

Preparation of value added products from jackfruit and organoleptic evaluation

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SUMMARY : During processing, a large portion of jackfruit (including core, rind, undeveloped perigones and seeds goes waste. These fruit wastes, which are highly perishable and seasonal, is a problem to the processing industries, pollution monitoring agencies and also to people who are concerned about its disposal. It is not only a problem, but a nuisance or menace as well and therefore, suitable methods have to be adopted to utilize them for the conversion into value-added products.

How to cite this paper: Patil, Rashmi, Joshi, G.D., Haldankar, P.M. and More, Mrinal (2011). Preparation of value added products from jackfruit and organoleptic evaluation, *Internat. J. Proc. & Post Harvest Technol.*, 2 (1) : 44-51.

Research chronicle : Received : 08.04.2011; Sent for revision : 20.05.2011; Accepted : 26.05.2011

KEY WORDS : Perigone, Core, Rind, T.S.S., Titratable acidity, pH, Pickle, Jelly

Profitable exploitation of fruit wastes into value added byproducts improve the overall economics of processing units by reducing the cost of production of main products. Thus, byproduct recovery can either offset the cost or increase the cash flow or both. Besides this, the problem of environmental pollution can be reduced considerably. As per the objective of present investigation attempts were made to use a jackfruit waste (*i.e.* garbages left after removal of bulbs from ripe as well as mature jackfruit, included undeveloped perigones rind, core and seeds) for estimation of pectin and preparation of some processed products.

EXPERIMENTAL METHODS

Processed products from the waste material of jackfruit from firm and soft flesh types:

Jackfruit perigone pickle:

Jackfruit perigone pickle were prepared after separating perigones from fruit and cut into uniform sized pieces longitudinally. The pickles were prepared using the

recipe and procedure described under.

Pickles were prepared from jackfruit perigone. The product was prepared according to the following recipe.

– Perigone pieces	– 1 kg
– Common salt	– 166.66 g
– Fenugreek powder	– 13.33 g
– Turmeric powder	– 20 g
– Asafoetida powder	– 35 g
– Mustard powder	– 66.66 g
– Mustard whole	– 5 g
– Sweet oil (boiled)	– 350.00 g
– Chilli powder	– 33.00 g
– Citric acid	– 10 g

The cut pieces were first pressed in between palms of hand to remove excess water. Then applied with half the quantity of salt and turmeric given in recipe, and kept as such for 2-3 hrs for sweating. Then the sweet oil was heated in a steel vessel; to that full quantities of whole mustard, asafoetida powder and fenugreek powder were added. After minute of heating, the mixture was cooled down. Then the mustard powder, citric acid, chilli powder and remaining quantity of salt and turmeric powder were added to the mixture and stirred for 15 minutes. Then the pieces were added to the mixture and stirred well to mix the pieces properly with fried spices. The pickle was then filled in presterilized, dried wide mouth glass bottles in such a way that no air pockets left inside. The moisture-free boiled oil was added in the bottles so that the pieces could remain below oil layer. Then the bottles were

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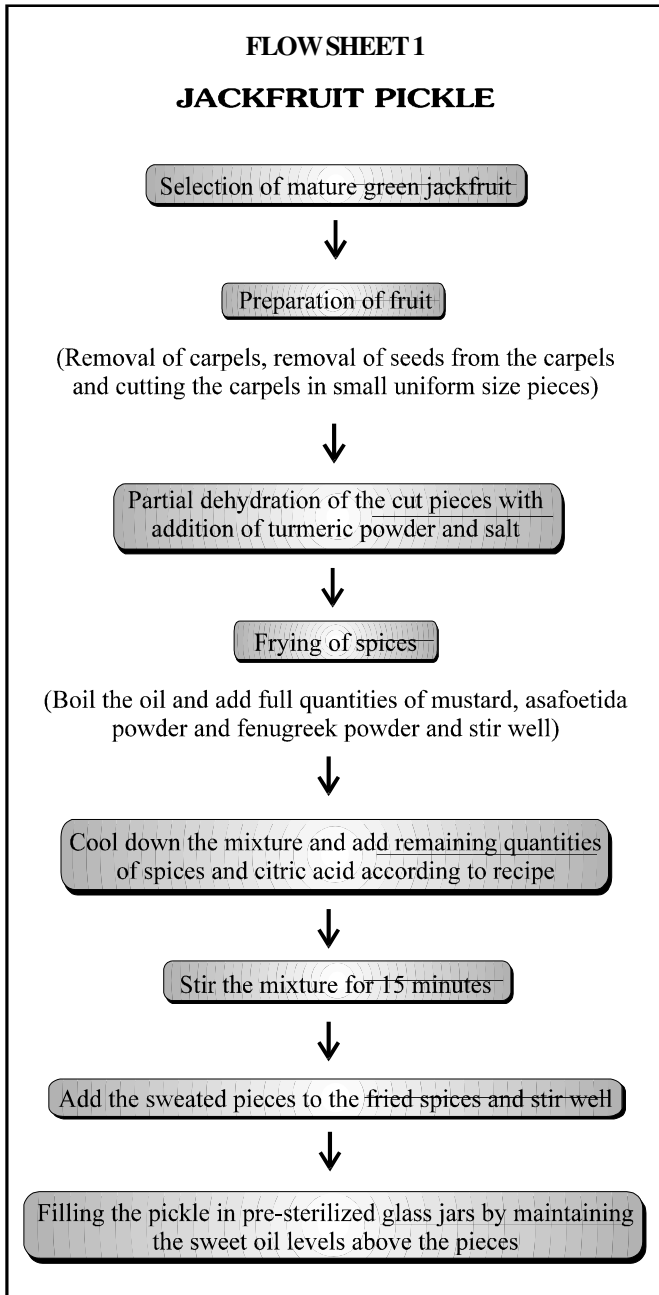
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closed with plastic lids and stored at cool and dry place for further storage studies (Flowsheet 1).



Jackfruit rind pickle:

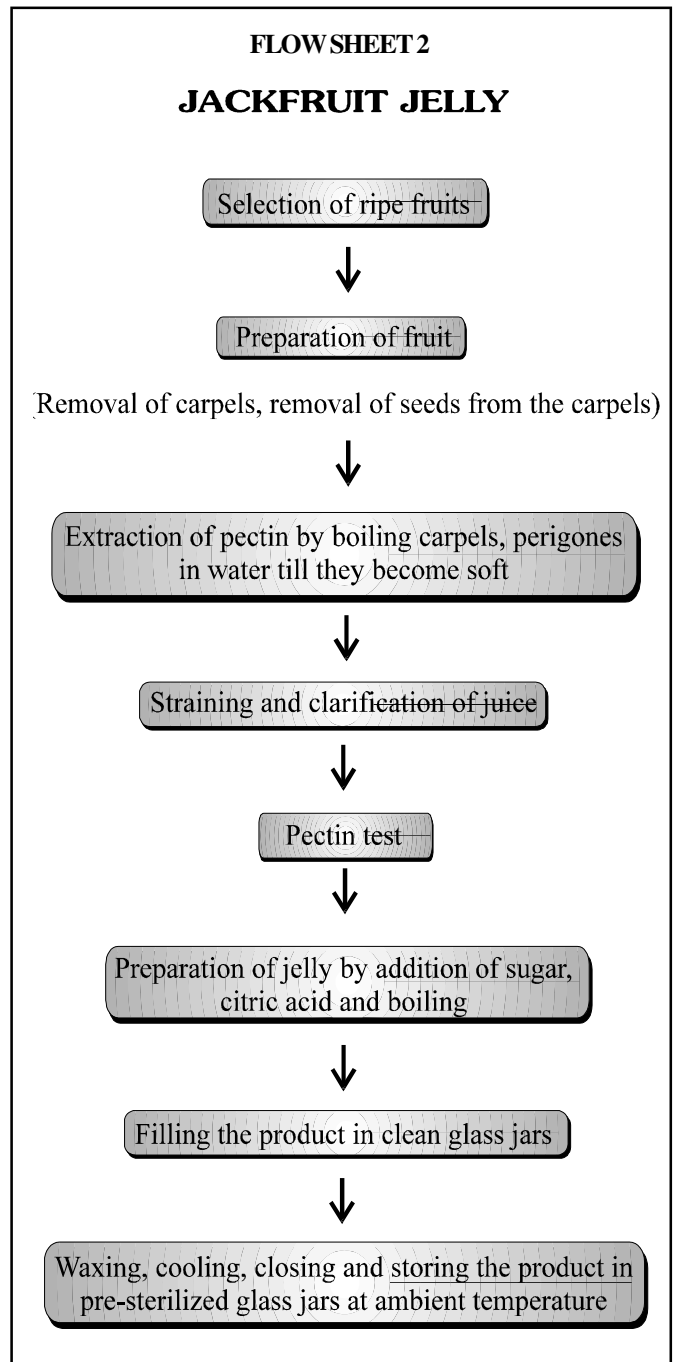
For preparation of this, rind of raw jackfruit (after separation of bulbs and undeveloped perigones) was used. First the spikes on rind were scrapped off using stainless steel knife/potato peeler such a smooth rind was then cut into small uniform pieces of one cubic centimeter size. The rind pickles were made using the recipe and procedure described under jackfruit perigone pickle.

Jackfruit core pickle:

After separating core from jackfruit the ends were trimmed off and the remaining portion was cut into small uniform sized pieces of one cubic centimeter. The pieces, thus prepared were used for pickle making. The pickles were prepared by using method described under jackfruit perigone pickle.

Jackfruit perigones jelly:

Jackfruit jelly was prepared according to the procedure standardized by CFTRI, Mysore (Flowsheet 2).



For preparation of ripe perigones jelly, the perigones from the fruit were separated. Then these perigones and water were taken 1:2 proportion and boiled for 30 minutes with addition of 0.3 per cent citric acid till perigones became soft.

The perigone juice along with cooled perigones was strained through muslin cloth and again that strained juice was passed twice through two fold cloth to get clear juice. Clear juice was kept aside for setting and clear extract was used for preparation of jelly.

Test for pectin:

A teaspoonful of extract was taken and two teaspoonful methyl alcohol was added to it. Formation of big clot was observed which indicated the high pectin.

One kilogram of sugar and 6 g of citric acid per litre of clear extract was added. Mixture was cooked till temperature raised upto 104°C and T.S.S. up to 68.5 °Brix. End point was judged by flake test when a little quantity of jelly was taken in a big spoon and after cooling, it was poured down which fell in the form of flakes.

Jelly was filled hot at the temperature of 94.5°C in a wide mouth pasteurised glass bottles. On the surface, a thin layer of wax was given. Bottles were labelled and stored in a cool dry place.

Chemical changes in jackfruit waste processed products during storage:

The jackfruit waste processed products prepared from perigones, rind and core were analysed for different chemical constituents viz., T.S.S., acidity and pH at initial 4, 8 and 12 months of storage as described under.

Total soluble solids (T.S.S.):

Total soluble solids were determined with the help of hand refractometer (A.O.A.C., 1975) and expressed in °Brix or per cent.

Titrateable acidity:

A known quantity of sample was titrated against 0.1 N sodium hydroxide (NaOH) solution using phenolphthalein as an indicator (A.O.A.C., 1975). In case of jackfruit carpels, a known quantity of sample was blended in pestle and mortar with 20-25 ml distilled water. It was then transferred to 100 ml volumetric flask and filtered. A known volume of aliquot was titrated against 0.1 N NaOH solution using phenolphthalein as an indicator. The results were expressed as per cent anhydrous citric acid (Ranganna, 1986).

pH:

The pH was determined by using pH meter at 25°C.

Organoleptic evaluation of jackfruit waste:

The jackfruit waste processed products were organoleptically for assessing for the colour, flavour and texture at initial 4, 8 and 12 months of storage by panel of seven judges using 9 point hedonic scale as under.

Organoleptic evaluation:

The experimental fruits under study were organoleptic evaluated on ripening viz., colour, flavour and texture by panel of seven judges by using 1-9 point Hedonic scale (Amerineet al., 1965) as given below.

Organoleptic score	Rating
9	Like extremely
8	Like very much
7	Like moderately
6	Like slightly
5	Neither liked nor disliked
4	Dislike slightly
3	Dislike moderately
2	Dislike very much
1	Dislike extremely

EXPERIMENTAL FINDINGS AND ANALYSIS

The results of the present study as well as relevant discussions have been presented under following sub heads:

Preparation of different value added products from jackfruit wastes:

The products such as perigone jelly, core, perigone and rind pickle were prepared from firm and softflesh jackfruit.

Chemical changes in different jackfruit waste products:

The data pertaining to changes in chemical composition of the ripe firm and softfleshperigone jelly at ambient temperature (25°C-30°C and 79 per cent R.H.) storage conditions are presented in Table 1.

Firm and softfleshperigone jelly:

Total soluble solids (°B):

It is evident from the data presented in Table 1 that, the total soluble solids content in ripe perigone jelly prepared from firmflesh and softflesh showed gradual increase during storage period of 12 months. There was an increase in TSS of jelly from initial (68.28 and 68.61) to 12 months of storage (70.18 and 71.29) in firmflesh and softflesh, respectively. The gradual increase in TSS

Table 1 : Changes in chemical composition of firmflesh and softfleshperigone jelly during storage at ambient temperature (25⁰C to 30⁰C, 79 per cent R.H.)

Period of storage	Firmfleshperigone jelly								
	T.S.S. (⁰ B)			Acidity (%)			pH		
	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled
Initial	68.28	68.25	68.26	1.01	1.01	1.01	4.64	4.63	4.64
4 months	68.63	68.68	68.65	0.83	0.82	0.83	4.93	4.94	4.94
8 months	69.83	69.98	69.90	0.81	0.82	0.81	4.96	4.97	4.96
12 months	70.23	70.13	70.18	0.75	0.73	0.74	4.99	5.04	5.01
Mean	69.24	69.26	69.25	0.85	0.84	0.85	4.88	4.89	4.88
S.E. ±	0.12	0.07	0.09	0.01	0.01	0.01	0.03	0.02	0.03
C.D. at 5%	0.37	0.22	0.29	0.03	0.03	0.03	0.08	0.06	0.07
	Softfleshperigone jelly								
Initial	68.75	68.48	68.61	0.99	0.99	0.99	4.67	4.65	4.66
4 months	69.50	69.46	69.48	0.91	0.88	0.89	4.83	4.86	4.84
8 months	70.25	70.35	70.30	0.85	0.82	0.83	4.93	4.94	4.94
12 months	71.13	71.45	71.29	0.74	0.73	0.73	4.97	4.97	4.97
Mean	69.91	69.93	69.92	0.87	0.85	0.86	4.85	4.85	4.85
S.E. ±	0.19	0.11	0.15	0.01	0.01	0.01	0.01	0.02	0.01
C.D. at 5%	0.55	0.47	0.51	0.03	0.04	0.03	0.03	0.05	0.04

content could be attributed due to conversion of non-reducing sugars into reducing sugars due to presence of acids. Analogous observations to this finding were also reported by Parab (1992) in jackfruit perigone jelly.

Titrateable acidity:

The perusal of data presented in Table 1 regarding the changes in acidity of the firmflesh and softfleshperigone jelly showed that the acidity of jelly was found to gradual declined from initial (1.01 and 0.99) to 12 months of storage (0.74 and 0.73) in firmflesh and softfleshperigone jelly, respectively. It could be attributed to decline in acid components and also the utilization of acids for inversion of non-reducing sugars into reducing sugars, similar observations were reported by Parab (1992) in jackfruit perigone jelly and Sawant (2000) in jackfruit jelly.

pH:

The data pertaining to the change in pH values of firmflesh and softflesh jackfruit perigone jelly during storage are presented in Table 1.

It could be observed from the data that the pH value of perigone jelly was found to be gradually increased towards the end of storage period. pH showed increasing trend from initial (4.64 and 4.66) to 12 months of storage (5.01 and 4.97) in firmflesh and softfleshperigone jelly, respectively. It could be attributed to decline in acid components during storage. Observations conformity to these findings were also recorded by Parab (1992) and

Sawant (2000) in jackfruit perigone carpel jelly, respectively.

Firmflesh and softflesh core, perigone and rind pickle:

The data pertaining to changes in chemical composition of firmflesh and softflesh core, perigone and rind pickle at ambient temperature (25⁰C to 30⁰C and 79 per cent R.H.) storage condition are presented in Table 2.

Titrateable acidity (per cent):

It could be seen from the data presented in Table 2 that the acidity of the firmflesh and softflesh core, perigone and rind pickle were found to be significantly increased during storage period. The acidity of firmflesh core pickle was 1.18 per cent at initial changed to 1.6 per cent at 12 months storage. But the acidity of softflesh core pickle was 1.14 per cent at initial changed to 1.64 at 12 months of storage. Further, the acidity of firmflesh and softfleshperigone pickle were 1.39 and 1.40 per cent, respectively at initial stage changed to 1.55 and 1.66 per cent, respectively after 12 months storage period. Firmflesh rind pickle acidity was 1.37 per cent at initial stage changed to 1.67 per cent during 12 months storage and softflesh rind pickle acidity was 1.38 per cent at initial stage changed to 1.69 per cent at 12 months of storage. Variation in acidity content in firmflesh and softflesh core, perigone and rind pickle could be attributed due to genetic variation between them. Further the increasing trend of

Table 2 : Changes in chemical composition (acidity) of firmflesh and softflesh core, perigone and rind pickle during storage at ambient temperature (25⁰C to 30⁰C, 79 per cent R.H.)

Period of storage	Acidity (%) in firmflesh pickle								
	Core			Perigone			Rind		
	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled
Initial	1.16	1.20	1.18	1.37	1.41	1.39	1.37	1.37	1.37
4 months	1.41	1.42	1.41	1.42	1.44	1.43	1.51	1.53	1.52
8 months	1.55	1.59	1.57	1.48	1.53	1.51	1.55	1.62	1.58
12 months	1.64	1.69	1.67	1.55	1.56	1.55	1.66	1.67	1.66
Mean	1.44	1.48	1.46	1.45	1.48	1.47	1.52	1.55	1.53
S.E. ±	0.02	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.02
C.D. at 5%	0.06	0.04	0.05	0.05	0.03	0.04	0.05	0.05	0.05
	Acidity (%) in softflesh pickle								
Initial	1.12	1.16	1.14	1.40	1.40	1.40	1.37	1.38	1.38
4 months	1.36	1.42	1.39	1.51	1.55	1.53	1.42	1.45	1.44
8 months	1.53	1.60	1.56	1.52	1.59	1.56	1.62	1.63	1.62
12 months	1.61	1.66	1.64	1.63	1.69	1.66	1.67	1.69	1.68
Mean	1.40	1.46	1.43	1.51	1.56	1.54	1.52	1.54	1.53
S.E. ±	0.02	0.03	0.02	0.03	0.02	0.02	0.01	0.02	0.01
C.D. at 5%	0.05	0.05	0.05	0.05	0.08	0.06	0.04	0.05	0.04

acidity during storage could be attributed due to lactic acid formation. Analogous observations were reported by Pawar (1988) in karonda pickle, Parab (1992) in jackfruit and cashew apple pickle, Kumar (1995) in watermelon pickle and Joshi *et al.* (1996) in nutmeg pickle.

pH:

The data pertaining to the change in pH values of

firm and softflesh core, perigone and rind pickle during storage are presented in Table 3.

It could be observed from the pooled data that pH values of firm and softflesh core, perigone and rind pickle were found to be significantly decreased during storage period. The pH value of firmflesh and softflesh core pickle were 2.50 and 3.03, respectively at initial stage changed to 2.05 and 2.03 at 12 months of storage. Further, the pH

Table 3 : Changes in pH values of firmflesh and softflesh core, perigone and rind pickle during storage at ambient temperature (25⁰C to 30⁰C, 79 per cent R.H.)

Period of storage	pH values in firmflesh pickle								
	Core			Perigone			Rind		
	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled
Initial	2.52	2.48	2.50	2.56	2.48	2.52	2.43	2.42	2.43
4 months	2.37	2.35	2.36	2.39	2.36	2.37	2.34	2.31	2.32
8 months	2.12	2.08	2.10	2.22	2.16	2.19	2.10	2.07	2.08
12 months	2.06	2.03	2.05	2.15	2.19	2.17	2.00	2.01	2.01
Mean	2.27	2.23	2.25	2.33	2.29	2.31	2.22	2.20	2.21
S.E. ±	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03
C.D. at 5%	0.10	0.08	0.09	0.09	0.09	0.09	0.09	0.07	0.08
	pH values in softflesh pickle								
Initial	3.04	3.02	3.03	2.53	2.54	2.53	2.48	2.48	2.48
4 months	2.57	2.49	2.53	2.51	2.46	2.48	2.42	2.38	2.40
8 months	2.13	2.05	2.09	2.16	2.10	2.13	2.07	2.06	2.06
12 months	2.03	2.02	2.03	2.09	2.05	2.07	2.09	2.07	2.08
Mean	2.44	2.39	2.42	2.32	2.29	2.30	2.27	2.25	2.26
S.E. ±	0.02	0.02	0.02	0.01	0.03	0.02	0.01	0.02	0.02
C.D. at 5%	0.06	0.08	0.07	0.04	0.08	0.06	0.04	0.07	0.06

Table 4 : Changes in sensory qualities of firmflesh and softfleshperigone jelly during storage at ambient temperature conditions (25⁰C to 30⁰C, 79 per cent R.H.)

Period of storage	Firmflesh perigone jelly											
	Colour			Flavour			Texture			Average		
	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled
Initial	6.61	6.64	6.62	6.84	6.81	6.82	6.78	6.75	6.77	6.74	6.73	6.74
4 months	6.58	6.58	6.58	6.76	6.73	6.75	6.73	6.70	6.72	6.69	6.67	6.68
8 months	6.52	6.53	6.53	6.69	6.67	6.66	6.67	6.65	6.66	6.63	6.62	6.62
12 months	6.48	6.48	6.48	6.61	6.59	6.60	6.63	6.58	6.61	6.57	6.55	6.56
Mean	6.55	6.56	6.55	6.72	6.70	6.71	6.70	6.67	6.68	6.66	6.64	6.65
S.E. ±	0.03	0.04	0.03	0.04	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.03
C.D. at 5%	0.11	0.11	0.11	0.11	0.10	0.10	0.06	0.05	0.05	0.09	0.09	0.09
	Softflesh perigone Jelly											
Initial	6.72	6.67	6.69	6.89	6.83	6.86	7.10	7.09	7.09	6.90	6.86	6.88
4 months	6.68	6.62	6.65	6.82	6.80	6.81	6.93	6.88	6.90	6.81	6.77	6.79
8 months	6.65	6.55	6.60	6.78	6.71	6.75	6.76	6.81	6.79	6.73	6.69	6.71
12 months	6.60	6.53	6.56	6.70	6.68	6.69	6.72	6.72	6.72	6.67	6.54	6.67
Mean	6.67	6.60	6.64	6.80	6.76	6.78	6.88	6.87	6.87	6.78	6.74	6.76
S.E. ±	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.08	0.06	0.03	0.04	0.04
C.D. at 5%	0.08	0.05	0.06	0.08	0.08	0.08	0.13	0.24	0.18	0.10	0.12	0.11

value of firmflesh and softfleshperigone pickle were 2.52 and 2.53, respectively at initial stage changed to 2.17 and 2.07 at 12 months of storage. And pH value of firmflesh and softflesh rind pickle were 2.43 and 2.48, respectively at initial stage changed to 2.01 and 2.08 at 12 months of storage. The declined trend of pH during storage could be attributed due to formation of lactic acid and corresponding increasing trend of acidity during storage. Similar observations in accordance to this finding were also reported by Pawar (1988) in karonda pickle, Salvi (1991) in mango, Karonda and cashew apple pickle and Joshi *et al.* (1996) in nutmeg pickle.

Organoleptic evaluation of jackfruit waste products: Firmflesh and softfleshperigone jelly:

The data pertaining to the sensory score of palatability of firm and softfleshperigone jelly during 12 months of storage period at ambient temperature conditions are presented in Table 4.

It could be evident from the data that the jelly prepared from firm and softflesh jackfruit carpel according to recipe under study was found to be organoleptically quite acceptable not only at the time of preparation but also throughout the storage period of 12 months.

The statistical analysis of pooled organoleptic scores recorded for the sensory qualities such as colour, flavour and texture indicate maximum overall organoleptic score (6.74 and 6.88) at initial stage of evaluation followed by 4

months of storage and were minimum (6.56, 6.67) at 12 months of storage in firmflesh and softfleshperigone jelly. Further, the softfleshperigone jelly scored maximum average score (6.88) than firmfleshperigone jelly (6.74) at initial stage of evaluation. As regards colour, flavour and texture the initial stage of evaluation recorded the maximum score with 6.62, 6.82, 6.77 in firmfleshperigone jelly, respectively and 6.69, 6.86, 7.09, respectively in softfleshperigone jelly and were minimum at 12 months of storage with score of 6.48, 6.60, 6.61 in firmfleshperigone jelly and 6.56, 6.69, 6.72, respectively in softfleshperigone jelly. Further, gradual decline trend could be attributed due to decline in flavouring and chemical components of products during storage. Similar results were reported by Parab (1992) in jackfruit perigone jelly and Sawant (2000) in jackfruit carpel jelly.

Firmflesh and softflesh core, perigone and rind pickle:

The data presented in Table 5, 6 and 7 indicate the sensory score of palatability of firmflesh and softflesh core, perigone and rind pickle during storage period at ambient temperature conditions. It could be revealed from the data that the pickle prepared from firmflesh and softflesh jackfruit according to recipe under study was found to be organoleptically quite acceptable not only at the time of preparation but also throughout the storage period of 12 months.

The statistical analysis of the pooled organoleptic

Table 5 : Changes in sensory qualities of firmflesh and softflesh core pickle during storage at ambient temperature conditions (25-30°C, 79 per cent R.H.)

Period of storage	Firmflesh core pickle											
	Colour			Flavour			Texture			Average		
	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled
Initial	6.27	6.28	6.27	5.60	5.58	5.59	5.34	5.36	5.35	5.74	5.74	5.74
4 months	6.24	6.21	6.22	5.66	5.61	5.63	5.37	5.40	5.38	5.76	5.74	5.74
8 months	6.16	6.15	6.15	5.56	5.53	5.54	5.48	5.50	5.49	5.73	5.73	5.73
12 months	6.09	6.06	6.07	5.44	5.43	5.44	5.31	5.36	5.34	5.61	5.62	5.62
Mean	6.19	6.18	6.18	5.57	5.54	5.55	5.37	5.41	5.39	5.71	5.71	5.71
S.E. ±	0.02	0.02	0.02	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
C.D. (P=0.05)	0.06	0.07	0.06	0.11	0.08	0.09	0.07	0.07	0.07	0.08	0.07	0.07
	Softflesh core pickle											
Initial	6.40	6.37	6.38	5.77	5.71	5.74	5.55	5.55	5.55	5.91	5.88	5.89
4 months	6.36	6.31	6.33	5.79	5.73	5.76	5.56	5.59	5.57	5.90	5.88	5.89
8 months	6.26	6.27	6.26	5.88	5.81	5.84	5.52	5.50	5.51	5.89	5.86	5.87
12 months	6.25	6.21	6.23	5.78	5.78	5.78	5.45	5.42	5.43	5.83	5.80	5.81
Mean	6.32	6.29	6.30	5.81	5.76	5.78	5.52	5.52	5.52	5.82	5.86	5.87
S.E. ±	0.02	0.02	0.02	0.04	0.03	0.03	0.02	0.02	0.02	0.03	0.02	0.02
C.D. (P=0.05)	0.07	0.05	0.06	0.12	0.10	0.11	0.07	0.06	0.06	0.09	0.07	0.08

Table 6 : Changes in sensory qualities of firmflesh and softfleshperigone pickle during storage at ambient temperature conditions (25-30°C, 79 per cent R.H.)

Period of storage	Firmfleshperigone pickle											
	Colour			Flavour			Texture			Average		
	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled
Initial	7.52	7.51	7.51	6.94	6.96	6.95	6.78	7.72	6.75	7.08	7.06	7.07
4 months	7.42	7.42	7.42	7.03	6.79	6.91	6.81	6.79	6.80	7.09	7.00	7.04
8 months	7.31	7.33	7.32	7.19	7.16	7.17	6.83	6.80	6.81	7.11	7.09	7.10
12 months	7.19	7.18	7.19	6.66	6.62	6.64	6.63	6.56	6.60	6.83	6.79	6.81
Mean	7.36	7.36	7.36	6.95	6.88	6.91	6.76	6.72	6.74	7.02	6.99	7.00
S.E. ±	0.01	0.02	0.01	0.05	0.11	0.08	0.02	0.02	0.02	0.03	0.05	0.03
C.D. at 5%	0.04	0.05	0.04	0.14	0.35	0.24	0.05	0.07	0.06	0.08	0.16	0.11
	Softfleshperigone pickle											
Initial	7.07	6.79	6.93	6.75	6.74	6.74	6.66	6.68	6.67	6.83	6.74	6.78
4 months	6.89	6.82	6.86	6.77	6.78	6.77	6.68	6.73	6.70	6.78	6.78	6.77
8 months	6.71	6.73	6.72	6.83	6.77	6.80	6.72	6.76	6.74	6.75	6.75	6.73
12 months	6.65	6.70	6.68	6.81	6.73	6.77	6.67	6.70	6.68	6.71	6.73	6.71
Mean	6.83	6.76	6.80	6.79	6.76	6.77	6.68	6.72	6.70	6.78	6.74	6.76
S.E. ±	0.10	0.03	0.02	0.02	0.04	0.03	0.02	0.03	0.02	0.05	0.03	0.04
C.D. at 5%	0.31	0.10	0.20	0.07	0.11	0.09	0.07	0.10	0.08	0.15	0.10	0.12

Table 7 : Changes in sensory qualities of firmflesh and softflesh rind pickle during storage at ambient temperature conditions (25-30°C, 79 per cent R.H.)

Period of storage	Firmflesh rind pickle											
	Colour			Flavour			Texture			Average		
	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled	2000-2001	2001-2002	Pooled
Initial	5.57	5.56	5.56	6.10	6.09	6.09	5.63	5.61	5.62	5.77	5.75	5.76
4 months	5.51	5.48	5.49	6.23	6.26	6.24	5.71	5.66	5.68	5.82	5.80	5.80
8 months	5.49	5.44	5.46	6.28	6.30	6.29	5.81	5.69	5.75	5.86	5.81	5.83
12 months	5.44	5.46	5.45	6.08	6.97	6.52	5.64	5.52	5.58	5.72	5.98	5.85
Mean	5.50	5.49	5.50	6.17	6.15	6.16	5.69	5.62	5.65	5.79	5.75	5.77
S.E. ±	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02
C.D. at 5%	0.06	0.06	0.06	0.10	0.08	0.09	0.07	0.11	0.09	0.08	0.08	0.08
	Softflesh rind pickle											
Initial	5.66	5.63	5.64	6.14	6.12	6.13	5.59	5.62	5.60	5.80	5.79	5.79
4 months	5.61	5.53	5.57	6.17	6.09	6.13	5.65	5.70	5.67	5.81	5.77	5.79
8 months	5.59	5.50	5.54	6.10	6.09	6.09	5.69	5.71	5.70	5.79	5.76	5.78
12 months	5.55	5.50	5.52	5.96	5.90	5.93	5.68	5.68	5.68	5.73	5.69	5.71
Mean	5.60	5.54	5.57	6.09	6.05	6.07	5.65	5.68	5.66	5.78	5.76	5.77
S.E. ±	0.02	0.02	0.02	0.04	0.03	0.04	0.03	0.04	0.03	0.03	0.03	0.03
C.D. at 5%	0.06	0.05	0.05	0.11	0.10	0.10	0.10	0.11	0.11	0.09	0.08	0.09

scores recorded for the sensory qualities such as colour, flavour and texture indicate the maximum overall average or organoleptic score 5.74, 7.07 and 5.76 in firmflesh and 5.89, 6.78 and 5.79 in softflesh core, perigone and rind pickle, respectively at initial stage of evaluation and was minimum (5.62, 6.81 and 5.85) in firmflesh and (5.81, 6.71 and 5.71), respectively in softflesh core, perigone and rind pickle. Further it was observed that firmfleshperigone pickle recorded highest organoleptic score than softfleshperigone pickle (6.78) at the time of preparation and also after 12 months of storage. Variation in organoleptic score could be attributed due to genetic variation between two types. As regards the colour, flavour and texture, the maximum score was recorded at initial stage of evaluation (6.27, 5.59, 5.35, respectively) in firmflesh core pickle and (6.38, 5.74 and 5.55, respectively) in softflesh core pickle. Similar results were observed in firmflesh and softfleshperigone pickle and rind pickle. Firmfleshperigone pickle recorded score of .7.51, 6.95 and 6.75 for colour, flavour and texture at initial stage of evaluation, respectively and that of softfleshperigone recorded score of 6.93, 6.74 and 6.67 for colour, flavour and texture at initial stage of evaluation, respectively. And firmflesh rind pickle recorded score (5.56, 6.09, 5.62) and softflesh rind pickle recorded (5.64, 6.13, 5.60) score for colour, flavour and texture, respectively at initial stage of evaluation. Further, the gradual decrease in organoleptic score of the product during storage appeared to be due to the decline in flavouring and some chemical constituents like sugars during storage and also due to lactic acid formation during storage. Observations according to these findings were also reported by Antarkar (1991) and Parab (1992) in jackfruit pickle and Joshi *et al.* (1996) in nutmeg pickle.

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