



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2017; 5(4): 1748-1752

© 2017 IJCS

Received: 15-05-2017

Accepted: 16-06-2017

NR RangareDepartment of Horticulture
JNKVV Jabalpur (M.P.) India**PK Jain**Department of Horticulture
JNKVV Jabalpur (M.P.) India**SK Pandey**Department of Horticulture
JNKVV Jabalpur (M.P.) India**BP Bisen**Department of Horticulture
JNKVV Jabalpur (M.P.) India**Bharat Kumar**Department of Horticulture
JNKVV Jabalpur (M.P.) India

Effect of different Fruit pulp ratio on sensory parameter and Economics for mixed fruit jam

NR Rangare, PK Jain, SK Pandey, BP Bisen and Bharat Kumar

Abstract

A trial was conducted in the Department of Horticulture, College of Agriculture, JNKVV, Jabalpur MP to see the effect of different ratio of different fruit pulp on the quality and economics of Jam production. The different fruit (mango, banana, papaya and apple) were collected from Jabalpur. The results showed that the higher rating for texture, flavour, and taste was obtained with treatment combination in T₇ (250g banana + 250g mango + 500ml wood apple pectin). Thus a higher acceptable score was given to it while, lower score was found in T₁₂ (1000 ml wood apple pectin) higher rating (8.840) for colour and appearance was recorded in treatment T₁₀ (250gm apple + 250gm papaya + 500ml wood apple pectin) for overall acceptability was found in treatment combination T₇ (250 gm banana + 250 gm mango + 500 ml wood apple pectin) while minimum acceptable score (8.053) was recorded in treatment T₁₂ (1000 ml wood apple pectin). The highest economic returns were obtained with the treatments T₇ (1.96) followed by T₁₁ and minimum was found with T₈ and T₆.

Keywords: Fruit, Jam, colour, texture, flavor, overall acceptability, Economics

1. Introduction

Fruits are important part of human diet. They are commercially important and nutritionally indispensable food commodity. Man has kept these commodities in his diet to provide variety, taste, interest, aesthetic appeal and to meet certain nutritional requirements. Fruits are edible products of the perennial higher plants with high water content, soft texture, sweet, sour and semi-astringent flavors. Also because of their exotic flavor and taste, considerable attention is paid in different parts of the world. The Fruit are consumed by man, mainly because of their organoleptic and chemical property. They play a vital role in human nutrition, by supplying the necessary growth factors essential for maintaining normal health. Fruits along with vegetables are termed as 'Protective foods' They are rich sources of vitamins (A, B complex and C) and minerals (calcium, iron and phosphorus) in diets to keep human health in good stead. Fruits are easily digestible and contain ample amounts of different organic acids and digestive enzymes. They are rich sources of roughage value in food, help in bowel movement, prevents constipation, natural fiber and an energy giving materials having high calorific value. Almost all fruits have some medicinal value in one way or the other. Physicians recommend fruits for the treatment of many ailments like scurvy, night blindness, asthma, fever, anemia, ulcers etc. An apple a day, keeps the doctor away' is a well known phrase indicating significance of fruits in human diet. India is the second largest producer of Fruits after China. Wood apple (*Feronia limonia* L.) belongs to the Family Rutaceae is one of the hardy fruit grown in arid and semi-arid region of the country. Wood apple being hardy in nature is grown in neglected and marginal areas of tropical and sub-tropical regions. Wood apple fruit consists of 64.2% moisture, 7.1% protein, 3.7% fat, 1.9% minerals, 5.0% fiber and 18.1% carbohydrates per 100 grams. They are rich in oxalic acid, malic acid, citric acid and a concentrated tannic acid. Mango (*Mangifera indica* L.) belongs to the Family Anacardiaceae. Approximately 50% of all tropical fruits produced worldwide are mangoes. Mango is an important fruit crop in India and popularly called the 'king of fruits'. Mango is the most widely cultivated fruit in India. India is the major Mango growing country. It is a rich source of vitamin A and C. Raw fruits are used for preparing various traditional products like raw slices in brine, amchur, pickle, murabba, jam, chutney, panhe (sharabat) etc. Banana (*Musa* sp.) belonging to the Family Musaceae banana and plantains are grown in about 120 countries. India leads the world in banana production with an annual output of about 14.2 million tones. (Anonymous, 2014) [2].

Correspondence**NR Rangare**Department of Horticulture
JNKVV Jabalpur (M.P.) India

Other leading producers are Brazil, Ecuador, China, Philippines and Indonesia. Production is the highest in Maharashtra (3924.1 thousand tones) followed by Tamil Nadu (3543.8 thousand tones), in India. It is a rich source of carbohydrate and vitamins particularly vitamin B. Apple (*Malus domestica*) belonging to the Family Rosaceae, is commercially the most important temperate fruit and is fourth among the most widely produced fruits in the world after banana, orange and grape. It is mostly grown in the states of Jammu & Kashmir, Himachal Pradesh and Uttaranchal. Papaya (*Carica papaya*) belonging to the Family Caricaceae is a tropical fruit. The area under papaya cultivation in India.

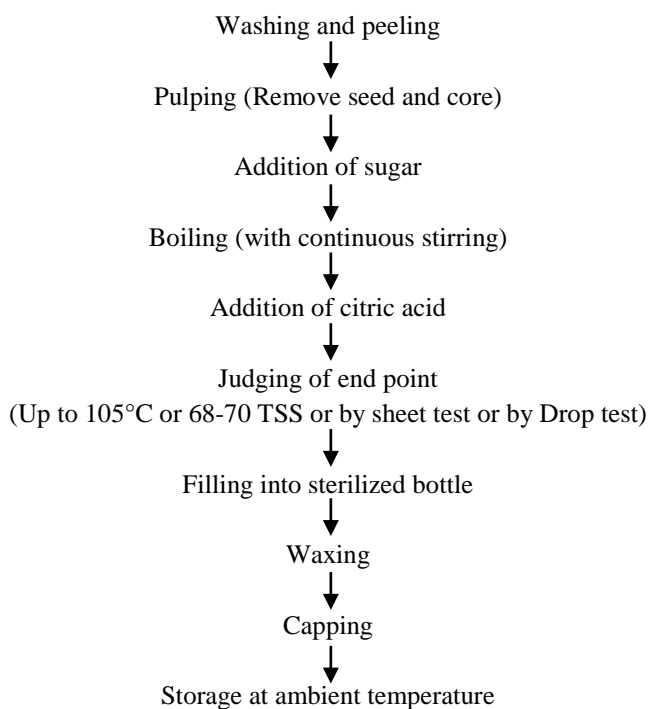
2. Material and Methods

The present investigation entitled "Effect of various recipes on chemical characteristics of mixed Fruit Jam was" conducted during the year 2014-15. The Wood apple fruits local cultivars were collected from Almoda village Sehora Near Jabalpur. The fruits were collected in monsoon season (2014) and Mango (Totapuri), Banana, Apple, Papaya fruits cultivar were collected from "Fruit Mandi, Jabalpur (M.P.)" and used for experimentation. The unripe, shorted diseased, damaged and off type fruits were discarded. The selected fruits were thoroughly washed with tap water to remove dirt and dust particles adhering to the surface of fruit and were allowed for surface drying. The good quality/shorted fruits were picked up and used for the purpose of experimentation. Detail of various treatment combinations-

Treatments	Fruit Pulp [in g.]				Extract Wood apple pectin	Sugar In g.
	Banana	Apple	Mango	Papaya		
T ₁	125	125	125	125	500 ml	1000
T ₂	166	166	166	-	500 ml	1000
T ₃	166	166	-	166	500 ml	1000
T ₄	-	166	166	166	500 ml	1000
T ₅	166	-	166	166	500 ml	1000
T ₆	250	250	-	-	500 ml	1000
T ₇	250	-	250	-	500 ml	1000
T ₈	250	-	-	250	500 ml	1000
T ₉	-	250	250	-	500 ml	1000
T ₁₀	-	250	-	250	500 ml	1000
T ₁₁	-	-	250	250	500ml	1000
T ₁₂	-	-	-	-	1000ml	1000

2.1 Procedure for preparation of Jam

Unripe and ripe fruits of wood apple and mature fruit of mango, banana, apple, papaya were collected and used for preparation of jam. The fruits of wood apple, mango, banana, apple and papaya were washed and graded to select fruit to treatment having uniform maturity. Ripe firm fruit. Technological flow sheet for preparation of wood apple based mixed fruit jam:



2.2 Extraction of pulp from wood apple mango, Banana, Apple and papaya

The fruit of wood apple were broken into small pieces with the help of small hammer and scoop out with the help of spoon after that some quantity of water was added and steamed for pulp preparation. The steamed pulp was prepared with the help of mixercum grinder. In case of mango, Banana, Apple and Papaya were washed and peeled off separately and cut into small pieces. After removal of seeds (stones) some quantity of water added and steamed for pulp preparation. The steamed pulp was prepared with the help of mixer cum grinder.

Sensory evaluation of jam

- Colour
- Flavour
- Taste
- Texture
- Overall acceptability

The Jam of different pulp concentration and recipes was evaluated for various sensory qualities attributes like colour, flavour, taste and overall acceptability at 0, 30, 60, 90 and 120 days of storage by panel of 5 judges by giving marks as per 9 point hedonic scale (Amerine, *et al.*, 1965)^[1].

3. Results and Discussion

3.1 Colour and appearance

The result of present investigation clearly (table 2.) indicated that the colour rating of mixed fruit jam decreased with increases in storage period. The higher rating (8.840) for colour and appearance was recorded in treatment T₁₀ (250gm

apple + 250gm papaya + 500ml wood apple pectin) due to higher contribution of papaya pulp in these combinations. The minimum value for colour was obtained with treatment T₁₂ (1000ml wood apple pectin) i.e., (8.05). It was observed that the colour and appearance slightly decreased from initial day of storage up to 120 days. This may be loss of ascorbic acid content due to oxidation reaction during storage by (Thakre and Jain 2013) [17] and Similarly (Sakhale *et al.* 2012) [14] observed that colour of whey based mango beverage decreased due to changes occurred during storage of beverage. Similar results were found (by Singh *et al.* 2013) [15] with jam prepared from three mango cultivars.

3.2 Flavour

It was cleared from (table 3.) the results that the higher mean score of flavour was found in treatment T₇ (i.e., 250gm banana + 250gm mango + 500ml wood apple pectin) i.e., (8.793) because of higher ratio of mango pulp that showed higher values for flavour whereas minimum rating (8.053 and 8.430) was found in T₁₂ and T₁. This study proved that the flavour rating were degraded with time. In the present context of results, (Hamanan *et al.* 1980) [10] also supported the finding.

3.3 Texture

The highest value (8.830) for texture found in T₇ (250gm banana + 250gm mango + 500 ml of wood apple pectin) while minimum in (7.850) in T₁₀ (1000ml wood apple pectin) (table 4.). The result showed that the mango pulp provide hardness, work of shear, stickiness, work of adhesion and proportion of banana pulp in combination to wood apple pectin was better for improving the texture of mixed fruit jam. It might be due to presence of pectin in the banana which has the good binding capacity and in addition to it, the higher quality of sugar gave better texture of jam. As the period of storage extended, the values decreases Similar results were found i.e. decrease in texture by (Singh *et al.* 2013) [15] with jam prepared from three mango cultivars. Similar conclusions were drawn by (Che man and Taufik 1995) [5] with jackfruit leather and (Aruna *et al.* 1999) [3] during storage of papaya fruit bar.

3.4 Taste

The result for taste indicated (table 5.) that the higher rating (8.793) of mixed fruit jam was obtained from the treatment combination in T₇ (i.e., 250gm banana + 250gm mango + 500

ml of wood apple pectin) while, minimum rating (8.055) was seen in treatment T₁₂ (1000ml wood apple pectin). It was found that the taste of mixed jam was due to interaction effect of banana, mango and sugar. The rating of taste decreases might be due to higher T.S.S value and storage period. Similar results were found by Similar results were found by (Punam *et al.* 2009) [13] who reported that organoleptic quality like taste reduced significantly with increased storage period. These findings are supported by other workers (Jakhar and Pathak 2012) [11] in blended RTS of ber & jamun, (Deka *et al.* 2005) [8] in mango-pineapple spiced beverages. The rating for taste of jam degraded but with very little variation. This slight decrease in rating might be due to conversion of polysaccharides into soluble sugars. These findings were in conformity with the results reported by (Hamanan *et al.* 1980) [10], (Baramanray *et al.* 1995) [4] and (Chauhan *et al.* 2008) [7].

3.5 Overall acceptability

The overall acceptability of mixed fruit jam was dependent on colour or appearance, texture, flavour, and taste rating of the product. The result obtained showed that the highest score (8.840) for overall acceptability was found in treatment combination T₇ (i.e., 250gm banana + 250gm mango + 500 ml wood apple pectin), because it possessed attractive texture, flavour and taste. While minimum acceptable score (8.053) was recorded in treatment T₁₂ (1000ml wood apple pectin). As the period of storage prolonged, the overall acceptability showed a decreasing trend (table 5.) Similar results were found by (Thakre and Jain 2013) [17] in the blended nectar (50:50) of papaya and banana. The possible reason might be due to decrease in rating of colour flavour, taste and texture of jam. The reason behind the decreasing trend for organoleptic rating of jam might be loss of ascorbic acid content, pectin degradation, oxidation due to presence of residual oxygen in glass container and conversion of polysaccharides into soluble sugars. These result were supported by the finding of (Hamanan *et al.* 1980) [10], (Baramanray *et al.* 1995) [4] and (Chauhan *et al.* 2008) [7] in guava pulp.

3.6 Economics of the treatments

The highest economic returns were obtained with the treatments T₇ (1.96) followed by T₁₁ and minimum was found with T₈ and T₆. The difference in recipe has not showed much effect on the B:C ratio (table 7.). The B:C ratio was an economical parameter in comparison to other parameters like Sensory and quantitative parameter.

Table 1: Effect of fruit pulp ratio on colour and appearance of mixed fruit jam during storage

Symbol	Ratio of fruit pulp B+A+M+P (in g)	Wood apple pectin (in ml.)	0 Days During	30 Days During	60 Days During	90 Days During	120 Days During
			Storage Period	Storage Period	Storage Period	Storage Period	Storage Period
			Recipe	Recipe	Recipe	Recipe	Recipe
T ₁	125+125+125+125	500	8.773	8.720	8.707	8.670	8.663
T ₂	170+170+170+0	500	8.693	8.660	8.640	8.633	8.620
T ₃	170+170+0+170	500	8.740	8.727	8.690	8.683	8.643
T ₄	0+170+170+170	500	8.790	8.760	8.743	8.730	8.713
T ₅	170+0+170+170	500	8.767	8.750	8.713	8.703	8.690
T ₆	250+250+0+0	500	8.757	8.737	8.723	8.713	8.697
T ₇	250+0+250+0	500	8.727	8.713	8.700	8.687	8.673
T ₈	250+0+0+250	500	8.807	8.793	8.787	8.773	8.747
T ₉	0+250+250+0	500	8.457	8.440	8.427	8.413	8.400
T ₁₀	0+250+0+250	500	8.840	8.833	8.793	8.787	8.773
T ₁₁	0+0+250+250	500	8.613	8.590	8.580	8.573	8.553
T ₁₂	0	1000	8.050	8.040	8.030	8.017	8.000
Mean							
SEm±							
CD at 5% level							

*B= Banana, A=Apple, M=Mango, P=Papaya

Table 2: Effect of fruit pulp ratio on flavour of mixed fruit jam during storage

Symbol	Ratio of fruit pulp B+A+M+P (in g)	Wood apple pectin (in ml.)	0 Days During Storage Period	30 Days During Storage Period	60 Days During Storage Period	90 Days During Storage Period	120 Days During Storage Period
			Recipe	Recipe	Recipe	Recipe	Recipe
T ₁	125+125+125+125	500	8.437	8.433	8.407	8.380	8.373
T ₂	170+170+170+0	500	8.740	8.723	8.707	8.687	8.673
T ₃	170+170+0+170	500	8.693	8.677	8.663	8.647	8.647
T ₄	0+170+170+170	500	8.753	8.740	8.727	8.700	8.680
T ₅	170+0+170+170	500	8.767	8.753	8.747	8.713	8.697
T ₆	250+250+0+0	500	8.767	8.743	8.727	8.707	8.693
T ₇	250+0+250+0	500	8.793	8.747	8.750	8.727	8.713
T ₈	250+0+0+250	500	8.760	8.783	8.733	8.717	8.690
T ₉	0+250+250+0	500	8.773	8.767	8.753	8.740	8.693
T ₁₀	0+250+0+250	500	8.763	8.753	8.740	8.723	8.693
T ₁₁	0+0+250+250	500	8.727	8.720	8.700	8.683	8.660
T ₁₂	0	1000	8.053	8.040	8.020	8.003	7.993
Mean			8.669	8.657	8.640	8.619	8.600
SEm±			0.099	0.099	0.099	0.098	0.096
CD at 5% level			0.291	0.290	0.292	0.288	0.282

*B= Banana, A=Apple, M=Mango, P=Papaya

Table 3: Effect of fruit pulp ratio on texture of mixed fruit jam during Storage

Symbol	Ratio of fruit pulp B+A+M+P (in g)	Wood apple pectin (in ml.)	0 Days During Storage Period	30 Days During Storage Period	60 Days During Storage Period	90 Days During Storage Period	120 Days During Storage Period
			Recipe	Recipe	Recipe	Recipe	Recipe
T ₁	125+125+125+125	500	8.277	8.253	8.227	8.200	8.160
T ₂	170+170+170+0	500	8.487	8.467	8.433	8.410	8.397
T ₃	170+170+0+170	500	8.167	8.067	7.957	7.930	7.897
T ₄	0+170+170+170	500	8.540	8.507	8.470	8.440	8.413
T ₅	170+0+170+170	500	8.493	8.473	8.433	8.407	8.393
T ₆	250+250+0+0	500	8.320	8.273	8.240	8.210	8.177
T ₇	250+0+250+0	500	8.837	8.810	8.783	8.757	8.730
T ₈	250+0+0+250	500	8.663	8.640	8.617	8.593	8.573
T ₉	0+250+250+0	500	8.737	8.720	8.700	8.673	8.640
T ₁₀	0+250+0+250	500	8.617	8.583	8.547	8.520	8.493
T ₁₁	0+0+250+250	500	8.550	8.510	8.487	8.460	8.440
T ₁₂	0	1000	7.850	7.820	7.757	7.703	7.693
Mean			8.462	8.427	8.388	8.359	8.334
SEm±			0.152	0.157	0.164	0.161	0.161
CD at 5% level			0.447	0.461	0.481	0.473	0.472

*B= Banana, A=Apple, M=Mango, P=Papaya

Table 4: Effect of fruit pulp ratio on taste of mixed fruit jam during storage

Symbol	Ratio of fruit pulp B+A+M+P (in g)	Wood apple pectin (In ml.)	0 Days During Storage Period	30 Days During Storage Period	60 Days During Storage Period	90 Days During Storage Period	120 Days During Storage Period
			Recipe	Recipe	Recipe	Recipe	Recipe
T ₁	125+125+125+125	500	8.457	8.447	8.427	8.400	8.373
T ₂	170+170+170+0	500	8.693	8.677	8.663	8.647	8.642
T ₃	170+170+0+170	500	8.740	8.723	8.707	8.687	8.673
T ₄	0+170+170+170	500	8.753	8.740	8.727	8.700	8.680
T ₅	170+0+170+170	500	8.767	8.753	8.733	8.713	8.697
T ₆	250+250+0+0	500	8.757	8.747	8.727	8.707	8.693
T ₇	250+0+250+0	500	8.793	8.783	8.750	8.727	8.713
T ₈	250+0+0+250	500	8.773	8.767	8.753	8.740	8.693
T ₉	0+250+250+0	500	8.760	8.747	8.733	8.717	8.690
T ₁₀	0+250+0+250	500	8.727	8.720	8.700	8.683	8.660
T ₁₁	0+0+250+250	500	8.763	8.753	8.740	8.723	8.693
T ₁₂	0	1000	8.055	8.040	8.020	8.003	7.993
Mean			8.670	8.658	8.640	8.621	8.600
SEm±			0.099	0.100	0.099	0.098	0.096
CD at 5% level			0.291	0.294	0.292	0.288	0.282

*B= Banana, A=Apple, M=Mango, P=Papaya

Table 5: Effect of fruit pulp ratio on over all acceptability of mixed fruit jam during storage

Symbol	Ratio of fruit pulp B+A+M+P (in g)	Wood apple pectin (in ml.)	0 Days During	30 Days During	60 Days During	90 Days During	120 Days During
			Storage Period	Storage Period	Storage Period	Storage Period	Storage Period
			Recipe	Recipe	Recipe	Recipe	Recipe
T ₁	125+125+125+125	500	8.613	8.590	8.580	8.573	8.553
T ₂	170+170+170+0	500	8.690	8.680	8.673	8.657	8.640
T ₃	170+170+0+170	500	8.693	8.660	8.640	8.633	8.620
T ₄	0+170+170+170	500	8.727	8.713	8.700	8.687	8.673
T ₅	170+0+170+170	500	8.757	8.737	8.723	8.713	8.697
T ₆	250+250+0+0	500	8.767	8.750	8.713	8.703	8.690
T ₇	250+0+250+0	500	8.840	8.833	8.793	8.787	8.773
T ₈	250+0+0+250	500	8.790	8.760	8.743	8.730	8.713
T ₉	0+250+250+0	500	8.807	8.793	8.787	8.773	8.747
T ₁₀	0+250+0+250	500	8.773	8.720	8.707	8.670	8.663
T ₁₁	0+0+250+250	500	8.740	8.727	8.690	8.683	8.643
T ₁₂	0	1000	8.053	8.040	8.030	8.017	8.000
Mean			8.688	8.667	8.648	8.636	8.618
SEm±			0.078	0.078	0.074	0.076	0.078
CD at 5% level			0.229	0.229	0.217	0.223	0.229

*B= Banana, A=Apple, M=Mango, P=Papaya

Table 6: Effect of various treatments on gross return and B:C ratio

Treatment	Cost of fruit pulp (Rs.)	cost of pectin (Rs.)	Cost of sugar (Rs.)	Processing cost (Rs.)	Total cost (Rs.)	Gross return (Rs./Kg)	Net return (Rs.)	B:C ratio
T ₁	17.75	5	30	12.45	65.2	120	54.8	1.84
T ₂	20.65	5	30	12.45	68.1	120	51.9	1.76
T ₃	19.6	5	30	12.45	67.05	120	52.95	1.78
T ₄	19.95	5	30	12.45	67.4	120	52.6	1.78
T ₅	14.53	5	30	12.45	61.98	120	58.2	1.93
T ₆	22	5	30	12.45	69.45	120	50.55	1.72
T ₇	13.5	5	30	12.45	60.95	120	59.05	1.96
T ₈	27.69	5	30	12.45	75.14	120	44.86	1.59
T ₉	22.5	5	30	12.45	69.95	120	50.05	1.71
T ₁₀	21	5	30	12.45	68.45	120	51.55	1.75
T ₁₁	14.5	5	30	12.45	61.95	120	58.05	1.93
T ₁₂	0	10	30	12.45	52.45	100	47.55	1.90

References

- Amerine MA, Pangborn RM, Roessler EB. Principles of Sensory Evaluation of Food. New York: Academic Press, 1965.
- Anonymous. Indian Horticulture Database, published by NHB Gurgaon. 2014, 4.
- Aruna K, Vimala V, Dhanalakshmi K, Vinodini Reddy. Physico-chemical changes during storage of papaya fruit *Carica papaya* L. bar Thandra. J of Fd. Sci. and Technol. 1999; 36(5):428-433.
- Baramanray A, Gupta OP, Dhawan SS. Composition of guava hybrids with commercial cultivars for making jelly. Haryana Journal of Horticultural Sciences. 1995; 24(4):196-204.
- Che Man, Taufik YB. Development and stability of jack fruit leather. Fd. Sci and Technol. Abstracts Tropical Science. 1995; 35(3):245-250.
- Chouhan A, Jain PK, Raut RL, Bhadauria SKS. Effect of cultivars and storage period on quality of guava pulp. Green Farming. 2008; 1(7):38-39.
- Chouhan A, Jain PK, Raut RL, Bhadauria SKS. Effect of cultivars and storage period on quality of guava pulp. Green Farming. 2008; 1(7):38-39.
- Deka BC, Sethi V, Saikia A. Changes in quality of mango-pineapple spiced beverage during storage. Indian Journal of Horticulture. 2005; 62(1):65-68.
- Hamanan SW, Bains GS, Singh KK. Studies on the processing of pink and white fleshed guava varieties for pulp. Punjab Hort. J. 1980; 20(1-2):179-189.
- Hamanan SW, Bains GS, Singh KK. Studies on the processing of pink and white fleshed guava varieties for pulp. Punjab Hort. J., 1980; 20(1-2):179-189.
- Jakhar MS, Pathak S. Studies on the preparation and storage stability of blended Ready-to-serve from ber and jamun pulp. Plant Archives. 2012; 12(1):533-536.
- Punam, Gehlot R, Singh R, Siddiqui S. Studies on physico-chemical composition of fresh bael and mango fruits. Haryana Journal of Horticultural science. 2009; 38(1-2):66-67.
- Punam, Gehlot R, Singh R, Siddiqui S. Studies on physico-chemical composition of fresh bael and mango fruits. Haryana Journal of Horticultural science. 2009; 38(1-2):66-67.
- Sakhale BK, Pawar VN, Ranveer RC. Studies on the Development and Storage of whey based RTS beverage from mango cv. Kesar. J Food Process Technol. 2012; 3(3):10144-10148.
- Singh J, Sodhi KJ, Kaur MM. Sensory Evaluation of Jam prepared from Various Cultivars of Mango and Mango-Papaya Blends. Annals of Horticulture. 2013; 6(1):133-138.
- Thakre M, Jain V. Storage study of blended nectar of papaya and banana under different storage conditions. Progressive Horticulture. 2013; 45(1):100-103.
- Thakre M, Jain V. Storage study of blended nectar of papaya and banana under different storage conditions. Progressive Horticulture. 2013; 45(1):100-103.