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Nutritient Content of the Papaya Powder Obtained by Different Methods of Drying

Home Science

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ABSTRACT

Papaya is considered as a fruit of choice of the processing sector as the availability of the fruit is largely spread throughout the year. Though India is world's second largest producer of fruits, hardly five per cent of the produce is processed. A need therefore prevails to develop suitable technology for processing of fruits. Papaya pieces were dried using sun, hot air oven and solar drying in order to preserve the fruit without loss of quality for extended periods. The dried fruit obtained were ground into fine powders separately. The fruit powders were analysed for their nutrient content like energy, protein, carbohydrate, calcium, phosphorus, iron, thiamine, riboflavin, vitamin C, carotenes, reducing sugars, ash, moisture and acidity and also subjected to acceptability trials. The results obtained from nutrient analysis revealed that fruit powders obtained by solar drying were found to be best.

Introduction

India stands second in fruits and vegetable production by producing about 86 and 43 million tonnes respectively (Government of India, 2000). India with its diverse, but favorable agro climatic conditions produces a wide range of tropical and temperate fruits and vegetables. The area of fruits cultivation increased from 1.22 million hectares to 3.35 million hectares in 1995-96. India with a production of 41.50 million tonnes (1996-97) is the second largest producer (next to China 45-46 million tonnes) with a share of eight per cent in world fruit production (Chadha,1995).

Almost all the states of India have fruits orchard. Many types of tropical, semi tropical and temperate fruits are cultivated. Glucose, fructose, sucrose and starches constitute the "available carbohydrates" of fruits and the caloric value of the fruit depends to a large measure on the concentration of these components.

In terms of nutrition, fruits are very good sources of several vitamins, mineral salts and dietary fibre, all of which are essential for good health. Papaya (Carica papaya) known as the wonder fruit of the tropics can provide the essential protective nutrition for the poorest section of the society. Papaya is nutritious and has much therapeutic value (Directorate of Extension, 2000). Papaya is unique among the fruit crops because of its high yielding potential and year round fruiting behaviour (Singh et al., 1998). It is a good medicine for constipation and urinary disorders (Joseph, 2002).

Though India is world's second largest producer of fruits and vegetables , hardly five per cent of the produce is processed and 30 per cent of the annual produce is wasted due to lack of preservation facilities (India budget, 2001). Food preservation by drying is one of the methods practices from ancient times. The best and most inexpensive method to make the fruits available through all seasons is drying. In drying, a food loses its moisture content, which results in increasing the concentration of nutrients in the remaining mass.

Objectives: To

· Analysing the nutritive value of the papaya fruit
· Identification of suitable method for dehydration of papaya
· Evaluate the nutritive value of the dried papaya powder

Experimental Procedure

Papaya is considered as a fruit of choice of the processing sector as the availability of the fruit is largely spread throughout the year. The comparatively cheaper cost of papaya, higher recovery of pulp, attractive colour of the flesh, high carotene content to alleviate vitamin A deficiency and suitability for a wide range of processed products make it more ideal for processing.

The types of dehydration methods followed in the study included sun drying, hot air oven drying and solar drying. Dehydration methods like sun drying and solar drying have been selected because of the natural abundant source of solar energy, convenience, minimum cell destruction and inexpensiveness. Hot air oven drying was selected because of its more convenient and can be carried out at household level.

The samples obtained after drying by the selected three methods were powdered separately using a household mixie to get a fine powder. The dried powders were used for nutrient analysis. Energy content of the powder was determined using Oxygen Bomb Calorimeter. The protein content was estimated using Kjeltech distillation system. Determination of moisture, ash, carbohydrate, thiamine, riboflavin, calcium, phosphorus and iron were carried out following AOAC (1990) procedures. Estimation of ascorbic acid by 2,6 dichlorophenol indophenol method and reducing sugar by Nelson-somogyi method. Total carotene was analyzed by spectrophotometery and beta carotene by HPLC Method. All the estimates were done in duplicates and the mean values were found out.

Findings of the Study

Details of Drying of Papaya

Table I presents the drying details namely time, temperature, yield and acceptability scores of papaya powder obtained by sun drying, solar drying and hot air oven drying methods.

TABLE I

DRYING TIME, TEMPERATURE, YIELD AND MEAN ACCEPTABILITY SCORES OF PAPAYA POWDERS

S. No	Details	Sun Drying	Solar Drying	Hot air oven drying
1.	Drying time (in hrs)	13	8	6
2.	Temperature (°C)	34	35	60
3.	Yield (g/kg of raw fruit)	252	241	235
4.	Mean Acceptability Scores (Max : 25)			
	Appearance (5)	3.25	4.55	3.75
	Colour (5)	3.40	4.70	3.90
	Texture (5)	4.45	4.60	4.55
	Flavour (5)	3.27	4.25	4.40
	Taste (5)	4.00	4.29	4.50

It is observed from the table that among the three drying methods, the time taken for drying the fruit was found to be minimum 6 hours in hot air oven drying compared to solar drying and sun drying where the time taken for drying 13 hours and 8 hours respectively . The time taken for sun drying was found to be twice as that of hot air oven drying.

The temperature of drying was found to be more or less similar for both sun drying and solar drying with a range of 34 to 35 °C whereas hot air oven drying was carried out at a higher temperature of 60 °C

When the fruits were subjected to various methods of drying, yield of fruit powder in grams per kilogram of fruit pulp ranged from 235 to 252 grams with a maximum of 252 grams for sun dried samples. This increased weight may be attributed to the phenomenon of incomplete moisture removal in sun drying in comparison with a greater moisture removal among solar and hot air oven dried samples.

Among the selected three methods solar dried samples were found to be superior in terms of higher acceptability scores for appearance, colour, texture, flavour and taste compared to sun dried and hot air oven dried fruit powders. Texture and taste scores were similar among all the three methods, whereas the scores for appearance, colour and flavour of sundried and hot air oven dried samples were found to be lesser than solar dried items.

NUTRIENT CONTENT OF PAPAYA POWDER OBTAINED BY DIFFERENT METHODS OF DRYING

The analyzed values of the nutrient content of papaya powder got by the three drying methods are presented in Table II.

TABLE II
ENERGY, PROTEIN, CARBOHYDRATE, MOISTURE, ASH AND MINERAL CONTENT OF PAPAYA POWDER

S.No	Nutrients	Sun Drying	Solar Drying	Hot air oven drying
1.	Energy (kcal)	181	189	184
2.	Protein (g)	0.36	0.40	0.38
3.	Carbohydrate (g)	32.0	34.0	33.0
4.	Moisture (g)	6.1	5.4	5.8
5.	Ash (g)	0.58	0.64	0.60
6.	Calcium (mg)	28.0	29.0	27.6
7.	Phosphorus (mg)	36.0	36.8	36.5
8.	Iron (mg)	0.8	0.9	0.84

Solar dried papaya powder was found to have slightly higher energy value in comparison with sun dried and oven dried samples. In general, fruits are poor sources of protein which is evident from the values of 0.36 to 0.4 grams of 100 grams. Values were slightly higher for solar dried samples. The carbohydrate values ranged from 32 to 34 grams per cent for papaya powders, with solar dried samples showing the maximum carbohydrate content.

Table III presents the values of vitamins, reducing sugar, acidity and TSS of papaya powder.

TABLE III
VITAMINS, REDUCING SUGAR, ACIDITY AND TSS VALUES OF PAPAYA POWDER

S. No	Nutrients	Sun Drying	Solar Drying	Hot air oven Drying
1.	Thiamine (mg)	0.014	0.02	0.01
2.	Riboflavin (mg)	0.009	0.01	0.007
3.	Vitamin C (mg)	24.0	26.0	20.0
4.	Total carotene (mg)	4.569	10.067	11.008
5.	Beta carotene (mg)	1.215	2.816	3.427
6.	Reducing sugar (g)	10.0	10.9	9.8
7.	Acidity	0.38	0.40	0.36
8.	TSS (0 Brix)	35.0	36.4	34.2

Papaya powder had negligible amounts of thiamine and riboflavin. Among the three methods, solar dried papaya powder had 0.02 mg and 0.01 mg per cent of thiamine and riboflavin respectively Ascorbic acid is lost due to oxidation while drying to the extent of 75 per cent. Papaya had ascorbic acid in the range of 20 to 26 mg per cent with a maximum for solar dried powder. Papaya is a rich source of carotene and vitamin C besides minerals (Aruna et al., 1998).

Carotene which is the precursor of vitamin A, is present in abundant amounts in papaya, which will give us significant amounts of carotene on consumption. Other components like reducing sugars, acidity and Total Soluble Solids (TSS) contents were retained to a maximum extent in solar drying compared to sun and hot air oven drying. Deepa and Lakshmi (2000) also noticed that oven dried and sun dried papaya powders had a reducing sugar content of 10.32 g and 9.5 g per cent respectively which were less than the solar dried powder.

Conclusion

Nutrient analysis revealed that papaya powders obtained by solar drying were found to be more nutritious than other methods of drying. This revealed the fact that solar drying was the best method with minimum loss of nutrients. Use of solar energy to preserve the fruits is no means detrimental to the nutritive content of the fruits. Fruit dried using solar drier shows good nutrient retention,which can be well be recommended for incorporation in infants and preschoolers diet and needs to be popularized in the community, to alleviate the problem of micronutrient malnutrition.

REFERENCE

AOAC(1990),"Association of Official Analytical Chemists", Official methods of analysis of the association of official chemists, Vol.1, 15th edition, K-Hetrich (ed) Association of Official Analytical Chemists, Arlington, VA. | 2. Aruna, K. Dhanalakshmi,K. and Vimala,S.(1998), "Development and storage stability of cereal based papaya powder", Journal of Food Science and Technology, Vol.35, No.3,Pp.250-254. | 3. Chadha, K.L. (1995), "Fruits in India, tropical and sub-tropical", Horticulture Advances, No.1,P. 95. | 4. Deepa,V and Lakshmi, U.K. (2000),"Preparation and incorporation of papaya powder in selected recipes and their nutritional and organoleptic evaluation", A thesis submitted to Avinashilingam Deemed University for Women, Coimbatore, Tamil Nadu, India. | 5. Government of India (2000), Press Information Bureau, year end review | 8. Directorate of Extension (2000), Kerala Agricultural University, Thrissur, Kerala, Part 1&2. | 9. Singh,C.Bhagat,B.K.and Ray,R.N. (1998), "Effect of nitrogen,phosphorus and potassium on growth, yield and quality of papaya (carica papaya)",The Orissa Journal of Horticulture, Vol.26 (2),Pp.61-65. | 10. Joseph,G.V.R.(2000),"Papaya for your digestion", Herald of Health, May, Vol.9,No.5,Pp.9-10. | 11. India Budget (2001), Indian Economy;Budget 2001, Indian Business News |