



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(7): 1761-1764
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www.thepharmajournal.com

Received: 02-03-2022

Accepted: 06-06-2022

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Studies of biochemical and organoleptic parameters on different varieties in Ber (*Zizyphus mauritiana* L.) in Saurashtra region of Gujarat

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Abstract

Ber viz., Deshi (V₁), Seb (V₂), Apple (V₃), Umran (V₄), Gola (V₅), Surti Kantha (V₆), Zafrani gol (V₇), Mehrun (V₈) was evaluated at Lal Bagh, Fruit Research Station, Department of Fruit Science, College of Horticulture, Junagadh Agricultural University, Junagadh during the year 2021-22. The evaluation was based on the biochemical and organoleptic parameters. The result indicated that maximum total sugar (15.17%) and non-reducing sugar (12.48%) was noted in variety Apple (V₃). Similarly, maximum reducing sugar (5.09%) was observed in variety Gola (V₅). Whereas, maximum TSS (20.00 °B) was found in the variety Mehrun (V₈). The lowest acidity (0.14%) was recorded in the variety Umran (V₄). Maximum score (8.87) obtained by the variety Umran (V₄) with golden yellow colour. Highest score (8.95) was noted by the variety Gola (V₅) with juiciness. Maximum score (8.20) and (8.18) was observed by the variety Zafrani Gol (V₇) with very much like flavour and sweet taste respectively. Maximum score (9.05) was recorded by the variety Gola (V₅) with extremely acceptability.

Keywords: Ber, biochemical, organoleptic, score, quality

Introduction

Ber (*Zizyphus mauritiana* Lamk.) is a fruit native to India that belongs to the Rhamnaceae family with chromosome number 2n=48. The genus *Zizyphus* has around fifty species, 18 to 20 of which are endemic to India (Pareek, 1983) [20]. It is a genus of approximately 100 evergreen trees and deciduous and shrubs found in subtropical and tropical parts of the world between 34°S and 51°N latitude and up to 2800 meters above sea level. It is referred to as a poor man's fruit since it not only supplies a nutritious food to the impoverished farmers of the difficult region, but it also provides them with a reliable source of revenue (Vashishtha, 1989) [26]. It's also known as "poverty fruit" (Bisla and Daulta, 1986) [7]. Ber has more protein, phosphorus, calcium, carotene, and Vitamin-C than an apple and it has more phosphorus, iron, Vitamin-C, and carbs than an orange (Bakhshi and Singh, 1974) and it has a greater calorific value. Ber is a nutrient-dense fruit. Fresh fruits provide energy of 24.76 kJ (5.92 kcal), carbohydrates of 17 g, sugars of 5.4-10.5 g, dietary fiber of 0.60 g, moisture of 81.6-83.0 percent, protein of 0.8 g, fat of 0.07 g, calcium of 25.6 mg, phosphorus of 26.8 mg, iron of 1.1 mg (USDA Nutrient Database, 2013). Vitamin-A 70 mg/100g, Vitamin-C 50-150 mg (Singh *et al.*, 1967). "Three jujubes every day keeps the doctor away", according to legend, and would meet FAO/WHO recommendations for Vitamin-C and B-complex (Anon., 1974) [6].

Despite the detail that appears to be a lot of promise for using fruits in the processing sector and diverse portions of the tree in pharmacology. Candies, pickles, preserves, canned ber chutney, murabba, ber powder, and chuhara are all made using fruits. Jam, squash nectar bases, and ready-to-drink beverages are whole made up with pulp (Neog *et al.*, 1993) [18]. Consumers will like a variety with good acid sugar along with a more attractive flavour, big size and form, and a high total phenol content. The knowledge of the health-promoting antioxidants may promote to a better understanding and higher consumption of this fruit in its fresh form, resulting in enhanced nutrition and a larger food supply.

Materials and Methods

Investigation on eight varieties was conducted at Lal Bagh, Fruit Research Station and its biochemical analysis was done at laboratories of College of Horticulture, Junagadh Agricultural University, Junagadh during the year 2021-22. The experiment was done by using the Randomized Block Design (RBD) having three replications with fifteen-year-old plant

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having spacing of 6m x 6m. Fruits were examined at attains maturity indices and biochemical parameters were measured. TSS is measured with help of digital hand refractometer (0-32 °B). The AOAC (1984) [11] techniques were used to determine the other fruit quality criteria. The organoleptic rating was computed using the average score of 17 people's input on a 1-9 scale, with 9 representing "very like," 5 representing "neither like nor hate," and 1 representing "strongly dislike." The statistical analysis of the various features under consideration was performed using the analysis of variance approach for Randomized Block Design (RBD) as suggested by (Panse and Sukhatme 1985) [19]. The "F" test was used to determine the relevance of each character. At a 5% level of significance, the standard error of mean (S.Em. ±) and critical difference (CD) were calculated.

Results and Discussion

The biochemical results were presented in the (Table – 1 and Fig. 1) wide range of variability was present in the of eight

varieties. The variation due to different varieties was also found significant and showed that the maximum total sugar (15.17%) was recorded in variety Apple (V₃) followed by variety Mehrun (V₈). Similarly, lowest total sugar (7.12%) was recorded in variety Umran (V₄). This might be due to the much variation in the reducing and non-reducing sugar which leads to variation in the total sugar. The results are in consonance with Mandal *et al.* (2009) [14], Kumari *et al.* (2015) [11] and Amin *et al.* (2018) [4]. Maximum reducing sugar (5.09%) was noted in variety Gola (V₅) followed by the variety Mehrun (V₃). Whereas, the minimum (2.69%) in variety Apple (V₃). From the (Table – 1) result showed that the maximum non-reducing sugar (12.48%) was observed in variety Apple (V₃) followed by the variety Deshi (V₃). While, lowest (4.97%) in variety Seb (V₅). This might be due to more free ketone or aldehyde group are present in the different varieties. Similar observation was also recorded by Singh and Singh (1973) [24], Abbas *et al.* (2012) [2], Mohsin *et al.* (2012) [16] and Kumari *et al.* (2015) [11].

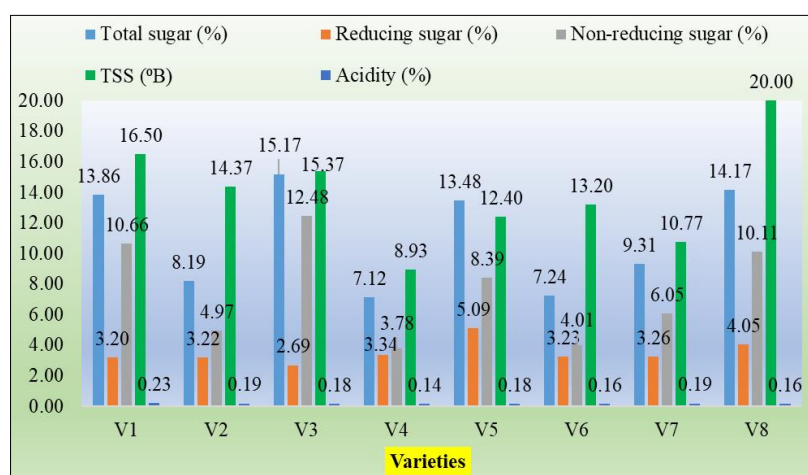


Fig 1: Effect of different varieties on chemical parameters

The result was also found significant in total soluble solids (°B), maximum TSS (20.00 °B) was found in the variety Mehrun (V₈) followed by the variety Deshi (V₃). Likewise, minimum TSS (8.93 °B) was noted in variety Umran (V₄). This might be due the difference in the genetic variation in the fruits of different varieties and its chemical composition. These result were in line with finding of Anjum *et al.* (2018) [5], Sharif *et al.* (2019) [22] and Abdel-Sattar *et al.* (2021) [3]. For acidity the result showed the lowest acidity (0.14%) was recorded in the variety Umran (V₄) which was at par with variety Surti Kantha (V₆). But, the highest acidity (0.23%) was recorded in variety Deshi (V₁). This might be due to

varietal difference and also genetic variation in the varieties. Present results of the line investigated are in agreement with those of Navjot *et al.* (2007) [17] and Godi and Joshi (2016) [8]. The variation in organoleptic parameters due to different varieties was also found significant. The data presented in (Table – 2) showed that the maximum score (8.87) was noted by the variety Umran (V₄) with golden yellow colour at ripening. Whereas, the minimum score (6.16) was observed by the variety Deshi (V₁) with light greenish yellow. The similar variation was also recorded by (Pareek and Vashishtha 1983) [26] and Krishna *et al.* (2016) [10].

Table 1: Biochemical characteristic of different ber cultivars

Varieties	Total sugar (%)	Reducing sugar (%)	Non-reducing sugar (%)	TSS (°B)	Acidity (%)
V ₁ – Deshi	13.86	3.20	10.66	16.50	0.23
V ₂ – Seb	8.19	3.22	4.97	14.37	0.19
V ₃ – Apple	15.17	2.69	12.48	15.37	0.18
V ₄ – Umran	7.12	3.34	3.78	8.93	0.14
V ₅ – Gola	13.48	5.09	8.39	12.40	0.18
V ₆ – Surti Kantha	7.24	3.23	4.01	13.20	0.16
V ₇ – Zafrani gol	9.31	3.26	6.05	10.77	0.19
V ₈ – Mehrun	14.17	4.05	10.11	20.00	0.16
S.Em.±	0.261	0.084	0.194	0.263	0.005
CD at 5%	0.79	0.26	0.59	0.80	0.02
CV%	4.08	4.16	4.46	3.27	4.82

The highest score (8.95) was noted by the variety Gola (V₅) with juiciness. While, the lowest score (6.96) was obtained by variety Mehrun (V₇) with soft texture fruit. Similar result is in agreement with reported earlier by Liu *et al.* (2008) [13]. The maximum score (8.20) was obtained by variety Zafrani gol (V₇) with very much like flavour. Similarly, the minimum score (6.20) with slightly like flavour was recorded by variety Umran (V₄). These findings are quiet in line with Miklavcic *et al.* (2019) [15]. The result showed that the highest score (8.18) was observed by the variety Zafrani gol (V₇) with much sweet taste. Whereas, lowest score (6.15) was recorded by variety

Umran (V₄) with slightly sweet taste. The observations collaborated with the findings of Lin *et al.* (2011) [12] and Anjum *et al.* (2018) [5]. The maximum score (9.05) was recorded by the variety Gola (V₅) with like extremely acceptability. Whereas, the lowest score (6.07) was recorded by variety Umran (V₄) with like slightly. Similar observation was also recorded by Ibrahim *et al.* (2009) [9] and Singh and Pathak (2016) [23]. The variation in the varieties this might be due to presence of biochemical active compound and genetic variation in different varieties.

Table 2: Organoleptic evaluation of different varieties in ber

S. No.	Varieties	Fruit colour	Fruit texture	Flavor	Taste	Overall acceptability
1.	V ₁ – Deshi	6.16	7.04	7.10	7.23	7.19
2.	V ₂ – Seb	7.07	8.13	6.97	7.94	8.12
3.	V ₃ – Apple	8.23	7.93	7.17	6.93	7.70
4.	V ₄ – Umran	8.87	7.14	6.20	6.15	6.07
5.	V ₅ – Gola	7.22	8.95	7.90	8.07	9.05
6.	V ₆ – Surti Kantha	6.21	7.12	7.07	6.25	6.11
7.	V ₇ – Zafrani gol	7.40	8.20	8.20	8.18	8.07
8.	V ₈ – Mehrun	6.97	6.96	7.17	7.11	7.17
	S.Em.±	0.209	0.200	0.156	0.175	0.167
	CD at 5%	0.63	0.61	0.47	0.53	0.51
	CV%	4.98	4.98	3.75	4.19	3.89

Conclusion

From the result of investigation, it is concluded as wide variation in biochemical and organoleptic parameters were presented among the eight varieties. Variety Apple, Mehrun and Umran were found to be better for biochemical characters due to much accumulation of biochemical during fruit set to maturity. The variety Umran, Gola and Zafrani gol were for organoleptic characters due to genetic variation and sensory evaluation parameters. The highest overall acceptability score was obtained by variety Gola. This will more helpful for the new varietal development for the saurashtra region of Gujarat.

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