their qualitative and technological attributes, by the complex biochemical composition and by the very pleasant taste and specific flavor etc.

There are many apricot consumption benefits that are also supported by scientific studies.

Firstly, they are a real and rich source of vitamin A, B and C, along with beta carotene (due to which the color is yellow-orange) helps maintain eyesight and nerves and tissue regeneration (www.pro-sanatate.com/caisele-beneficii...).

But in the biochemical composition of fruits there are several other important components for the human nutrition, including: 10.6 to

21.7% dry substance, 6 to 16.6% total sugar, 0.55 to 1.1% pectin, 1.09 to 1.64% protein, 0.6 to 0.86% minerals out of which: K 75-112 mg%, P 21-32 mg% 6-14 mg% Ca, mg, S, Na, 0.41 to 3.20 mg%, vitamin P, 0.72 to 1.8 mg% vitamin E, and the energy value is 21-77 calories per 100 g etc. As shown by the above data, through the biochemical composition, apricots ensure all components the human body needs to conduct metabolism in good condition. Apricots are used for their favorable effect on digestion due to alkaline reaction, in the production of hemoglobin in anemia etc. High nutritional value of apricots and apricot-based finished products, led specialists in the scientific research domain to diversify the assortment by creating or placing cultivars in the tillage that behave well in the climatic conditions from Romania. Because apricots are not suitable for fresh storage more than a short

period of time, processing them as canned represents a needed and desired solution.

But fruit conservation suitability is a cultivar characteristic; therefore, studies on the potential of different cultivars to be processed in one form or another are necessary.

Lately, in our country, there have been many concerns in this direction for the species: cherries, peaches, sweet cherries (Caplan et al., 2015; Caplan et al., 2016; Lamureanu et al., 2014; Lamureanu et al. 2015; Sarbu et al., 2010; Veringa et Dumitrescu, 2016; Vintila et al., 2015).

When manufacturing, consuming and evaluating the quality of processed products, we must consider the provisions of state or professional standards that regulate quality technical conditions of raw and auxiliary materials, the organoleptic and physicochemical properties of the finished product etc.

In the present work, which final aims to establish the destination of improvement by setting the processing suitability of cultivars of apricot, these standards were taken into consideration: STAS 3164-90. Fruit compote. Standard State; STAS 3750-90. Comfiture. Standard State; STAS 3183-90. Jams. Standard State; SP 877-96. Fruit nectar. Standard Professional.

MATERIALS AND METHODS

During 2015-2016 studies and research were carried out, aiming at determining the suitability of processing of seven local native cultivars of apricots that exist in culture at Research Station for Fruit Growing Constanta: 'Tudor', 'Sirena', 'Orizont', 'Olimp', 'Neptun', 'Augustin' and 'Litoral'.

For this purpose apricots were processed as compote with whole fruits, comfiture, jam and nectar at the Research and Development Institute for Industrialization and Marketing of Horticultural Products in Bucharest, in the micro-production lab. After the period required to stabilize the product (21 days), the cans were subjected to sensory analysis, applying the evaluation method A- STAS 12656-88, which establishes the methods of analysis using unitary score scales (used in evaluating the organoleptic characteristics of food).

This method is applied in order to assess a

combination of organoleptic properties: appearance, color, taste, texture or, where appropriate, consistency.

Each organoleptic evaluation was made by comparing with the unitary score scales from 0-5 points and got the average score given by the group of tasters, based on individual sheets of recording the marks that were given.

The score of weighted average was calculated, adding these for obtaining the overall average score and the organoleptic qualities of the products on the basis of total average, by comparison with a scale of 0 - 20 points were settled.

Finally they awarded qualifiers for each product and cultivar. In the overall score achieved by the various analyzed products, we differentiate between 5 quality classes: very good (18.1-20.0), good (15.1-18.0), satisfactory (11.1-15.0), unsatisfactory (7.1-11.0) and incompatible (0-7.0).

Before processing, fresh fruit of every cultivar were organoleptic analyzed and characterized in terms of size, shape, color and flesh peeling, texture, taste and aroma pulp, the kernel size etc.

It has also been tested and shown resistance to keeping temporary apricots of every cultivar.

RESULTS AND DISCUSSIONS

The fruit from the 'Tudor' cultivar has a good resistance for keeping fresh, is medium-sized, averaging 40-45 g, ovoid shaped, slightly dorsal-ventrally flattened with orange peel covered with carmine red on 2/3.

The flesh is orange, non-adherent to the kernel, juicy, fragrant, and the kernel is large with bitter core.

The sensory analysis of processed products (Table 1) highlights the fact that, according to the product, their quality differs greatly from "satisfactory" in the case of compote and jam, to "very good" in the case of comfiture.

In the Figure 1, we have the deliverables: comfiture, nectar, compote and apricot jam from the 'Tudor' cultivar.

The 'Sirena' cultivar fruit is medium to large on average 65 g, globular to ovoid shape, slightly asymmetrical, with good resistance to fresh storage.

The peel is orange with red spots on the sunny side. The orange pulp has a sturdy structure, juicy enough, pleasant taste and fine flavor. The stone represents 6.1% of the weight of the fruit and has a sweet core.

Table 1. Sensory analysis of the apricot processed products from the ‘Tudor’ cultivar

Specification	Product			
	Compote	Comfiture	Jam	Nectar
Aspect	4.08	5.72	4.80	3.84
Color	3.04	5.32	3.68	2.72
Taste	4.08	3.72	3.84	5.76
Consistency	3.04	3.72	2.40	4.00
Overall average score	14.24	18.48	14.72	16.32
Qualificative	satisfactory	very good	satisfactory	good



Fig 1. Apricot processed products from the ‘Tudor’ cultivar

Out of the four types of processed products (Fig. 2), the nectar is highlighted with 18.24 points and the qualification ”very good”. The compote, with only 14.25 points scored ”satisfactory” (Table 2).

Table 2. Sensory analysis of the apricot processed products from the ‘Sirena’ cultivar

Specification	Product			
	Compote	Comfiture	Jam	Nectar
Aspect	3.81	5.06	4.56	5.12
Color	3.77	5.06	2.56	3.68
Taste	4.00	3.55	5.04	5.76
Consistency	2.67	3.55	3.36	3.68
Overall average score	14.25	17.22	15.52	18.24
Qualificative	satisfactory	good	good	very good

For the comfiture (17.22 points) and the jam (15.52 points) the qualificative that was awarded was ”good”.



Fig. 2. Apricot processed products from the ‘Sirena’ cultivar

The ‘**Orizont**’ variety, with good resistance to fresh storage has an oblong shaped fruit, medium to large weight (45.8 to 62.3 g). The peel is orange, with carmine red on the sunny side. The flesh is orange; fine textured, of an average firmness, aromatic, very juicy. The kernel is medium-sized, oblong shaped, adherent to the flesh, with sweet core. The data in Table 3 shows a good suitability at processing to ‘Orizont’ cultivar, compote (18.32 points), nectar (18.16 points) getting a ”very good” qualificative, comfiture (17.22 points) and jam (15.84 points) the ”good” qualificative.

Table 3. Sensory analysis of the apricot processed products from the ‘Orizont’ cultivar

Specification	Product			
	Compote	Comfiture	Jam	Nectar
Aspect	4.80	5.32	4.32	5.6
Color	3.52	4.86	2.72	3.20
Taste	6.00	3.49	5.76	5.52
Consistency	4.00	3.55	3.04	3.68
Overall average score	18.32	17.22	15.84	18.16
Qualificative	very good	good	good	very good

The four types of products obtained from the ‘Orizont’ cultivar are presented in Figure 3.

The ‘**Olimp**’ cultivar has good resistance to preserve the fruit in fresh state. The fruit is big (65-75g) with orange skins and the flesh is bright orange, with firm texture, good flavor, very good and balanced taste. All four types obtained by processing received very high

marks from tasters, which lead to the unique qualitative of “very good” (Table 4 and Figure 4).



Fig. 3. Apricot processed products from the ‘Orizont’ cultivar

Table 4. Sensory analysis of the apricot processed products from the ‘Olimp’ cultivar

Specification	Product			
	Compote	Comfiture	Jam	Nectar
Aspect	5.04	6.00	6.00	5.36
Color	3.36	3.20	5.32	3.84
Taste	6.00	6.00	3.90	5.76
Consistency	4.00	3.68	4.00	3.52
Overall average score	18.40	18.88	19.22	18.48
Qualificative	very good	very good	very good	very good

The compote has obtained the maximum score for taste and consistency, the comfiture for aspect and taste and the jam for aspect and consistency.

The ‘**Neptun**’ cultivar, with good resistance for fresh storage, has a large fruit, ovoid, sharper at the top, yellow, striped and red dotted on the sunny side. The flesh is yellow-orange, firm, sweet and slightly fizzy, appreciated for meal.



Figure 4. Apricot procesed products from the ‘Olimp’ cultivar

The canned version is also praised (Table 5 and Figure 5), given that outside of sweetness, which received a ”good” qualitative, the other assortments were employed by tasters in the ”very good” column.

Table 5. Sensory analysis of the apricot processed products from the ‘Neptun’ cultivar

Specification	Product			
	Compote	Comfiture	Jam	Nectar
Aspect	5.76	5.72	6.00	6.00
Color	3.36	4.39	6.00	4.00
Taste	6.00	3.46	3.77	6.00
Consistency	3.52	3.81	4.00	3.52
Overall average score	18.64	17.38	19.77	19.52
Qualificative	very good	good	very good	very good

The jam (19.77 points) as well as the nectar (19.52 points) has received score close to the highest.



Figure 5. Apricot processed products from the ‘Neptun’ cultivar

The ‘**Augustin**’ cultivar shows cordiforme fruit shape, with average size (45 to 57.5 g), with orange peel with a lot of carmine red.

The flesh is orange, with average firmness, intermediate texture, strongly scented, very juicy.

The kernel is of average size, round shaped, adherent to the pulp, sweet core.

The results of the sensory analysis for processed products indicate weaker results for this cultivar, because only in the case of comfiture (18.16 points) tasters have given the ”very good” qualitative (Table 6).

Table 6. Sensory analysis of the apricot processed products from the 'Augustin' cultivar

Specification	Product			
	Compote	Comfiture	Jam	Nectar
Aspect	5.04	5.76	4.62	4.56
Color	3.52	3.20	3.52	3.04
Taste	5.76	5.52	2.67	5.28
Consistency	3.52	3.68	3.85	3.68
Overall average score	17.84	18.16	14.66	16.56
Qualificative	good	very good	satisfactory	good

The compote and the nectar have received the "good" while the jam (14.66 points) has received the "satisfactory" qualificative. Picture 6 presents the four types of canned apricot from the 'Augustin' cultivar.



Figure 6. Apricot processed products from the 'Augustin' cultivar

The 'Litoral' cultivar's fruit is big, ovoid, yellow-lime with red dots and streaks on the sunny side.

The flesh is yellow, moderately consistent, has a lot of dry substance and pleasant taste.

The products obtained by processing apricots of this cultivar (Table 7 and Figure 7) were well appreciated by tasters who, by the score given, made it possible that comfiture (18.24 points) and jam (18.06 points) receive the "very good" qualificative and the compote (16.80 points) and nectar (17.04 points), the rating "good".

The data shows that the compote as well the nectar has a pleasant aspect and a taste good, but the consistency has dropped below the overall average score.

Depending on the results obtained in processing the form of canned apricots, there were established the destinations of valorization in processed form of the cultivars studied (Table 8).

Table 7. Sensory analysis of the apricot processed products from the 'Litoral' cultivar

Specification	Product			
	Compote	Comfiture	Jam	Nectar
Aspect	5.52	5.76	5.32	5.04
Color	3.04	3.04	5.46	3.36
Taste	5.04	5.76	3.38	5.28
Consistency	3.20	3.68	3.90	3.36
Overall average score	16.80	18.24	18.06	17.04
Qualificative	good	very good	very good	Good



Figure 7. Apricot processed products from 'Litoral' cultivar

It finds that cultivar 'Olimp' is very well suitable to the processing into all 4 types of canned analyzed: comfiture, jam, compote and nectar, the resulting product having remarkable sensorial qualities.

Apricots in variety 'Tudor' are less suitable for processing, being able to consume preferably as fresh fruits or possibly as comfiture or nectar.

Table 8. – The destinations of valorization in processed form of apricot varieties

Cultivar	Option		
	I	II	III
'Tudor'	comfiture	nectar	compote, jam
'Sirena'	nectar	comfiture, jam	compote
'Orizont'	compote, nectar	comfiture, jam	
'Olimp'	compote, comfiture, jam, nectar	-	-
'Neptun'	compote, jam, nectar	comfiture	-
'Augustin'	comfiture	compote, nectar	jam
'Litoral'	comfiture, jam	compote, nectar	-

It finds that cultivar ‘Olimp’ is very well suitable to all the processing into four types of canned analyzed: comfiture, jam, compote and nectar, the resulting product having remarkable sensory qualities. The apricots from the ‘Tudor’ cultivar are less suitable for processing, being able to be consumed fresh fruits or, possibly, as comfiture or nectar.

CONCLUSIONS

The apricots from the seven cultivars studied are different in size, shape, color and fresh storage capacity. Although, all these cultivars have in common a pleasant, sweet flavor, which is why they are highly appreciated for fresh consumption. These characteristics also affect the quality of the processed products.

The following cultivars are recommended:

- for obtaining the canned compote ‘Orizont’, ‘Olimp’, ‘Neptun’;
- for the comfiture, the cultivars: ‘Tudor’, ‘Olimp’, ‘Augustin’, ‘Litoral’;
- for the jam, the cultivars: ‘Orizont’, ‘Neptun’, ‘Litoral’;
- for the nectar: ‘Sirena’, ‘Orizont’, ‘Olimp’, ‘Neptun’.

Cultivar ‘Olimp’ is very well suitable to the processing into all 4 types of canned analyzed: comfiture, jam, compote and nectar, the resulting product having remarkable sensorial qualities. The apricots from the cultivar ‘Tudor’ are less suitable for processing, being able to be consumed preferably as fresh fruits or possibly as comfiture or nectar.

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