International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(5): 2855-2860

Received: 21-07-2019
Accepted: 25-08-2019

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Foam mat dehydration of bael (*Aegle marmelos* L.) pulp for powder preparation

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Abstract
The present investigation entitled "Foam mat dehydration of bael (*Aegle marmelos* L.) pulp for powder preparation" was aimed to standardize the process for foam mat drying of bael pulp for preparation of powder. Experiment was conducted for foam mat drying of bael pulp using different concentration of low, medium and high viscous CMC. Bael pulp powder can be prepared by mixing and whipping CMC followed by mechanical dehydration in cabinet dryer till a moisture content of 6-7 per cent and can remains shelf stable on the basis of nutritional as well as sensory quality upto six months storage. Result of the study depicts during six month storage bael powder prepared by using 0.5 per cent high viscous CMC for foam mat dehydration observed to have minimum increase in moisture and TSS while minimum decrease in acidity, ascorbic acid, vitamin B_2 and sensory quality.

Keywords: Bael, foam mat drying, powder, ascorbic acid and vitamin B_2

Introduction
Bael (*Aegle marmelos* L.) is an indigenous fruit of India belonging to family Rutaceae. It has great mythological and religious significance in Indian history and culture. Bael is a sub-tropical, deciduous tree and its fruit is globuse with grey or yellowish hard woody shell. Inside shell, there is soft yellow or orange coloured mucilaginous pulp with numerous seeds. Bael fruit is very rich in vitamins, amino acids and minerals as compared to other fruits, and it can contribute significantly to the daily nutrient intake needs of the individual. Bael fruit is the richest source of vitamin B_2 (riboflavin), vitamin A and vitamin C (Mukherjee and Ahmad, 1957) [11]. The fruit has also fair amount of calcium, phosphorus and potassium. It is also rich in volatile oil and *marmelosine* (Jauhari and Singh, 1971) [5]. *Marmelosine* content is reported in the range of 0.03 to 0.37 per cent (Dixit and Dutt, 1932) [3]. Numerous alkaloides, coumarins and steroids have also been isolated and identified in bael fruits (Sharma *et al*., 1980) [18]. Tannic acid is the important polyphenolic substance detected from bael fruits (Siddappa, 1958) [21]. The seeds of bael are also rich in nutrients and contain 62 per cent protein, 32 per cent oil, 3 per cent carbohydrate and 3 per cent ash (Verma, 2006) [24].

The different parts of bael are used for various therapeutic purposes, such as for treatment of asthma, anaemia, fractures, healing of wounds, swollen joints, high blood pressure, jaundice, diarrhoea, brain typhoid and troubles during pregnancy. The unripe dried fruits are astringent, digestive, stomachic and used to cure diarrhea and dysentery. Due to its hard shell, mucilaginous texture and numerous seeds, it possess hindrances for its consumption. Therefore, it is not popular as a dessert fruit. Various value added products such as candy, preserve, ready to serve (RTS) drink, squash, jam, toffee, crush etc. can be prepared (Ullikashi, 2017) [23] and possess better potential for future use in view of nutritional security and high economic return, besides, medicinal uses.

Foam-mat drying is a simple process of drying liquid - solid foods by being mixed with stabilizing agent and or foaming agent to produce stable foam, which undergoes air drying temperatures ranging from 50-80 °C (Kandasamy *et al*., 2012) [7]. The foam dried product is then further ground to produce a powdered product. Foam-mat drying is the simplest forms of drying compared to other methods such as freeze drying, spray drying, as it is less expensive, less complicated and is less time consuming (Febrianto *et al*., 2012) [4].

Materials and Method
An experiment was conducted for foam mat drying of bael pulp using ten different treatments of foaming agents Control (T_1), Low viscous CMC [0.50% (T_2), 1.00% (T_3), 1.50% (T_4)],

Medium viscous CMC [0.50% (T_5), 1.00% (T_6), 1.50% (T_7)], High viscous CMC [0.50% (T_8), 1.00% (T_9) and 1.50% (T_{10})]. Selected ripe bael fruits were washed with tap water to remove the adhering dirt and dust particles. After washing, the fruits were cut into halves by using sharp stainless steel (SS) knife. Fruit after cutting were subjected to removal of pulpy portion along with seeds. In this pulpy portion water was added in the ratio of 1:1.5 followed by pulp extraction by use of pulper. After the extraction of bael fruit pulp, foaming agent (carboxy methyl cellulose) was mixed with pulp (as per treatments) and whipped for 10 minutes at 4000 rpm. Then fomed pulp was spread on flat SS tray for dehydration in cabinet dryer at a temperature of 65 °C till a moisture content of 10±1 per cent. After dehydration, dehydrated bael pulp was ground into powder in grinding machine. After powder preparation, 50g samples of bael powder were packed in polypropylene bags (400 gauge), sealed airtight and stored at room temperature. Principal steps used for powder preparation are illustrated in Fig.1.

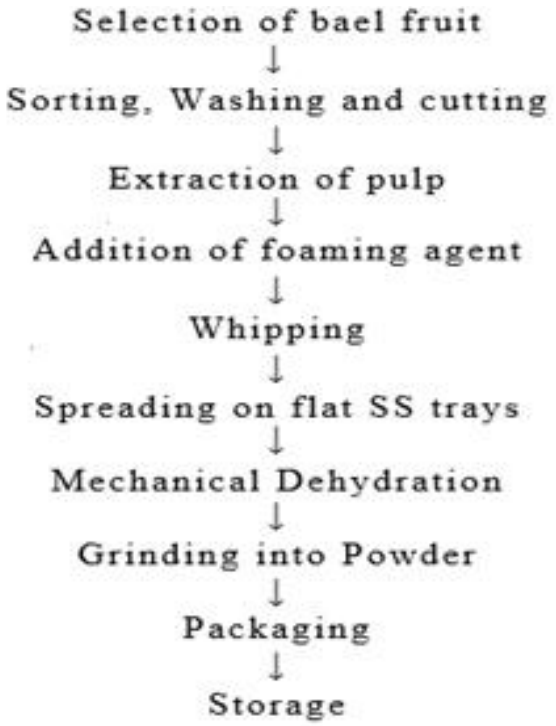

Fig 1: Principal steps used for preparation of powder from bael pulp

Results and Discussion

Recovery

Perusal of data pertaining to effect of foaming agent treatments on recovery of foam mat dehydrated bael pulp powder has been presented in Table 1. Data showed that among different foaming agent treatments, the mean recovery of dehydrated bael powder (T) varied significantly between 24.20 per cent and 24.80 per cent, with minimum recovery in bael pulp dehydrated without foaming agent (T_1) and maximum in powder prepared by using 1.5 per cent high viscous CMC (T_{10}).

Drying rate

Perusal of data pertaining to effect of foaming agent treatments on drying rate of foam mat dehydrated bael pulp powder has been presented in Table 1. Data showed that among different foaming agent treatments, the mean drying rate of dehydrated bael powder (T) varied significantly between 7.28 g/min and 9.44 g/min, with minimum drying rate in bael pulp dehydrated without foaming agent (T_1) and maximum in powder prepared by using 0.5 per cent high viscous CMC (T_8). Rajkumar *et al.* (2007) [17] reported significant effect of foaming agent on drying rate of foamed mango pulps. Similar results were reported by Lopez *et al.* (2000) [8] in cauliflower leaves and Mishra *et al.* (2002) [10] in apple.

Table 1: Effect of different foaming agent treatment on recovery and drying rate of bael pulp powder.

Treatment	Characteristics	
	Recovery %	Drying Rate g/min
$T_{1\,(C)}$	24.20	7.58
$T_{2\,(0.5\ LV)}$	24.40	8.40
$T_{3\,(1.0\ LV)}$	24.40	8.40
$T_{4\,(1.5\ LV)}$	24.80	8.35
$T_{5\,(0.5\ MV)}$	24.30	8.41
$T_{6\,(1.0\ MV)}$	24.50	8.38
$T_{7\,(1.5\ MV)}$	24.80	8.35
$T_{8\,(0.5\ HV)}$	24.47	9.44
$T_{9\,(1.0\ HV)}$	24.60	9.42
$T_{10\,(1.5\ HV)}$	24.80	9.40
Mean (T)	24.53	8.61
SEm±	0.037	0.032
$CD_{0.05}$	0.108	0.094
CV%	0.26 %	0.64 %

Moisture

Perusal of data pertaining to effect of foaming agent treatments on moisture content of foam mat dehydrated bael pulp powder during six months storage has been presented in Table 2. Data showed that among different foaming agent (CMC) treatments, the mean moisture content of foam mat dehydrated bael pulp powder (T) varied between 6.74 per cent and 7.36 per cent, with minimum moisture content in bael pulp dehydrated by using 1.00 per cent CMC of high viscosity (T_9) which remained statistically at par with T_4 (1.5 per cent CMC of low viscosity) and maximum moisture in bael pulp dehydrated without foaming agent T_1 (control). However, effect of treatment was found to have significant effect. Variation in moisture content might be due to higher drying rate with lesser drying time as compared to control. Similar significant variations due to use of foaming agent on moisture content were also reported by Mishra *et al.* (2002) [10] for foam mat drying of apple and Rajkumar *et al.* (2007) [17] for foam mat drying of alphonso mango pulp. Data depicted that storage of dehydrated bael pulp powder resulted increase in mean moisture content (S) from 5.85 per cent to 7.66 per cent during six months. However, effect of storage level was found to have significant effect. It may be due to absorption of moisture during storage which might be attributed to permeability of the packaging material toward moisture absorption. The similar reason for other processed products had been reported by Ajela *et al.* (2008) [1] for dietary powder of mango peel for dehydrated onion rings and dehydrated *Aloe vera* jel.

Table 2: Effect of different treatments on moisture of foam mat dehydrated bael pulp powder during storage.

Treatment	Moisture (%)			Mean (T)
	Storage (month)			
	0	3	6	
T_1 (C)	6.94	7.30	7.84	7.36
T_2 (0.5 LV)	5.80	7.24	7.62	6.89
T_3 (1.0 LV)	5.68	7.46	7.90	7.01
T_4 (1.5 LV)	5.46	7.30	7.49	6.75
T_5 (0.5 MV)	5.82	7.51	7.74	7.02
T_6 (1.0 MV)	5.35	7.35	7.64	6.78
T_7 (1.5 MV)	5.94	7.21	7.41	6.85
T_8 (0.5 HV)	6.20	7.41	7.74	7.12
T_9 (1.0 HV)	5.35	7.36	7.52	6.74
T_{10} (1.5 HV)	5.94	7.49	7.71	7.05
Mean (S)	5.85	7.36	7.66	
SEm±	T	S	T×S	CV%
	0.042	0.023	0.074	T: 8.17
$CD_{0.05}$	0.125	0.067	0.212	S: 1.84

Total soluble solids

Perusal of data pertaining to effect of foaming agent treatments on TSS of foam mat dehydrated bael pulp powder during six months storage has been presented in Table 3. Data showed that among different foaming agent (CMC) treatments, the mean TSS of foam mat dehydrated bael pulp powder (T) varied between 72.70 °Brix and 72.26 °Brix, with maximum TSS in bael pulp dehydrated by using 0.5 per cent low viscous CMC (T_2) which remained statistically at par with T_8 (0.5 per cent CMC of high viscosity) and minimum TSS in bael pulp dehydrated without foaming agent (T_1). However, effect of treatment was found to have significant effect. Variation in TSS might be due to variations in moisture content and variations in CMC concentrations. Similar significant variations due to use of foaming agent on TSS were also reported by Mishra *et al.* (2002) [10] for foam mat drying of apple and Rajkumar *et al.* (2007) [17] for foam mat drying of alphonso mango pulp. Data depicted that storage of dehydrated bael pulp powder resulted increase in mean TSS (S) from 72.32 °Brix to 72.90 °Brix during six months. However, effect of storage level was found to have significant effect. Increase in TSS during storage might be due to inversion or hydrolysis of polysaccharides into simple sugars in presence of organic acids as reported by Raj (2000) [15] in dehydrated onion ring during six months storage. Similar observations were made by Sharada (2013) [19] in TSS of foam mat dried guava and banana powder during storage.

Table 3: Effect of different treatments on TSS of foam mat dehydrated bael pulp powder during storage.

Treatment	TSS (°B)			Mean (T)
	Storage (month)			
	0	3	6	
T_1 (C)	72.00	72.27	72.50	72.26
T_2 (0.5 LV)	72.42	72.68	73.00	72.70
T_3 (1.0 LV)	72.50	72.60	72.92	72.67
T_4 (1.5 LV)	72.33	72.60	73.00	72.64
T_5 (0.5 MV)	72.42	72.62	72.95	72.66
T_6 (1.0 MV)	72.33	72.50	72.82	72.55
T_7 (1.5 MV)	72.42	72.50	72.90	72.61
T_8 (0.5 HV)	72.33	72.58	73.15	72.69
T_9 (1.0 HV)	72.25	72.43	72.83	72.51
T_{10} (1.5 HV)	72.25	72.52	72.92	72.56
Mean (S)	72.32	72.53	72.90	
SEm±	T	S	T×S	CV%
	0.074	0.039	0.126	T: 0.30
$CD_{0.05}$	0.218	0.114	NS	S: 0.30

Acidity

Perusal of data pertaining to effect of foaming agent treatments on acidity of foam mat dehydrated bael pulp powder during six months storage has been presented in Table 4. Data showed that among different foaming agent (CMC) treatments, the mean acidity of foam mat dehydrated bael pulp powder (T) varied significantly between 1.018 per cent and 1.207 per cent, with minimum acidity in bael pulp dehydrated by using 0.5 per cent low viscous CMC (T_2) and maximum in bael pulp dehydrated without foaming agent (T_1). The decreasing trend was observed by Orishagbemi *et al.* (2015) [12] in foam dried pineapple powder and cashew juice powder. Data depicted that storage of dehydrated bael pulp powder resulted significantly decrease in mean acidity (S) from 1.204 per cent to 1.060 per cent during six months. Kadam *et al.* (2010) [6] observed declined of acidity in foam dried pineapple powder during storage. Similarly significant decrease in acidity was also reported by Anon. (2017) [2] for dehydrated cauliflower segments and okra slices during six months of storage when packed in different packaging material. Raj *et al.* (2006) [16] also observed decrease in acid content of the dehydrated onion ring during six months storage.

Table 4: Effect of different treatments on acidity of foam mat dehydrated bael pulp powder during storage

Treatment	Acidity (%)			Mean (T)
	Storage (month)			
	0	3	6	
T_1 (C)	1.330	1.177	1.113	1.207
T_2 (0.5 LV)	1.097	1.013	0.943	1.018
T_3 (1.0 LV)	1.137	0.983	0.967	1.029
T_4 (1.5 LV)	1.083	1.000	0.987	1.023
T_5 (0.5 MV)	1.230	1.143	1.100	1.158
T_6 (1.0 MV)	1.267	1.160	1.123	1.183
T_7 (1.5 MV)	1.230	1.107	1.053	1.130
T_8 (0.5 HV)	1.230	1.143	1.130	1.168
T_9 (1.0 HV)	1.270	1.147	1.113	1.177
T_{10} (1.5 HV)	1.167	1.080	1.067	1.104
Mean (S)	1.204	1.095	1.060	
SEm±	T	S	T×S	CV%
	0.011	0.002	0.006	T: 2.82
$CD_{0.05}$	0.033	0.005	0.017	S: 0.90

Ascorbic acid

Perusal of data pertaining to effect of foaming agent treatments on ascorbic acid of foam mat dehydrated bael pulp powder during six months storage has been presented in Table 5. Data showed that among different foaming agent (CMC) treatments, the mean ascorbic acid of foam mat dehydrated bael pulp powder (T) varied significantly between 75.00 mg/100 g and 68.02 mg/100 g, with maximum ascorbic acid in bael pulp dehydrated by using 1.0 per cent high viscous CMC (T_9) which was statistically at par with T_8 (0.5 per cent CMC of high viscosity) and minimum ascorbic acid in bael pulp dehydrated without foaming agent (T_1). Lower ascorbic acid values were found in foamed banana powder prepared by vacuum drying and hot air drying by Phisut *et al.* (2015) [14]. Ovasi (2014) [13] reported that the ascorbic acid content reduced during foam mat drying of tomato. Data depicted that storage of dehydrated bael pulp powder resulted significantly decrease in mean ascorbic acid (S) from 83.34 mg/100 g to 66.83 mg/100 g during six months. The decline in ascorbic acid content during storage might be due to oxidation (Mokady *et al.*, 1984). However, Mapson (1970) [9] reported decrease in ascorbic acid content in the products due to the

effect of storage temperature and catalytic activity of fructose and conversion of ascorbic acid to dehydroxy-ascorbic acid. Similar decline in ascorbic acid content was noticed in banana powder by Thuwapanichayanan *et al*. (2008) [22], mango powder by Rajkumar *et al.* (2007) [17], apple powder by Mishra *et al*. (2002) [10].

Table 5: Effect of different treatments on ascorbic acid of foam mat dehydrated bael pulp powder during storage

Treatment	Ascorbic acid (mg/100 g) Storage (month)			Mean (T)
	0	3	6	
$T_{1\ (C)}$	79.18	63.28	61.61	68.02
$T_{2\ (0.5\ LV)}$	78.92	68.34	66.67	71.31
$T_{3\ (1.0\ LV)}$	85.18	69.03	67.36	73.86
$T_{4\ (1.5\ LV)}$	78.98	68.84	67.18	71.67
$T_{5\ (0.5\ MV)}$	84.77	68.47	66.81	73.35
$T_{6\ (1.0\ MV)}$	85.18	69.03	67.36	73.86
$T_{7\ (1.5\ MV)}$	85.18	69.03	67.36	73.86
$T_{8\ (0.5\ HV)}$	85.36	69.94	68.24	74.51
$T_{9\ (1.0\ HV)}$	85.77	70.47	68.77	75.00
$T_{10\ (1.5\ HV)}$	84.90	68.65	66.99	73.51
Mean (S)	83.34	68.51	66.83	
SEm±	T	S	T×S	CV%
	0.277	0.118	0.374	T: 1.14
$CD_{0.05}$	0.817	0.338	1.069	S: 0.89

Vitamin B_2

Perusal of data pertaining to effect of foaming agent treatments on vitamin B_2 of foam mat dehydrated bael pulp powder during six months storage has been presented in Table 6. Data showed that among different foaming agent (CMC) treatments, the mean vitamin B_2 of foam mat dehydrated bael pulp powder (T) varied between 1922.22 µg/100 g and 1824.78 µg/100 g, with maximum vitamin B_2 in bael pulp dehydrated by using 0.5 per cent medium viscous CMC (T_5) and minimum vitamin B_2 in bael pulp dehydrated by using 0.5 per cent low viscous CMC (T_2). However, effect of treatment was found to have non-significant effect. Data depicted that storage of dehydrated bael pulp powder resulted decrease in mean vitamin B_2 (S) from 2916.30 µg/100 g to 821.10 µg/100 g during six months.

Table 6: Effect of different treatments on vitamin B_2 of foam mat dehydrated bael pulp powder during storage

Treatment	Vitamin B_2 (µg/100 g) Storage (month)			Mean (T)
	0	3	6	
$T_{1\ (C)}$	2916.33	1820.00	738.00	1824.78
$T_{2\ (0.5\ LV)}$	2915.33	1821.00	735.00	1823.77
$T_{3\ (1.0\ LV)}$	2915.00	1905.00	911.00	1910.44
$T_{4\ (1.5\ LV)}$	2916.67	1870.00	832.00	1872.89
$T_{5\ (0.5\ MV)}$	2916.00	1930.00	920.00	1922.22
$T_{6\ (1.0\ MV)}$	2916.33	1861.00	790.00	1855.79
$T_{7\ (1.5\ MV)}$	2916.00	1831.00	795.00	1847.56
$T_{8\ (0.5\ HV)}$	2916.00	1848.00	918.00	1894.11
$T_{9\ (1.0\ HV)}$	2917.00	1882.00	857.00	1885.22
$T_{10\ (1.5\ HV)}$	2916.66	2010.00	715.00	1880.56
Mean (S)	2916.30	1877.80	821.10	
SEm±	T	S	T×S	CV%
	2.288	1.112	3.517	T: 0.37
$CD_{0.05}$	6.749	3.179	10.053	S: 0.33

Colour

Perusal of data pertaining to effect of foaming agent treatments on colour score of foam mat dehydrated bael pulp powder during six months storage has been presented in Table 7. Data showed that among different foaming agent (CMC) treatments, the mean colour score of foam mat dehydrated bael pulp powder (T) varied between 7.50 and 7.27, with maximum colour score in bael pulp dehydrated by using 1.5 per cent high viscous CMC (T_{10}) which was statistically at par with T_8 and minimum colour score in bael pulp dehydrated without foaming agent (T_1). However, effect of treatment was found to have significant effect. Kandasamy *et al*. (2010) [6] found significant effect for various treatments of foam mat drying on colour. Data depicted that storage of dehydrated bael pulp powder resulted decrease in mean colour score (S) from 7.57 to 7.14 during six months. However, effect of storage level was found to have significant effect. The decrease in colour during storage might be attributed to increase in NEB of the bael powder during storage. Similar significant decrease in colour score were reported by Ramachandra and Rao (2011) [18] in dehumidified air dried *Aloe vera* gel powder during accelerated storage.

Table 7: Effect of different treatments on colour of foam mat dehydrated bael pulp powder during storage.

Treatment	Colour Storage (month)			Mean (T)
	0	3	6	
$T_{1\ (C)}$	7.50	7.25	7.05	7.27
$T_{2\ (0.5\ LV)}$	7.55	7.28	7.04	7.29
$T_{3\ (1.0\ LV)}$	7.50	7.25	7.15	7.30
$T_{4\ (1.5\ LV)}$	7.50	7.20	7.10	7.27
$T_{5\ (0.5\ MV)}$	7.53	7.25	7.11	7.30
$T_{6\ (1.0\ MV)}$	7.50	7.25	7.07	7.27
$T_{7\ (1.5\ MV)}$	7.53	7.20	7.16	7.30
$T_{8\ (0.5\ HV)}$	7.63	7.43	7.25	7.44
$T_{9\ (1.0\ HV)}$	7.71	7.45	7.25	7.47
$T_{10\ (1.5\ HV)}$	7.73	7.55	7.23	7.50
Mean (S)	7.57	7.31	7.14	
SEm±	T	S	T×S	CV%
	0.055	0.026	0.081	T: 2.24
$CD_{0.05}$	0.161	0.073	NS	S: 1.91

Taste

Perusal of data pertaining to effect of foaming agent treatments on taste score of foam mat dehydrated bael pulp powder during six months storage has been presented in Table 8. Data showed that among different foaming agent (CMC) treatments, the mean taste score of foam mat dehydrated bael pulp powder (T) varied between 7.39 and 6.63, with maximum taste score in bael pulp dehydrated by using 0.5 per cent high viscous CMC (T_8) and minimum taste score in bael pulp dehydrated without foaming agent (T_1). However, effect of treatment was found to have significant effect. Kandasamy *et al*. (2010) [6] found non-significant effect for various treatments of foam mat drying on taste. Data depicted that storage of dehydrated bael pulp powder resulted decrease in mean taste score (S) from 7.27 to 6.83 during six months. However, effect of storage level was found to have significant effect. The decrease in taste score might be attributed to increase in browning of dehydrated bael powder during storage. Similar significant decrease in taste score were also reported by Anon. (2017) [2] for dehydrated cauliflower segments, okra slices and onion ring during six months storage in different packaging materials.

Table 8: Effect of different treatments on taste of foam mat dehydrated bael pulp powder during storage

Treatment	Taste			Mean (T)
	Storage (month)			
	0	3	6	
$T_{1\ (C)}$	6.92	6.75	6.23	6.63
$T_{2\ (0.5\ LV)}$	7.60	6.69	6.40	6.90
$T_{3\ (1.0\ LV)}$	7.00	6.77	6.43	6.73
$T_{4\ (1.5\ LV)}$	7.48	7.06	6.93	7.16
$T_{5\ (0.5\ MV)}$	7.00	6.95	6.95	6.97
$T_{6\ (1.0\ MV)}$	7.17	7.11	7.11	7.13
$T_{7\ (1.5\ MV)}$	7.20	7.00	7.00	7.00
$T_{8\ (0.5\ HV)}$	7.78	7.27	7.13	7.39
$T_{9\ (1.0\ HV)}$	7.33	7.10	7.00	7.14
$T_{10\ (1.5\ HV)}$	7.37	7.20	7.07	7.21
Mean (S)	7.27	6.99	6.83	
SEm±	T	S	T×S	CV%
	0.066	0.042	0.134	T: 2.81
$CD_{0.05}$	0.195	0.121	0.382	S: 3.29

Flavour

Perusal of data pertaining to effect of foaming agent treatments on flavour score of foam mat dehydrated bael pulp powder during six months storage has been presented in Table 9. Data showed that among different foaming agent (CMC) treatments, the mean flavour score of foam mat dehydrated bael pulp powder (T) varied between 7.63 and 6.87, with maximum flavour score in bael pulp dehydrated by using 0.5 per cent high viscous CMC (T_8) and minimum flavour score in bael pulp dehydrated without foaming agent (T_1). Kandasamy *et al*. (2010) [6] found non-significant effect for various treatments of foam mat drying on flavour. However, effect of treatment was found to have non-significant effect. Data depicted that storage of dehydrated bael pulp powder resulted decrease in mean flavour score (S) from 7.32 to 7.04 during six months. However, effect of storage level was found to have significant effect. The decrease in flavour score might be attributed development of off-flavour and increase in browning of dehydrated bael powder during storage. Similar significant decrease in flavour score were also reported by Anon. (2017) [2] for dehydrated cauliflower segments, okra slices and onion ring during six months storage in different packaging materials.

Table 9: Effect of different treatments on flavor of foam mat dehydrated bael pulp powder during storage

Treatment	Flavor			Mean (T)
	Storage (month)			
	0	3	6	
$T_{1\ (C)}$	7.00	6.88	6.72	6.87
$T_{2\ (0.5\ LV)}$	7.73	7.40	7.10	7.41
$T_{3\ (1.0\ LV)}$	7.00	6.88	6.76	6.88
$T_{4\ (1.5\ LV)}$	7.00	6.88	6.77	6.88
$T_{5\ (0.5\ MV)}$	7.03	6.92	6.80	6.92
$T_{6\ (1.0\ MV)}$	7.17	7.05	6.93	7.05
$T_{7\ (1.5\ MV)}$	7.50	7.32	7.19	7.33
$T_{8\ (0.5\ HV)}$	7.70	7.67	7.53	7.63
$T_{9\ (1.0\ HV)}$	7.60	7.50	7.38	7.49
$T_{10\ (1.5\ HV)}$	7.43	7.33	7.20	7.32
Mean (S)	7.32	7.18	7.04	
SEm±	T	S	T×S	CV%
	0.215	0.029	0.088	T: 9.01
$CD_{0.05}$	NS	0.079	NS	S: 2.12

Texture

Perusal of data pertaining to effect of foaming agent treatments on texture score of foam mat dehydrated bael pulp powder during six months storage has been presented in Table 10. Data showed that among different foaming agent (CMC) treatments, the mean texture score of foam mat dehydrated bael pulp powder (T) varied between 7.53 and 6.79, with maximum texture score in bael pulp dehydrated by using 1.0 per cent high viscous CMC (T_9) and minimum texture score in bael pulp dehydrated without foaming agent (T_1). Kandasamy *et al*. (2010) [6] found non-significant effect for various treatments of foam mat drying on texture. However, effect of treatment was found to have significant effect. Data depicted that storage of dehydrated bael pulp powder resulted decrease in mean texture score (S) from 7.47 to 7.16 during six months. However, effect of storage level was found to have significant effect. The decrease in texture score might be attributed to increase moisture content of dehydrated bael powder during storage. Similar significant decrease in texture score were also reported by Anon. (2017) [2] for dehydrated cauliflower segments, okra slices and onion ring during six months storage in different packaging materials.

Table 10: Effect of different treatments on texture of foam mat dehydrated bael pulp powder during storage

Treatment	Texture			Mean (T)
	Storage (month)			
	0	3	6	
$T_{1\ (C)}$	7.00	6.76	6.61	6.79
$T_{2\ (0.5\ LV)}$	7.50	7.30	7.20	7.33
$T_{3\ (1.0\ LV)}$	7.50	7.35	7.30	7.38
$T_{4\ (1.5\ LV)}$	7.50	7.34	7.27	7.37
$T_{5\ (0.5\ MV)}$	7.50	7.31	7.22	7.34
$T_{6\ (1.0\ MV)}$	7.30	7.06	6.91	7.09
$T_{7\ (1.5\ MV)}$	7.50	7.25	7.11	7.29
$T_{8\ (0.5\ HV)}$	7.60	7.43	7.37	7.47
$T_{9\ (1.0\ HV)}$	7.83	7.43	7.33	7.53
$T_{10\ (1.5\ HV)}$	7.50	7.33	7.25	7.36
Mean (S)	7.47	7.26	7.16	
SEm±	T	S	T×S	CV%
	0.069	0.044	0.139	T: 2.84
$CD_{0.05}$	0.204	0.125	NS	S: 3.29

Overall acceptability

Perusal of data pertaining to effect of foaming agent treatments on overall acceptability score of foam mat dehydrated bael pulp powder during six months storage has been presented in Table 11. Data showed that among different foaming agent (CMC) treatments, the mean overall acceptability score of foam mat dehydrated bael pulp powder (T) varied between 7.48 and 6.89, with maximum overall acceptability score in bael pulp dehydrated by using 0.5 per cent high viscous CMC (T_8) and minimum overall acceptability score in bael pulp dehydrated without foaming agent (T_1). Effect of treatment was found to have significant effect. However, Kandasamy *et al*. (2010) [6] found non-significant effect for various treatments of foam mat drying on overall acceptability. Data depicted that storage of dehydrated bael pulp powder resulted decrease in mean overall acceptability score (S) from 7.41 to 7.05 during six months. However, effect of storage level was found to have significant effect. The decrease in overall acceptability score might be attributed to increase in moisture content, water activity and NEB in dehydrated bael powder during storage.

Table 11: Effect of different treatments on overall acceptability of foam mat dehydrated bael pulp powder during storage

Treatment	Overall acceptability			Mean (T)
	Storage (month)			
	0	3	6	
$T_{1\ (C)}$	7.10	6.91	6.65	6.89
$T_{2\ (0.5\ LV)}$	7.60	7.17	6.93	7.23
$T_{3\ (1.0\ LV)}$	7.25	7.06	6.91	7.08
$T_{4\ (1.5\ LV)}$	7.37	7.12	7.02	7.17
$T_{5\ (0.5\ MV)}$	7.27	7.11	7.02	7.13
$T_{6\ (1.0\ MV)}$	7.28	7.12	7.00	7.13
$T_{7\ (1.5\ MV)}$	7.38	7.19	7.11	7.23
$T_{8\ (0.5\ HV)}$	7.68	7.45	7.32	7.48
$T_{9\ (1.0\ HV)}$	7.62	7.37	7.32	7.44
$T_{10\ (1.5\ HV)}$	7.51	7.35	7.23	7.37
Mean (S)	7.41	7.19	7.05	
SEm±	T	S	T×S	CV%
	0.064	0.015	0.047	T: 2.67
$CD_{0.05}$	0.189	0.043	0.135	S: 1.13

Conclusion

The findings summarized above indicate that Bael pulp powder can be prepared by mixing and whipping 0.5 per cent high viscous CMC followed by mechanical dehydration in cabinet dryer till moisture content of 6-7 per cent and can remain shelf stable on the basis of nutritional as well as sensory quality upto six months in polypropylene bag of 400 gauge.

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