Utilization of Peach pulp for making puree and Canning of Peach –halves in fruit juice

Abstract

Peach fruits of the cultivar TA-170 were lye peeled and canned in A2 ½ tin cans with a covering medium of 40^0 Brix containing enzymatically extracted fruit juice in a concentration of 30-40 per cent with or without ascorbic acid (500 ppm) and compared with the control (40^0 Brix of sucrose syrup + 0.3% citric acid). Cut out analysis carried out upto 6 months with 2 months storage interval, revealed that all the treatments met FPO specification for drained weight and showed superiority in quality over conventional canned peaches. The vitamin C fortified treatments had a higher retention of ascorbic acid throughout the storage as compared to the unfortified treatments. Higher non- enzymatic browning was observed in the peach halves canned in plain sucrose syrup compared to those canned in juice with or without ascorbic acid in covering medium. Treatments containing 40 per cent juice in a covering medium of 40^0Brix was rated the best followed by 30 per cent peach juice on the basis of physico- chemical, sensory and microbiological evaluation. The additional advantage of canning of fruits in natural fruit juice occurred due to the economic use of the left over pulp for preparation of puree. Puree which was prepared by adding sugar retained better quality, higher acceptability and could be stored for 6 months. Addition of juice not only improves the quality of canned product but also enhance its nutrition along with the economic utilization of the left over pulp in the form of puree.

Key words: Canning, puree, covering medium, juice, pulp, sensory evaluation

Introduction

Peach **(*Prunus persica*** Batsch*)* is the 3rd most widely distributed temperate stone fruit in the world. The total world production of peach is 13.757 million tonnes and India contributes 1,14,000 metric tonnes[3]. In India, its cultivation is confined in the states of Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana, Tamil Nadu and parts of Uttarakhand. However, the low chilling peaches in India are grown in sub-mountainous region and parts of Uttar Pradesh. In the North East it is mainly grown in Arunachal Pradesh, Nagaland and Meghalaya covering an area of 600 ha with an annual production of 1,250 tonnes[10]. Low chilling peach is most important in terms of adaptability and extension of area as these peaches mature early in subtropical areas and thus find an excellent market. Peach is a delicious fruit of the world, which contains an appreciable amount of vitamin C *i.e* 1-27 mg/100 g, 7-8 per cent sugars, 0.6- 1.2 per cent proteins and is rich in mineral contents and vitamins. Peaches like other stone fruits can not endure long storage life after harvest at ambient temperature as they are subjected to softening and senescence breakdown immediately after harvest. In addition, there is often a glut in the peach market during the peak harvest season. Therefore, to make fruits available throughout the year to consumers and for better return to growers, preservation of fruit halves in fruit juice and conversion of the pulp to puree could be an attractive alternative. Some workers have suggested replacement of sugar syrup with corn syrup in canning of fruits. Peach halves have been canned in juices of apples[8]. 20-30 per cent of the apple juice concentrate of 35 ^{0}B as covering medium has been

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successfully used in canning of apple rings. Hence the present investigation was carried out to explore the feasibility of using peach juice at different levels, in the canning of peach halves to obtain a product having good nutrition with better retention of quality during storage and also aimed at economic utilization of the peach pulp and processing it into puree.

Material and Method

Preparation of fruit, pulp and juice

Firm ripe fruits of peach cultivar TA-170 were obtained from Horticultural Research farm, ICAR Research complex for NEH Region, Umiam (Meghalaya). The sound peach fruits were manually sorted, graded, washed and lye-peeled by dipping fruits in 1.0 per cent boiling caustic soda for 50-60 sec. The lye peeled fruits were halved by removing the pit. Some of the fruits were pulped with 10 per cent water, cooked for 10-15 min, passed through the pulper and pasteurized for 20 min. For extraction of juice, the pulp was treated with pectinase (0.5 per cent) and incubated at 40^0C for 4 hours. Later the enzyme treated pulp was passed through muslin cloth, and extracted juice was heated to 95^0C to inactivate the added enzyme and then stored in sterilized glass bottles after pasteurizing for 20 min. The left over pulp after extraction of juice was also collected and stored.

Packing and processing

Lye peeled peach halves were packed in A 2 ½ cans with a covering medium of 40^0B strength containing 30-40 per cent peach juice, as prepared above, with or without 500ppm ascorbic acid. The conventionally canned samples with covering syrup of 40^0B strength (prepared with sucrose and having 0.3 per cent citric acid) constituted the control. For peach puree only the prepared pulp were used in same proportions (200gm) with sugar and without sugar maintaining the final TSS at 15^0B and with salt maintaining the final TSS at 11^0Brix. The processing of packed tin cans and puree bottles was done as per the standard method and the processed cans and puree bottles were stored at ambient temperature (14.92 -26.39 ^{0}C) for 6 months. The experiment was replicated thrice.

Analysis

The physico-chemical analysis of the fresh and canned fruits along with peach puree was carried out according to the procedures described by Ranganna[9]. The overall acceptability evaluation of fruit halves and puree was carried out by a panel of 7 semi-trained judges on a 9 point Hedonic scale[1]. The data were statistically analyzed and means compared at 5 per cent level of significance.

Results and Discussion

Table 1- Physico- chemical characteristics of fresh peach fruit

Parameter	Mean	Standard deviation
Length, cm	4.56	.013
Width, cm	4.58	.013
Weight, g	61.89	0.339

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Specific gravity	1.01	0.062
Pulp/stone ratio	13.83	0.018
Length/breadth ratio	1.01	0.011
Moisture, per cent	87.55	0.148
Total soluble solids, ^{0}B	13.43	0.162
Titratable acidity, per cent as malic acid	0.44	0.017
Reducing sugar, per cent	3.10	0.068
Total sugars, per cent	5.72	0.018
Ascorbic acid, mg/100g	45.69	0.016
Total carotenoids, µg/100g	23.54	0.149
TSS/acid ratio	29.86	0.017
Firmness, N	102.12	3.773
Fruit Colour,		
L	46.25	5.727
A	7.45	0.068
B	6.20	0.175

*Average value of 10 fruits

Characteristics of fruit

Fresh fruits were analyzed for their physico-chemical characteristics before canning and puree making and the results are summarized in Table 1.The average fruit length and width of the peach cultivar TA-170 were 4.56 and 4.58 cm respectively. The weight and specific gravity of the fruits were 61.89 g and 1.01 respectively, with firmness of 102.12 N. The colour reflectance of the peach fruits was measured as the 'Hunter colour values (L,a and b). L is a measure of lightness on a scale ranging from 0(black) to 100 (white): +a denotes redness, -a indicates greenness when the values are negative; +b denotes yellowness when the values are positive and –b indicates blue when the values are negative respectively. The L, a and b values for the peach fruits were found as 46.25, 7.45 and 6.20, respectively. The status of various chemical parameters in fruits were as follows: moisture 87.55 per cent, total soluble solids (TSS) 13.43^{0}B, titratable acidity 0.44 per cent as malic acid with TSS/acid ratio of 29.86. Reducing sugars, total sugars, ascorbic acid and total carotenoids were 3.10 and 5.72 per cent, 45.69 mg/100 g and 23.54 µg/100g respectively. It was apparent from the physico-chemical characteristic of the peach that the fruits were suitable for canning and puree making.

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Table 2- Cut-out examination of canned peach halves after 6 months of storage

Parameter	Ascorbic acid, ppm	Concentration of juice , per cent		Mean
		30	40	
Drained weight, per cent	0	56.94	57.86	**57.40**
	500	57.13	58.10	**57.62**

	Mean	**57.04**	**57.98**	**CD $_{0.05}$ =0.046**
Total soluble solids (TSS), per cent	0	22.21	24.69	**23.45**
	500	18.17	23.20	**20.69**
	Mean	**20.19**	**23.95**	**CD $_{0.05}$ =0.047**
Titratable acidity, per cent	0	0.229	0.237	**0.233**
	500	0.230	0.235	**0.232**
	Mean	**0.229**	**0.236**	**CD $_{0.05}$ =0.006**
Ascorbic acid, mg/100g	0	7.47	8.92	**8.20**
	500	16.09	22.50	**19.30**
	Mean	**11.78**	**15.71**	**CD $_{0.05}$ =0.107**
Non-enzymatic browning, optical density at 440 nm	0	0.161	0.108	**0.135**
	500	0.072	0.067	**0.069**
	Mean	**0.117**	**0.088**	**CD $_{0.05}$ =0.0007**
Overall acceptability score	0	5.65	6.11	**5.88**
	500	5.42	5.57	**5.49**
	Mean	**5.54**	**5.84**	**CD $_{0.05}$ =0.007**

*Drained weight, total soluble solids, titratable acidity, ascorbic acid, non-enzymatic browning and overall acceptability score for control samples after 6 months of storage was 55.31, 25.46, 0.313, 4.27 0.189 and 3.85 respectively.
**Initial total soluble solids of covering media 40 per cent.
***Control treatment (conventional canning media) contained 40 ^{0}B sucrose syrup having 0.3 per cent citric acid.

Characteristics of canned peach-halves

The cut out analysis results of the canned peach-halves stored at ambient temperature for a period of six months, are presented in Table 2. The results presented show that the drained weights of the canned peach halves were significantly influenced by different treatment. Even the lowest drained weights due to the treatments given to the peach-halves were higher than that of controls which was 54.77 per cent. A drained weight of 55.0, 56.01 and 57.0 per cent in peach halves canned in plain sugar, reconstituted in apple juice concentrate medium and straight apple juice medium respectively has been reported earlier by Vyas and Joshi[11]. All the treatments reported in this paper meet the FPO specification[4] or the minimum drained weight. An increase in TSS due to sugar diffusion during the equilibrium process was noticed in all the treatments on storage.

The titaratable acidity decreased in all the treatments of peach-halves with storage, as the acids might have been used in the hydrolysis of sucrose to simple sugars and also due to leaching into the covering medium on advancement of storage time. The acidity was comparatively higher in the control samples, conventionally canned-peach halves, at 0.313 per cent of citric acid mainly due to the fact that 0.30 per cent of citric acid was added in the sucrose syrup of

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peach-halves canned under the conventional method. Among the treatments the highest acidity of 0.237 was recorded in the treatment containing 40 per cent peach juice in a covering media of 40 ^{0}B which was statistically at par with the treatment containing 40 per cent peach juice in a covering media of 40 ^{0}B having 500 ppm ascorbic acid and the lowest value of 0.229 per cent in the treatment containing 30 per cent peach juice in a covering media of 40 ^{0}B.

The data on the retention of ascorbic acid in canned peach-halves revealed that although, there was a reduction in the vitamin C, the retention of ascorbic acid was higher in vitamin C fortified treatments. The deliberate addition of ascorbic acid not only enhanced the nutritive value of the canned product but also reduced non-enzymatic browning to a great extent. The highest and lowest levels of ascorbic acid in ascorbic acid fortified treatments were 22.50 and 16.09 mg/100 g in treatment containing 40 per cent peach juice in a covering media of 40 ^{0}B having 500 ppm ascorbic acid and 30 per cent peach juice in a covering media of 40 ^{0}B having 500 ppm of ascorbic acid, respectively. On the other hand, in unfortified treatments the highest and the lowest levels of retained ascorbic acid were 8.92 and 7.47 mg/100 in treatment containing 40 per cent peach juice in a covering media of 40 ^{0}B and treatment containing 30 per cent peach juice in a covering media of 40 ^{0}B, respectively. The control samples contained the lowest level of ascorbic acid at 4.27 mg/100 g. Garg *et al.*[5] have observed that the ascorbic acid in canned peaches declined by 80.0-81.0 and 78.0-82.0 per cent in *Crawford Early* and *Golden Bush* cultivars of peaches, respectively.

Non-enzymatic browning was recorded as the highest in control samples, canned conventionally, recording an optical density of 0.189 as compared to the samples packed in a medium containing fruit juice and it was much lower in the vitamin C fortified samples. It may be due to the antioxidant effect of the vitamin C. The highest and the lowest levels of optical density at 440 nm were 0.161 and 0.108, for the unfortified samples containing 30 per cent peach juice and 40 per cent peach juice in a covering media of 40 ^{0}B, respectively. Whereas, in ascorbic acid fortified samples the highest and lowest levels of the optical density were 0.072 and 0.067 corresponding to treatments containing 30 and 40 per cent peach juice in a covering media of 40 ^{0}B with 500 ppm ascorbic acid, respectively.

Sensory quality evaluation of peach halves carried out by a panel of 7 semi-trained judges revealed that all the treatments showed an improvement over control samples. On the basis of different quality parameters, *viz*, colour, flavour, taste and texture, the treatment containing 40 per cent peach juice was rated as best over six months of storage period followed by samples containing 30 per cent peach juice, 40 per cent peach juice with 500 ppm ascorbic acid and 30 per cent peach juice with 500 ppm ascorbic acid all in a covering media of 40 ^{0}B and recorded overall Hedonic rating of 6.11,5.65, 5.57 and 5.42, respectively, on the nine-point Hedonic scale (Table 2). Hulme[6]has reported that addition of acid leads to a firmer and crispy texture of peaches. Conventionally canned peach halves have been reported to be acceptable up to 200 days by Kinge[7].

Puree which was prepared from the extracted and left over pulp by adding sugar, salt and without adding sugar was also evaluated by the panel of seven semi-trained judges and the results are given in Table 3. Overall acceptability score based on the observation for the different sensory attributes, *viz*, colour, flavour, taste and consistency/body showed that the puree

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which was prepared by adding sugar retained better quality, higher acceptability and could be stored for six months. The highest rating of 8.75 was recorded for the puree prepared by adding sugar, followed by those prepared with salt (8.0) and without adding sugar (7.5), respectively as per Hedonic and Bhowmik, PanMethod[2]

Conclusion

From the present study, it may be concluded that the sucrose syrup being used in canning of peach-halves at present can successfully be replaced with the covering medium containing 30-40 per cent peach juice. Addition of juice not only improved the quality of canned product but also enhanced its nutrition along with the economic utilization of the left over pulp in the form of peach puree.

Table-3 Overall acceptability score of peach puree after six months of storage

Parameters	Treatments of peach puree			$CD_{0.05}$
	With sugar	Without sugar	With salt	
Colour	8.35	8.25	8.25	0.0084
Flavour	8.21	8.11	7.31	0.007
Texture	4.67	3.90	4.67	0.0056
Taste	8.50	7.53	7.00	0.049
Overall acceptability	8.75	7.53	8.00	0.031

* on 9 point hedonic scale and Bhowmik, Pan method (1992)

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