PRESERVATION OF WATERMELON SQUASH USING SODIUM BENZOATE AND POTASSIUM METABISULPHITE

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Watermelon squash was prepared according to the standard method. It was divided into two equal lots and preserved by sodium benzoate (0.1%) and potassium metabisulphite (0.06%). The squash so prepared was filled in glass bottles (capacity 250 ml), sealed and stored at ambient temperature for 240 days. The physico-chemical and organoleptic evaluation showed that watermelon squash preserved with sodium benzoate was more stable and superior in quality as compared to potassium metabisulphite during storage.

INTRODUCTION

Watermelon (*Citerullus vulgaris*) is an important summer vegetable of Pakistan. According to a report from the Directorate of Crop Area Reporting Services (1991), 0.237 m. tonnes of watermelon were produced in the province of Punjab during 1990-91. During the period of excessive production a considerable portion of the crop is wasted due to lack of storage facilities. In Pakistan no work has been reported to develop any product from watermelon. Gusina and Tronstinskaya (1974) reported that watermelon juice has cooling effect, possesses diuretic properties and has high contents of vitamins K and C and precursor of vitamin A. Hour *et al.* (1980) made studies to produce good quality concentrate at 65°Brix from watermelon juice and observed slight change in colour of reconstituted concentrate after a storage period of 18 months. Uddin and Nanjumdaswamy (1982) found that acceptability of watermelon juice prepared with the addition of sugar and citric acid (TSS 15°Brix and 0.3% acidity) decreased with the passage of storage period at ambient temperature. Keeping in view all these aspects, this study was conducted to develop watermelon squash, a new product in our country, using two different preservatives.

MATERIALS AND METHODS

Watermelon (*Vr. sugar baby*) was purchased from the local market. After washing, it was peeled and passed through a pulper to extract juice. The juice was strained through a fine pulper and analysed for Brix°, pH and acidity (AOAC, 1984).

The squash was then prepared according to the standard method and divided into two equal lots, which were preserved with the following preservatives:

Sodium benzoate	0.1%-designated as T_1
Potassium meta-bisulphite	0.06%-designated as T_2

The squash so prepared was filled in transparent glass bottles (250 mL capacity), sealed with crown corks and analysed for TSS, pH, acidity and sugars (reducing and non-reducing) according to AOAC (1984). It was evaluated for colour, flavour and taste using the ranking method of Larmond (1977) at 60 days interval during storage. The data thus collected were analysed statistically.

RESULTS AND DISCUSSION

1. **Composition:** Before processing the watermelon juice was analysed for different

parameters, the results of which are as under:

Total soluble solids(%)	= 7.5
pH	= 5.2
Acidity (%)	= 0.06
Juice recovery (%)	= 35

2. Physico-chemical Analysis

pH and acidity: Table 1 indicates the effect of storage on the acidity of watermelon squash. The initial acidity was 0.39 and 0.50% in T_1 and T_2 respectively and after the course of 240 days storage, these values increased to 0.42 and 0.57%. Similarly pH values in T_1 & T_2 ranged from 3.10-2.95 and 2.95-2.34 respectively. The storage intervals as well as the treatments showed significant influence ($P < 0.01$) on acidity and pH of the squash.

This gradual increase in acidity with a corresponding decrease in pH values in both the treatments may be due to the release of some organic acids by degradation of pectin and sugar. These results are in agreement with the work reported for citrus juice preserved by pasteurization, potassium metabisulphite or sodium benzoate (Mehta and Bajaj, 1983) and orange squash preserved with potassium metabisulphite, benzoate and sorbic acid (Raza, 1979).

Total soluble solids: The initial degree Brix was 51.0 and 51.50 in T_1 and T_2 (Table 1). The values increased during storage in the treatments and the change was significant ($P < 0.01$). This increase in the degree Brix may be attributed to the formation of water soluble pectin from protopectin as reported by Godara and Pareek (1985).

Reducing and non-reducing sugars: The reducing sugars ranged from 8.10-45.10 and 8.01-45.20% in T_1 and T_2 respectively during the storage period of 240 days as indicated in Table 1. A rapid decrease in non-reducing sugars was also observed in these treatments ranging from 42.0-5.1 and 42.1-5.0% in T_1 and T_2 respectively. A pronounced increase ($P < 0.01$) in reducing sugars and decrease in non-reducing sugars was observed in all the samples during storage, which could be attributed to hydrolytic reactions (Babky et al., 1986).

Table 1. Effect of storage on percent acidity, pH, total soluble solids, reducing and non-reducing sugars of watermelon squash.

	Storage period in days					
Treatment	0	60	120	180	240	Mean
Acidity (%)						
T_1	0.39	0.38	0.38	0.40	0.42	0.39b
T_2	0.50	0.50	0.55	0.56	0.57	0.54a
Mean	0.45d	0.44e	0.47c	0.48b	0.50a	
pH						
T_1	3.10	3.00	3.10	3.00	2.95	3.03a
T_2	2.95	2.35	2.35	2.40	2.34	2.48b
Mean	3.03a	2.68c	2.73b	2.70b	2.65a	
Total soluble solids(%)						
T_1	51.50	51.50	51.60	51.75	52.20	51.71a
T_2	51.10	51.25	51.45	51.45	51.70	51.39b
Mean	51.30e	51.38d	51.53c	51.60b	51.95a	
Reducing sugars(%)						
T_1	8.10	24.00	37.20	42.00	45.10	31.28b
T_2	8.01	24.00	36.96	42.30	45.20	18.29a
Mean	8.06e	24.00d	37.08c	42.15b	45.15a	
Non-reducing sugars(%)						
T_1	42.00	25.10	12.00	8.00	5.10	18.43b
T_2	42.10	24.96	12.20	8.01	5.00	18.46a
Mean	42.05a	25.03b	12.10c	8.00d	5.05e	

Different superscripts on means in column and row represent significant ($P < 0.01$) differences.

3. Organoleptic evaluation: Ready to serve drinks were prepared by diluting the squash samples with iced water to get final TSS of 14°Brix. These drinks were evaluated organoleptically by a panel of five judges for colour, taste and flavour at storage intervals of 0, 60, 120, 180 and 240 days.

The data presented in Table 2 revealed that no colour change occurred in the squash

Table 2. Effect of preservatives on the organoleptic characteristics of watermelon squash under different treatments during storage

Treatment	Storage period in days					
	0	60	120	180	240	Mean
Colour						
T_1	8.0	8.0	8.0	8.0	8.0	8.00a
T_2	8.0	8.0	7.0	6.0	5.5	6.90b
Mean	8.00a	8.00a	7.50b	7.00c	6.75d	
Taste						
T_1	7.0	7.0	7.0	7.0	6.5	6.93a
T_2	7.0	6.5	6.5	6.5	6.0	6.47b
Mean	7.00a	6.75b	6.75b	6.75b	6.25c	
Flavour						
T_1	8.0	7.0	7.0	6.5	6.5	7.0a
T_2	7.0	6.5	6.5	6.0	5.5	6.5b
Mean	7.50a	6.75b	6.75b	6.25c	6.00d	

Different superscripts on means in column and row represent significant ($P < 0.01$) differences.

preserved with 0.1% sodium benzoate (T_1), whereas the samples preserved with potassium metabisulphite (T_2) did not retain their original colour after 240 days storage. The taste of the squash preserved with sodium benzoate (T_1) was found better with mean score values ranging from 7.0-6.5 as compared to the samples preserved with potassium metabisulphite with mean score values of 7.0-6.0. Similarly, the mean score values for flavour varied from 8.0 to 6.5 in the samples preserved with sodium benzoate and 7.0 to 5.5 in the samples preserved with potassium metabisulphite.

Higher scores in case of squash samples preserved with sodium benzoate were observed for colour, taste and flavour than the squash preserved with potassium metabisulphite, which might be due to the reason that SO_2 has bleaching effect along with its pungency. It may be concluded that watermelon squash preserved with sodium benzoate proved better in storage stability as well as organoleptic characteristics as compared to the squash preserved with potassium metabisulphite.

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