

Effect of cultivars and picking dates on physico-chemical characteristics of Karonda (*Carissa carandas* L.) jelly

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ABSTRACT :Karonda jelly was prepared from three cultivars viz., Pant Manohar, Pant Sudarshan and Pant Suvarna three different picking dates, 40, 60 and 80 days after fruit set. The storability of the jelly samples were evaluated at ambient temperature for a period of nine months. The jelly prepared from Pant Suvarna fruits exhibited maximum moisture, total soluble solids (T.S.S.), reducing sugar, non reducing sugar, total sugar, non-enzymatic browning and pectin content. The maximum pectin content, colour, appearance, taste, consistency and overall acceptability scores were observed in the jelly prepared from the fruits harvested 60 days after fruit set. Gradual reduction in the moisture content, non-reducing sugar, total sugar, ascorbic acid, pectin, colour, appearance, taste consistency and overall acceptability was observed during the nine months storage period. However, there was an increase in the T.S.S., reducing sugar, titratable acidity, non enzymatic browning and flavor as the time for storage period advanced. There was no fungal growth being observed during the entire storage period.

Key words: Karonda, *Carissa carandas*, picking dates, storability, Jelly.

Karonda (*Carissa carandas* L.) is a well known, indigenous, evergreen, multipurpose horticultural bush of the family Apocyanaceae and is popularly known as Christ's thorn due to its spiny nature. It is widely popular as a bio-fence being planted on the boundaries for the crop protection as it has dense foliage with numerous sharp thorns. It is also grown as an ornamental crop due to its beautiful red cherry like fruits. The karonda fruit apart from being nutritional has various medicinal properties. It is used as an astringent and is one of the richest source of iron, therefore, very useful for curing anaemia. It is used as a remedy for biliousness (Jadhav *et al.* 2004). The fresh Karonda fruits are astringent in taste which is a hindrance in its consumption but its value added products like appetizer, squash, pickle, jam, jelly, wine, candy, chutney, puddings, sauces, tart and wine are very much consumer friendly (Hayes, 1957). The mature Karonda fruits are rich in pectin, therefore, an excellent quality jelly can be prepared. Jelly is made from slightly unripe fruits or a combination of ripe and unripe fruits to enhance the colour (Mortan, 1987). Almost all the available recognized cultivars of Karonda are sour and astringent in taste which renders them unsuitable for fresh consumption. The present investigation, therefore, was undertaken to evaluate the suitability of different cultivars according to their harvesting at correct stage of maturity for the preparation of optimum quality jelly and the storability of jelly.

MATERIALS AND METHODS

The fruits of three Karonda cultivars viz., Pant Manohar, Pant Sudarshan and Pant Suvarna were harvested at three different picking dates i.e., 40, 60 and 80 days after fruit set from the experimental orchard of Horticultural Research Station, Patharchatta, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand. The fruit juice was extracted by boiling thin slices of fruits with equal quantity of water for about 20 minutes till they became soft. The boiled extract was drained and a second extract was taken by boiling the same mass with half quantity of water. Both the extracts were mixed and strained through a coarse muslin cloth. The strained extract was allowed to settle overnight and the clear supernatant was decanted without disturbing the sediments.

The jellies from three Karonda cultivars harvested at three picking dates were developed as per the procedure described by Girdharilal *et al.* (1960). The sugar was added in the ratio of 45:55 (Fruit extract: Sugar). The mixture of extract and sugar was boiled with continuous stirring until the desired consistency of 65° Brix was achieved. Pectin (medium set pectin of 150 grade) was added at the rate of 0.03-0.07 per cent. Citric acid (2g/litre extract) was added and the extract was boiled at 104-105°C. End point was noted by sheet test and confirmed

by clot formation in cold water. The jelly was cooled to 90°C and filled in sterilized wide mouthed glass jars of 250g capacity. A thin layer of hot molten paraffin wax was poured on the surface of jelly after its solidification. Stored products were checked at three months interval during 9 months of storage. Moisture content was determined by drying a known weight of sample in hot air oven at 65°C till a constant weight. Total soluble solids were determined by hand refractometer (Erma, Tokyo, Japan). Titratable acidity was determined by titrating against 0.1 N NaOH solution using phenolphthalein as an indicator. Reducing, non-reducing and total sugars were estimated as per the method of Lane and Eynon (1923). Ascorbic acid, non-enzymatic browning and pectin content were determined as per Ranganna (1986). The reported results were analysed by taking average of three replications. The sensory evaluation was done by a panel of 9 judges on a 9 point hedonic scale (Amerine *et al.* 1965). The microbial load during storage of jelly for 9 months was analysed as per the month described by Harrigan and Maccance (1976). The data was analysed in factorial completely randomized design (Cochran and Cox 1967).

RESULTS AND DISCUSSION

Significant interaction between cultivars, picking dates and storage periods of jellies were observed for all the characters. The moisture content of the jellies decreased with the length of the storage period irrespective of the cultivars and picking dates (Table 1). The maximum and minimum moisture contents were found in the freshly prepared jelly from Pant Suvarna fruits (38.75%) harvested at 40 days after fruit set and the jelly of Pant Sudarshan fruits (29.49%) picked at 40 days after fruit set and stored for 9 months, respectively. The variation among the cultivars may be due to their genetic variability. The reduction in the moisture content of the jellies with the increase in the storage period might be due to binding of water of the components from crystalline to the amorphous form. The results are in accordance with the findings of Sudhagar *et al.* (2003) in pear jelly and Yousif and Alghamdi (1999) in Date jelly. The maximum T.S.S. content (71.87^B) was recorded in the jelly prepared from Pant Suvarna fruits picked at 80 days after fruit set and stored for 9 months. T.S.S. increased with the

Table 1: Effect of cultivars, picking dates and storage period on the quality of Karonda jelly

Moisture (%)													
Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	33.88	35.87	36.59	35.44	33.81	34.71	36.14	34.89	34.36	36.75	38.75	36.62	35.65
3	32.69	33.90	35.01	33.86	33.42	33.69	34.74	33.95	32.66	35.48	37.12	35.09	34.30
6	30.98	32.54	33.51	32.34	32.65	32.05	33.33	32.68	31.06	33.19	35.20	33.15	32.72
9	29.49	30.75	32.11	30.78	31.06	29.92	31.62	30.87	30.03	32.04	33.49	31.85	31.16
Mean(C)	31.76	33.26	34.30	33.11	32.73	32.59	33.96	33.09	32.02	34.36	36.14	34.18	
Mean(D)	32.17	33.41	34.80										
CD at 5%	C=0.241;			D=0.241;	S=0.279;			CxD=0.418;	CxS=0.483;	DxS=0.483;	CxDxS=0.837		
TSS (°Brix)													
Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	65.26	65.26	65.53	65.35	65.13	65.26	65.33	65.24	65.49	65.75	66.51	65.91	65.50
3	66.09	66.71	66.94	66.58	66.80	66.52	66.61	66.64	66.66	66.57	67.88	67.07	66.75
6	68.08	6.027*	68.27	68.21	68.37	67.52	68.17	68.02	67.12	68.08	69.37	68.19	68.14
9	69.03	69.84	70.24	69.70	70.03	69.00	69.40	69.48	69.57	70.53	71.87	70.66	69.94
Mean(C)	67.11	67.52	67.74	67.46	67.58	67.07	67.38	67.34	67.21	67.73	68.91	67.95	
Mean(D)	67.30	67.44	68.01										
CD at 5%	C=0.152;			D=0.152;	S=0.176;			CxD=0.264;	CxS=0.305;	DxS=0.305;	CxDxS=0.528		
Reducing sugars (%)													
Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	22.26	23.60	25.15	23.67	20.32	22.63	23.98	22.31	25.76	26.77	27.52	26.68	24.22
3	25.14	25.86	27.77	26.26	22.53	24.48	25.80	24.27	28.33	28.59	29.88	28.93	26.48
6	26.81	28.26	30.62	28.57	24.99	26.42	28.01	26.47	30.89	30.76	31.56	31.07	28.70
9	29.05	30.65	33.56	31.08	27.62	28.79	30.82	29.08	33.10	34.13	33.19	33.47	31.21
Mean(C)	25.81	27.09	29.28	27.39	23.87	25.58	27.15	25.53	29.52	30.06	30.54	30.04	
Mean(D)	26.40	27.58	28.99										
CD at 5%	C=0.177;			D=0.177;	S=0.204;			CxD=0.307;	CxS=0.354;	DxS=0.354;	CxDxS=0.614		

Non-reducing sugars (%)

Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	35.51	35.56	36.50	35.84	33.14	33.71	34.08	33.64	36.63	36.64	37.26	36.80	35.43
3	31.55	31.56	32.00	31.90	30.28	31.62	30.28	30.73	33.23	32.58	33.44	32.89	31.84
6	28.08	27.56	28.37	27.93	27.87	28.13	25.91	27.37	28.99	28.47	28.90	28.79	28.03
9	25.34	23.77	24.42	23.86	23.13	23.57	24.22	23.63	24.22	24.22	24.82	24.49	23.99
Mean(C)	29.56	29.62	30.35	29.84	28.17	29.15	29.21	28.84	30.46	30.77	31.10	30.78	
Mean(D)	29.39	29.85	30.22										
CD at 5 %	C=0.302;			D=0.302;	S=0.349;			CxD=0.524;	CxS=0.605;	DxS=0.605;		CxDxS=1.049	

Total sugars (%)

Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	60.68	62.26	62.43	62.00	58.90	59.85	61.37	60.04	61.31	62.84	63.72	62.41	61.48
3	58.83	61.06	61.76	60.88	56.83	57.71	59.02	57.85	60.20	61.87	62.75	61.28	60.00
6	56.79	58.69	61.12	58.87	54.86	55.43	57.35	55.88	58.17	60.38	61.15	59.89	58.21
9	55.11	56.78	59.06	58.35	53.14	53.82	55.63	54.20	56.70	58.48	59.87	60.32	57.62
Mean(C)	59.09	60.75	61.30	60.38	55.93	56.70	58.34	56.99	60.35	59.84	61.67	60.62	
Mean(D)	58.46	59.10	60.43										
CD at 5 %	C=1.419;			D=1.419;	S=1.639;			CxD=2.453;	CxS=2.839;	DxS=2.839;		CxDxS=4.915	

Titratable acidity (%)

Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	1.50	1.30	1.11	1.30	1.66	1.54	1.17	1.46	1.38	1.27	0.93	1.19	1.32
3	1.64	1.44	1.36	1.48	1.78	1.70	1.37	1.62	1.56	1.37	1.24	1.39	1.50
6	1.93	1.67	1.60	1.73	2.08	1.97	1.51	1.85	1.75	1.47	1.46	1.56	1.71
9	2.08	1.96	1.83	1.96	2.27	2.13	1.88	2.09	1.97	1.82	1.86	1.88	1.98
Mean(C)	1.79	1.59	1.47	1.62	1.95	1.84	1.48	1.76	1.66	1.48	1.37	1.51	
Mean(D)	1.80	1.64	1.44										
CD at 5 %	C=0.011;			D=0.011;	S=0.013;			CxD=0.019;	CxS=0.023;	DxS=0.023;		CxDxS=0.039	

Ascorbic acid (mg/100g)

Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	7.63	8.86	11.00	9.16	11.32	13.24	13.92	12.82	6.85	7.30	8.30	7.48	9.83
3	6.51	7.17	9.48	7.72	9.68	10.21	12.03	10.74	5.48	6.45	7.55	6.49	8.32
6	4.81	5.63	7.57	6.00	6.75	7.70	10.09	8.21	4.64	5.11	5.60	5.11	6.44
9	3.71	5.06	5.65	4.80	5.39	6.13	8.58	6.70	3.40	4.44	5.04	4.29	5.27
Mean(C)	5.66	6.68	8.42	6.93	8.28	9.32	11.25	9.62	5.09	5.82	6.62	5.84	
Mean(D)	6.34	7.27	8.76										
CD at 5 %	C=0.168;			D=0.168;	S=0.194;			CxD=0.292;	CxS=0.337;	DxS=0.337;		CxDxS=0.584	

Pectin (%)

Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	0.95	0.99	0.93	0.95	0.94	0.97	0.91	0.94	0.96	1.22	0.95	1.04	0.97
3	0.92	0.95	0.91	0.92	0.93	0.95	0.87	0.91	0.94	1.16	0.92	1.01	0.94
6	0.87	0.91	0.89	0.89	0.89	0.89	0.81	0.86	0.91	0.99	0.90	0.93	0.89
9	0.82	0.89	0.87	0.86	0.82	0.82	0.80	0.81	0.88	0.97	0.89	0.91	0.86
Mean(C)	0.89	0.94	0.88	0.91	0.89	0.91	0.85	0.88	0.92	1.08	0.91	0.97	
Mean(D)	0.90	0.97	0.88										
CD at 5 %	C=0.007;			D=0.007;	S=0.008;			CxD=0.012;	CxS=0.014;	DxS=0.014;		CxDxS=0.024	

Non-enzymatic browning (OD at 440nm)

Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	0.23	0.24	0.27	0.24	0.22	0.23	0.25	0.23	0.25	0.27	0.28	0.26	0.24
3	0.27	0.31	0.34	0.30	0.25	0.28	0.30	0.28	0.30	0.33	0.35	0.33	0.30
6	0.38	0.40	0.45	0.41	0.36	0.38	0.41	0.38	0.39	0.41	0.48	0.42	0.41
9	0.48	0.49	0.52	0.50	0.47	0.49	0.49	0.48	0.48	0.51	0.57	0.52	0.50
Mean(C)	0.34	0.36	0.39	0.36	0.32	0.34	0.36	0.34	0.35	0.38	0.42	0.39	
Mean(D)	0.34	0.36	0.39										

CD at 5 % C=0.005; D=0.005; S=0.006; CxD=0.008; CxS=0.010; DxS=0.010; CxDxS=0.017

Yeast and mould count (cfu/g)

Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mean(C)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Mean(D)	ND	ND	ND										

CD at 5 % C= ND; D= ND; S= ND; CxD= ND; CxS= ND; DxS= ND; CxDxS= ND

D₁= Picking at 40 days after fruit set, D₂= Picking at 60 days after fruit set, D₃= Picking at 80 days after fruit set, C=Cultivar; D= Picking date; S=Storage interval

increase in the picking dates and storage period. This might be due to the conversion of acids to sugars with the maturity of fruits and degradation of polysaccharides into simple sugars during storage. The results are in conformity with the findings of Barmanray *et al.* (1996) in guava jelly and Jadhav *et al.* (2004) in Karonda jelly. The mean reducing sugars increased (24.22 to 31.21%) while the mean non-reducing (35.43 to 23.99%) and the total sugars (61.48 to 57.62%) decreased with the increasing period of storability from 0 to 9 months. The highest reducing sugar content (34.13%) in Pant Suvarna jelly might be due to higher reducing sugars in their fresh fruits and it increased with the storage period due to sucrose inversion in the presence of acidic environment. Chaudhary *et al.* (2007) and Jadhav *et al.* (2004) have also reported similar findings in the Karonda jelly. The non-reducing sugars decreased gradually with the advancement in storage period due to hydrolysis of polysaccharides and inversion of non-reducing sugars into reducing sugars during storage while the total sugars decreased due to their breakdown into simple sugars and utilization in non enzymatic browning reactions. The results are in accordance with the findings of Yousif and Alghamdi (1999) in Date jelly and in Sea buckthorn jelly. The titratable acidity of the jellies increased with the storage period probably due to the de-esterification of pectin molecules and formation of fatty acids during storage. Similar results have also been reported by Chaudhary *et al.* (2007) in Karonda jelly, Kalarani (2000) in custard apple jelly and Shah and Bhatia (1983) in culled apple jelly. The mean ascorbic acid decreased from

9.83 to 5.27 mg/100g from 0 to 9 months of storage, irrespective of cultivars and picking dates. This might be due to the oxidation of ascorbic acid into dehydroascorbic acid by the trapped oxygen in the containers and its role in enhancing the non-enzymatic browning reactions. The maximum pectin content (1.22%) was recorded in the freshly prepared jelly from Pant Suvarna fruits picked at 60 days after fruit set. The maximum pectin content was observed in the jellies prepared from the fruits harvested at 60 days after fruit set which is probably the best stage containing maximum soluble pectin content which was converted to insoluble pectic acid with the advancing maturity. During storage, the pectin decreased due to its conversion into pectic acid, sugars, and galacturonic acid. The non enzymatic browning continuously increased during storage (0.24 to 0.50 OD) which might be due to the internal reactions between amino acids and reducing sugars and also due to oxidation of ascorbic acid along with various phenolic compounds. However, several other factors like storage temperature, moisture, carbonyl compounds, organic acids, water activity, oxygen and sugars might have contributed in increasing non-enzymatic browning in the stored products. The hygiene maintained during processing and subsequent storage of jellies prevented the microbial growth and therefore, no yeast and moulds were found.

There was significant effect of storability on the sensory quality of the jellies stored for a period of 9 months. The highest sensory scores for colour, appearance, taste and overall acceptability were observed

Table 2: Effect of cultivars, picking dates and storage period on the sensory qualities of the jelly

Color													
Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	8.72	8.95	8.27	8.65	8.47	8.68	8.23	8.46	8.28	7.99	7.48	7.91	8.34
	8.52	8.79	8.11	8.48	8.37	8.56	8.18	8.37	8.12	7.90	7.31	7.78	8.21
6	8.32	8.71	7.97	8.33	8.29	8.44	8.08	8.26	8.03	7.85	7.20	7.69	8.09
9	8.24	8.50	7.84	8.19	8.09	8.28	8.00	8.13	7.97	7.64	7.08	7.56	7.96
Mean(C)	8.45	8.74	8.05	8.41	8.31	8.49	8.12	8.30	8.09	7.85	7.27	7.74	
Mean(D)	8.28	8.36	7.81										
CD at 5 %	C=0.021;			D=0.021;	S=0.024;			CxD=0.037;	CxS=0.483;	DxS=0.043;	CxDxS=0.074		

Appearance													
Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	8.65	8.86	8.26	8.59	8.44	8.63	8.18	8.41	8.21	7.97	7.43	7.87	8.29
3	8.48	8.77	8.06	8.44	8.35	8.52	8.09	8.32	8.10	7.89	7.29	7.76	8.17
6	8.29	8.69	7.96	8.31	8.25	8.41	8.03	8.23	7.97	7.80	7.11	7.63	8.05
9	8.22	8.48	7.83	8.17	8.08	8.23	7.99	8.10	7.91	7.50	7.03	7.48	7.92
Mean(C)	8.41	8.70	8.03	8.38	8.28	8.44	8.07	8.26	8.05	7.79	7.21	7.68	
Mean(D)	8.24	8.31	7.77										
CD at 5 %	C=0.027;			D=0.027;	S=0.031;			CxD=0.047;	CxS=0.305;	DxS=0.055;	CxDxS=0.095		

Flavour													
Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	8.55	8.90	8.24	8.56	8.27	8.48	8.14	8.29	8.20	8.48	7.88	8.19	8.35
3	8.36	8.85	8.33	8.51	8.18	8.34	8.03	8.18	8.01	8.31	7.59	7.97	8.22
6	8.21	8.79	7.99	8.33	8.04	8.18	7.94	8.05	7.78	8.16	7.43	7.79	8.05
9	8.18	8.65	7.87	8.23	7.87	7.89	7.63	7.79	7.52	7.94	7.26	7.57	7.86
Mean(C)	8.32	8.80	8.11	8.41	8.09	8.22	7.94	8.08	7.88	8.22	7.54	7.88	
Mean(D)	8.09	8.41	7.86										
5 %	C=0.036;			D=0.036;	S=0.041;			CxD=0.062;	CxS=0.354;	DxS=0.072;	CxDxS=0.125		

Taste													
Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	8.70	8.96	8.32	8.66	8.37	8.57	8.20	8.38	8.29	8.57	7.95	8.27	8.43
3	8.58	8.86	8.20	8.54	8.28	8.43	8.11	8.27	8.18	8.43	7.72	8.11	8.31
6	8.42	8.82	8.04	8.42	8.05	8.27	7.95	8.08	7.96	8.34	7.57	7.95	8.15
9	8.27	8.77	7.90	8.31	7.87	8.05	7.77	7.89	7.82	8.16	7.46	7.81	8.00
Mean(C)	8.49	8.85	8.11	8.48	8.14	8.33	8.01	8.16	8.06	8.37	7.68	8.04	
Mean(D)	8.23	8.51	7.93										
CD at 5 %	C=0.020;			D=0.020;	S=0.023;			CxD=0.035;	CxS=0.605;	DxS=0.041;	CxDxS=0.071		

Consistency													
Storage (months)	Pant Manohar				Pant Sudarshan				Pant Suvarna				Mean(S)
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	
0	8.67	8.82	8.40	8.63	8.50	8.74	8.23	8.49	8.76	8.45	8.22	8.47	8.53
3	8.53	8.71	8.31	8.51	8.37	8.59	8.11	8.36	8.62	8.32	8.04	8.32	8.40
6	8.39	8.55	8.24	8.39	8.22	8.37	8.06	8.21	8.47	8.24	7.92	8.21	8.27
9	8.27	8.34	7.99	8.20	8.09	8.21	7.91	8.07	8.25	8.13	7.72	8.03	8.10
Mean(C)	8.46	8.60	8.23	8.43	8.30	8.48	8.08	8.28	8.53	8.28	7.97	8.26	
Mean(D)	8.43	8.46	8.09										
CD at 5 %	C=0.016;			D=0.016;	S=0.019;			CxD=0.028;	CxS=2.839;	DxS=0.033;	CxDxS=0.057		

Storage (months)	Overall acceptability												
	Pant Manohar				Pant Sudarshan				Pant Suvarna				
	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	D ₁	D ₂	D ₃	Mean	Mean(S)
0	8.66	8.90	8.30	8.62	8.41	8.62	8.19	8.41	8.35	8.29	7.79	8.15	8.39
3	8.50	8.79	8.16	8.48	8.31	8.49	8.10	8.30	8.21	8.17	7.59	7.99	8.26
6	8.33	8.71	8.04	8.36	8.17	8.33	8.01	8.17	8.04	8.07	7.44	7.85	8.12
9	8.24	8.55	7.88	8.22	8.00	8.13	7.86	8.00	7.89	7.87	7.31	7.69	7.97
Mean(C)	8.43	7.92	8.09	8.42	8.22	8.39	8.04	8.22	8.12	8.10	7.53	7.92	
Mean(D)	8.25	8.41	7.89										

CD at 5 % C=0.012; D=0.012; S=0.013; CxD=0.020; CxS=0.023; DxS=0.024; CxDxS=0.041

D₁= Picking at 40 days after fruit set, D₂= Picking at 60 days after fruit set, D₃= Picking at 80 days after fruit set, C=Cultivar; D= Picking date; S=Storage interval

for the freshly prepared jelly from Pant Manohar fruits harvested at 60 days after fruit set while for flavour and consistency, Pant Suvarna ranked highest probably due to the higher concentration of volatile compounds and pectins in its fruits. The pectin content was highest in the jellies prepared from the fruits harvested 60 days after fruit set. Decreased quality attributes except flavour with the increasing storage period might be attributed to chemical composition of jellies, changes in the sugar acid ratio, loss of aromatic compounds due to oxidation, loss in pectin content and non-enzymatic browning reactions (Maillard reaction). The flavour of the jellies increased with the storage period probably due to the breakdown of volatile compounds. Similar observations have been reported by Chaudhary *et al.* (2007) and Joshi and Jain (2006) in Karonda Jelly and Barmanray *et al.* (1996) in guava jelly and Selvamuthukumar (2007) in Seabuckthorn jelly.

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