Research regarding the setting up of the Processing Directions of Peach New Cultivars and Hybrids

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Abstract

There were studied nine peach cultivars and hybrids: Antonia, Amalia, Turtite 1 Baneasa, Turtite 2 Baneasa, Turtite 3 Baneasa, $D_2R_{32}T_{81,}$ HB 7-16, HB 5-43, HB 7-35, during the period 2003 – 2005. Some technological parameters that contributed to the setting up of the processing directions were analyzed at these cultivars and hybrids.

The new peach cultivars and hybrids were processed under similar technological conditions with control cultivars Antonia and Amalia, according to the technologies used in the production for the preservation of fruit as nectar and compote.

*After the stabilization period of the preserved products, of minimum 21 days from processing, the following analyses were carried out: sensorial analyses, biochemical analyses with determining of the energetic value and microbiologic analyses***.**

Keywords: peach, cultivars, hybrids, quality, nectar, compote, processing

Introduction

The peach is one of the most valuable and appreciated tree varieties cultivated in our country due to the high nutritive value of the fruit. Peaches represent a particular significance both for the consumption of fresh fruit and also as raw material for processing [1].

The research carried out has proved two essential aspects for processing of the fruit: the quality of the raw material and the applied technology that must keep or even improve the natural qualities of the fruit, in order to satisfy the consumer's taste [2].

Within the practice of the new fruit varieties testing for homologation, besides the check up of the agricultural, biologic and technological qualities, the nutritional value and optimum qualities of processing into preservation product are very important [3].

The fruit intended for industrial processing are considered of quality if, besides the sensorial properties, they have also a high content of soluble dry substance, pectic substances and maintain their colour and the flavour during their processing into compotes, jellies, jams, juices etc. [4].

Testing the new fruit cultivars the nutritive, sensorial and the technological qualities are carried out.

Materials and methods

The testing material for the processing was supplied by the Baneasa Research-Development Station for Fruit Trees.

The experimentations were carried out at the Research-Development Institute for Processing and Marketing of Horticultural Products – HORTING Bucharest within the frame of the Laboratory of Research – Processing of Horticultural Products.

Two control cultivars of peach: Antonia and Amalia and seven new cultivars and hybrids of peach: Turtite 1 Baneasa, Turtite 2 Baneasa, Turtite 3 Baneasa, $D_2R_{32}T_{81,}$ HB 7-16, HB 5-43, HB 7-35 were analyzed for a period of three years (2003-2005).

At these peach cultivars and hybrids, a series of technological parameters (sensorial, physical and biochemical), which have contributed to the setting up of the processing directions, were analyzed.

The new peach cultivars and hybrids were processed under similar technological conditions with control cultivars Antonia and Amalia, according to the technologies used in the production for the processing of fruit as nectar and compote.

The technological flow sheet for "Peach nectar" was included the following steps: qualitative and quantitative checking, sorting, washing, cleaning, cutting, preliminary heat treatment, cooling, crushing, refinement, mixing with sugar syrup and acid citric, homogenization with vitamin C, de-aeration, filling bottles, hermetic sealing, pasteurization, cooling, labeling, storage [3, 5].

The technological flow sheet for "Peach compote" was included the following steps: qualitative and quantitative checking, sorting, washing, cleaning, cutting, filling jars, preparation sugar syrup with citric acid, preheating, hermetic sealing, pasteurization, cooling, labeling, storage [3, 5].

In experimentations were also used: auxiliary materials (sugar, citric acid, vitamin C), packaging (Twist-off jars 720ml, bottles 250ml), lab and industrial equipments, reagents and lab glass.

The control and assessment of the technological quality of the peach cultivars and hybrids were carried out in three stages through:

- analysis of the raw material;
- analysis of behaviour on the processing flow sheet of nectar and compote;
- analysis of the preserved product.

After the stabilization period of the preserved products obtained from processing of the peach cultivars and hybrids, of minimum 21 days from processing, the following analyses were carried out:

- sensorial analyses (aspect, colour, taste, flavour, consistence, texture) – STAS12656-88 [6];
- biochemical analyses (soluble dry substance, glucides, lipids, proteins, vitamin C, acidity) determining the energetic value [6];
- microbiological analyses: aerobic and anaerobic bacteria - STAS 8924-96, yeasts and moulds - STAS 12964-91 [6].

Results and discussion

Following the examination of the sensorial and physical characteristics of the new cultivars and hybrids of peach it was noticed that: 3 new cultivars (Turtite 1 Băneasa, Turtite 2 Băneasa, Turtite 3 Băneasa) have the fruit flat and the pulp white, 3 new hybrids ($D_2R_{32}T_{81}$,

HB 7-16, HB 5-43) have yellow pulp, 2 control cultivars (Antonia, Amalia) and hybrid HB 7-35 have white pulp.

The cultivars with flat fruit have distinguished themselves by firm structure of the pulp, sweet or sweet-soury balanced taste and intense flavour, as well as the control cultivar Amalia. The other new hybrids have had a more juicy pulp with fine flavour, as the control cultivar Antonia. The prevalent taste was sweet-soury. Only the hybrid $D_2R_{32}T_{81}$ had the sweet-bitter taste.

In table 1 the average values of the biochemical characteristics analyzed at the peach cultivars and hybrids during 2003-2005 are presented.

Table 1. Average biochemical indicators of peach cultivars and hybrids (2003-2005)

Cultivar/ hybrid	Soluble dry substance (%)	Total (g malic acid/100g)	Total glucides (%)	Vitamin C (mg/100g)	Ratio glucides/ acidity
Antonia	13.2	0.62	10.41	9.33	16.79
Amalia	13.7	0.7	11.62	11.08	16.60
Turtite 1 Baneasa	15.2	0.48	12.60	10.69	26.25
Turtite 2 Baneasa	13.7	0.46	11.32	9.66	24.61
Turtite 3 Baneasa	13.5	0.57	11.33	9.21	19.88
$D_2R_{32}T_{81}$	10.3	0.54	7.80	7.73	14.44
HB 7-35	13	0.82	10.05	7.79	12.26
HB 7-16	13	0.88	10.30	9.08	11.70
HB 5-43	13	0.53	10.39	10.28	19.60

Following these analyses, the best average values of the biochemical characteristics achieved during the period of the three years study were registered at hybrid Turtite 1 Băneasa with soluble dry substance of 15.2%, and an average value of total glucides content of 12.6%.

The highest content in vitamin C was registered at the control cultivar Amalia with 11.08mg/100g, followed by the hybrid Turtite 1 Băneasa with 10.69% and HB 5-43 with 10.28 mg/100g.

Also, a high content of glucides was registered by the control cultivar Amalia with 11.62%, Turtite 3 Băneasa with 11.33% and Turtite 2 Băneasa with 11.32%.

Total acidity of the peaches ranged from 0.48 to 0.88 g malic acid/100g. Higher average values presented the hybrid HB 7-16 with 0.88 g malic acid/100g and the hybrid HB 7-35 with 0.82 g malic acid/100g.

The ratio existent between the glucides content and acidity ranged between 11.70 and 26.25. The taste of fruit is determined especially by this ratio.

The hybrids: HB 7-16 and HB 7-35 have presented the lowest value of the glucides/acidity ratio: 11.70 and, respectively, 12.26, while the hybrids Turtite 1 Băneasa and Turtite 2 Băneasa have had the highest values of this ratio: 26.25 and, respectively, 24.61.

The qualitative assessment of the processed products from the new peach cultivars and hybrids was established by sensorial, biochemical and efficiency analyses. The results of these analyzes for the product “Peach Nectar” are presented in table 2.

From the biochemical point of view, the product “Peach Nectar” registered the highest content of vitamin C at the control cultivar Amalia (6.35 mg/100g), followed by the new cultivars Turtite 2 Băneasa (6.20 mg/100 g), Turtite 1 Băneasa (6.12 mg/100 g) and the hybrid HB 5-43 (6.15 mg/100 g), while the highest energetic value was registered for the new

cultivars Turtite 2 Băneasa (55.97 kcal/100 g) and Turtite 1 Băneasa (54.77 kcal/100 g) by comparison with the controls that have had lower values.

Table 2. Quality indicators of peach cultivars and hybrids processed as „Peach nectar"

Quality indicator	**Cultivar/hybrid**								
	Antonia	**Amalia**	**Turtite 1 Baneasa**	**Turtite 2 Baneasa**	**Turtite 3 Baneasa**	**$D_2R_{32}T_{81}$**	**HB 7-35**	**HB 7-16**	**HB 5-43**
Sensorial properties Product aspect	Turbid liquid, homogenous with superficial sediment								
Colour	whitish-gray	whitish-gray	yellowish	cream	whitish-gray	light yellow	cream-yellowish	yellow	yellow-orange
Taste	tasteless	sweet	sweet	sweet	sweet	tasteless	tasteless	sweet	sweet
Flavour	fine	intense	intense	intense	fine	fine	fine	fine	fine
Consistency	semi-fluid								
Biochemical properties Soluble dry substance (%)	14	14.5	14	14.5	13.5	12	12.5	13.5	13
Glucides(%)	13.1	13.2	13.2	13.45	12.35	11.12	11.45	12.6	12.26
Lipids (%)	0.042	0.035	0.05	0.041	0.04	0.06	0.03	0.028	0.035
Proteins (%)	0.46	0.38	0.38	0.45	0.32	0.52	0.41	0.39	0.5
Vitamin C (mg/100g)	4.92	6.35	6.12	6.2	4.94	4.4	4.47	4.93	6.15
Energetic value (kcal/100g)	54.62	54.63	54.77	55.97	51.04	47.08	47.71	52.21	51.35
Refuse (%)	18.11	18.52	8.51	5.75	7	13.51	12	19	10

The product "Peach Nectar" was subject of sensorial analysis and the results were presented in table 3.

Table 3. Sensorial analyses of peach cultivars and hybrids processed as "Peach nectar"

Cultivar/ hybrid	**Aspect**	**Colour**	**Taste**	**Flavour**	**Total average score (P_{mt})**	**Qualification**
Antonia	3.656	4.656	5.82	3.768	17.9	good
Amalia	3.656	5.484	5.82	3.88	18.8	very good
Turtite 1 Baneasa	3.88	5.484	5.592	3.88	18.8	very good
Turtite 2 Baneasa	3.88	5.484	6	3.88	19.2	very good
Turtite 3 Baneasa	3.88	5.484	5.592	3.552	18.5	very good
$D_2R_{32}T_{81}$	3.728	5.592	4.656	3.2	17.2	good
HB 7-35	3.2	4.656	3.996	2.84	14.7	acceptable

HB 7-16	4	6	5.46	3.728	19.2	very good
HB 5-43	3.816	6	5.592	3.64	19.0	very good

The new cultivars Turtite 1 Băneasa, Turtite 2 Băneasa, Turtite 3 Băneasa and hybrids HB 7-16, HB 5-43 processed as nectar have obtained the qualification "very good", as well as the control cultivar Amalia and were characterized by special sensorial qualities, as for example the more attractive aspect of the product, the pleasant sweet balanced taste and intense flavour.

The hybrid $D_2R_{32}T_{81}$ processed as nectar has obtained the qualification "good", as the control cultivar Antonia, due to the tasteless taste and fine flavour. The hybrid HB 7-35 obtained the qualification "satisfactory" due to the tasteless taste, fine flavour and non-attractive aspect of the product.

According to the average sizes of the fruits, the peach cultivars and hybrids were processed as compote with whole fruits: Turtite 1 Băneasa, Turtite 2 Băneasa, Turtite 3 Băneasa and HB 7-16 and as compote with sliced fruits: Antonia, Amalia, $D_2R_{32}T_{81}$, HB 7-35, HB 5-45.

Table 4 presents the quality indicators for the product "Peach Compote".

Table 4. Quality indicators of peach cultivars and hybrids processed as „Peach compote"

Quality indicator	**Cultivar/hybrid**								
	Antonia	**Amalia**	**Turtite 1 Baneasa**	**Turtite 2 Baneasa**	**Turtite 3 Baneasa**	**$D_2R_{32}T_{81}$**	**HB 7-35**	**HB 7-16**	**HB 5-43**
Sensorial properties Fruit aspect	Fruit pieces are about the same size. They are uniform included in liquid.		Whole fruit are about the same size. They are uniform included in liquid.			Fruit pieces are about the same size. They are uniform included in liquid.			
Liquid aspect	light opalescent	clear	clear	clear	clear	clear	clear	clear	clear
Fruit texture	soft	strong	strong	strong	strong	strong	strong	strong	strong
Fruit colour	yellow-cream	beige-brown	yellow-cream	light yellow	yellow-cream	yellow - beige	intense yellow	white-yellowish	intense yellow
Liquid colour	yellowish	yellowish	yellowish	yellowish-brown	yellowish	yellowish	yellowish-orange	yellowish	yellowish-brown
Taste	sweet-soury	sweet	sweet-bitterish	sweet - bitterish	sweet-bitterish	sweet	sweet-soury	sweet-soury	sweet
Flavour	intense	intense	intense	intense	intense	fine	intense	fine	fine
Biochemical properties Soluble dry substance (%)	19	20	20	20	19	18	19	19	19
Glucides (%)	17.64	18.7	18.68	18.64	17.25	16.25	17.94	17.55	17.93
Lipids (%)	0.045	0.03	0.04	0.03	0.041	0.029	0.05	0.036	0.041
Proteins (%)	0.44	0.46	0.4	0.37	0.39	0.41	0.39	0.51	0.36
Energetic value (kcal/100g)	72.725	76.51	76.68	76.31	70.929	66901	73.77	72.564	73.529
Refuse (%)	17.70	18.63	-	-	-	14.52	13.25	-	11.2

From the biochemical point of view, the product "Peach Compote" registered the highest energetic value at the cultivar Turtite 1 Băneasa (76.68 kcal/100 g) as compared to the control cultivar Amalia (76.51 kcal/100 g). In case of the other cultivars and hybrids the energetic value ranged from 66.901 kcal/100 g at the hybrid $D_2R_{32}T_{81}$, and 73.31 kcal/100 g at the cultivar Turtite 2 Băneasa.

The product "Peach Compote" was subject of the sensorial analysis and the results were presented in Table 5.

Table 5. Sensorial analyses of peach cultivars and hybrids processed as "Peach compote"

Cultivar/ hybrid	Aspect	Colour	Taste	Flavour	Total average score (P_{mt})	Qualification
Antonia	4	6	6	4	20	very good
Amalia	3.904	5.856	6	4	19.8	very good
Turtite 1 Baneasa	3.904	6	6	4	19.9	very good
Turtite 2 Baneasa	3.904	6	5.46	3.376	18.7	very good
Turtite 3 Baneasa	4	6	5.46	3.376	18.8	very good
$D_2R_{32}T_{81}$	3.376	5.46	5.46	3.376	17.7	good
HB 7-35	3.904	5.856	6	3.376	19.1	very good
HB 7-16	4	6	6	3.816	19.8	very good
HB 5-43	3.376	5.46	3.996	3.376	16.2	good

Following the sensorial analysis the product "Peach Compote" obtained the qualificative "very good" for this cultivars and hybrids: Antonia, Amalia Turtite 1 Băneasa, Turtite 2 Băneasa, Turtite 3 Băneasa, HB 7-35 and HB 7-16, due to the attractive aspect of the product and special sweet taste. Also, the particular flavour of the compote obtained from the peach cultivars with flat fruit was distinguished.

The cultivars and the hybrids with the stone adherent to the pulp have registered bigger losses at the nectar and compote processing with sliced fruit.

All the preservation products were microbiologically analyzed registering the absence of aerobe and anaerobic, mesophile and thermophile bacteria, as well as the absence of yeasts and moulds.

Conclusions

The new peach cultivars: Turtite 1 Băneasa, Turtite 2 Băneasa, Turtite 3 Băneasa and new hybrid HB 5-43 have distinguished and had higher values as regards the content of soluble dry substance, total glucides and vitamin C. Also, the new cultivars Turtite 1 Băneasa and Turtite 2 Băneasa had the highest value of the glucides/acidity ratio.

From the sensorial and biochemical point of view, Turtite 1 Băneasa, Turtite 2 Băneasa and HB 5-43 have distinguished in the nectar processing, and Turtite 1 Băneasa, Turtite 2 Băneasa, Turtite 3 Băneasa, HB 7-35 and HB 7-16 have distinguished in the compote processing.

Based on these results, the premises are created in order to supply with consumers the quality products obtained from peach cultivars and hybrids with high sensorial and nutritional qualities.

The results of these experimentations are used at the registration of the new cultivars of fruit into the "Official Catalogue of Cultivated Plants Cultivars from Romania."

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