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Shelf-Life Stability and Quality Evaluation of Sugar Cane Juice

Syed Abdul Majeed Shah[1], Abdul Sattar Shah[2], Muhammad Imran[4], Sana Noreen[4*], Bahisht Rizwan[4], Fatima Syed[9], Malik Muhammad Hashim[3], Ishtiaque Ahmad[5], Sumaira Kausar[8], Hamna Ahmad[4], Habib-ur-Rehman[6], Noshiza Majeed[7], Azghana Choudhary[10], Affifa Sani[10], Umar Bacha[11] and Maryam Yaseen[10]

[1]Department of Food Science & Technology, the University of Haripur, **Pakistan**
[2]KP Food Safety & Halal Food Authority, Peshawar **Pakistan**
[3]Institute of Food Science & Nutrition, Gomal University D.I. Khan, **Pakistan**
[4]University Institute of Diet and Nutritional Sciences, Faculty of Allied Health Sciences
The University of Lahore-Lahore, **Pakistan**
[5]Department of Dairy Technology, University of Veterinary and Animal Sciences, Lahore, **Pakistan**
[6]Department of Clinical Nutrition, NUR International University-Lahore-**Pakistan**
[7]Department of Food and Nutrition, Minhaj University, Lahore, **Pakistan**
[8]University Institute of Medical Laboratory Technology, Faculty of Allied Health Sciences
The University of Lahore-Lahore, **Pakistan**
[9]Gulab Devi Educational Complex, Lahore, **Pakistan**
[10]University Institute of Diet and Nutritional Sciences, The University of Lahore, Lahore, **Pakistan**
[11]School of Health Sciences (SHS), University of Management and Technology, Lahore. **Pakistan**

***Correspondence:** sananoreen.rizwan@gmail.com **Received 21-02-2021, Revised: 18-03-2021, Accepted: 30-03-2021 e-Published: 10-04-2021**

The existing study was designed to observe the storage stability, physico-chemical, and sensory quality of freshly extracted sugarcane juice sold by venders from Peshawar market. The resultant samples were prepared for physicochemical and sensorial characters by using the different chemicals. The result revealed that, the TSS of the juice were decreased insignificant in all samples but the maximum decrease was found in control sample due to spoilage while minimum decrease was found in T_4 i.e. (2.54%). Similarly, the pH of juice significantly decreased in all samples. The maximum pH was found in T_0 (5.15) which minimum was observed in T_4 (4.29) during the storage. The titratable acidity was increase in all the samples. Maximum percent increase was found in control due to spoilage while minimum was observed in T_4 (23.68%). The organoleptic evaluation of the juice samples showed significant ($P<0.05$) decrease in all parameters i-e, (Appearance, flavor, texture and of Overall acceptability). For the color, flavor, texture and overall acceptability maximum score was found in T_4 (8.22) while minimum was observed in T_0. (1.4). Both the storage duration and treatments have statistically significant effects on the physicochemical and sensory quality of sugar can juice.

Keywords: Sugarcane juice, preservation, chemicals, heat treatments, organoleptic

INTRODUCTION

In Pakistan sugarcane juice most widely use due to its delicious and nutritious nature. Sugarcane is excellent source of energy which provides 40 Kcal of energy per 100 ml of juice (Parvathy, 1983). Sugarcane juice have nutritional medicinal properties and enzyme. Sugarcane juice contain 75%-80% water, 11%-20% non-

reducing sugars and 0.3%-3.0% sugars (Swaminathan, 1987). It plays an important role to prevent infections and healing of throat, flu and cold. Due to its glycemic effect its keep the body healthy. It also plays an important role in hepatitis treatment.It refreshes the body rapidly when exposed to hot physical activity and prolong heat. It is outstandingalternates for aerated cola and drinks.its instant source of energy because it contains simple carbohydrates and keep the body fresh.it refreshes and energizes the body instantly as it is rich in carbohydrates. The major problem with sugarcane juice is that it spoiled quickly by the presence of simple sugars. Soon after the harvest of sugarcane juice endogenous invertase enzyme is activated and acts as a cause of deterioration, biodegradation caused by microorganisms mainly Leuconostoc sp. (L. mesenteroidesand L. dextranium). These organisms convert sucrose into polysaccharides, such as dextran (Krishnakumar & Devadas, 2006). The sugarcane juice can be presented as delightful beverages by inhibiting the spoilage of juice with applicable methods. Glass bottle is an outstanding packaging material for storing liquid foods, which is impermeable to moisture and gases, odor resistance, good transparency and tamperature resistance. Addition of citric acid or ascorbic acid to juice also gave good satisfying dull orange color to juice (Kapur et al. 1987) and addition of lemon juice, followed by pasteurization and preservation with chemicals also reduce the phisco-chemical changes during storage in ready to serve bottled sugarcane juice (Bhupinder et al. 1991). Potassium Meta bisulphte and Sodium benzoate was able to inhibit the growth of bacteria and fungus (Chauhan et al. 2002). The main objective of this research was to maintain and extend the shelf life of sugarcane juice at ambient temperature by using different chemicals and heat treatments at altered level.

MATERIALS AND METHODS

Collection and Pre-processing

Sugarcane juice of CP-77/400 variety was collected from the local vendor from Taro (Distt. Nowshera Peshawar). For the extraction of sugarcane juice mostly stored sugarcane was used. Running tap water was used in order to free from dust, dirt, chemicals and microbes.Then node and skin of sugarcane stem were detached by using curved blade knife.Power operated screw juice extractor was used for extraction of sugarcane juice and filtered through the sieve to remove undesirable materials.

The method of sugarcane juice extraction is given in Figure 1.

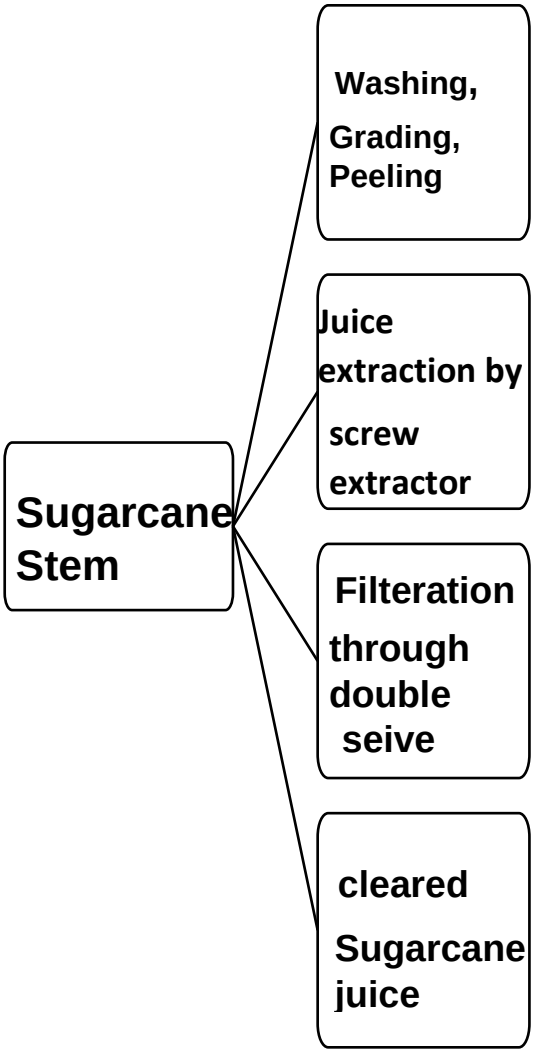

Figure 1: Method for extraction of sugarcane Juice

Sharpe blade knife was used to cut the lemon into two pieces. Lemon squeezer was used to extract the juice. The juice was filtered through muslin cloth to remove the seeds and other foreign materials. The method of lemon juice extract is given in (Figure 2.)

Packaging and storage

The prepared samples were then filled in 250 ml sterilized bottles to study the effect of treatment on the sensory evaluation and physico-chemical of sugar cane juice.

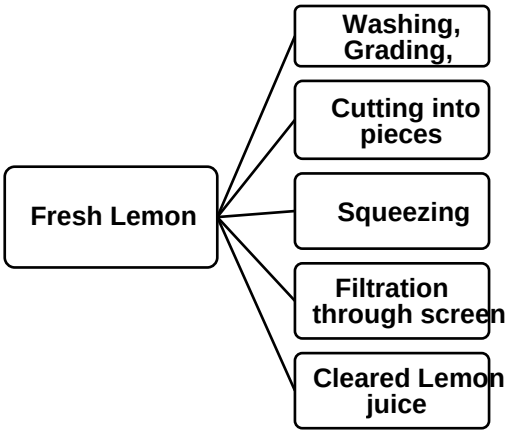

Figure 2: Method for extraction of lemon Juice

Physicochemical Analysis

Sugarcane juice samples were stored at ambient temperature and samples were analyzed for acidity%, total soluble solids by hand refractometer and pH through pH meter by following the guidelines of AOAC (2000).

Sensory Evaluation

In sugar cane juice, sensory evaluation was measured by panel of 15 trained judges using 9-point hedonic scale as described by Larmond (1977). The evaluation of scoring rates of panel was 1-9

Statistical Analysis:

The data is statistically analyzed by Statistix 8.1, by (CRD) Factorial Design.

RESULTS AND DISCUSSION

pH

The pH value of the sugarcane juice decreased from (5.15) to (4.29) during 40 days of storage as shown in (Figure.1).

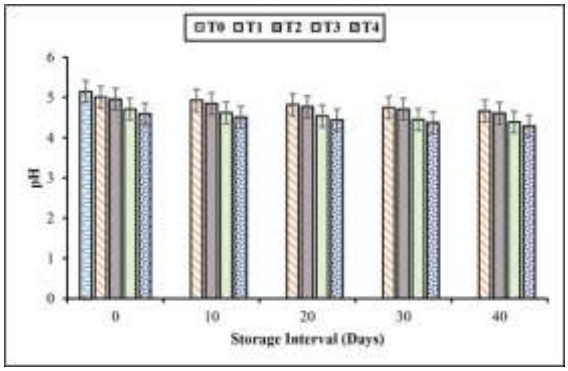

Figure 1: Effect of chemicals and pasteurization on pH of sugarcane juice during storage interval.

The decreasing trend in pH of sugarcane juice is similar to the observation of (Chauhan et al. 1997). The decreasing in pH were observed in all treatments, but the ratio was different in each treatment. The maximum mean value was found in T1(4.83) followed by T2(4.78) while the minimum value was observed in T4(4.44) followed by T3(4.54). The highest percent decrease was obtained in control followed by T_1(6.98%) while lowest was found in T_4(6.53%) followed by T_3(6.79%). The decrease in pH is might be due to formation of acidic compounds during reduction of sugar content, or due to production of acetic acid by the action of acetic acid bacteria, and this is in agreement with the findings of (Karmakar et al. 2011). The overall results showed that different chemicals and pasteurization significantly ($P \leq 0.05$) affected the pH of sugarcane juice during storage interval. The mean values were separated by applying LSD test at 5% probability level.

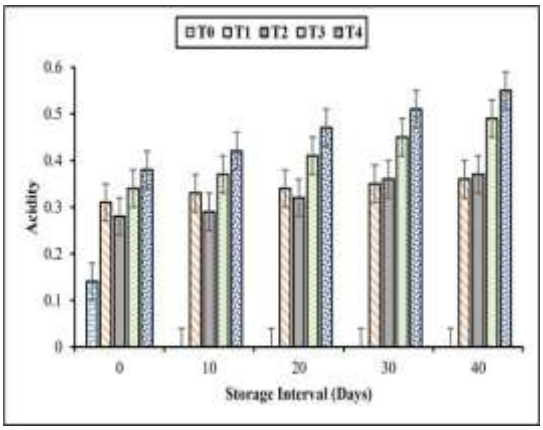

Figure 2: Effect of chemicals and pasteurization on Acidity of sugarcane juice during storage interval.

The acidity of the Sugarcane juice increased

in 40 days of storage interval as shown in (Figure.2) The tendency of increasing in acidity is similar to the study of (Ali et al. 2015). The increasing in acidity were noticed in all treatments, but the ratio was different in each treatment. The mean value of acidity varies from (0.30) to (0.42). The highest percent increase was found in treatment T2 (32.14%) while the lowest percent increase was observed in treatment T4 (23.68%). The increase in acidity might be due to degradation of pectin into pectic acid and hydrolysis of polysaccharides into di and mono saccharides. The result of increasing in Acidity of sugarcane juice is also matching to the analysis of (Yasmin et al. 2010).

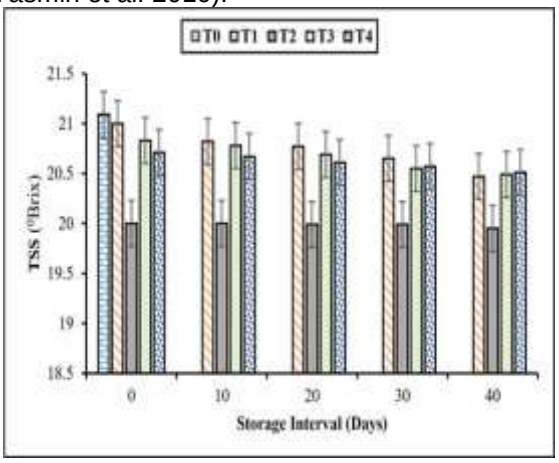

Figure 3: Effect of chemicals and pasteurization on TSS of sugarcane juice during storage interval.

The TSS of the Sugarcane juice decreased in 40 days of storage interval as shown in (Figure.3) The decreasing trend in TSS of sugarcane juice is similar to the observation of (Ali et al. 2015). The decreasing in TSS were noticed in all treatments, but the ratio was different in each treatment. The mean value of TSS decreases from (20.74) to (19.98). There was negligible change observed in TSS while after storage interval of 40 days were decreased to (20.51) from (21.09). The highest percent decrease was found in treatment control followed by T2 (2.65%) while the lowest percent decrease was observed in treatment T4 (2.54%) followed by T3(2.55%). Decreasing trend in TSS value might be due to alteration of sugars into acids during storage interval because of different biochemical responses in the sugarcane juice. The result of decreasing in TSS is accordance with the results of (Mao et al. 2007).

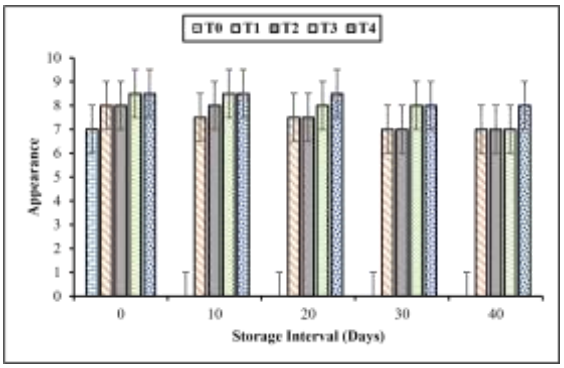

Figure 4: Effect of chemicals and pasteurization on Appearance of sugarcane juice during storage interval.

The appearance score of the sugarcane juice decreased in 40 days of storage interval as shown in (Figure.5) The change in appearance were noted in each and every treatment, but the share was diverse in all treatments.The mean value of appearance decreases from (8.3) to (7.4). The highest percent decrease was found in control sample followed by T2 (12.5%) while the small percent decrease was found in treatment T4 (5.55%) followed by T3(5.88%). The result of decreasing in appearance is accordance with the results of (Khare et al.2012).

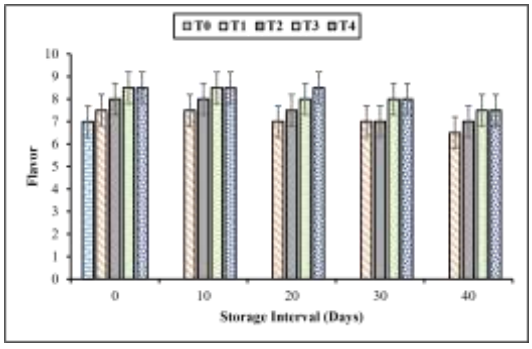

Figure 5: Effect of chemicals and pasteurization on Flavor of sugarcane juice during storage interval.

The flavor of the sugarcane juice decreased in 40 days of storage interval as shown in (Figure.7) The mean value of flavor decreases from (8.2) to (7.1). There was change observed in flavor while after storage interval of 40days. The highest percent decrease was found in control sample followed by T1 (12.22%) while the smallest percent decrease was found in treatment T4 (5.55%) followed by T3(5.64%). Decreasing trend in flavor value might be due to conversion of sugars into acids during storage interval because of biochemical reactions in the sugarcane juice.

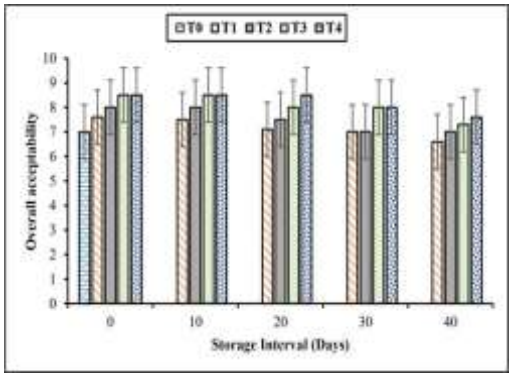

Figure 6: Effect of chemicals and pasteurization on Overall acceptability of sugarcane juice during storage interval.

The result of decreasing in overall score is accordance with the results of (Prasad K & Nath, 2002).The overall score of the sugarcane juice decreased in 40 days of storage interval as shown in (Figure.7) The mean value of overall score decreases from (20.74) to (19.98). The highest percent decrease was found in treatment control followed by T1(14.11) while the smallest percent decrease was found in treatment T4 (6.66%) followed by T3(6.98%).Decreasing in overall score due to change in appearance, texture and flavor of sugarcane juice. The result of decreasing in overall score is accordance with the results of (Yasmin et al. 2010).

CONCLUSION

The purpose of this investigation was to assess the result of pasteurization and different chemicals on physico-chemical and sensory attributes of sugarcane juice during storage intervals. The information formed during the study specifies that the sample heated at 90^0C for 2 min, with combination of different chemicals (KMS+SB+AA+CA=250ppm) and lemon juice (2ml), stored at ambient temperature, the anticipated properties remain safe for a period of time.After reviewing all the parameters of the sugarcane juice while in storage interval, in each of the treated samples, above mentioned is a satisfactory quality beverage of sugarcane juice with reasonable storage strength for 40 days.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

SAMS, ASS and MI: Conceptualization and methodology. SAMS MI, SN and BR: Writing original draft. FS, MMH and IA: Visualization and investigation. HN and NN: Data validation. SK, NM, AC, AS, MY, HA and HR: Writing, reviewing and editing. All authors read and approved the final version.

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