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Short Communication

Effect of Sucrose and Potassium Metabisulphite on the Physicochemical and Microbial Analysis of Apricot Pulp

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Abstract. Effect of different concentrations of sucrose and potassium metabisulphite on the apricot pulp was studied fortnightly for 90 days through physicochemical and microbial analysis. No significant change in total soluble solids (TSS) of apricot pulp was observed during the storage. Acidity and non-reducing sugar significantly ($p<0.05$) decreased, while pH and reducing sugars significantly ($p<0.05$) increased during the storage. Samples with added 20% sucrose and 0.2% potassium metabisulphite, packed in plastic and glass containers, had negligible microbial population, maintained maximum nutrients and the best sensory characteristics during the storage. Storage duration and treatments had significant ($p<0.05$) effect on pH, acidity, non reducing sugars and total fungal count, while on TSS (total soluble solids) and reducing sugar, the effect of treatments was nonsignificant ($p<0.05$).

Keywords: apricot pulp, additives, chemical analysis, microbial analysis, sucrose, potassium metabisulphite

The apricot, *Prunus armeniaca* is grown in almost all provinces of Pakistan. Important commercial varieties grown in Pakistan are Red Flesh Early, Old Cap, Charamaghzi, Moorpark, Nuri and Shakarapara. Excellent apricots are produced in the Northern areas of Pakistan.

According to Wills (1987), edible portion of the fruit is 94%. The fruit is high in pro-vitamin A and vitamin C, also high in potassium, but is low in fat and is cholesterol free. Apricot is prescribed to counter tension, insomnia, psycho-physical stress, during convalescence and in cases of hyperuricemia. In addition, it is recommended during growth in cases where an increase in the alkaline reserve is required.

During peak harvest season, large quantities (30-50%) of this valuable fruit is wasted due to limited storage life (Wills and Scott, 1972). Formulation of fruit products with longer shelf-life could be useful for producers as well as for consumers in off-season. This study was undertaken to observe the physico-chemical effect of potassium metabisulphite and different concentrations of added sucrose on the apricot pulp, stored in bulk at ambient temperature, so as to assess its use in further product development.

For the study, fresh mature apricots were purchased from Peshawar fruit market; after washing and pitting, apricots were cut into 2 halves and blanched in citric acid solution (0.25%) for 2 min at 212 °F, to stop possible enzymatic reactions, then blended in the mixer to form pulp. The pulp was subjected to treatments as mentioned in Table 1 and stored at ambient temperature in 3 kg glass containers (G) and 3 kg plastic containers (P) for a period of 3 months. The product was analysed chemically and microbially at fortnightly intervals, for a total storage period of 90 days.

It was noted that total soluble solids of apricot pulp slightly increased from 19.4° to 20.2° brix during storage. Maximum increase was observed in sample G_4 (10%), while minimum in sample G_1 (5.21%). For treatments, maximum mean values were recorded for sample G_3 (27.77), while minimum mean values were recorded for sample P_0 (10.17). This increase in soluble content of the product might be due to the solubilization of fruit constituents during storage (Shah *et al.*, 1975). In another study Samnu and Bayindirli (1995) found an increase in TSS through dipping mature apricot in sucrose.

Acidity plays an important role in the flavour development of the product. Mean values of acidity of apricot pulp significantly ($p<0.05$) decreased from 0.251% to 0.113% during storage. pH of the pulp significantly ($p<0.05$) increased from 3 to 3.8 during storage. Maximum increase was observed in sample G_4 (50), while minimum in sample P_2, P_3 and G_3 (16.6%).

Table 1. Proposed plan of study

Sample	Treatment
P_0 & G_0	control
P_1 & G_1	sucrose @ 15% + 0.20% potassium metabisulphite
P_2 & G_2	sucrose @ 17% + 0.20% potassium metabisulphite
P_3 & G_3	sucrose @ 20% + 0.20% potassium metabisulphite
P_4 & G_4	unsweetened + 0.20% potassium metabisulphite

P = plastic container; G = glass container

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Table 2. Mean values of treatments for TSS, acidity, pH, reducing and non reducing sugars and total fungal count of apricot pulp during storage

	Storage time (days)						
Parameters	1	15	30	45	60	75	90
TSS (%)	19.4a	19.4a	19.6a	19.8a	19.9a	20.0a	20.2a
pH	3.0e	3.1de	3.2d	3.5c	3.6bc	3.7ab	3.8a
Acidity (%)	0.251a	0.207ab	0.195bc	0.175cd	0.156cd	0.14d	0.113d
R. Sugar (%)	4.2a	4.9a	5.6a	4.97a	5.5a	4.54a	5.09a
Non R. Sug. (%)	48.0a	47.1a	46.3a	37.3ab	36.5ab	27.8b	27.3b
TFC (cfu/g)	6.4e	13.1e	6.1e	58.8cd	33.1de	119.5ab	147.5a

TSS = total soluble solids; TFC = total fungal count; R.Sugar = reducing sugar (AOAC, 1984; Diliello, 1982); figures with different small letters (from left to right) are statistically different ($p<0.05$).

For treatment, maximum mean values were recorded for sample P_0 (3.721), while minimum mean values, for sample G_3 (3.28). Similar results, regarding an increase in pH values, were observed by Sammnu and Bayindirli (1995), who reported increases in pH in mature apricots dipped in sucrose mixture solutions during ambient storage. These changes might be the result of high temperature during the storage.

Mean value of reducing sugar of apricot pulp significantly ($p<0.05$) increased from 4.28 to 5.09% during the storage. Maximum increase was observed in sample G_3 (123.6%), while minimum, in G_0 (22.9%). For treatments, maximum mean values were recorded for sample P_1 (6.54%), while minimum mean values were recorded for sample G_0 (2.28). In a similar study, Ali (1965) reported an increase in reducing sugars in canned orange juice, probably due to conversion of sucrose to reducing sugars (glucose and fructose) on account of acid and high temperature during storage (Ruiz-Nieto *et al.*, 1997).

Mean values of non-reducing sugar of apricot pulp significantly ($p<0.05$) decreased from 48 to 27.34 percent during the storage. Maximum decrease was observed in sample G_1 (10.4%), while minimum decreased was in P_0 (3.4%) For treatments, maximum mean values were recorded for sample P_3 (51.34), while minimum mean values were recorded for sample G_0 (18.5).

The mean total fungal count (TFC) of apricot pulp significantly ($p<0.05$) increased from 6.4 to 147.5 cfu/g during storage. For treatments, maximum increase in TFC was recorded in sample G_0 (3788.8%), while minimum in sample P_2 (1328.5%). Maximum mean values were recorded in sample P_0 (160), while minimum, in sample P_3 (36.43). The results showed that samples with added 20% sucrose and potassium metabisulphite had the best results overall in controlling the microbial growth due to water boundness (Ayub *et al.*, 1996), and maintaining the nutrients and sensory characteristics (Shearer *et al.*, 2000).

The statistical analysis by using Randomized Complete Block Design as recomended by Steel and Torrie (1980), showed that storage intervals and treatments had a significant ($p<0.05$) effect on pH, acidity, non-reducing sugars and fungal count, while on TSS and reducing sugars, the effect of treatments was non significant ($p<0.05$) (Table 2).

It could be concluded from this study, that addition of high concentration of sucrose along with potassium metabisulphite to the apricot pulp, helps in reducing water activity, maintaining nutrients, controlling microbial growth and maintaining sensory characteristics during the storage at ambient temperature.

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