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Impact of sugar solutions on chemical composition of osmo dehydrated papaya slices during storage with different drying methods

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Abstract
Papaya slices were treated with different pre-treatments namely control, T_1 = Control, T_2 = Potassium Metabisulphate, T_3 = Sodium bisulphate and T_4 = Blanching at 95 ^oC for 4 minute. The treated sample were osmosed in syrup solution of 55 ^{o}Brix & 65 ^{o}Brix for period of 180 minutes, than wiped and dried in tray dryer and hot air oven dryer at 60 ^oC. The highest acidity content was found 0.809 for untreated dried sample 60 ^oC (Tray Dryer) after zero days of storage. It was observed that the T_1 sample have maximum (8.8%) moisture content after 90 days of storage periods. While the T_2 sample have minimum (2.38%) moisture content after zero day storage period. The highest ash content was found 0.29 for untreated dried sample at 60 ^oC (Tray Dryer) after 90 days of storage. The highest acidity content was found 0.809 for untreated dried sample 60 ^oC (Hot Air Oven) after zero days of storage. It was observed that the T_1 sample have maximum (13.59%) moisture content after zero day of storage period. The highest ash content was found 0.31 for T_4 sample at 60 ^oC (Hot Air Oven) after 90 days of storage.

Keywords: Papaya, dryer, sugar concentration, **s**torability etc.

Introduction
Osmotic dehydration of fresh produce can also be used as a pre-treatment to additional supplementary drying processing to improve sensory, functional and even nutritional properties. The rate of softening after processing depends on many factors related to the product and to the processing and storage conditions. Pretreatment with osmotic solution having concentration lower than the natural cell concentration can improve the rehydration characteristics (Chandra and Kumari, 2015) [2]. The use of fresh-cut papaya in food service institutions is very limited owing to the many technical problems involved in maintaining its quality and microbiological safety during storage (Rivera-Lopez *et al*., 2005) [3]. Osmotic dehydration results in increased shelf-life, little bit loss of aroma in dried and semidried food stuffs, lessening the load of freezing and to freeze the food without causing unnecessary changes in texture (Petrotos and Lazarides, 2001) [1]. Osmotic dehydration of fresh produce can also be used as a pre-treatment to additional supplementary drying processing to improve sensory, functional and even nutritional properties (Kumar, *et al*., 2019 & Chaudhary, *et al*., 2019) [5, 6]. Many processing techniques can be employed to preserve fruits and vegetables such as drying and dehydration. It is one of the most important operations that are widely practiced because of considerable saving in packaging, storage etc. Osmotic dehydration has received greater attention in recent years as an effective method for preservation of fruits (Chaudhari, *et al*., 2015) [4].

Material and Methods
Experimental plan
Papaya slices were pretreatment with treatments (T_1 = Control, T_2 = Potassium Metabisulphate, T_3 = Sodium bisulphate and T_4 = Blanching at 95 ^oC for 4 min.) in osmotic solution at temperature of 50 °C. Then the samples were dried under Hot Air Oven drier at 60 ^oC temperature. During the process, osmosis was carried out in sucrose solution at a varying concentration of 55°Brix and 65°Brix. At each experimental condition, osmotic dehydration was carried out for 180 minutes and data are observed at each 30 min intervals.

Experimental procedure

The papaya was procured from the local market of Meerut (UP) in 2018. The papaya was then washed, and decides into 2.5x2.5x2.5 cm Size. The papaya slices were treated above decided treatments for 30 minutes and then the sample were removed from treated solution and placed at room temperature for 15 minutes and then weighted by electrical balance. After that the samples were osmosed with sugar solution (55°Brix and 65°Brix) for 180 minutes at 50 °C temperature and then the osmo-dried papaya slices were dried in Tray Dryer and Hot Air Oven at 60 °C.

Results

Effect of sugar solution on Acidity content of osmo dried (Tray Dryer) papaya slices during storage.

It can observe that the acidity of all samples was decreasing at different days of storage. The highest acidity content was found 0.809 for untreated dried sample 60 °C (Tray Dryer) after zero days of storage. While lowest 0.101 for 65 °Brix osmo treated with blanching (T_4) pretreated, the sample dried at 60 °C after 90 days of storage. The complete data are show in Table 1.

Table 1: Effect of sugar solution on Acidity content of osmo dried (Tray Dryer) papaya slices during storage.

Days	T_1		T_2		T_3		T_4	
	55 °B	65 °B	55 °B	65 °B	55 °B	65 °B	55 °B	65 °B
0	0.809	0.127	0.280	0.112	0.232	0.172	0.044	0.107
30	0.808	0.126	0.270	0.110	0.231	0.170	0.041	0.106
60	0.807	0.125	0.250	0.108	0.229	0.169	0.038	0.103
90	0.805	0.124	0.230	0.107	0.227	0.168	0.036	0.101

Effect of sugar solution on Acidity content of osmo dried (Hot Air Oven) papaya slices during storage

It can observe that the acidity of all samples was decreasing at different days of storage. The highest acidity content was found 0.809 for untreated dried sample 60 °C (Hot Air Oven) after zero days of storage. While lowest 0.029 for 65 °Brix osmo treated T_4 pretreated, the sample dried at 60 °C after 90 days of storage. The complete data are show in table 2.

Table 2: Effect of sugar solution on Acidity content of osmo dried (Hot Air Oven) papaya slices during storage.

Days	T_1		T_2		T_3		T_4	
	55 °B	65 °B	55 °B	65 °B	55 °B	65 °B	55 °B	65 °B
0	0.809	0.127	0.132	0.037	0.063	0.063	0.069	0.065
30	0.808	0.126	0.130	0.034	0.062	0.060	0.067	0.062
60	0.807	0.125	0.128	0.031	0.061	0.058	0.065	0.060
90	0.805	0.124	0.125	0.029	0.058	0.057	0.064	0.059

Effect of sugar solution on moisture content of osmo dried (Tray Dryer) papaya slices during storage

The moisture content a slight increasing trend as the storage period increases and this is due to the storage of samples at ambient temperature. The moisture content in osmotic solution increase the variation in moisture of dried papaya slices with storage period for experimental of sugar syrup concentration (55 and 65 °Brix) and control the effect of moisture content on osmo convective dehydration papaya slices was clearly show in figure. It was observed that the T_1 sample have maximum (8.8%) moisture content after 90 days of storage periods. While the T_2 sample have minimum (2.38%) moisture content after zero-day storage period. It concludes that the moisture content of T_3 sample were range from 4.95 to 5.21 and 3.01 to 3.04 at 55 °Brix and 65 °Brix respectively. While it concludes that the moisture content of T_4 sample was range from 1.65 to 2.20 and 5.58 to 5.62 at 55 °Brix and 65 °Brix respectively. The complete data are show in table 3

Table 3: Effect of sugar solution on moisture content of osmo dried (Tray Dryer) papaya slices during storage.

Days	T_1		T_2		T_3		T_4	
	55 °B	65 °B	55 °B	65 °B	55 °B	65 °B	55 °B	65 °B
0	8.59	7.03	2.38	3.51	4.95	3.01	1.65	5.58
30	8.65	7.05	2.47	3.61	5.05	3.02	1.95	5.60
60	8.72	7.09	2.54	3.63	5.12	3.03	2.14	5.61
90	8.88.	7.09	2.63	3.64	5.21	3.04	2.20	5.62

Effect of sugar solution on moisture content of osmo dried (Hot Air Oven) papaya slices during storage

It was observed that the T_1 sample have maximum (13.59%) moisture content after zero day of storage period. While the T_3 sample have minimum (3.94%) moisture content after same storage period. It conclude that the moisture content of T_2 sample were range from 4.61 to 4.92 and 3.94 to 4.23 at 55 °Brix and 65 °Brix respectively. While it concludes that the moisture content of T_4 sample were range from 2.71 to 2.91 and 8.68 to 8.93 at 55 °Brix and 65 °Brix respectively. The complete data are show in table 4

Table 4: Effect of sugar solution on moisture content of osmo dried (Hot Air Oven) papaya slices during storage.

Days	T_1		T_2		T_3		T_4	
	55 °B	65 °B	55 °B	65 °B	55 °B	65 °B	55 °B	65 °B
0	6.37	13.29	4.61	3.94	6.70	8.33	2.71	8.68
30	6.45	13.37	4.73	4.08	6.83	8.45	2.79	8.75
60	6.67	13.46	4.86	4.16	6.92	8.56	2.84	8.84
90	6.74	13.59	4.92	4.23	6.98	8.63	2.91	8.93

Effect of sugar solution on Ash content of osmo dried (Tray Dryer) papaya slices during storage.

The Ash content a slight increasing trend as the storage period increases and this is due to the storage of samples at ambient temperature. The highest ash content was found 0.29 for untreated dried sample at 60 °C (Tray Dryer) after 90 days of storage. While lowest 0.26 for 55 °Brix T_2 sample after 90 days of storage periods. The complete data are show in table 5.

Table 5: Effect of sugar solution on Ash content of osmo dried (Tray Dryer) papaya slices during storage.

Days	T_1		T_2		T_3		T_4	
	55 °B	65 °B	55 °B	65 °B	55 °B	65 °B	55 °B	65 °B
0	0.27	0.29	0.26	0.26	0.27	0.27	0.28	0.28
30	0.27	0.29	0.26	0.26	0.27	0.27	0.28	0.28
60	0.27	0.29	0.26	0.26	0.27	0.27	0.28	0.28
90	0.27	0.29	0.26	0.26	0.27	0.27	0.28	0.28

Effect of sugar solution on Ash content of osmo dried (Hot Air Oven) papaya slices during storage.

The Ash content a slight increasing trend as the storage period increases and this is due to the storage of samples at ambient temperature. The highest ash content was found 0.31 for T_4 sample at 60 °C (Hot Air Oven) after 90 days of storage. While lowest 0.27 for 55 °Brix T_1 sample after 90 days of storage periods. The complete data are show in table 6.

Table 6: Effect of sugar solution on Ash content of osmo dried (Hot Air Oven) papaya slices during storage.

Days	T_1		T_2		T_3		T_4	
	55 °B	65 °B	55 °B	65 °B	55 °B	65 °B	55 °B	65 °B
0	0.27	0.29	0.28	0.28	0.29	0.29	0.30	0.31
30	0.27	0.29	0.28	0.28	0.29	0.29	0.30	0.31
60	0.27	0.29	0.28	0.28	0.29	0.29	0.30	0.31
90	0.27	0.29	0.28	0.28	0.29	0.29	0.30	0.31

Conclusion

It can observe that the acidity of all samples was decreasing at different days of storage. The moisture content a slight increasing trend as the storage period increases and this is due to the storage of samples at ambient temperature. The Ash content a slight increasing trend as the storage period increases and this is due to the storage of samples at ambient temperature.

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