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Effect of various chemical preservatives on microbial and organolyptic properties of sweet cherry (*Prunus avium*) juice

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Abstract
This research work was carried out to check the to check the microbial activity and sensory evaluation of sweet cherry juice treated with different chemical preservatives and stored for three months at room temperature. The organolyptical evaluation such as color, flavor and overall acceptability changed and decreased gradually during storage. The color score given by the panel of judges was decreased range from 7.98 to 5.56, the minimum fall off was noticed in CJ_3 (7.85)12.94% and highest in CJ_0 (5.63)39.66%. Reduction in score of flavor in cherry juice was found from 7.72 to 5.18, the lowest dropped off was noticed in CJ_3 (7.74)21.43% while highest CJ_0 (5.32)114.28%. Overall acceptability score of sweet cherry juice declined during three month of storage from 7.90 to 4.82, minimum reduction was found in CJ_3(7.58)17.65% and highest in CJ_0 (5.25)62.50%. Microbial result showed that the total plate count was increased during storage period from 2.60 to 43.40. Maximum increment was recorded in CJ_0 (160.22%) while lowest was found in CJ_3 (81.81%). The treatment CJ_0 had shown worse result under sensory consideration during storage. Treatment CJ_3 was found best in maintaining sensory attributes, nutrients content and microbial load as compare to other treatments. The treatment CJ_0 had shown worse result under sensory consideration during storage. Treatment CJ_3 was found best in maintaining sensory attributes, nutrients content and microbial load as compare to other treatments.

Keywords: Sweet Cherry juice, Microbial, Sensory, Skardu G.B

1. Introduction
Sweet cherry (*Prunus avium* L.) is the most delicious stone fruit and can serve as fresh and process into different juice and canned products and the best zone for the cultivation of this fruit is temperate area. According to the statistical data in Gilgit Baltistan the total area and cultivation of cherry fruit were 1302 hectares and 2,384 tons (Agri. Stat. Dptt. Gilgit Baltistan. 2011-2012) [1].
Attractive color, sugariness, bitterness, insistence, means of antioxidants and nutrients are the key uniqueness for cherry feature (Esti *et al*., 2002; Usenik *et al*., 2005; Gabriele *et al*., 2013) [6, 15, 8]. For the soft drinks the most standard chemical preservatives are sorbate and sodium benzoate. Sofo and Naidu (2000) [13] reveled that sorbates is non chemical additives which used widly in different foods products similarly Varnam and Sutherland (1999) [16] discussed that mostly at low pH the sorbic acid acid efficiency attained its peck against microbial growth such as yeast and mould but sometime it works at pH 6.5. As food preservatives advantages of sodium, benzoate included low price, ease of incorporation into products, lack of color, off favor and antimicrobial activity. These are use at the rate of various concentrations 0.05 to 0.1% (Ihekoronye and Ngoddy, 1995) [10]. Bu keeping in view the above facts this experiment carried out to overcome the loses of sweet cherry fruits.

2. Materials and Methods
The cherry fruit juice were prepared and packed in polyethylene terephthalate bottles and stored at room temperature for analyse.
Treatments
Following are the treatments
CJ_0 = Cherry juice without preservatives
CJ_1 = Cherry juice + 0.05% sodium benzoate + 0.1% citric acid
CJ_2 = Cherry juice + 0.05% potassium sorbate + 0.1% citric acid
CJ_3 = Cherry juice + 0.1% sodium benzoate + 0.1% citric acid
CJ_4 = Cherry juice + 0.1% potassium sorbate + 0.1% citric acid

2.1 Sensory Evaluation
All the samples of cherry juice were examined organolyptically for color, flavour and overall acceptability by the method as reported by Larmond (1977) [11].
Microbial analysis

2.2 Total plate count
Total plate count was counted according to prescribed method of AOAC (2012) [3].
Statistical Analysis: All the data were analysed by using Complete Randomized Design describe by (Steel and Torrie, (1980).
All analytical parameters were tested in triplicates and the obtained data were calculated

3. Results and Discussion
3.1 Sensory Evaluation
The sweet cherry samples were evaluated for sensory analysis such as color, flavor and overall acceptability. The sweet cherry juice samples were analyzed for color estimation at every one month interval during three months of storage at room temperature presented in Table-8. As early color of sweet cherry juice samples (CJ_0 to CJ_4) scored was 8.00, 8.10, 7.80, 8.50and 7.50, which reduced up to 3.50, 6.10, 5.80, 7.40 and 5.00 during storage period. Table-8 demonstrates that the treatments and storage gap had significant ($p < 0.05$) affect on color and the

mean values were diminished from 7.98 to 5.56. Sample CJ_3 (7.85), ranked higher mean later than sample CJ_1 (7.05) at the same time as samples CJ_0 (5.63) ranked lowest mean value followed by CJ_4 (6.10). Large reduction of color was happened in sample CJ_0 (39.66%) followed by CJ_4 (33.33%) while the lowest was revealed in sample CJ_3 (12.94%) nearby CJ_1 (24.69%) (Table. 1). The humiliation in color (6.77 to 4.8) was evidenced in guava during the research effort of Ayub *et al*. (2005) [4]. Cherry juice color was affected by storage intervals and treatments significantly. Color may be affected by the packaging material (Irwandi *et al*., 1998) additionally by the presence of oxygen and non- enzymatic reaction during storage (Che-Man and Sanny, 1996) [5].

Flavor of any food substance is essentially consisting of taste and aroma. It is seriously manipulated by the storage period. To learn this effect sweet cherry juice samples were assessed for flavor. The flavor of sweet cherry juice was declined steadily at room temperature. At early day judges had marked for flavor to treatments (CJ_0 to CJ_4) from 7.50, 7.60, 7.80, 8.50 and 5.50 which slowly diminished to 3.50, 5.00, 5.10, 7.00 and 5.00. The significant ($p<0.05$) diminished in mean score of flavor throughout the storage tenure from 7.72 to 5.18. The result showed that highest mean value of flavor was found in treatment CJ_3 (7.74), subsequent to treatment CJ_2 (6.60) while treatment CJ_0 (5.32) obtained lowest mean marked for flavor next with CJ_4 (5.92). Extreme falling was found out in treatment CJ_0 (114.28%) later than CJ_4 (83.33%) and lowest was recorded in treatment CJ_3 (21.43%) go after CJ_1 (52.00%) (Table.2).The storage periods and treatment was significantly ($p < 0.05$) affected on sweet cherry juice. Drops off of flavor take placed due to the enhanced in furfural level and declined in vitamin C. In (1981) Shimoda and Osjima and Hashmi *et al*. (2007) calculated that consequence of storage resulted in fall off of flavor in mango juice. Ayub *et al*. (2005) [4] also concluded that reduction in flavor (5.04 to 3.14) occurred in preservation of guava slice at storage period.

The sweet cherry juice treated with different chemical preservatives stored at room temperature was analyzed for overall acceptability. During three month of storage overall acceptability were gradually decreased. Cherry juice samples (CJ_0 to CJ_4) at early days was marked by judges as 8.00, 7.80, 7.70, 8.50 and 6.10 that afterward declined up to 3.00, 5.40, 4.50, 7.00 and 4.2 during storage. For the cherry juice the mean value of overall acceptability was declined significantly ($p < 0.05$) from 7.90 to 4.82. Results had presented in Table.3. The treatment CJ_3 (7.58) illustrated maximum mean value go after treatment CJ_1 (6.63), while treatment CJ_0 (5.25) presented the lowest mean value go after the treatment CJ_4 (5.80). Prominent reduction was renowned in CJ_0 (60.50%) as contrast to CJ_4 (44.00%) although smallest reduction got in treatment CJ_3 (17.65%) followed by CJ_1 (30.77%) (Table-3).From the above outcome it has been accomplished with the aim of the overall acceptability of cherry juice was affected significantly ($p < 0.05$) by storage gaps and treatments. In (Che-Man and Sanny 1996) [5] reported that the product with overall acceptability mean score greater than 4 was acceptable.

3.2 Microbial Analysis

Total Plate Count.

Juice sample were analyzed at every 30 days of interval during three month of storage. Initially total plate count in treatments CJ_0 to CJ_4 were 3.00, 2.00, 3.00, 2.00 and 3.00 which increased up to 108, 20, 34, 15 and 40 CFU/ml during storage. Mean values increased for total plate count from 2.60 to 43.4 significantly ($p<0.05$) during storage. Highest mean values was observed in CJ_0 (38.25) nearby CJ_4 (17.25) while lowest mean value was found in CJ_3 (6.00) followed by CJ_1 (9.75). Increment in term of percentage, minimum was recorded in CJ_3 (81.81%) followed by CJ_1 (90%) and at the same time maximum was noted in CJ_0 (160%) next with CJ_4 (92.25 %). (Table-4). Storage interval and the treatments having chemical preservatives had significant ($p<0.05$) impact on total plate count of sweet cherry juice during 90 days of storage. Analysis was prepared on the chosen plate comprising countable number of colonies ranging from 25-250 or 30-300 CFU/ml. TPC was calculated by utilizing standard methods Andrew-1992. Our results were accordance with manual of food quality control 4.rew.1 and microbiological analysis F.A.O Rome 1992. Our results are also accordance with the finding of Ayub *et al*. 2005 [4].

Table 1: Effect of chemical preservatives and storage period on color of sweet cherry juice

Treatments	Storage Interval (30 days)				% Decrease	Means
	Initial	30	60	90		
CJ_0	8.00	6.63	4.40	3.50	39.66	5.63d
CJ_1	8.10	7.40	6.60	6.10	24.69	7.05b
CJ_2	7.80	7.20	6.40	5.80	25.64	6.80b
CJ_3	8.50	8.00	7.50	7.40	12.94	7.85a
CJ_4	7.50	6.40	5.50	5.00	33.33	6.10c
Means	7.98a	7.12b	6.07c	5.56d		

Mean values followed by different small letters are significantly ($P<0.05$) different from each other

Table 2: Effect of chemical preservatives and storage period on flavour of sweet cherry juice

Treatments	Storage Interval (30 days)				% Decrease	Means
	Initial	30	60	90		
CJ_0	7.50	5.80	4.50	3.50	114.28	5.32c
CJ_1	7.60	6.70	5.80	5.30	43.39	6.15b
CJ_2	7.80	7.00	6.50	5.10	52.94	6.60b
CJ_3	8.50	7.75	7.70	7.00	21.42	7.74a
CJ_4	7.20	6.03	5.45	5.00	44.00	5.92d
Means	7.72a	6.65b	5.99c	5.18d		

Mean values followed by different small letters are significantly ($P<0.05$) different from each other

Table 3: Effect of chemical preservatives and storage period overall acceptability of sweet cherry juice

Treatments	Storage Interval (30 days)				% Decrease	Means
	Initial	30	60	90		
CJ_0	8.00	5.50	4.50	3.00	62.50	5.25c
CJ_1	7.80	7.00	6.30	5.40	30.77	6.63b
CJ_2	7.70	6.50	5.80	4.50	41.56	6.13b
CJ_3	8.50	7.50	7.30	7.00	17.65	7.58a
CJ_4	7.50	6.20	5.30	4.20	44.00	5.80d
Means	7.90a	6.54b	5.84c	4.82d		

Mean values followed by different small letters are significantly ($P<0.05$) different from each other

Table 4: Effect of chemical preservatives and storage period on total plate count cfu/ml of sweet cherry juice

Treatments	Storage Interval (30 days)				% Decrease	Means
	Initial	30	60	90		
CJ_0	3.00	10.0	32.0	108	160.22	38.25a
CJ_1	2.00	6.00	11.0	20.0	90.00	9.75b
CJ_2	3.00	7.00	15.0	34.0	91.17	14.25b
CJ_3	2.00	4.00	8.00	15.0	81.81	6.00e
CJ_4	3.00	8.00	18.0	40.0	92.10	17.25b
Means	2.60a	7.00b	16.8c	43.4d		

Mean values followed by different small letters are significantly ($P<0.05$) different from each other

4. Conclusion

The overall results shows that potassium sorbate and sodium benzoate had significant ($p<0.05$) impact on cherry juice microbiologically and organolyptically. Treatment CJ_3 that contained 0.1% sodium benzoate + 0.1% citric acid had shown the best result maintaining maximum quality followed by CJ_1, CJ_2 and CJ_4 on the other hand, CJ_0 (control) sweet cherry juice without preservative had shown worse results under the sensory acceptability grade. The result showed that sodium benzoate had excellence effect on keeping maximum quality of sweet cherry juice as compare to potassium sorbate.

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