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STUDIES ON PHYSICAL AND CHEMICAL CHARACTERISTICS OF CUSTARD APPLE FRUIT PULP FROM DIFFERENT LOCATIONS

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ABSTRACT

Custard apple (*Annona squamosa* L.) is nutritional rich and largely valued for its taste. Majority of fruits are cultivated in unorganized sector around the hilly areas while some organized farmers also grow custard apple. The investigation was carried out to find the suitability of custard apple fruits for organized farming on the basis of different physical and chemical characteristics such as fruit weight, number of seeds, seed weight, rind yield and pulp yield, TSS, pH, acidity, total sugar and ascorbic acid. The results revealed that custard apple growth in organized orchards resulted in comparatively higher pulp yield and better chemical properties, justifying its suitability for commercial exploitation.

Key words: Custard apple fruit, Pulp composition, Pulp yield.

INTRODUCTION

Annona is a genus of tropical fruit tree belonging to the family *Annonaceae*. *A. Squamosa*, and *Cherimoya* fruits are valued for their nutritional status. *Annona squamosa L.* is a small tree which grows wild in many places in the north of South America, Central America, and the Caribbean region. It is cultivated and highly esteemed especially in India and Pakistan. The pulp may be consumed raw or transformed into various food products. Pulp tastes aromatic sweet, with custard like flavor. It has great potential for value addition through processing (Kotecha *et al.*, 2000). The area under custard apple in India is distributed mostly in the states of Andhra Pradesh, Uttar Pradesh, Bihar and Assam. Maharashtra covers 4,990 hectares of land with an average production of 20,479 tonnes (Sontakke, 2005). Due to the suitability of custard apple pulp in preparation of ice cream, newer varieties of custard apple are being developed. The organized cultivation of custard apple in Maharashtra is mostly in the districts of Pune, Aurangabad, Jalgaon, Osmanabad, Beed and Bhandara.

The custard apple fruit is mostly used as a dessert because of its delicious taste and nutritive value. The fruit yields about 40 - 45 per cent pulp having 26.4°Bx (TSS), pH 5.5 and 0.5 per cent tannins (Nanjudaswamy and Mahadeviah, 1990). The white, creamy flesh has strong aroma reminiscent of a mixture of strawberry, banana and pineapple (Brown *et al.* 1988). The fruit is a good source of carbohydrates (23.5%), minerals (0.9%), and proteins (1.6%), (Gopalan *et al.* 1991).

Climacteric and highly perishable fruits of custard apple cannot be stored for longer period. The fruits are chilling sensitive at 15.5°C or below. Custard apple pulp has been recognized as a base ingredient in various value added food products like ice cream, milk shakes, beverages (Khurdiya, 2001). In present investigation the efforts were made to justify the organized cultivation of custard apple fruit on the basis of various physical and chemical characteristics of fruit pulp.

MATERIALS AND METHODS

Raw material: The natural unorganized custard apple orchards of Maharashtra, India located at Pimpaldari, Dharur, Weedabazar and Dongarkini were used as experimental platforms to collect freshly harvested fruits while Palaskheda was considered as only representative of organized custard apple orchard.

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Chemicals and processing equipments: Most of the chemicals used in this investigation were of analytical grade. Equipments and chemicals were obtained from Department of Food Science and Technology and Department of Animal Products Technology, College of Food Technology, MAU, Parbhani.

Ripening of custard apple fruit: The fresh fruits were sorted, graded and packed in five ply corrugated fiber boxes with 14 holes for constant and sufficient aeration. The fruits were subjected for uniform ripening under controlled conditions as follows.

i)	Temperature	:	25 $\pm 1^0$C
ii)	Humidty	:	85 to 90%
iii)	Aeration	:	Sufficient aeration (14 holes 2 cm diameter)
iv)	Mode of ripening period	:	Auto induced ethylene ripening
v)	Ripening Period	:	i) 2 - 3 days (Commercial physiological maturity stage) ii) 1 - 12 hr. (Critical physiological maturity stage)

Physical characteristics of custard apple:

Weight of fruit (g): The weight of individual fruit was recorded on electronic balance and average weight of fruit calculated in grams.

Number of seeds per fruit: The seeds, which were embodied in flesh, were separated and counted from each fruit.

Weight of seed per fruit (g): The seeds which were separated for taking its count, were weighed on electronic balance in grams.

Weight of rind (g): Rind of fruit including the stem end impregnated in fruit pulp was separated from its pulp and seeds by manual labour and weights were recorded on electronic balance.

Weight of pulp (g): For calculating weight of pulp, sum of weight of rind and weight of seed was subtracted from weight of fruit.

Chemical characteristics of custard apple: The content of total soluble solids (%) in the fruit pulp was recorded by using a Erma Tokyo A°32 hand refractometer and the value were corrected to 20°C with the help of temperature correction chart (AOAC, 1990) and expressed in percentage. Titrable acidity, pH, total sugars and ascorbic acid content of pulp was determined by standard method (Ranganna, 1986).

Statistical analysis: The analysis of variance of the data was done by using completely randomized design (CRD) for different treatments as per the methods given by Panse and Sukhatme (1967). The analysis of variance revealed at significance of $P < 0.05$ level, S.E. and C.D. at 5 % level is mentioned wherever required.

RESULTS AND DISCUSSION

Effect of Different Locations on Physical Characters of Custard Apple Fruits: The freshly harvested fruits were collected. The results obtained are presented in Table 1.

Weight of fruit: The gross weight of custard apple fruit from the different locations varied in the range 131.3g to 184.5g. The mean weight of fruit was found as 160.45 g. The wide variation in weight of fruit is a function of physiological growth, cultivar and climatic conditions during growth at particular location. Organized orchard farming of custard apple resulted on higher weight.

Number of seeds per fruit: The number of seeds per fruit is directly proportional to gross weight and size of individual fruit with certain exceptions (Table-1).

Percent weight of seeds: The data on weight of seeds presented in Table-1 indicate that the mean per cent weight of seed was 22.45. It ranged from 18.9 to 26.4 per cent indicating the effect of different locations on weight of seeds per fruit. It was also interesting to note that irrespective of higher number of seeds, the unit weight of the seed was lower in organized orchard compared to unorganized ones.

Percent weight of fruit pulp: It is evident from Table-1 that the mean weight of pulp was recorded as 41.53 per cent at different locations. The higher yield of fruit pulp (50.00%) recorded by the fruits collected from the organized orchards of *Padaskheda* supports the observation of more yield of pulp because of intensive cultivation practices under controlled conditions. The pulp content of the fruit is an important morphological feature of fruit, which justifies table consumption and processable quality.

Percent weight of rind: The rind is fragmented and very susceptible to vertical or horizontal impact

TABLE 1. Effect of location on physical characters of custard apple fruit pulp.

Location	Weight of Fruit (g)	Number of seeds per fruit	Weight of seeds (%)	Weight of pulp (%)	Weight of rind (%)
Organized					
Palaskheda	184.5	43.0	18.9	50.0	31.1
Unorganized					
Dharur	170.0	49.6	22.3	42.0	35.7
Weedabazar	181.6	36.0	19.6	40.8	39.6
Pimpaldari	143.8	31.6	21.9	36.9	41.8
Dongarkini	151.5	41.5	25.6	40.8	33.6
Gungakhed	131.3	32.4	26.4	38.7	34.9
Mean	160.45	39.01	22.45	41.53	36.11
S.E. +	5.94	–	1.03	2.44	1.30
C.D. at 5%	17.70	–	1.05	7.30	5.69

* Each value is an average of five determinations

at critical ripening phase. The data on effect of locations on per cent weight of rind depicted in Table-1 indicate that the mean value of weight of rind is 36.11 per cent. The morphological development of the rind with respect to its thickness, susceptibility to disintegrate at intra-areole sutures, is function of cultivars, environmental conditions and genetical makeup.

Effect of different locations on chemical characters of custard apple fruits

Total soluble solids (%): The data on total soluble solids (Table-2) indicate that per cent total soluble solids (TSS) content of all samples were more than 22°Brix. The mean value of total soluble solids content was found 24.3°Bx which specifies the processable status of pulp.

Titratable acidity (%): A slight variation in acidity in custard apple pulp at different locations was observed. The per cent acidity was recorded in range from 0.23 to 0.28.

pH: The pH of custard apple fruit was found to be in the range of 4.8 to 5.4 with an average value of 5.1.

Total sugars: The total sugar content of the pulp notifying the quality of the fruit was recorded in the range of 18.1 to 22.0 per cent with average value of 19.5. The marginal difference in total sugars may be associated with locations and cultivars.

Ascorbic acid (Vitamin C): The ascorbic acid content of the fruit pulp was found to be comparatively less which justifies custard apple

TABLE 2. Effect of location on chemical parameters of custard apple fruit pulp.

Location	Chemical parameters of fruit				
	Total Soluble Solids (%)	Per cent Acidity (Citric acid)	pH	Total Sugar	Ascorbic Acid (mg/100g)
Organized					
Palaskheda	23.4	0.24	5.1	19.0	17.5
Unorganized					
Dharur	24.9	0.26	5.2	20.1	18.3
Weedabazar	25.0	0.24	5.1	19.3	17.7
Pimpaldari	24.5	0.23	5.0	18.4	16.4
Dongarkini	25.2	0.28	5.4	22.0	20.8
Gungakhed	22.96	0.23	4.8	18.1	15.9
Mean	24.32	0.24	5.10	19.50	17.76
S.E. +	0.48	0.008	0.006	0.53	0.61
C.D. at 5%	1.46	0.024	0.018	1.57	1.81

* Each value is an average of five determinations.

as a poor source of vitamin C. It ranged from 16.0 to 18.4 with an average mean value of 17.38 mg/ l00g of pulp.

CONCLUSION

It could be concluded that fruits obtained from organized sectors have better fruit weight and pulp yield with appreciable difference in chemical properties. Hence, justifies the importance for commercial production of custard apple.

REFERENCES

AOAC (1990). Official Methods of Analysis. Association of Official Analytica Chemists. 15th Edition. Washington D.C.

Beerh, O.P., Giridhar N. and Raghuramajah B. (1983). Custard apple (*Annona squamosa* L.) Part- I. Physico-morphological characteristics and chemical composition. *Indian Food Packer.* **37-38(3):**77-81.

Brown B.I., Wong L.S., George A.P and Nissen R.J. (1988). Comparative studies on the post-harvest physiology of fruit from different species of annona (custard apple). *J. Hort. Sci.* **63(3):**521-528.

Gopalan, C. Rama Sastri, B.V. and Balsubramanian, S.C. (1991). Nutritive value of Indian Foods. National Institute of Nutiition Hyderabad, pp : 55 and 72.

Khurdiya D.S. (2001). Post harvest management of underutilized fruits of fresh marketing. *Winter school on exploitation of underutilized fruits.* Division of Post Harvest Technology. IARI, New Delhi. 3rd-23rd October 2001. pp: 266-274.

Kotecha P.M., Adsule R.N. and Kadam S.S.(2000). Processing of custard apple: Preparation of ready to serve beverage and wine. *Indian Food Packer*, **49(5):**5-10.

Nanjudaswamy A. M. and Mahadeviah M. (1990). Fruit processing on Advances in horticulture. Vol. (4). Fruit crops. (Chada. K. L. and Pareek, O. P. Eds.) Malhotra Publishing House, New Delhi, India (1993): 18-48.

Panse V.S. and Sukhatme P. V. (1967). Statistical Methods for Agricultural Workers. Indian Council of Agricultural Research. New Delhi, pp70-72.

Ranganna S. (1986). Manual of Analysis of Fruit and Vegetable Products. Tata-Mc Graw Hill Publishing Co. Ltd. New Delhi.

Sontakke M. B. (2005) Importance of rainfed fruit crops. *Winter school on advances in production and management of rainfed fruit crops.* Marathwada Agricultural University, Parbhani. Pp: 1-7.

Venkataratnam L. (1959). Sitaphal and other annonaceous fruits in India. Farm Bull. No. 54: Directorate of Extension, Ministry of Food and Agriculture, New Delhi.