EVALUATION OF DIFFERENT JUICE VARIETIES OF GRAPE (*Vitis* sp.) FOR QUALITATIVE CHARACTERISTICS

Abstarct

The present investigation was conducted at College of Horticulture, Rajendranagar, during the year 2023. The experiment was laid out in completely randomized design. The research experiment was conducted to evaluate qualitative parameters of different juice varieties of grape. The results revealed that maximum TSS (21.05 ^{0} B) and brix/acid ratio (42.96) were recorded in T_1 – H-516. Maximum pH was recorded in T_6 – Manjari Medika (4.03) and highest titrable acidity was recorded in T_5 – Gulabi X Bangalore Purple (0.71 %). Reducing sugars were highest in T_1 – H-516 (17.24 %), whereas total sugars were maximum in T_4 – Concord (28.56 %). Juice recovery was recorded maximum in T_6 – Manjari Medika (71.80 %).

Key words: juice varieties, parameters of juice, grape juice, fruit crops

Introduction

Grape is one of the important fruit crops that belongs to the family Vitaceae. The family contains about 1000 species belonging to 17 genera that are typically shrubs or woody lianas which climb by means of their tendrils (Keller, 2020). Grape is a refreshing fruit, rich in sugars, acids, minerals, vitamins and tannins. Major constituents of fruits are carbohydrates (15 %), minerals (0.2-0.6 %), organic acids (0.3-1.5 %), nitrogenous compounds (0.03-0.7 %), iron (0.003-0.017 %/100 g), calcium (0.004-0.025 %), potassium (0.15-0.25 %), vitamin A (1-80 microgram), vitamin B complex (391-636 mg/100 g), and vitamin C (1-1.25mg/100 mg) (Winkler, 1965). In India grape is grown in Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Telangana, Punjab, Haryana, Himachal Pradesh and Uttar Pradesh. It occupies an area of 162 thousand ha with the production of 3.49 million MT (NHB data, 2021-22 First Advance Estimate). As fresh fruit, grapes are very delicate and extremely perishable and have a very high rate of loss during harvest and distribution. Therefore, grapes are processed into different products like wine, raisins, juice, crush, jelly, canned grapes etc to reduce waste and improve the

marketability and profit from grape cultivation. (Venkitasamy *et al.,* 2019). Grape juice contains 81 to 86 percent of water, in which nutrient elements, sugar and natural acids are present in readily available forms. Hence grape juice assimilates in body fluid immediately after consumption, and act as an excellent health drink with instant source of energy (Gurak *et al.,* 2010). The present study aims at evaluating the different juice varieties of grape for their qualitative parameters.

Material And Methods

The experiment was conducted at College of Horticulture, Rajendranagar, during the year 2023. Eight grape varieties (T_1 – H-516, T_2 – Arka Shyam, T_3 – Black Cornechen, T_4 – Concord, T_5 – Gulabi X Bangalore Purple, T_6 – Manjari Medika, T_7 – Pusa Navrang, T8 – Bangalore Blue) were collected from grape vines planted at Grape Research Station, Rajendranagar.

Total soluble solids (TSS) (^{0} Brix)

The TSS of grape juice was measured with the help of digital refractometer (HI 96801, Hanna, Romania). Data was expressed as degree Brix (^{0} B).

pH

The pH was determined using pH meter. pH meter was calibrated with the help of standard buffer solutions (pH 4.0 and 7.0). The juice sample was taken in 100 ml beaker and electrode was kept in the sample and read on pH meter.

Titrable acidity (%)

Titrable acidity in juice of different varieties of grape was estimated by adopting the procedure suggested by Lunkes and Hashizume (2014).

$$\text{Acidity (\%)} = \frac{\text{TV} \times \text{Normality of alkali} \times \text{Eq wt of acid} \times \text{Vol made (ml)} \times 100}{\text{Volume of aliquot (ml)} \times \text{Weight of sample (g)} \times 1000}$$

Brix/Acid ratio

Brix-acid ratio was calculated by dividing the TSS value by the acid value.

$$\text{Brix/Acid ratio} = \frac{\text{TSS value}}{\text{Acid value}}$$

Reducing sugars (%)

The reducing sugars were analysed by Lane and Eynon method suggested by Ranganna (1986).

$$\text{Reducing sugars (\%)} = \frac{\text{Factor X Volume made up X 100}}{\text{Titre value X Weight or volume of sample}}$$

Total sugars (%)

Total sugars in juice of different varieties were estimated by adopting the Lane and Eynon method suggested by Ranganna (1986).

$$\text{Total sugars (\%)} = \frac{\text{Factor X Volume made up X 100}}{\text{Titre value X Weight or volume of sample}}$$

Juice recovery (%)

Representative berries weighing 1 kg were taken and juice was extracted with the help of juice extractor. The juice was weighed on a weighing balance and juice yield was calculated in percentage (%).

$$\text{Juice recovery (\%)} = \frac{\text{Weight of juice}}{\text{Weight of berries}} \text{ X } 100$$

Results and Discussion

Trials were conducted to evaluate different juice varieties of grape for qualitative parameters. The data recorded were statistically analysed and the results obtained are presented in the Table 1, 2 and 3.

Total soluble solids (^{0} Brix)

The evaluation of TSS content established significant differences between different grape juice varieties. Among the different grape juice varieties, total soluble solids were significantly highest in T_1 – H-516 (21.05 ^{0} Brix) which was statistically on par with T_4 – Concord (20.87 ^{0} Brix), whereas significantly lowest total soluble solids were observed in T_5 – Gulabi X Bangalore Purple (17.47 ^{0} Brix). The variation in TSS may be attributed to changes in site, locality, topography and environment (Soni *et al.*, 2019). The variation in TSS of grape grown under same environment could be because of experimental conditions (Vijaya *et al.*, 2018). The results from current investigation are in accordance with the findings reported by Mehan *et al.* (2006), Patil *et al.* (2008), Gill and Arora (2009), Ratnacharyulu (2010) and Vijaya *et al.* (2018) in different varieties of grape.

pH

pH was found significant in all treatments. Of all the varieties evaluated, T_6 – Manjari Medika had significantly highest pH (4.03), followed by T_1 – H-516 (4.00), while T_5 – Gulabi X Bangalore Purple recorded significantly lowest pH (3.22). The variation in pH of berry juice depends on genotypes, cultivars and environmental condition (Eshghi *et al.*, 2014). Karibasappa and Adsule (2008), Ratnacharyulu (2010), Sahoo *et al.* (2018) and Akram *et al.* (2020) reported similar findings in different grape varieties.

Titrable acidity (%)

Significantly maximum titrable acidity was obtained in T_5 – Gulabi X Bangalore Purple (0.71 %) which was statistically on par with T_3 – Black Cornechen (0.68 %), whereas the minimum titrable acidity was obtained in T_6 – Manjari Medika (0.48 %). The difference in acidity among different varieties might be due to varietal difference and other factors like storage conditions (Akram *et al.*, 2020). The reduction in acidity at the time of harvest is also due to dilution effect caused by increased fruit size (Khan *et al.*, 2011). Similar observations in different varieties of grape were reported by Ghosh (2006), Kumar and Rajan (2006), Patil *et al.* (2008), Gill and Arora (2009) and Soni *et al.* (2019).

Brix/Acid ratio

Among the different grape juice varieties, T_1 – H-516 recorded significantly highest brix/acid ratio (42.96) which was statistically on par with T_6 – Manjari Medika (41.52), while T_5 – Gulabi X Bangalore Purple recorded the lowest brix/acid ratio (24.61). The brix/acid ratio varies in different varieties of grape because amount of TSS/TA ratio is governed by genetical constitution, phenotypical factors and also the day and night temperature generally favours the accumulation of solutes (Sahoo *et al.,* 2018). Mehan *et al.* (2006), Ghosh (2006) and Gill and Arora (2009) reported similar findings in various grape varieties.

Reducing sugars (%)

All the varieties exhibited significant differences in the reducing sugars with significantly highest being T_1 – H-516 (17.24 %) which was followed by T_4 – Concord (16.39 %), whereas T_7 – Pusa Navrang recorded significantly lowest reducing sugars (10.86 %). The difference in reducing sugars among the grape varieties might be because of the fact that the sugars in grapes are greatly influenced by varietal difference and environmental condition (Yinshan *et al.,* 2017; Akram *et al.,* 2020). The results of present investigation are supported by findings of Ratnacharyulu (2010) and Bahksh *et al.* (2022) in different grape varieties.

Total sugars (%)

Total sugars were found significant in all treatments. Of all the varieties evaluated, significantly highest total sugars were recorded in T_4 – Concord (28.56 %) which was followed by T_1 – H-516 (25.60 %), while lowest total sugars were recorded in T_2 – Arka Shyam (14.21 %). The variation in the total sugars might be due to genetic makeup of the variety and environmental condition (Shiraishi *et al.,* 2010; Khan *et al.,* 2011). Similar findings were reported by Ghosh (2006), Ratnacharyulu (2010) and Akram *et al.* (2020) in different grape varieties.

Juice recovery (%)

All the different grape juice varieties showed significant differences in the juice recovery percentage. T_6 – Manjari Medika was found to have significantly maximum juice recovery (71.80 %) which was statistically on par with T_7 – Pusa Navrang (70.40

%), while T_5 – Gulabi X Bangalore Purple recorded minimum juice recovery (60.12 %). The highest juice recovery might be due to high bunch parameters like more bunch weight, high berry weight and diameter of berries. Similar findings were reported by Ratnacharyulu (2010), Brar *et al.* (2016), Sharma *et al.* (2018) and Vijaya *et al.* (2018) in different grape varieties.

Conclusion

The results from the present investigation revealed that TSS was recorded maximum in T_1 – H-516 (21.05 ^{0} B) which was statistically on par with T_4 – Concord (20.87 ^{0} B). T_6 – Manjari Medika recorded maximum pH (4.03) followed by T_1 – H-516 (4.00). The maximum titrable acidity was found in T_5 – Gulabi X Bangalore Purple (0.71 %) which was statistically on par with T_3 – Black Cornechen (0.68 %). Highest brix/acid ratio was recorded in T_1 – H-516 (42.96) which was statistically on par with T_6 – Manjari Medika (41.52). T_1 – H-516 recorded maximum reducing sugars (17.24 %) followed by T_4 – Concord (16.39 %), whereas maximum total sugars were recorded in T_4 – Concord (28.56 %) followed by T_1– H-516 (25.60 %). The maximum juice recovery was recorded in T_6 – Manjari Medika (71.80 %) which was statistically on par with T_7 – Pusa Navrang (70.40 %).

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Treatments	Total soluble solids (^{0} Brix)	pH	Titrable acidity (%)	Brix/Acid ratio

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Table 1 : Evaluation of different juice varieties of grape for TSS (^{0} Brix), pH, titrable acidity (%) and brix/acid ratio

T_1 : H - 516	21.05	4.00	0.49	42.96
T_2 : Arka Shyam	18.57	3.44	0.54	34.38
T_3 : Black Cornechen	19.13	3.38	0.68	28.13
T_4 : Concord	20.87	3.64	0.56	37.27
T_5 : Gulabi X Bangalore Purple	17.47	3.22	0.71	24.61
T_6 : Manjari Medika	19.93	4.03	0.48	41.52
T_7 : Pusa Navrang	18.84	3.99	0.51	36.94
T_8 : Bangalore Blue	20.67	3.34	0.58	35.64
SEm ±	0.09	0.01	0.01	0.60
CD at 5%	0.26	0.02	0.03	1.79
CV	0.76	0.27	2.74	2.94

Table 2 : Evaluation of different juice varieties of grape for sugar content

Treatments	Reducing sugars (%)	Total sugars (%)
T_1 : H - 516	17.24	25.60

T_2 : Arka Shyam	12.82	14.21
T_3 : Black Cornechen	11.36	15.16
T_4 : Concord	16.39	28.56
T_5 : Gulabi X Bangalore Purple	13.51	19.18
T_6 : Manjari Medika	14.49	22.53
T_7 : Pusa Navrang	10.86	16.34
T_8 : Bangalore Blue	12.65	15.92
SEm $\pm$	0.26	0.29
CD at 5%	0.78	0.86
CV	3.28	2.52

Table 3 : Evaluation of different juice varieties of grape for juice recovery (%)

Treatments	Juice recovery (%)
T_1 : H - 516	65.89

T_2 : Arka Shyam	68.60
T_3 : Black Cornechen	69.85
T_4 : Concord	61.70
T_5 : Gulabi X Bangalore Purple	60.12
T_6 : Manjari Medika	71.80
T_7 : Pusa Navrang	70.40
T_8 : Bangalore Blue	63.90
SEm $\pm$	0.88
CD at 5%	2.63
CV	2.28