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## Studies on preparation of squash from Mango (*Mangifera indica* L.) pulp and Aloe vera (*Aloe barbadensis* M.) gel blends

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### Abstract

The present investigation was executed at the Laboratory of Department of Post-Harvest Technology, College of Horticulture and forestry, Narendra Deva University of Agriculture & Technology, Kumarganj, Faizabad (U.P.) India during the year 2014-15. Mango (*Mangifera indica* L.) and aloe vera (*Aloe barbadensis* M.) gel have nutritional, meditational, and theoretic values. The mango pulp and aloe vera gel are used to prepare palatable squash 30 percent of blend consisting 70 percent mango pulp and 25 percent aloe vera gel, 50 percent sugar 350 ppm SO<sub>2</sub>. Observation on changes during storage revealed that TSS, acidity, reducing sugars, non-reducing sugar and organoleptic score decreased continuously with storage period. The squash prepared from blend of mango pulp and aloe vera gel could be stored up to five months under ambient temperature with acceptable quality.

**Keywords:** Mango, Development, Squash, Pulp and gel

### Introduction

Mango (*Mangifera indica* L.) belongs to family Anacardiaceae, which is also known National fruit of India. Mango is one of the exporting materials both in fresh and processed form and is being exported to U.K., U.S.A., France, Malasiya, Qatar and Singapore. Mango has also strong antioxidant, anti-lipid peroxidation, immunomodulation, cardiogenic, hypotensive, wound healing, antidegenerative and antidileptic activities. Ripe mango fruits are utilized in preparing syrup, squash, juice, jam, jelly, preserve, etc. The Aloe vera (*Aloe barbadensis* Miller.) is perennial, succulent and drought resistant plant belonging to Liliacy family. The squash prepared from blend of mango pulp and aloe vera gel could be stored was up to five months under ambient conditions with acceptable quality. Aloe vera comes under food related products (Dubick and Michael, 1983)<sup>[8]</sup> and is being used as an ingredient for functional food, mainly in the development of healthy drinks and beverages like tea (Singh *et al.*, 2009)<sup>[21]</sup>. World Health Organization (WHO) estimated that 80 per cent of the population of developing countries rely on traditional medicine, mostly plant drugs for their primary health care needs (Malhotra *et al.*, 2010)<sup>[10]</sup>. Other applications of aloe includes healing of wounds and burns, immunizing fresh bite damage, protection of skin damage from x-rays, lung cancer, inertia problem and reducing blood sugar in diabetes. Blending of mango pulp with aloe vera gel offers scope to develop healthy blended squash with improve Colour, taste, flavor and over all acceptability. The findings of experiment would be useful for growers, processors, marketing agencies and consumers have interest in beverage rich in mango and aloe vera properties.

### Materials and methods

#### Raw materials

The ripe fruit of mango cultivar Amrapali and mature leaves of aloe vera cultivar Sim Sheetal were collected from the main experimental station Department of Horticulture, Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad and Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow (India), respectively. The chemical characteristics of mango pulp and aloe vera gel used for the preparation of blended squash were analyzed and presented in table-1.

#### Extraction of mango pulp and aloe vera gel.

The pulp from ripe mango fruits and gel mature aloe vera leaves were extracted as per flue sheet show in figure-1 and figure-2, respectively.

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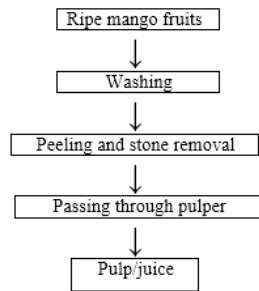


Fig 1: Flow sheet for extraction of pulp from mango fruits.

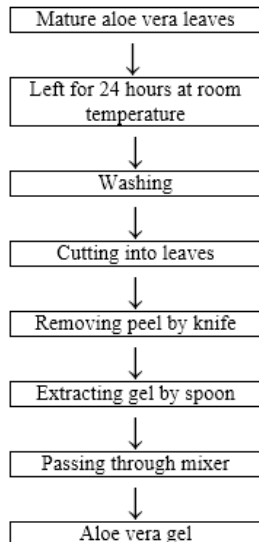


Fig 2: Flow sheet for extraction of gel from aloe vera leaves.

### Preparation of squash

Different five blend combination 50 percent mango pulp and 50 percent aloe vera gel, 70 percent mango pulp and 30 percent aloe vera gel, 30 percent mango pulp and 70 percent aloe vera gel, 60 percent mango pulp and 40 percent aloe vera gel and 40 percent mango pulp were prepared thereafter squash from each combination were made consisting 25 percent blend, 50 percent TSS, 1.25 percent acidity and 350 ppm SO<sub>2</sub>. The technique used for the preparation of squash is shown in fig.3. The squash prepared from each combination of blend were evaluated on 9 point Hedonic scale by a panel of semi trained judges for their organoleptic quality find out the best combination of mango pulp and aloe vera gel for squash preparation.

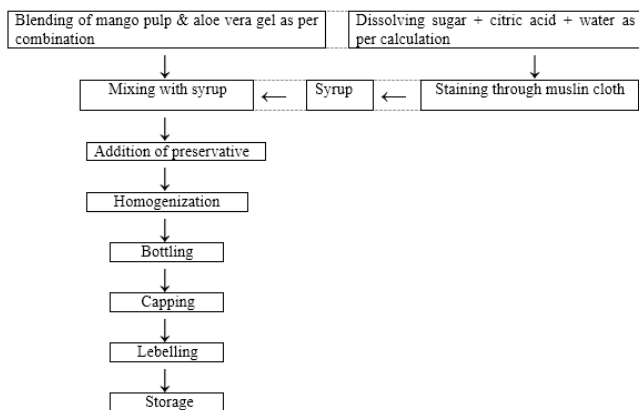


Fig 3: Flow sheet for preparation of mango + aloe vera blend squash.

### Storage studies

The 3 liters squash was prepared from the best combination of

mango pulp and aloe vera gel, filled into glass bottle of 750 ml capacity leaving 2 cm head space, capped and put under ambient temperature for its storage studies. During storage data on changes in TSS, Acidity, Vitamin-C, Reducing sugars, Non-reducing sugar, Total sugars, Non-enzymatic browning and organoleptic quality were recorded at monthly interval.

### Result and Discussion

The data pertaining to the preparation of squash from Mango (*Mangifera indica* L.) pulp and Aloe vera (*Aloe barbadensis* M.) gel blends. The present findings revealed that the mango pulp used in squash making contained 23.80 per cent total soluble solids, 0.53 per cent acidity, 19.00 mg/100 g vitamin-C, 6.49 per cent reducing sugars, 11.84 per cent nonreducing sugar, 18.78 per cent total sugars and 15.25 mg/100 g total carotenoids whereas contained 2.20 per cent total soluble solids, 0.05 per cent acidity, 1.02 per cent reducing sugars, 1.08 per cent non-reducing sugar, 2.10 per cent total sugars and 2.35 mg/100 g vitamin-C. A quality blended squash with 25 per cent blend of 75 per cent mango pulp and 25 per cent aloe vera gel with 50 per cent sugar, 1.25 per cent acidity and 350 ppm SO<sub>2</sub> was organoleptically found best for preparation of blend squash. Similarly, Nath *et al.*, (2005) [11] reported that the squash prepared from mixing mandarin and ginger juice in ratio of 25:5 scored highest sensory attribute. Nidhi *et al.*, (2007) [13] also reported that squash blended with bael and guava was found highest acceptable. Observation was recorded on changes during storage of blended squash indicated that total soluble solids increased gradually after one month of storage. Similar trend in change of TSS was found in guava squash (Pandey, 2004) [15], bael squash (Prasad *et al.*, 2006) [16], bael and guava blended squash (Nidhi *et al.*, 2007) [13], Karonda squash (Deen and Singh, 2012) [7]. This increase in TSS content in blended squash during storage was probably due to the conversion of polysaccharides into sugar. In present findings the total acidity of blended squash increased gradually during storage period that could be attribute to degradation of pectic substances of products into soluble solids (Conn and Stumpf, 1976) [5]. The present findings are also in agreement with the observations of several earlier workers like Pandey (2004) [15] on guava squash, Zulfakar *et al.*, (2011) [25] on seabuckthorn berries squash, Deen and Singh (2012) [7] on Karonda squash, Nidhi *et al.*, (2007) [13] on bael and guava blended squash. The vitamin 'C' content was decreased continuously during storage period which might be due to oxidation of ascorbic acid into dehydro ascorbic acid by oxygen. The finding is consistent with results reported by research papers authors: Nidhi *et al.*, (2007) [13] in bael and guava blended squash, Das (2009) [6] in jamun squash, Zulfakar *et al.*, (2011) [25] in seabuckthorn berries squash, Deen and Singh (2012) [7] in Karonda squash. The study confirmed that that the reducing sugars and total sugars of blended squash increased continuously throughout entire period of storage. Similar observations were also observed in phalsa squash (Waskar and Kkurdya, 1987) [24], in bael and guava blended squash Nidhi *et al.*, (2007) [13], in Karonda squash Deen and Singh (2012) [7], Whereas, non-reducing sugar of blended squash decreased continuously throughout the entire period of storage which might be because of inversion of non-reducing sugar. Similarly, Wasker and Khurdiya (1987) [24] in phalsa squash, Wasker and Deshmukh (1955) in pomegranate juice, Deen and Singh (2012) [7] in Karonda squash were found reduction in non-reducing sugar (Table 3). Browning increased gradually in blended squash

after one month of storage. This change could be mainly due to the non-enzymatic reaction with sugars and amino acids which leads to the formation of brown pigments. Similar results were reported by Rabbani (1992)<sup>[18]</sup> in mango squash, Pandey (2004)<sup>[15]</sup> in guava squash, Zulfakar *et al.*, (2011)<sup>[25]</sup> in seabukthorn berries squash, Deen and Singh (2012)<sup>[7]</sup> in karonda squash. The acceptability of blended squash in terms of organoleptic score decreased gradually during the storage period at room temperature (Table 2). Similar results on reduction in organoleptic quality have also been reported in

kinnow, mandarin and ginger juice blended squash (Nidhi *et al.*, 2008)<sup>[12]</sup>, mango squash (Kumari and Sandal, 2011)<sup>[17]</sup> Karonda squash (Deen and Singh, 2012)<sup>[7]</sup>. In conclusion, Mango pulp and aloe vera gel have medicinal and therapeutic values. A palatability quality squash with 25 per cent blend consisting 75 per cent mango pulp and 25 per cent aloe vera gel was found best for preparation of squash containing 50 per cent sugar, 1.25 per cent acidity and 350 ppm SO<sub>2</sub> squash could be stored up to five months under ambient condition with acceptable quality.

**Table 1:** Chemical compositions of mango pulp and aloe vera gel.

S. No.	Chemical compositions	Mango pulp	Aloe vera gel
1	Total Soluble Solids ( <sup>0</sup> Brix)	23.80	2.50
2	Acidity (%)	0.53	0.13
3	Vitamin-C (mg/100g)	19.00	2.80
4	Reducing sugars (%)	6.94	1.00
5	Non-reducing sugar (%)	11.84	1.03
6	Total sugars (%)	18.78	2.03
7	Total carotenoids (mg/100g)	15.25	-

**Table 2:** Organoleptic quality of squash prepared from different blends of mango pulp and aloe vera gel.

Treatments	Different combination of blends		Organoleptic quality	
	Mango pulp (%)	Aloe vera gel (%)	Score	Rating
1	50	50	7.20	Like moderately
2	70	30	8.14	Like very much
3	30	70	7.15	Like moderately
4	40	60	7.40	Like moderately
5	60	40	7.30	Like moderately
CD at 5 %			0.78	

**Table 3:** Changes in squash during storage.

Storage period (Months)	TSS ( <sup>0</sup> Brix)	Acidity (%)	Vitamin-C (mg/100g)	Reducing sugars (%)	Non-reducing sugar (%)	Total sugars (%)	Browning (OD)	Organoleptic quality	
								Score	Rating
0	50.00	1.32	4.86	6.48	40.63	47.11	0.59	8.02	LVM
1	50.00	1.41	4.53	7.23	40.12	47.35	0.60	7.90	LVM
2	51.20	1.53	4.40	8.92	39.53	48.45	0.61	7.65	LM
3	51.30	1.86	4.19	9.61	39.00	48.61	0.63	7.37	LM
4	52.00	1.93	4.00	9.94	38.84	48.78	0.65	7.10	LM
5	52.14	2.10	3.84	10.10	38.24	48.34	0.68	6.50	LM
CD at 5 %	5.35	0.15	0.48	0.92	4.88	4.98	0.08	0.79	-

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