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Studies on Preparation of Spray Dried Pineapple (*Ananas Comosus* L.) Juice Powder

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Abstract: *The present investigation entitled, 'Studies on preparation of spray dried pineapple (Ananas comosus L.) juice powder' was undertaken at the Department of Post harvest Management of Fruit, Vegetables, and Flower Crops, Faculty of Post Harvest Management, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist- Ratnagiri during the year 2014-2015.*

The experiment was conducted in F.C.R.D. with four factors viz., maltodextrin levels (10%, 15%, 20% and 25%) with 1% tricalcium phosphate and storage period (0, 30, 60, and 90 days). Based on the overall acceptability, the addition of maltodextrin @ 10 per cent proved to be suitable for the production of high quality of spray dried pineapple juice powder.

Keywords: *Pineapple juice powder, Storage, Spray drying, Overall acceptability.*

INTRODUCTION

Pineapple (*Ananas cosmosus L*), is a tropical fruit which grows in countries which are situated in the tropical and sub-tropical regions. It is native to Central and South America. Pineapple belongs to the Bromeliaceae family and grows near the ground. It can grow up to 1 m in height and 1.5 m wide. Other bromeliads live on trees (epiphytes). There are many cultivars of *Ananas*, but the predominant one is 'Smooth Cayenne' (Samson, 1986). Total pineapple production worldwide is around 16 to 18 million tons. There are several countries (*e.g.* Thailand, Costa richa, Brazil, Phillipines, Indonesia, India and Nigeria) which contribute to the total production. India is the sixth largest producer of pineapple in the world contributing almost 6.24 per cent to the world production of fresh pineapple (Anon., 2012).

West Bengal, Assam, Tripura, Karnataka, Bihar, Manipur, Meghalaya, Nagaland are the major pineapple producing states of India. It occupies an area of about 105.2 thousand ha with the production of 1570.6 million MT in India (Anon., 2013). In Maharashtra, it is mostly grown in Konkan region due to hot and humid climatic conditions and sloppy land. Processed pineapple is a popular product which is exported by countries which produce pineapple. Brazil is considered the main pineapple producing country in the world since 2005 (Carvalho *et al*., 2008). During processing, the nutritional quality of pineapple gets reduced, but there are some new technologies which could retain the nutritional quality of the pineapple fruit. This is to meet the consumer demand for healthy, nutritious and "natural" products (Deliza *et al*., 2005).

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Spray drying method is used in food processing for making a powder form of product. In this method, the high pressure and temperature vacuum is used and a juice is dehydrated and converted into powder form to increase shelf life and that helps to get good market price. Pineapple juice powder is new dimension of pineapple processing industries and the spray dried powder could be utilized for making cakes, pastries, ice-creams, RTS, etc. Therefore, the present investigation was undertaken with the following objectives. 1. To standardize levels of maltodextrin for spray drying and 2. To study quality attributes of pineapple juice powder.

MATERIAL AND METHODS

The fully matured, healthy and uniform size pineapple fruits were obtained from local market. Well developed uniform size fruits free from diseases, injuries, bruises and blemishes were selected, cleaned and used for the juice extraction. The extracted pineapple juice was clarified manually by using muslin cloth to obtain clear juice for spray drying, Potassium metabisulphite was added at the rate of 500 ppm in pineapple filtered juice and mix it well and then transferred into food grade plastic cans for further investigation.

In pineapple juice, maltodextrin was added at the rate 10, 15, 20 and 25 per cent as per the treatment. The tricalcium phosphate was added @ 1 per cent for free flowingness of the powder in each treatment. After addition of maltodextrin and tricalcium phosphate pineapple juice was stirred thoroughly and used for the preparation of powder by help of spray dryer. Immediately after spray drying the powder was packed in the multi layer aluminium pouches for further chemical and sensory evaluation.

Treatment Details

T1- 10% maltodextrin + 1 % TCP,

T2- 15% maltodextrin + 1 % TCP.

T3- 20% maltodextrin + 1 % TCP and

T4- 25 % maltodextrin + 1 % TCP.

Preparation of Pineapple Powder by Spray Drying Technique

Ripe pineapple fruits

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Cleaning of the pineapple fruits

↓

Peeling, cutting of fruit and removal of core portion

↓

Extraction of juice by mixer

↓

Straining of juice through muslin cloth

↓

Addition of potassium metabisulphite @ 500 ppm in juice

↓

Addition of maltodextrin as per the treatment

↓

Addition of tricalcium phosphate @1% in each treatment

↓

Homogenization

↓

Spray drying

↓

Pineapple powder

↓

Packaging in multilayer aluminium pouches

↓

Storage at cool and dry place

RESULTS AND DISCUSSION

The data on the changes in TSS, acidity, reducing sugar, total sugar content of pineapple juice powder during storage is presented in Table 1 to 2. There was a significant decline in TSS content during storage. This might be due to pickup of the moisture

Table 1
Changes in T.S.S. and titratable acidity of pineapple powder during storage

Treatments	*TSS (°B)*					*Titratable acidity (%)*				
Days	*0*	*30*	*60*	*90*	*Mean*	*0*	*30*	*60*	*90*	*Mean*
T1	95.30	94.55	92.65	88.65	92.79	2.37	2.35	2.17	1.72	2.15
T2	96.17	95.27	93.80	90.55	93.55	2.05	1.85	1.82	1.41	1.77
T3	97.05	95.46	95.02	91.40	94.74	2.00	1.76	1.37	1.19	1.58
T4	98.03	95.18	93.80	92.00	94.75	1.76	1.58	1.24	1.01	1.40
Mean	96.64	95.12	93.82	90.65		2.03	1.88	1.65	1.33	

	S.E.m ±	C.D. at 5%	S.E.m ±	C.D. at 5%
Treatment (T)	0.48	1.36	0.04	0.11
Storage(S)	0.48	1.36	0.04	0.11
Interaction (TXS)	0.95	N.S.	0.08	N.S.

Table 2
Changes in Reducing sugar and total sugar of pineapple powder during storag

Treatments	*Reducing sugars (%)*					*Total sugars (%)*				
Days	*0*	*30*	*60*	*90*	*Mean*	*0*	*30*	*60*	*90*	*Mean*
T1	17.91	17.21	16.03	12.44	15.90	38.22	37.54	31.18	27.62	33.64
T2	19.06	17.84	15.65	12.59	16.28	41.64	39.15	35.70	28.84	36.33
T3	19.82	19.06	18.35	13.18	17.60	48.79	43.24	40.23	34.01	41.82
T4	20.00	19.16	17.77	14.25	17.79	49.25	46.36	46.33	43.23	46.29
Mean	19.20	18.31	16.95	13.11		44.47	41.57	38.36	33.68	

	S.E.m ±	C.D. at 5%	S.E.m ±	C.D. at 5%
Treatment (T)	0.34	0.96	0.45	1.27
Storage(S)	0.34	0.96	0.45	1.27
Interaction (TXS)	0.68	N.S.	0.90	2.55

from the atmosphere by the spray dried pineapple juice powder which lowered the concentration of total soluble solids of the spray dried pineapple juice powder. Similar results were also observed by Costa *et al*. (2009) who reported that the dehydrated cashew apple fruit powder had higher (40.38°B) total soluble solids. The decreasing trend in acidity of the pineapple juice powder content was observed. Similar results were also observed by Dhutade (2012) in sapota juice powder, Patade (2013) in coconut milk powder and Kamtekar (2014) in jamun juice powder. During storage, there was a significant decline in reducing sugars content during storage. Similar trend was also reported by Roy and Singh (1979) in beal fruit powder, Kumar and Sreenarayanan (2000) in dehydrated onion flakes and Sagar *et al*. (2000) in ripe mango powder. As regards storage, there was a decreasing trend in mean total sugars values of pineapple juice powder during the storage period of 90 days. Total sugars of karonda syrup increased significantly during storage period of 90 days. Similar results were also observed by Ramesh and Gupta (2005) reported 35.35 and 26.74 per cent total sugars in pineapple milk powder and pineapple lassi powder respectively. Among the treatments, treatment T_1 scored highest rating for

Table 3
Changes in Organoleptic score for colour and flavour texture of pineapple powder during storage

Treatments	*Colour*					*Flavour*					*Texture*				
Days	*0*	*30*	*60*	*90*	*Mean*	*0*	*30*	*60*	*90*	*Mean*	*0*	*30*	*60*	*90*	*Mean*
T1	8.25	8.00	8.00	7.62	7.97	8.00	7.75	7.62	7.38	7.69	8.13	7.63	7.37	6.75	7.47
T2	7.75	7.75	7.50	7.50	7.66	7.75	7.50	7.25	6.75	7.31	7.63	6.87	6.88	6.37	6.94
T3	7.50	7.50	7.50	7.25	7.47	7.38	7.13	7.00	6.75	7.06	7.13	6.38	6.50	6.00	6.50
T4	7.37	7.37	7.25	7.00	7.28	7.00	7.00	7.00	6.50	6.88	6.63	6.00	6.00	5.63	6.06
Mean	7.82	7.66	7.56	7.34		7.53	7.34	7.22	6.84		7.38	6.72	6.69	6.19	
	S.E.m ±		C.D. at 5%			S.E.m ±		C.D. at 5%			S.E.m ±		C.D. at 5%		
Treatment (T)	0.10		0.27			0.15		0.43			0.18		0.52		
Storage(S)	0.10		0.27			0.15		0.43			0.18		0.52		
Interaction (TXS)	0.19		N.S.			0.30		N.S.			0.36		N.S.		

overall acceptability and was significantly superior to rest of the treatments. The pineapple juice powder with 10 per cent maltodextrin was rated the best with respect to the sensory attributes like colour, flavour, texture and overallacceptability.

CONCLUSION

The present study revealed that the maltodextrin levels exhibited a significant variation with respect to chemical parameters such as TSS, acidity, total sugars, reducing sugars content of the pineapple juice powder and also the sensory qualities of powder and RTS prepared from pineapple juice powder.

Based on the overall acceptability, the addition of maltodextrin @10 per cent would be recommended for the preparation of high quality spray dried pineapple juice powder.

Table 4
Changes in Organoleptic score for overall acceptability of pineapple powder during storage

Overall acceptability					
	Storage period (Days)				
Treatments	*0*	*30*	*60*	*90*	*Mean*
T1	8.13	7.79	7.66	7.25	7.71
T2	7.71	7.37	7.21	6.87	7.29
T3	7.34	7.00	7.00	6.67	7.00
T4	7.33	6.79	6.75	6.38	6.81
Mean	7.63	7.24	7.16	6.79	
		S.E.m ±		C.D. at 5%	
Treatment (T)		0.10		0.27	
Storage (S)		0.10		0.27	
Interaction (TXS)		0.19		N.S.	

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