

QUALITY EVALUATION OF SOME CLINGSTONE CULTIVARS PROCESSED INTO STEWED FRUIT

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Abstract

The peach tree is among one of the most valuable species cultivated both in Romania and abroad, being very much appreciated for the quality of its fruit. Being represented in crops through many varieties, with different periods of ripening, the peach tree provides fresh fruit beginning with the second half of the month of June and ending with the first decade of the month of November. This distribution of the production also allows for a rhythmical and prolonged supply with fresh fruit of the factories that process fruits. The cultivation of peach trees for industrial usage (clingstones) is of specific importance in the context of cultivating peach trees in general, due to the fact that lately it has become much more essential, having a wide and complex problematic as compared to the traditional crops for fresh consumption. This paper has as purpose the establishing of the viability for processing into stewed fruit of 7 clingstone cultivars: NJC 108, C 81, NJC 85, Shasta, Catherine, Fortuna and Loadel. The peaches, provided from experimental plots of Research Station for Fruit Growing Constanta, were processed into stewed fruit in micro production laboratory of Research and Development Institute for Processing and Marketing of the Horticultural Products, Bucharest. The sensorial analysis of the product was carried out according to the STAS 12656-88, which establishes the analysis methods with unitary scales of points (method A), methods used in the evaluation of the organoleptic characteristics of alimentary products. These methods are applied in order to appreciate a set of organoleptic properties: aspect, colour, taste, texture or, should it be the case, consistence. The best results were obtained by the Catherine cultivar, which received the maximum score (20.00) for its aspect, colour and taste and a total average score of 19.52. This cultivar, together with Fortuna (18.48 points) and C 81 (18.24 points) were labelled with the "very good" grade.

Key words: aspect, colour, cultivar, taste, texture

INTRODUCTION

The peach tree is among the most valuable species cultivated both in Romania and abroad and it is very appreciated for the quality of its fruit. These are generally large, beautifully coloured, with a relatively high content of vitamins and sugar and with a fresh, pleasant taste. Being represented in crops by numerous cultivars with different ripening periods, the peach tree ensures fresh fruit beginning with the second half of the month of June and ending in the first decade of the month of November. This distribution of the production also allows for a rhythmical and continuous supply of fresh fruit for the fruit processing factories.

Stewed fruits are tins containing fruit and sugar syrup which are packed in hermetic and thermally sterilised recipients. According to the species, they have a minimum content of over 45% fruit [1, 2]. The short processing process (65 minutes) allows for maintaining within the finite product of the maximum quantity of nutrients, as well as the taste characteristics, the colours and the flavour [3]. These are the products with the highest requirements concerning the quality of the raw material, which is why the chosen cultivars are those that have certain technological properties and chemical composition, with different ripening periods – from extra early to late – in order to prolong the processing season. The fruit are harvested little before they are ripen for

consumption, when the pulp is firm and the flavour is already pronounced [4].

The quality of the stewed fruit depends on the characteristics of the cultivar, whose fruit must be uniform, with an attractive colour, good firmness and good resistance for the sterilisation process [6]. Fruit assessment performed directly by the consumer is often used when seeking to popularise a new cultivar or to compare the quality of several cultivars or products obtained through processing of the fruit [5].

The purpose of this paper is to evaluate the suitability for processing into stewed fruit of certain clingstone varieties which were cultivated in the experimental field from SCDP Constanța.

MATERIAL AND METHOD

The research was carried out in 2010, with 7 clingstone cultivars: NJC 108, C 81, NJC 85, Shasta, Catherine Sel.1, Fortuna and Loadel which come from the experimental crop at SCDP Constanța. Given the fact that the quality of the production is an essential factor in choosing the cultivars fit for processing into stewed fruit, analyses were carried out before processing, as well as measurements and determinations concerning the studied cultivars. Immediately after harvesting, the fruit were examined from an organoleptic point of view, the examination being focused on size, shape, colour, size of the stone and their adherence. Also, measurements were performed concerning the content of soluble dry substance (refractometric) and the acidity (titrimetric).

The fruit were processed into stewed fruit (slices) at the Research and Development Institute for Processing and Marketing of the Horticultural Products, Bucharest, in the microproduction laboratory. The sensorial analysis of the product was carried out according to the STAS 12656-88, which establishes the analysis methods with unitary scale points (method A), used in the evaluation of the organoleptic characteristics of alimentary products. This method is applied in order to determine an ensemble of organoleptic traits: aspect, colour, taste, texture and sometimes, consistency.

The evaluation of each organoleptic characteristic was performed by comparison with point scales from 0 to 5 points, thus obtaining an average total of points given by the tasters, based upon the individual files for recording the obtained points. Weighted averages of the points were calculated and they were, in their turn, added up in order to obtain a total average score. Also, the organoleptic qualities of the products were established based upon the average total principle, by comparison with a point scale from 0 to 20 points. Finally, each cultivar received a grade.

Within the general scores obtained by the various analysed products, there are 5 distinct quality classes:

Grade	Score
very good	18.10 – 20.00
good	15.10 – 18.00
satisfying	11.10 – 15.00
unsatisfying	7.10 – 11.00
unsuitable	0.0 – 7.10

The sensorial analysis of the tinned products was performed after a period of minimum 21 days after processing (in which time it is considered that the product become stable). After this period, other analyses involved the establishing of the content of soluble dry substance (the refractometric method), of soluble carbohydrates (the Bertrand titrimetric method) and of titrable acidity (the titrimetric method).

RESULTS AND DISCUSSIONS

The fruit of the NJC 108 hybrid, which is extraearly, are spherical-ovoid, yellow with red on approximately 20-25% of their surface. The pulp is yellow and tasty. The size of the fruit is medium (80g). The ripening stage occurs in the last decade of June and the first two decades of July, making this hybrid the earliest clingstone in the Romania assortment (Photo1).

C-81 (Photo 2) is a hybrid with a low vigour, with fruit that are medium in size, of an ovoid shape and yellow-greenish with red on approximately 30% of the surface. The pulp is yellow-orange, with a good taste and high firmness. The ripening stage occurs in the last decade of July and the first decade of August.



Photo 1. Clingstones from the NJC 108 hybrid



Photo 4. Clingstones from the Shasta variety



Photo 2. Clingstones from the C 81 hybrid

The NJC 85 hybrid displays a greater vigour, the fruit being slightly ovoid, yellow with red on the sunny side, presenting slight pubescence (Photo 3). The pulp is yellow-orange and the average size of the fruit is that of 125 g. The ripening of the fruit occurs at the end of July and in the first half of August.

Shasta, a cultivar with medium to high vigour has spherical fruit, average-sized (75-80 g), the main colour being yellow, while the covering one, on the sunny side, is red (Photo 4). The pulp is yellow, firm and adherent to the core.



Photo 3. Clingstones from the NJC 85 hybrid

The Catherine Sel.1 cultivar (Photo 5) is a Romanian cultivar, unlike the other 6 studies cultivars which are of American origin. It is obtained at the SCDP Constanța by means of auto pollination of the American cultivar Catherine, followed by a selection into hybrid lineage. The vigour of the tree is medium to high while the fruit are spherical, slightly flattened, with an average weight or 120 g. Their colour is an intense orange, with reddish shades on the sunny side. The pulp is yellow-orange, firm, rubbery, without red fibres and infiltrations and with a pleasant taste and string flavour. The ripening takes place in the second decade of July and the first decade of August.

Fortuna is a cultivar with a high vigour and fruit that are almost spherical, symmetrical, mainly yellow with red on the sunny side (Photo 6). The pulp is yellow, firm, flavoured and very adherent to the stone. The average weight of the fruit is of approximately 110 g. The ripening begins in the third decade of July and ends at the beginning of the second decade of August.



Photo 5. Clingstones from the Catherine Sel.1 variety



Photo 6. Clingstones from the Fortuna variety



Photo 7. Clingstones from the Loadel variety

The Loadel variety's vigour is medium to high and its fruit are big (over 130 g), round, the main colour being yellow, while the covering one is red, on approximately 25-30% of the surface. The pulp is yellow, very firm, tasty and adherent to the stone (Photo 7). The ripening begins with the last decade of July and lasts until the third decade of August, depending on the climatic conditions of that specific year.

The data referring to the size of the fruit (weight and dimensions) and the stone, as well as the content of dry substance and acidity can be seen in Table 1.

Table 1. The main physical and chemical characteristics of fresh fruit

Specification	U.M.	Cultivar						
		NJC 108	C 81	NJC 85	Shasta	Catherine	Fortuna	Loadel
Dimensions of the fruit								
- large diameter	mm	54.0	52.9	55.8	54.9	57.0	55.2	53.7
- small diameter	mm	51.2	47.3	52.8	53.8	52.1	43.7	48.3
- height	mm	49.5	42.0	53.5	51.5	48.6	48.2	52.7
Weight of the fruit	g	80.2	76.9	123.0	77.2	116.9	107.3	131.8
Weight of the stone	g	9.8	9.0	11.4	8.0	8.1	5.8	4.1
Weight of the stone as percentage of the weight of the fruit	%	12.2	11.8	9.3	10.4	6.8	5.5	3.1
Soluble dry substance	%	8.8	8.7	10.3	10.6	11.0	9.4	10.
Total acidity (malic acid)	mg/100g	0.54	0.55	0.38	0.60	0.50	0.41	0.44

The average weight of the fruit varies between 131.8 g (Loadel) and 77.2 g (Shasta), there being 4 varieties with fruit weighing over 100 g: NJC 85 (123.0 g), Catherine Sel.1 (116.9 g) and Fortuna (107.3 g). Generally, the dimensions of the fruit are in accordance to their weight.

The size of the stone and especially the relationship between the weight of the fruit and the weight of the stone is very important, particularly for cultivars meant for industrialisation, in order to obtain a good efficiency processing. Concerning the studied varieties, the average weight of the stone ranges from 11.4 g (9.3% of the fruit) at the NJC 85 and 4.1 g (3.1% of the fruit) at the Loadel cultivar.

By analysing the data in table 1 we can observe that the average value of the content of dry substance in the conditions of the year 2010 is quite low, varying between 11.0% at Catherine Sel.1 and 8.7% at the C 81 hybrid. Among all the studied cultivars, 3 of them present a ration of dry substance under 10%: C 81 (8.7%), NJC 108 (8.8%) and Fortuna (9.4%). The acidity in the fruit is the indicator which ensures balance of their taste. By analysing the table, we notice that the value of the acidity ranges from 0.38mg/100g at NJC 85 to 0.60mg/100g at Shasta.

The observations performed on the product stewed fruit reveals great differences between cultivars as concerns the biochemical composition (table 2).

Table 2. The main chemical characteristics of stewed clingstones

Cultivar	Specification			
	Soluble dry substance (°Bx)	Soluble carbohydrates (%)	Titrate acidity (malic acid mg/100g)	Ratio carbohydrates/acidity
NJC108	12.07	10.18	0.41	24.82
C 81	14.19	12.21	0.49	24.91
NJC 85	12.70	8.98	0.35	25.65
Shasta	12.88	10.20	0.42	24.28
Catherine	15.27	13.11	0.47	27.89
Fortuna	12.46	10.59	0.41	25.82
Loadel	12.52	9.73	0.43	22.62

The content of soluble dry substance varies between 12.07°Bx at the NJC 108 hybrid and 15.27°Bx at the Catherine Sel.1 cultivar. The largest quantity of soluble carbohydrates is contained by the stewed fruit of the Catherine cultivar (13.11%), while the smallest belongs to the clingstones of the NJC 85 hybrid (9.98%). The titrable acidity has values that range from 0.49mg/100g at the C 81 cultivar to 0.35mg/100g at the NJC 85 hybrid. Due to these values, the ratio soluble carbohydrates/titrable acidity is the highest at the Catherine hybrid (27.89), whereas the Loadel cultivar presents the lowest values for this indicator (22.62).

An ensemble image of the jars containing stewed fruit from the 7 analysed cultivars is presented in Photo 8.



Photo 8. Stewed clingstones

The results of the sensorial analysis of the product “Stewed peaches” are presented in table 3. It can be noticed that the best values were obtained by the Catherine Sel.1 cultivar, which received maximum points for aspect, colour and taste and an average total score of 19.52. This cultivar, together with Fortuna (18.48 points) and C 81 (18.24 points) received the grade “very good”.

Table 3. The sensorial analysis of the product “Stewed peaches”

Specification	Cultivar						
	NJC 108	C 81	NJC 85	Shasta	Catherine	Fortuna	Loadel
Aspect	5.52	5.12	4.08	4.56	6.00	5.36	5.04
Colour	3.04	3.68	3.04	2.56	4.00	3.84	2.88
Taste	5.04	5.76	4.08	5.04	6.00	5.76	5.04
Texture	3.20	3.68	3.04	3.36	3.52	3.52	2.56
Average total score	16.80	18.24	14.24	15.52	19.52	18.48	15.52
Grade	Good	Very good	Satisfying	Good	Very good	Very good	good

The NJC 108 hybrid (16.80 points) and the Shasta (15.52 points) cultivars obtained the grade “good”. The last place, with only 14.24 points was occupied by the NJC 85 hybrid, which received the grade “satisfying”.

CONCLUSIONS

The Romanian cultivar Catherine Sel.1, created at the SCDP Constanța, proves to be utterly suitable to the processing of its fruit into stewed fruit, the resulting product having remarkable sensorial qualities. In the same

category, highly suitable are the C 81 and Fortuna hybrids as well.

The peaches of the NJC 108 hybrid and the Shasta and Loadel cultivars can be processed into stewed fruit, given the fact that the tasters awarded them with the grade “good”.

The NJC 85 hybrid is less suitable for processing into stewed fruit. The grade it obtained following the sensorial analysis was “satisfying”, due to its less pleasant aspect, weak texture and low acidity, which resulted in the product having a less balanced taste.

For the cultivars having less satisfying results when processed into stewed fruit, the recommendation is that processing into other forms be tried (comfiture, jam, nectar, etc.)

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