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Effect of juice extraction methods on the quality of raw mango squash

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SUMMARY : The cultivar *c.v 'vellari'* does not have much preference in pickling as it lacks the sourness required for pickles, so value addition to this produce as a beverage was studied. The juice of raw mango was extracted by scraping the flesh followed by extracting the juice (treatment 1); boiling with skin and then extracting the juice (treatment 2) and pressure cooking with skin and then extracting the juice (treatment 3). The squash made from the juice obtained by the three methods were analysed for physico chemical and sensory quality on a fortnightly basis for three months. The acidity, pH and brix of the juice obtained from all the treatments was seen to change gradually. On organoleptic evaluation, the first treatment turned out to the most acceptable and no significant change occurred in it during the storage period. It was found that raw mango squash prepared this way can successfully be manufactured on a commercial scale with significant stability in appearance, flavour and taste.

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There has been a spectacular growth in the consumption of fruit drinks in our country (Ministry of food processing industries, 2008). The extreme hot summer of Kerala is responsible for the demand for fruit based beverages in the state. Fruit juices are now a regular part of the diet of most people. Considering its commercial production, the cost of processing expensive raw materials like grapes, oranges and exotic mango varieties from outside the state can be saved to a great extent through utilizing under exploited fruits of the state. One such fruit is the raw mango cv. 'VELLARI' . This variety neither has application in pickling, (as it lacks the sourness required for pickles), nor is it acceptable as a table fruit on ripening. This mango belongs to the genus *mangifera* of the family Anacardiacea.

Raw mangoes in general are said to retain the body salts. It also contains antioxidants including vitamins 'C' which helps to retain iron in the blood. It is also rich in pectin, oxalic acid, citric acid, malic acid and succinic acid which have various regulatory roles in body function. (Sharma, 2006)

Mango is grown traditionally in all the districts of Kerala as an inevitable component of homesteads. It is the major fruit crop in the state, occupying an area of 85,428 ha. The systematic cultivation with promising varieties is limited to the northern districts. In districts like Thiruvananthapuramand Kollam, there is a large area under mango cultivation which are mostly seedling mangoes which are inferior in quality and referred to as wild mangoes to which category cv. 'VELLARI' too belongs (NHM, 2003).

EXPERIMENTAL METHODS

The raw mangoes harvested on the 110th day after flowering were collected. In the first treatment, the deskinned mangoes were grated to extract the juice and the concentrate (squash) was prepared with sugar (40%), pulp (25%) and water (35%). Citric acid was added at the rate of 1 per cent, colour (0.1%) and potassium meta bisulphite (0.2%) were added to improve sensory and keeping qualities.

Similarly, the pulp extracted by boiling (treatment 2), or pressure cooking (treatment 3) was rendered into juice concentrate. All concentrates were stored in room temperature after pasteurization for 15 minutes at 80^{0}C.

The physico - chemical and sensory evaluation of

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the samples were conducted fortnightly for 3 months. Acidity, pH and ^{0}brix were determined according to the methods by AOAC (1984). Sensory evaluation was carried out on a 5 point hedonic scale. The treatments were replicated five times. The results are presented herewith.

EXPERIMENTAL FINDINGS AND ANALYSIS

The results obtained from the present investigation are presented below:

Physico-chemical analysis of raw mango squash

Acidity:

The results showed an increase in acidity of the samples with increase in storage life (Table 1). The gradual increase in acidity might be due to the fermentation of acidic compounds by degradation or oxidation of reducing sugars present (Murtaza *et al.,* 2004).

Table 1: Acidity of mango squash

	Acidity (%)		
Storage period	T_1	T_2	T_3
0 days	0.28	0.26	0.26
15 days	0.29	0.26	0.27
30 days	0.31	0.27	0.27
45 days	0.32	0.28	0.29
60 days	0.32	0.30	0.31
75 days	0.34	0.31	0.32
90 days	0.35	0.32	0.32

pH:

The pH of the samples decreased over time due to an increase in acidity during storage period (Table 2). Similar observation were made by Dosumu *et al.* (2009)

Table 2: Analysis of pH of mango squash

	pH values		
Storage period	T_1	T_2	T_3
0 days	3.50	3.31	3.30
15 days	3.40	3.25	3.12
30 days	3.39	3.10	3.10
45 days	3.36	3.09	2.98
60 days	3.05	2.85	2.86
75 days	2.95	2.56	2.78
90 days	2.56	2.41	2.62

^{0}Brix:

The mean total soluble solid content value was seen to increase over the 90 days (Table 3). The increase in soluble solid content may be due to the hydrolysis of sucrose to invert sugars as reported by Hussain *et al.* (2002).

Table 3 : Analysis of brix of mango squash

	Brix		
Storage period	T_1	T_2	T_3
0 days	47.5	46.0	46.5
15 days	47.5	46.1	46.7
30 days	47.9	46.3	46.7
45 days	48.1	46.7	46.9
60 days	48.2	46.8	47.1
75 days	48.5	41.9	47.2
90 days	48.7	47.1	47.2

Sensory evaluation:

In the absence of adequate physical and chemical methods for measuring quality attribute of foods, it becomes necessary to resort to the human instrument. The raw mango squash was organoleptically evaluated for appearance, flavour and taste during the 3 months of storage by a semi trained panel of 25 women.

Appearance:

Adding of artificial colour gave more or less a uniform effect to all treatments, so appearance rather than colour of the product was evaluated. T_1 was rated higher mainly due to low sediments (Table 4).

Table 4: Analysis of appearance of the mango squash

	Appearance		
Storage period	T_1	T_2	T_3
0 days	4.92	4.12	4.52
15 days	4.92	4.8	4.38
30 days	4.86	3.96	4.12
45 days	4.82	3.84	4.08
60 days	4.82	3.68	3.96
75 days	4.82	3.64	3.88
90 days	4.82	3.62	3.86

Flavour:

Flavour was evaluated, on the basis of a 5 point hedonic scale, on a fortnightly basis by a semi trained panel of 25 women on the basis of a 5 point hedonic scale. T_1 ranked highest in this respect also, probably because the raw flavour was more acceptable than cooked flavour (Table 5).

Table 5: Analysis of flavour of the mango squash

	Flavour		
Storage period	T_1	T_2	T_3
0 days	4.81	3.68	3.90
15 days	4.80	3.61	3.87
30 days	4.76	3.60	3.86
45 days	4.75	3.59	3.85
60 days	4.61	3.58	3.85
75 days	4.61	3.58	3.84
90 days	4.59	3.57	3.84

Taste:

The taste is the major influential attribute in food selection. The semi trained panel adjudged T_1 as the best of the treatments as is shown in the Table 6.

Table 6: Analysis of taste of the mango squash

	Flavour		
Storage period	T_1	T_2	T_3
0 days	4.98	4.2	4.62
15 days	4.96	4.12	4.48
30 days	4.88	3.96	4.32
45 days	4.76	3.68	3.98
60 days	4.64	3.46	3.56
75 days	4.58	3.18	3.28
90 days	4.56	3.18	3.24

The squash made from scraped mango ranked the best for appearance, flavour and taste as compared to cooked treatments. The lower score of appearance for T_2 and T_3 may be due to the sediments formed with the cooked pulp. Raw mango squash prepared by scraping retained the original flavour and taste better than the cooked pulp. Hence, the beverage prepared from raw mango had better acceptability.

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