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EFFECT OF DIFFERENT COLOURED PULP AND SUGAR CONCENTRATIONS ON PREPARATION OF DRAGON FRUIT JAM

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ABSTRACT

A laboratory experiment on "Effect of different coloured pulp and sugar concentrations on preparation of dragon fruit jam" was conducted at Post-Harvest Technology and Analytical Laboratory, Department of Fruit Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2022-23 with the objectives to study the effect of different coloured pulp and sugar concentrations on preparation of dragon fruit jam, to study the effect of different coloured pulp and sugar concentrations on chemical changes of dragon fruit jam during storage and to find out suitable coloured pulp and sugar concentration for preparation of dragon fruit jam. The experiment was laid out in Factorial Completely Randomized Design (FCRD) with eight treatment combinations comprising WPS_1-White Pulp+50% sugar, WPS_2-White Pulp+55% sugar, WPS_3-White Pulp+60% sugar, WPS_4-White Pulp+65% sugar, PPS_1-Pink Pulp+50% sugar, PPS_2-Pink Pulp+55% sugar, PPS_3-Pink Pulp+60% sugar, PPS_4-Pink Pulp+65% sugar. Which were replicated thrice times. It is concluded from this study that dragon fruit jam made from pink coloured pulp and 65% sugar (PPS4-Pink Pulp+65% sugar) concentration showed good storability at ambient condition up to 3 months storage period with higher sugar concentration and obtained best results physico-chemically.

Key words : Dragon fruit, Jam, White pulp, Pink pulp.

Introduction

Dragon fruit (*Hylocereus undatus*) belongs to the family Cactaceae. It has received worldwide recognition, first as an ornamental and then as a fruit crop. In India mostly red skinned with white pulp (93%) (*Hylocereus undatus*) and fruits having red peel with red flesh (*Hylocereus monacanthus*) (6.5%) are cultivated by the growers (Kakade *et al*., 2020). Dragon fruit has an extremely low amount of cholesterol, which ultimately reduces the chance of heart attack and other diseases caused by accumulation of cholesterol. It has high fiber content, which can assist with poor digestion and constipation. Eating the flesh and seeds, which contain good protein, will keep body fortified. It is a good natural source of anti-oxidants, which help to prevent the dangers of free radicals, which can cause cancer and other undesirable health detriments. As dragon fruit is rich in vitamin C and B3, it is reported that it helps to cure problems like acne and burned skin. The flavour of the fruit resembles to kiwi fruit (Nangare *et al*., 2020). The availability of dragon fruit is sometimes rare and dragon fruit easily damaged if not stored properly. Like other fruits and vegetables, dragon fruit is highly perishable having shelf life of 5-7 days at ambient Indian conditions. In case of any market glut due to excess production, dragon fruit can be turned into various value-added products viz., jam, juice, freeze-dried chips or cookies. (Wakchaure *et al*., 2020).

Jam production is the act of fruit preservation process to stop or slow down the fruit spoilage, quality and nutritional value loss, edibility and extend the shelf life of the fruit storage (Darkwa *et al*., 2016). Jams are prepared by boiling fruit pulp with sufficient quantities of sugar to a reasonably thick consistency and thus were firm enough to hold fruit tissue in position. Because there was a enough amount of sugar with the fruit pulp, its preservation

properties could be utilised. Sugar in jam helped in the sweetening, gel formation and colour retention of the jams (Rahman *et al*., 2018).

Processed dragon fruit products are rarely available in our markets and very little work has been done on processing of dragon fruit in our country. Several locally processed fruit products are now available in the market. If quality products from dragon fruit are developed, it might be welcomed by the consumers who have affinity for dragon fruit round the year (Islam *et al*., 2012). Since fresh dragon fruits have a short shelf life, it is vital to convert them into various value-added products to extend their availability and stabilize the price during the surplus season. The current study was carried out to observe the influence of coloured pulp and sugar concentration on the rheological attributes of dragon fruit jam and its potential effect on the physicochemical attributes of the product during 90 days of storage period.

Materials and Methods

A laboratory experiment was conducted at Post-Harvest Technology and Analytical Laboratory, Department of Fruit Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2022-23. The experiment was laid out in Factorial Completely Randomized Design (FCRD) with eight treatment combinations comprising (Factor A) *i.e.*; two type of pulp of dragon fruit *viz*., PP (Pink Pulp) and WP (White Pulp) and (Factor B) *i.e*. four sugar concentrations *viz*., S_1 (pulp with 50% sugar), S_2 (pulp with 55% sugar), S_3 (pulp with 60% sugar), S_4 (pulp with 65% sugar), which were replicated thrice times. The different treatment combinations for preparation of dragon fruit jam were WPS_1-White Pulp+50% sugar, WPS_2-White Pulp+55% sugar, WPS_3-White Pulp+60% sugar, WPS_4-White Pulp+65% sugar, PPS_1-Pink Pulp+50% sugar, PPS_2-Pink Pulp+55% sugar, PPS_3-Pink Pulp+60% sugar, PPS_4-Pink Pulp+65% sugar.

Physico-chemical analysis of dragon fruit and dragon fruit jam was carried out according to the standard methods as described by Ranganna (1986), AOAC (2000 and 2007).

Results and Discussion

The observations regarding physicochemical parameters like moisture (%), TSS (^{0}B), pH, titratable acidity (%), reducing sugars (%), non-reducing sugars (%), total sugars (%) and ascorbic acid content (mg/ 100gm) were recorded. Physicochemical analysis of preserved dragon fruit jam was conducted at interval of initial days up to 90 days, stored at ambient storage condition.

The data pertaining to these observations of dragon fruit jam and physicochemical changes in jam throughout the storage period are presented and discussed below under the appropriate headings and sub headings.

Moisture (%)

The data in respect of moisture content (%) of dragon fruit jam as influence by different coloured pulp and sugar concentrations at ambient storage conditions was recorded up to 90th days of storage and presented in Table 1. It was observed that the moisture content of different treatments of dragon fruit jam were found to be decreased with increased in storage period significantly.

At initial day of storage, significantly maximum moisture content was observed 36.06 % in the treatment combination WPS_1 (white pulp and 50% sugar). Whereas, the minimum moisture content was recorded 31.79% in PPS_4 (pink pulp and 65% sugar) followed by 32.20% in WPS_4 (white pulp and 65% sugar). During 90 days of storage moisture content gradually decreased from 36.06% to in the treatment combination WPS_1 (white pulp and 50% sugar). And from 31.79% to28.77 in treatment combination PPS_4 (pink pulp and 65% sugar). During the study it was observed that the moisture content of dragon fruit jam decreased with increased in storage period. It is might be due to evaporation of moisture in jam due to processing of product.

The result mention above is in conformity with the findings of many research workers. The decrease in moisture content in mandarin jam with an increase in storage period might be due to the evaporation of moisture from the stored jam, reported by James *et al*. (2016) in mixed fruit jam. Processing of jams resulted in water removal and thus concentration. Moisture and dry matter levels of any food material is a measure of the shelf life of the food reported by Awolu *et al*. (2018) in blended jam of banana, pineapple and watermelon.

Total soluble solids (°B)

The data in respect of total soluble solids content of dragon fruit jam presented in Table 1 shows significant variation in TSS of dragon fruit jam during the storage of 90 days. At initial days of storage maximum total soluble solids content was recorded 68.70°B in treatment combination PPS_4 (pink pulp and 65% sugar concentration) at par with 68.67^{0}B in treatment combination WPS_4. Whereas, minimum total soluble solid content was found 68.34°B in treatment combinations WPS_1 (white pulp and 50% sugar). This same trend was observed during the storage of 30th, 60th days of storage.

Table 1 : Effect of storage and different treatments on moisture (%) and total soluble solids (^{0}B) content of dragon fruit jam.

Sugar concentrations	Initial Days			30 Days			60 Days			90 Days		
	Type of pulp			Type of pulp			Type of pulp			Type of pulp		
	Moisture (%)											
	WP	PP	Mean	WP	PP	Mean	WP	PP	Mean	WP	PP	Mean
S1 (50%)	36.06	36.02	36.04	35.04	34.99	35.02	34.26	34.09	34.17	33.64	33.40	33.52
S2 (55%)	35.04	35.02	35.03	34.41	32.04	34.23	33.58	32.94	33.26	32.58	32.03	32.30
S3 (60%)	33.10	33.02	33.02	32.14	31.01	32.07	32.02	31.80	31.91	30.45	30.02	30.23
S4 (65%)	32.20	31.79	31.99	31.21	31.13	31.17	30.78	30.64	30.71	29.22	28.77	28.99
Mean	34.10	33.96		33.20	33.04		32.66	32.37		32.04	31.45	
	Factor A	Factor B	AxB	Factor A	Factor B	AxB	Factor A	Factor B	AxB	Factor A	Factor B	AxB
SE (m)±	0.020	0.029	0.041	0.028	0.04	0.057	0.024	0.034	0.048	0.004	0.085	0.008
CD @5%	0.062	0.087	0.0123	0.086	0.012	0.0171	0.072	0.102	0.144	0.013	0.258	0.025
F test	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig
	TSS (^{0}B)											
	WP	PP	Mean	WP	PP	Mean	WP	PP	Mean	WP	PP	Mean
S1 (50%)	68.34	68.38	68.36	68.86	68.88	68.87	69.18	69.24	69.21	69.45	69.52	69.48
S2 (55%)	68.39	68.47	68.43	68.96	69.25	69.11	69.32	69.44	69.38	69.53	69.67	69.60
S3 (60%)	68.47	68.52	68.50	69.22	69.28	69.25	69.43	69.48	69.46	69.73	69.74	69.73
S4 (65%)	68.67	68.70	68.69	69.52	69.65	69.54	69.82	69.86	69.84	70.20	70.26	70.23
Mean	68.47	68.52		68.17	69.27		69.44	69.51		69.73	69.80	
SE (m)±	0.005	0.008	0.011	0.005	0.008	0.011	0.008	0.011	0.015	0.006	0.009	0.013
CD @5%	0.016	0.023	0.032	0.016	0.023	0.033	0.023	0.033	0.047	0.019	0.027	0.038
F test	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig

At 90th days of storage the treatment combination PPS_4 (pink pulp and 65% sugar) was found significantly superior over other treatments with 70.26^{0}B followed by treatment combination WPS_4 (white pulp and 65% sugar) with 70.20^{0}B. Statistical results revealed that treatment and storage had a considerable effect on the TSS of dragon fruit jam.

Increase in TSS during storage period might be due to addition of different coloured pulp and sugar concentrations and conversion of polysaccharides into sugars during hydrolysis process. The increase in total soluble solid of dragon fruit jam might be due to conversion of complex carbohydrates to simple sugar. The above results are in conformity with Rahman *et al*. (2018), who observed gradual increase in TSS content of guava jam during 90 days of storage. Increase in TSS might also be attributed to the reduction in moisture contents of the product with advancement of storage. This pattern of increasing of total soluble solid (^{o}Brix) during storage might be due to partial hydrolysis of complex polysaccharide and solubilization of pulp constituents during storage. The results are in agreement with the findings of Patel *et al*. (2015) in banana-pineapple blended jam.

pH

The pH value is most important factor during preparation of jam to obtain principal gel formation. The data presented in Table 2 shows significant differences in pH of dragon fruit jam among the different treatments during 90 days of storage.

The pH was found to decrease with increased in storage period significantly at initial day of storage and was non-significant at 90th days. At initial day, maximum pH 3.62 was found in treatment PPS_4 (pink pulp and 65% sugar) at par with 3.60 in treatment combination WPS_4 (white pulp and 65% sugar). Whereas, the treatment combination WPS_2 (white pulp and 55% sugar) showed minimum pH 3.53, which was found significantly

Table 2 : Effect of storage and different treatments on pH and titratable acidity (%) content of dragon fruit jam.

Sugar concentrations	Initial Days			30 Days			60 Days			90 Days		
	Type of pulp			Type of pulp			Type of pulp			Type of pulp		
	pH											
	WP	PP	Mean	WP	PP	Mean	WP	PP	Mean	WP	PP	Mean
S1 (50%)	3.52	3.54	3.53	3.47	3.48	3.48	3.41	3.43	3.42	3.27	3.39	3.29
S2 (55%)	3.53	3.56	3.55	3.49	3.53	3.51	3.42	3.46	3.44	3.31	3.32	3.32
S3 (60%)	3.55	3.58	3.56	3.51	3.54	3.53	3.45	3.47	3.46	3.34	3.34	3.35
S4 (65%)	3.60	3.62	3.61	3.55	3.57	3.56	3.48	3.49	3.49	3.39	3.37	3.40
Mean	3.55	3.58		3.50	3.53		3.44	3.46		3.32	3.36	
	Factor A	Factor B	AxB	Factor A	Factor B	AxB	Factor A	Factor B	AxB	Factor A	Factor B	AxB
SE (m)±	0.003	0.004	0.006	0.003	0.004	-	0.002	0.003	0.004	0.003	0.005	-
CD @5%	0.009	0.013	0.018	0.009	0.012	-	0.007	0.009	0.013	0.010	0.015	-
F test	Sig	Sig	Sig	Sig	Sig	NS	Sig	Sig	Sig	Sig	Sig	NS
	Titratable Acidity (%)											
	WP	PP	Mean	WP	PP	Mean	WP	PP	Mean	WP	PP	Mean
S1 (50%)	0.46	0.45	0.46	0.49	0.48	0.48	0.53	0.51	0.52	0.61	0.59	0.60
S2 (55%)	0.44	0.43	0.44	0.47	0.45	0.46	0.50	0.47	0.49	0.58	0.56	0.57
S3 (60%)	0.42	0.41	0.41	0.43	0.42	0.43	0.46	0.44	0.45	0.55	0.50	0.52
S4 (65%)	0.39	0.38	0.38	0.41	0.40	0.40	0.43	0.42	0.42	0.51	0.46	0.48
Mean	0.43	0.42		0.45	0.44		0.48	0.46		0.56	0.52	
SE (m)±	0.002	0.003	-	0.003	0.004	-	0.001	0.002	0.002	0.001	0.001	0.002
CD @5%	0.006	0.009	-	0.008	0.011	-	0.003	0.005	0.007	0.003	0.004	0.005
F test	Sig	Sig	NS	Sig	Sig	NS	Sig	Sig	Sig	Sig	Sig	Sig

superior over treatment WPS_1 (white pulp and 50% sugar) with pH 3.52.

The decrease in pH of dragon fruit jam might be due to increase in storage period of the jam and environmental changes. The decreased in pH value of dragon fruit jam was might be due to the increase in acidity percent during storage interval. The present finding shows agreement to the Rahman *et al*. (2018), who concluded that the decreased in pH value of guava jam was might be due to the contribution of hydrogen ions in acid formation, which leads to increase in acidity and decreased in pH.

The decrease in pH might be due to the breakdown of organic acids. A similar observation was also made by Kalra and Revanthi (1981). A similar decreasing trend in pH during storage was observed in mixed fruit jam by Shakir *et al*. (2008).

Titratable Acidity (%)

The results pertaining to the titratable acidity content (%) of dragon fruit jam under different treatments at ambient storage as influenced by different coloured pulp and sugar concentrations was recorded up to 90 days of storage and presented in Table 2. From Table 2, it is observed that at 60th days of storage significantly maximum titratable acidity (%) was recorded 0.53% in treatment combination WPS_1 (White pulp and 50 % sugar) Whereas, significantly minimum titratable acidity was recorded 0.42% in treatment combination PPS_4 (Pink pulp and 65% sugar) at 60th days of storage. Same trend was recorded at 90th days of storage significantly and the effect of different coloured pulp and sugar concentrations was found non-significant at initial and 30th days of storage. Increase in titratable acidity might also be due to formation of acids by degradation of polysaccharides and oxidation of reducing sugars or by breaking of pectin substances it is given by Okudu *et al*. (2015) in monkey cola jam.

It can be revealed from the observations that there was a gradual increase in acidity, during storage since

Table 3 : Effect of storage and different treatments on reducing sugars (%) and non-reducing sugars (%) content of dragon fruit jam.

Sugar concentrations	Initial Days			30 Days			60 Days			90 Days		
	Type of pulp			Type of pulp			Type of pulp			Type of pulp		
	Reducing sugars (%)											
	WP	PP	Mean	WP	PP	Mean	WP	PP	Mean	WP	PP	Mean
S1 (50%)	23.18	23.27	23.22	23.73	23.82	23.78	24.54	24.61	24.58	25.21	25.34	25.27
S2 (55%)	23.33	23.45	23.39	23.95	24.13	24.04	24.81	24.98	24.89	25.45	25.65	25.55
S3 (60%)	23.52	23.68	23.60	24.26	24.44	24.35	25.40	25.61	25.51	25.75	26.27	26.01
S4 (65%)	23.81	23.88	23.85	24.63	24.71	24.67	25.73	25.79	25.76	26.49	26.59	26.54
Mean	23.46	23.57		24.15	24.27		25.12	25.25		25.73	25.95	
	Factor A	Factor B	AxB	Factor A	Factor B	AxB	Factor A	Factor B	AxB	Factor A	Factor B	AxB
SE (m)±	0.004	0.005	0.007	0.006	0.009	0.012	0.005	0.007	0.009	0.005	0.006	0.009
CD @5%	0.011	0.016	0.022	0.018	0.026	0.037	0.014	0.020	0.028	0.014	0.020	0.027
F test	Sig	Sig	Sig	Sig	Sig	sig	Sig	Sig	Sig	Sig	Sig	Sig
	Non-reducing sugars (%)											
	WP	PP	Mean	WP	PP	Mean	WP	PP	Mean	WP	PP	Mean
S1 (50%)	41.94	41.92	41.93	41.70	41.69	41.69	41.41	41.37	41.38	41.37	41.34	41.36
S2 (55%)	41.90	41.81	41.85	41.64	41.52	41.58	41.38	41.34	41.36	41.25	41.18	41.21
S3 (60%)	41.83	41.73	41.78	41.47	41.35	41.40	41.15	41.10	41.12	41.11	41.05	41.08
S4 (65%)	41.77	41.72	41.74	41.25	41.21	41.23	41.12	41.08	41.10	41.01	40.94	40.98
Mean	41.86	41.80		41.51	41.44		41.26	41.22		41.18	41.13	
SE (m)±	0.005	0.007	0.009	0.008	0.011	0.015	0.005	0.008	-	0.006	0.008	0.012
CD @5%	0.014	0.020	0.028	0.023	0.033	0.047	0.016	0.023	-	0.017	0.025	0.035
F test	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	NS	Sig	Sig	Sig

days of storage found to produce significant effect on acidity of jam. It might be due to the formation of organic acids by ascorbic acid degradation as well as progressive decrease in pectin content. It is also due to formation of acids from sugar. Similar increase in titratable acidity with increase in storage period was also reported by Pushpa *et al*. (2018) in custard apple jam.

Reducing sugars %

The dragon fruit jam was analyzed for reducing sugars during 90 days of storage and presented in Table 3.

The data revealed that, the interaction effect of different coloured pulp and sugar concentrations on dragon fruit jam was statistically significant at initial, 30th, 60th and 90th days of storage. The reducing sugars were found to increases with increased in storage period significantly from initial to 90 days.

At initial day the treatment combination PPS_4 (pink pulp with 65% sugar) was found significantly superior over other treatments followed by 23.81% in treatment combination WPS_4 (white pulp and 65% sugar). Whereas the minimum reducing sugars was noticed 23.33% in treatment combination PPS_1 (pink pulp and 50% sugar) followed by 23.18% in treatment combination WPS_1 (white pulp and 50% sugar). This trend was observed same during 30th, 60thand 90th days of storage significantly. In the present study, it was observed that reducing sugars in jam was increased significantly during storage. The rise in reducing sugars might be assigned to the conversion of non-reducing sugar owing to the process of hydrolysis. It might be due to hydrolysis of non-reducing sugars due to the presence of organic acid which might now resulted in degradation of disaccharides to monosaccharides. Similar increase in reducing sugars with increase in storage period was also reported by Pushpa *et al*. (2018) in custard apple jam. Reducing sugars were found to be

increased significantly throughout the storage period. The significant increase in reducing sugars may be due to inversion of non-reducing to reducing sugars (Tripathi *et al*., 1988) in amla jam.

Non-reducing sugars (%)

From Table 3, it is observed that there was a gradual decreasing trend observed with advancement of storage period in case of non-reducing sugars in dragon fruit jam.

At initial days of storage minimum non- reducing sugars were recorded 41.73% in treatment combination PPS_3 (pink pulp and 65% sugar) at par with 41.72 in treatment combination PPS_4 (pink pulp and 60% sugar). At 30th days of storage minimum non-reducing sugars were observed 41.21% in treatment combination PPS_4 (pink pulp and 65% sugar), while maximum non- reducing sugars 41.70% were found in treatment combination WPS_1 (white pulp and 50% sugar) at par with 41.69% in treatment combination PPS_1 (pink pulp and 50% sugar). At 60th days of storage the effect of different coloured pulp and sugar concentrations on non-reducing sugars content was found non-significant. And at the end of the storage the treatment combinations WPS_1 (white pulp and 50% sugar) was found maximum non-reducing sugars content 41.37% at par with 41.34% in treatment combination PPS_1 (pink pulp and 50% sugar).

Similar results in non-reducing sugars with increase in storage period was also reported by Pushpa *et al*. (2018) in custard apple jam. The non-reducing sugars content directly related to amount of reducing sugar. The increase in reducing sugar leads to decrease in non-reducing sugar level in fruit or fruit products. The above results are in confirmation with Kotlawar *et al*. (2008).

Total sugars (%)

The data present in Table 4 shows that in general, there was increase in total sugars with increase in progressive storage period significantly. At initial day of

Table 4 : Effect of storage and different treatments on total sugars (%) and ascorbic acid (mg/100gm) content of dragon fruit jam.

	Initial Days			**30 Days**			**60 Days**			**90 Days**		
Sugar concentrations	**Type of pulp**			**Type of pulp**			**Type of pulp**			**Type of pulp**		
	Total Sugars (%)											
	WP	**PP**	**Mean**	**WP**	**PP**	**Mean**	**WP**	**PP**	**Mean**	**WP**	**PP**	**Mean**
S1 (50%)	65.12	65.19	65.15	65.43	65.51	65.47	65.95	65.98	65.96	66.58	66.68	66.63
S2 (55%)	65.23	65.26	65.24	65.59	65.65	65.62	66.19	66.32	66.25	66.70	66.83	66.76
S3 (60%)	65.35	65.41	65.38	65.73	65.79	65.75	66.55	66.71	66.63	66.86	67.32	67.09
S4 (65%)	65.58	65.60	65.59	65.88	65.92	65.90	66.85	66.87	66.86	67.50	67.53	67.52
Mean	65.32	65.37		65.66	65.71		66.38	66.47		66.91	67.09	
	Factor A	Factor B	AxB	Factor A	Factor B	AxB	Factor A	Factor B	AxB	Factor A	Factor B	AxB
SE (m)±	0.005	0.007	0.009	0.006	0.009	0.013	0.006	0.009	0.013	0.004	0.006	0.009
CD @5%	0.014	0.020	0.029	0.019	0.027	0.038	0.019	0.027	0.039	0.013	0.018	0.026
F test	Sig	Sig	Sig	Sig	Sig	sig	Sig	Sig	Sig	Sig	Sig	Sig
	Ascorbic Acid (mg/100gm)											
	WP	**PP**	**Mean**	**WP**	**PP**	**Mean**	**WP**	**PP**	**Mean**	**WP**	**PP**	**Mean**
S1 (50%)	11.81	11.82	11.82	11.66	11.69	11.67	10.81	10.84	10.83	9.87	10.08	9.97
S2 (55%)	11.75	11.77	11.77	11.36	11.64	11.49	10.53	10.71	10.62	9.84	10.05	9.94
S3 (60%)	11.58	11.64	11.61	11.07	11.18	11.12	10.41	10.57	10.49	9.81	9.98	9.89
S4 (65%)	11.39	11.57	11.48	11.01	11.34	11.17	10.37	10.44	10.40	9.75	9.94	9.85
Mean	11.63	11.71		11.28	11.47		10.53	10.64		9.81	10.01	
SE (m)±	0.005	0.007	0.009	0.006	0.009	0.012	0.006	0.008	0.011	0.003	0.005	0.007
CD @5%	0.014	0.020	0.029	0.018	0.027	0.037	0.017	0.024	0.034	0.010	0.015	0.021
F test	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig

storage significantly maximum total sugars (%) was recorded 65.60% in treatment combination PPS_4 (pink pulp and 65% sugar) at par with 65.58% in treatment combination WPS_4(white pulp and 65% sugar). Whereas, significantly minimum total sugars (% was recorded 65.12%) in treatment combination WPS_1 (white pulp and 50% sugar). Same trend was observed at 90 days of storage. During storage reducing sugars, total sugars and acidity increased, while ascorbic acid and non-reducing sugars decreased continuously in jam. The product was organoleptically acceptable for four months. The results are in agreement with the findings of Pushpa *et al*. (2018) in custard apple jam. The total sugars showed a gradual increase during storage period in all the processed product of fruits. Similar findings were also reported by Saravanan *et al*. (2004) in papaya jam.

Ascorbic acid/Vit. C (mg/100 g)

The data in respect of ascorbic acid content of dragon fruit jam as influenced by different coloured pulp and sugar concentrations was recorded up to 90 days of storage and presented in Table 4.

In general, there was decrease in ascorbic acid content with the advancement of storage. At initial day of storage, maximum ascorbic acid content 11.82 mg/ 100g was found in treatment combination PPS_1(pink pulp and 50% sugar) at par with 11.81mg/100g in treatment combination WPS_1 (white pulp and 65% sugar). And at 90^{th} days of storage the treatment combination PPS_1 (pink pulp and 50% sugar) was found significantly superior over other treatments with 10.08% ascorbic acid content followed by 10.05 % in treatment combination PPS_2 (pink pulp and 55% sugar).

The present findings are in agreement with the Susan *et al*. (2020), who concluded that the ascorbic acid content of dragon fruit sheet jam decreases with the increasing amount of sugar this is due the increasing amount of added sugar. Also, sugar is not a source of vitamin C. It was also observed that as the period of storage increased, the value of ascorbic acid decreased. The slight reduction in ascorbic acid might be due to oxidation of residual oxygen in glass bottles. Similar result was reported by Vidhya *et al*. (2011). This pattern of decreasing of ascorbic acid (mg/100g) during the storage might be due to increase in temperature level, which was affect the ascorbic acid due to its thermo mobile nature which was destroyed with temperature during storage period given by Patel *et al*. (2015). The ascorbic acid content decreased significantly in guava-papaya jam during storage. It was probably due to the fact that ascorbic acid was sensitive to oxygen, light, enzymatic and non-enzymatic catalyst heat. The differences in chemical composition of raw materials in the recipes might be responsible for these changes. These findings are in conformity with those of Rahman *et al*. (2018) in guava jam. In storage of 15 days, 30 days and 45 days shows slight decrease in vitamin C observed by Chorage *et al*. (2020).

Conclusion

It is concluded from this study that dragon fruit jam made from pink coloured pulp and 65% sugar concentration showed good storability at ambient condition up to 3 months storage period with higher sugar concentration and obtained best results physicochemically. Among all treatments, it was found that good quality and acceptable dragon fruit jam was made from pink coloured pulp and 65% sugar concentration.

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