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STUDIES ON PREPARATION OF WOOD APPLE SQUASH AND ITS ORGANOLEPTIC EVALUATION

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Abstract

A laboratory experiment was carried out during the year 2013-14 at Post Harvest Technology Laboratory, Department of Horticulture, Post Graduate Institute, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.) to find out the standard recipe for the preparation of wood apple squash by its organoleptic evaluation. The experiment was conducted in CRD design consisting of seven treatments *viz.*, T_1- 45 % TSS (Cane sugar) + 0.5 % acidity + 200 ppm sodium benzoate, T_2- 45 % TSS (Jaggery) + 0.6 % acidity + 250 ppm sodium benzoate, T_3- 45 % TSS (Honey) + 0.7 % acidity + 300 ppm sodium benzoate, T_4- 45 % TSS (50 % Cane sugar+ 50 % Jaggery) + 0.5 % acidity + 200 ppm sodium benzoate, T_5- 45 % TSS (50 % Cane sugar+ 50 % Honey) + 0.6 % acidity + 250 ppm sodium benzoate, T_6- 45 % TSS (50 % Jaggery + 50 % Honey) + 0.7 % acidity + 300 ppm sodium benzoate and T_7- control (Cane sugar alone) and three replications with local wood apple variety. By evaluating the wood apple squash organoleptically, it could be observed that, the wood apple squash prepared by the recipe 45 % TSS (Cane sugar) + 0.5 % acidity + 200 ppm sodium benzoate was found to be acceptable up to 120th day of storage in respect to sensory qualities. Further, from the experimental data recorded on sensory qualities of wood apple squash, it was found that, amongst all the treatments, 45 % TSS (Cane sugar) + 0.5 % acidity + 200 ppm sodium benzoate exhibited the maximum *i. e.* 7.2 score on 120th day which was rated as a superior quality or standard recipe for the preparation of wood apple squash.

Key Words: Wood apple, squash, local variety, organoleptic evaluation

Introduction

Wood apple (*Feronia limonia* L.) belonging to family Rutaceae is the important arid fruit crop in India. It is reported to be native of India and Ceylon, generally cultivated in both peninsulas. It is more common in southern Maharashtra and Madhya Pradesh and also occur in the western Himalaya upto an elevation of about 500 meter. The important link in the post-harvest chain is primary processing or value addition and the main objectives of processing are to ensure the maximum off-season availability. Out of the total production only 1 per cent wood apple fruits are used for processing and approximately 0.5 per cent processed products of wood apple are exported to the other countries. Wood apple fruit pulp has anti-inflammatory, antipyretic and analgesic activity. It also has anti-diabetic and antioxidant potential as it reduces the level of blood glucose and malondialdehyde. Fruit is used in India as a liver and cardiac tonic and when unripe, as a means of halting diarrhea and dysentery and for effective treatment for cough, sore throat and disease of the gums.

Wood apple is not eaten directly due to highly sour in taste, but can be consumed as a squash. The pulp in ripened fruit is about 70% of total weight and seeds are embedded in the pulp. It contains about 70% moisture, 7.3% protein, 0.6% fat, 1.9% mineral matter, 2.3% acidity, 7.2% sugars, 0.07% iron, 0.08% phosphorus and it is a rich source of riboflavin (77 mg/100 mg) and calcium (0.17%). The pectin content of the pulp is 3 to 5% (16% yield on dry-weight basis) (Chundawat, 2003).

The area under wood apple cultivation is increasing day by day and hence, the standard method for its processing needs to be developed in order to regulate the prices of produce during glut period. This seems to be attractive processing horizon for wood apple fruits in future. The sweetened pulp is a source of sherbet in the subcontinent. A good number of by products from the wood apple have been reported. Attempt was made to

prepare a good quality wood apple squash having good storability and better consumer acceptability.

Materials and Methods

A laboratory experiment was carried out during the year 2013-14 at PHT Laboratory, Department of Horticulture, Post Graduate Institute, Dr. PDKV, Akola (M.S.) to find out the standard recipe for the preparation of wood apple squash by its organoleptic evaluation. The experiment was conducted in Completely Randomized Block Design design consisting of seven treatments *viz.*, $\mathbf{T_1}$- 45 % TSS (Cane sugar) + 0.5 % acidity + 200 ppm sodium benzoate, $\mathbf{T_2}$- 45 % TSS (Jaggery) + 0.6 % acidity + 250 ppm sodium benzoate, $\mathbf{T_3}$- 45 % TSS (Honey) + 0.7 % acidity + 300 ppm sodium benzoate, $\mathbf{T_4}$- 45 % TSS (50 % Cane sugar+ 50 % Jaggery) + 0.5 % acidity + 200 ppm sodium benzoate, $\mathbf{T_5}$- 45 % TSS (50 % Cane sugar+ 50 % Honey) + 0.6 % acidity + 250 ppm sodium benzoate, $\mathbf{T_6}$- 45 % TSS (50 % Jaggery + 50 % Honey) + 0.7 % acidity + 300 ppm sodium benzoate and $\mathbf{T_7}$- control (Cane sugar alone) and three replications with local wood apple variety. For the experimentation, fully matured and uniform sized fruits of wood apple were procured from the Main Garden, College of Horticulture, Dr. PDKV, Akola. Approximately 100 kg matured wood apple fruits were brought to the laboratory and sorted out. Unripe, diseased, damaged and off type fruits were strictly discarded. The selected fruits were thoroughly washed with clean tap water to remove dirt. Pulp was extracted manually from well matured fruits with the help of water. Pulp adhering to the seed portion was used for the preparation of squash. For formulation of recipe, the actual total soluble solids and acidity present in the wood apple juice/pulp were first determined and then remaining quantity of sugar was adjusted in 1000 ml. Squash of each recipe was prepared by mixing the calculated quantity of juice, sugar, jaggary and honey as per the treatment. At first sugar syrup was prepared by heating the mixture of sugar and water and then it was mixed with fruit juice as per the general recipe. Then the prepared squash was filtered properly through a clean muslin cloth to obtain a final product of uniform consistency. The prepared products were poured into sterilized bottles of 150 ml capacity. After leaving 2 cm head space, bottles were crown corked by automatic crown corking machine. The mean values of score for sensory evaluation were calculated and reported according to the method given by Amerine and Tangborn (1965).

Consumer acceptability

The squash prepared from wood apple fruits was evaluated for sensory qualities *viz.* colour, aroma and taste at an interval of 20 days. Each attribute was given a separate score of 9 point hedonic scale according to the method reported by Amerine and Tangborn, 1965 with different scales *viz.*, like extremely-9, like very much-8, like moderately-7, like slightly-6, neither like nor dislike-5, dislike slightly-4, dislike moderately-3, dislike very much-2, dislike extremely-1.

Results and Discussion

The data from table 1 indicated that, there was an increase in the score with increase in percentage of juice used for the preparation of different proportions of squash. At 20th day of storage, the recipe $\mathbf{T_6}$ (45 % TSS (50 % Jaggery + 50 % Honey) + 0.7 % acidity + 300 ppm sodium benzoate) recorded maximum scores *i. e.* 8.2 followed by the treatment $\mathbf{T_7}$ [control (Cane sugar alone)] with score 7.7, however, the minimum score was recorded in the treatment $\mathbf{T_2}$ (45 % TSS (Jaggery) + 0.6 % acidity + 250 ppm sodium benzoate) *i. e.* 6.1.

When the observations recorded at 60th day of storage, it was noted that, the treatment $\mathbf{T_6}$ (45 % TSS (50 % Jaggery + 50 % Honey) + 0.7 % acidity + 300 ppm sodium benzoate) recorded good score (8.3) and it was rated superior which might be due to better compatibility of squash in the treatment $\mathbf{T_6}$ which was followed by the treatment $\mathbf{T_2}$ (45 % TSS (Jaggery) + 0.6 % acidity + 250 ppm sodium benzoate) with score 7.7, while, minimum score was noted in the treatment $\mathbf{T_3}$ (45 % TSS (Honey) + 0.7 % acidity + 300 ppm sodium benzoate) with 6.6 score.

However, at 80th day of storage, three treatment samples were spoiled *i. e.* $\mathbf{T_2}$, $\mathbf{T_3}$ and $\mathbf{T_6}$. At 120th day of storage superior score 7.2 was recorded in $\mathbf{T_1}$ (45 % TSS (Cane sugar) + 0.5 % acidity + 200 ppm sodium benzoate) which was followed by the treatment T_4 (45 % TSS (50 % Cane sugar+ 50 % Jaggery) + 0.5 % acidity + 200 ppm sodium benzoate) *i. e.* 6.4, whereas, the treatment $\mathbf{T_5}$ (45 % TSS (50 % Cane sugar+ 50 % Honey) + 0.6 % acidity + 250 ppm sodium benzoate) and $\mathbf{T_7}$ (Control) exhibited minimum score *i. e.* 6.1.

From the overall sensory evaluation of wood apple squash prepared with different recipes carried out from the day of preparation to 120th day of storage, it can be stated that, on an average most of the recipes remain acceptable up to the 60th day of storage and there after the score was reduced and recorded maximum value which was not the acceptable score as we expect the superior quality recipe. But, amongst all the combinations, the recipe $\mathbf{T_1}$ *i. e.* 45 % TSS (Cane sugar) + 0.5 % acidity + 200 ppm sodium benzoate exhibited the

Table 1: Effect of recipes on consumer acceptability of wood apple (local variety) squash.

Treatments	0 days				20 days				40 days			
	Colour	Aroma	Taste	Overall accept.	Colour	Aroma	Taste	Overall accept.	Colour	Aroma	Taste	Overall accept.
1	2				3				4			
T_1- 45 % TSS (Cane sugar) + 0.5 % acidity + 200 ppm sodium benzoate	8	7	7.0	7.3	7	7.2	7.1	7.1	7.5	8.2	7.7	7.8
T_2- 45 % TSS (Jaggery) + 0.6 % acidity + 250 ppm sodium benzoate	6	6	6.0	6.0	6	6.1	6.3	6.1	7.0	6.2	6.7	6.6
T_3- 45 % TSS (Honey) + 0.7 % acidity + 300 ppm sodium benzoate	6	7	7.0	6.6	7	7.2	7.4	7.2	7.0	7.0	7.5	7.1
T_4- 45 % TSS (50 % Cane sugar+ 50 % Jaggery) + 0.5 % acidity + 200 ppm sodium benzoate	8	6	6.1	6.7	6	6.4	6.5	6.3	6.0	7.5	7.3	6.9
T_5- 45 % TSS (50 % Cane sugar+ 50 % Honey) + 0.6 % acidity + 250 ppm sodium benzoate	6	6.5	6.0	6.1	6.2	6.7	6.6	6.5	6.0	6.2	5.9	6.0
T_6- 45 % TSS (50 % Jaggery + 50 % Honey) + 0.7 % acidity + 300 ppm sodium benzoate	9	8.1	8.0	8.3	8.2	8.4	8.0	8.2	8.0	8.3	5.9	8.2
T_7- control (Cane sugar alone)	9	8	8.2	8.4	8.0	7.2	8.0	7.7	8.4	7.6	7.8	7.9

contd. .....

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Treatments	60 days				80 days				100 days				120 days			
	Colour	Aroma	Taste	Overall accept.	Colour	Aroma	Taste	Overall accept.	Colour	Aroma	Taste	Overall accept.	Colour	Aroma	Taste	Overall accept.
1	5	6	7	8												
T_1	7.0	7.2	7.6	7.2	6.5	7.0	6.7	6.7	7.0	7.2	7.3	7.1	7.0	7.4	7.2	7.2
T_2	7.7	7.9	7.5	7.7	*	*	*	*	*	*	*	*	*	*	*	*
T_3	6.3	7.0	6.9	6.6	*	*	*	*	*	*	*	*	*	*	*	*
T_4	7.0	7.2	7.6	7.2	6.5	7.1	7.6	7.0	6.3	6.5	6.7	6.5	6.8	6.5	6.1	6.4
T_5	7.0	6.2	6.8	6.8	6.2	6.6	6.9	6.5	6.2	6.0	6.4	6.2	6.2	5.9	6.3	6.1
T_6	8.0	8.4	8.1	8.3	*	*	*	*	*	*	*	*	*	*	*	*
T_7	7.7	7.3	7.2	7.1	8.2	8.4	8.3	8.1	6.2	6.4	6.0	6.5	6.2	6.1	6.3	6.1

*Mould growth

maximum (7.2) score on 120th day of storage which may be rated as a superior quality or standard recipe. Kalra and Revti (1981) observed a continuous decrease in taste score of stored guava pulp. Sethi (1993) reported that, the litchi squash was found to be stable organoleptically upto four months period at room temperature. Prasad and Mali (2000) also observed that, the overall acceptability of pomegranate squash decreased during storage, however, its organoleptic scores remained above 3-4 months after storage.

Thus, from the above investigation it can be concluded that, during storage the colour, aroma and taste scores of wood apple squash found decreasing continuously with the advancement of storage period. The treatment $\mathbf{T_1}$ (45 % TSS (Cane sugar) + 0.5 % acidity + 200 ppm sodium benzoate) recorded maximum score *i. e.* 7.2 at 120th days under ambient storage conditions. Hence, the best recipe amongst all the recipes was $\mathbf{T_1}$ – 45 % TSS (°° brix) (cane sugar) + 0.5% acidity + 200 ppm sodium benzoate which secured maximum storability under ambient storage conditions.

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