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EFFECT OF DIFFERENT LEVELS OF YEAST ON JAMUN VINEGAR (*SYZYGIUM CUMINI)* QUALITY ATTRIBUTES

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***Key words**: Vinegar, Jamun, Yeast, Quality parameters, and Organoleptic evaluation.*

Abstract– The present experiment was carried out during 2021-23 in the Post-Harvest Lab, Department of Horticulture, SHUATS, Prayagraj. The experiment was conducted in a Completely Randomized Design with 8 treatments replicated three times. The treatments were T_0 Control (100% Jamun Juice), T_1 Jamun Juice + 0.5 g yeast /l, T_2 Jamun juice+ 1 g yeast /l, T_3 Jamun juice +2 g yeast /l, T_4 Jamun juice +3g yeast /l, T_5 Jamun juice +4g yeast /l, T_6 Jamun juice +5 g yeast /l, T_7 Jamun juice + 6 g yeast/l. From our experimental findings, it was concluded that the treatment T_2 was found after 6 months to be best in terms of Total soluble solid (^{0}Brix) (9.03), Ascorbic acid (mg/100g) (21.85), pH (2.21), Acidity % (5.50), Total sugar % (0.35), reducing sugar % (0.21), appearance (7.62), and overall acceptability (7.89). The B:C ratio was highest in T_0 with 2.77.

INTRODUCTION

Jamun is an important indigenous fruit of India. It is widely grown in the larger parts of India from the Indo-Gangetic plains in the North to Tamil Nadu in the south. It also occurs in the lower range of the Himalayas up to 1,300 m above mean sea-level. As its area of growing clearly indicates, it has a wide diversity in fruit shape, size, color taste, stone, percent of pulp ratio and acidity etc. which needs to be exploited. Jamun is an important underexploited indigenous fruit tree of India. It is a very common, large, evergreen beautiful tree of the Indian sub-continent that belongs to the Myrtaceae family. The tree is 8 m to 15 m tall, with oblong, opposite leaves that are smooth and glossy with a turpentine smell.

Jamun possesses commercial importance as a minor fruit in tropical and subtropical conditions. It is a versatile fruit tree of the best food and medicinal value. It is found throughout India starting from Myanmar and extending to Afghanistan. This plant is also found in other countries like Thailand, the Philippines, Madagascar etc. World production of jamun is estimated at 13.5 million tonnes out of which 15.4% is contributed by India.

Moreover, Jamun has a very long history of use for various medicinal purposes and currently has a large market for the treatment of diabetes, chronic diarrhea, and other enteric disorders, including its use as an antimicrobial. The seed is also used in various alternative healing systems like Ayurveda, Unani, and Chinese medicines for digestive ailments Achrekar *et al.,* (1991).

Vinegar is a fermented product made by acetic acid bacteria that convert ethyl alcohol into acetic acid by oxidation. Vinegar can be made from fruits, cereals and vegetables and used as a food supplement, tonic and nutraceutical Ozturk *et al.,* (2015) and Yang *et al.,* (2018). Vinegar is produced from a double fermentation of any fermentable sugary substrates, and its organoleptic and chemical properties can be changed according to the type of raw materials used and fermentation methods. The first step is alcoholic fermentation which is the conversion of fermentable sugars into ethanol mainly by yeast. The second step is acetic acid fermentation in which ethanol is oxidized to acetic acid aerobically by acetic acid bacteria Li *et al.,* (2015) and Turhan *et al.,* (2016). In general, two different methods, traditional (slow) and submerged (quick), are used for vinegar production. Vinegar produced by the slow method is high-

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quality in acidity and contents of aroma components but is rather expensive, while vinegar produced by the submerged method is quick and cheaper, which makes it the one that is most employed Cejudo Bastante *et al.,* (2018).

MATERIALS AND METHODS

The present investigation entitled "Effect of different levels of yeast on Jamun vinegar" was carried out at the post-harvest lab, Department of Horticulture, Naini Agricultural Institute, SHUATS, PRAYAGRAJ in the year 2022-2023. The CRD design is used to analyze the data statistically.

There were eight treatments replicated thrice. The treatments were T_0 Control (100% Jamun Juice), T_1 (Jamun Juice + 0.5 g yeast/l), T_2 (Jamun juice + 1 gm yeast /l), T_3 (Jamun juice +2 g yeast /l), T_4 (Jamun juice +3 g yeast/l), T_5 (Jamun juice +4 g yeast /l), T_6 (Jamun juice +5 g yeast /l), T_7 (Jamun juice + 6 g yeast/l).

RESULTS AND DISCUSSION

Total Soluble Solid

After 6th month of storage of jamun vinegar, peak total soluble solid (^{0}Brix) was observed (9.03) with the treatment T_2 Jamun juice (100%) + 1g yeast /l whereas the least total soluble solid (^{0}Brix) was observed (7.07) with the control treatment T_0 Jamun juice (100%).

The TSS may include soluble solids such as sugar, organic acid, amino acids, and soluble pectin. Accumulation of TSS is strongly related to the ripening of the fruit, this is also associated with an increased concentration of soluble solids. Soluble solids, which are influenced by additives in vinegar, consist of free sugars, such as glucose, fructose and sucrose, organic acids, and free amino acids Chen *et al.* (2009).

Ascorbic Acid

After 6th month of storage of jamun vinegar peak Ascorbic acid (mg/100 g) (Vitamin C) was observed (21.85) with the treatment T_2 Jamun juice (100%) + 1g yeast /l, followed by treatment T1 Jamun juice (100%) +0.5 g yeast /l, T3 Jamun juice (100%) +2 g yeast/l and T4 Jamun Juice (100%) + 3 g yeast /l. While the least ascorbic acid (mg/100 g) (Vitamin C) was observed (17.78) with the control treatment T_0 Jamun juice (100%). It might have oxidized itself resulting in the rapid reduction of vitamin C during

Table 1. Effect of storage period on total soluble solid(^{0}Brix), ascorbic acid, pH, and acidity % and total sugar of jamun vinegar

Treatment	TSS			Ascorbic acid (mg/100g)			pH			Acidity %			Total Sugar %		
	Initial	3rd month	6th month	Initial	3rd month	6th month	Initial	3rd month	6th month	Initial	3rd month	6th month	Initial	3rd month	6th month
T_0	12.31	9.32	7.07	15.95	16.52	17.78	4.01	3.57	2.98	1.07	3.03	3.77	8.41	2.49	1.35
T_1	13.34	10.52	8.27	17.11	19.35	21.68	3.88	3.44	2.37	1.14	3.20	4.73	9.37	1.51	0.92
T_2	13.43	11.67	9.03	17.12	19.40	21.85	3.08	2.64	2.21	1.48	4.71	5.50	9.59	1.72	0.33
T_3	13.42	11.08	8.79	17.07	19.10	21.41	3.39	2.93	2.71	1.37	4.16	5.23	9.48	1.53	0.46
T_4	13.18	10.66	8.56	16.62	18.07	20.16	3.67	3.08	2.64	1.31	4.10	5.02	9.20	1.34	0.51
T_5	13.05	10.30	8.49	16.49	17.94	19.50	3.75	3.13	2.59	1.26	3.94	4.97	9.08	1.16	0.53
T_6	12.87	10.18	8.30	16.30	17.95	19.11	3.78	3.26	2.56	1.24	3.93	4.91	9.65	1.83	0.67
T_7	12.58	9.58	8.20	16.31	17.59	19.06	3.87	3.36	2.44	1.19	3.85	4.81	9.62	1.76	0.90
F-Test	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
S.Ed.(+)	0.090	0.407	0.287	0.153	0.330	0.205	0.123	0.044	0.057	0.047	0.056	0.047	0.135	0.084	0.122
C.D.at0.5%	0.194	0.190	0.134	0.328	0.707	0.439	0.057	0.134	0.122	0.022	0.026	0.100	0.289	0.181	0.057

storage (Pradeepa *et al*., 2021).

pH

After 6th month of storage of jamun vinegar least pH was observed (2.21) with the treatment T_2 Jamun juice (100%) + 1 g yeast /l, while the highest pH was observed (2.98) with the control treatment T_0 Jamun juice (100%).

pH tended to decrease in most samples during the storage period, mainly due to the amount of organic or total acids present in the vinegar Liu *et al.,* (2008) shows that the pH and total acid content of the vinegars were not inversely correlated during storage. It is presumable that the decay rates of free sugars and amino acids were different among the vinegar.

Acidity

After 6th month of storage of jamun vinegar low Acidity (%) was observed (3.77) with the treatment T_0 Jamun juice (100%), and the highest acidity (%) was observed (5.50) with the T_2 Jamun juice (100%) + 1gm yeast/litre. Total acid contents are usually influenced by either fermentation or the addition of grape concentrates Goswami and Ray, (2011), and these may be responsible for the differences in total acid contents among vinegars. The change in total acidity with storage tended to increase in non-sterilized products, which seemed to be consistent with a previous study by Hutchinson *et al.,* (2019), where acetic acid produced by the action of acetic acid bacteria in non-sterile products was found to determine the total acid content.

Total Sugar

After 6th month of storage of jamun vinegar highest Total sugar (%) was observed (1.35) with the treatment T_0, whereas the lowest Total sugar (%) was observed (0.35) with the treatment T_2. The increase in reducing and total sugars corresponds to the increase in total soluble solids and the ultimate decrease in non-reducing sugars, which might be due to the hydrolysis of polysaccharides into reducing sugar (Jain *et al.,* 1984). The gradual rise in total sugars throughout the storage period may be caused by the gradual inversion of additional sucrose into simpler soluble molecules over time, as well as the inversion of polysaccharides like starch and cellulose in the presence of organic acids.

Reducing Sugar

After 6th month of storage of jamun vinegar highest reducing sugar (%) was observed (0.83) with the treatment T_0 Jamun juice (100%), while the lowest reducing sugar (%) was observed (0.21) with the treatment T_2 Jamun juice (100%) + 1 g yeast /l. The increase in reducing and total sugars corresponding to the increase in total soluble solids and ultimate decrease in non-reducing sugars, which might be due to the hydrolysis of polysaccharides into reducing sugar Jain *et al.* (1983). Gradual increase in total sugars over the storage could be due to inversion of polysaccharides like starch and cellulose substances in the presence of organic acids into simpler soluble molecules and also the inversion of added sucrose into simpler soluble substances in the course of time.

Appearance Score

After 6th month of storage of jamun vinegar highest appearance score was observed (7.62) with the treatment T_2 Jamun juice (100%) + 1 g yeast /l, while the lowest appearance score was observed (5.81) with the control treatment T_7 Jamun juice (100%) + 6

Table 3. Effectof storage period on reducing sugar, appearance score, overall acceptability, and B:C ratio of jamunvinegar

Treatment	Reducing Sugar			Appearance Score			Overall Acceptability			B:C
	Initial	3rd month	6th month	Initial	3rd month	6th month	Initial	3rd month	6th month	ratio
T_0	8.21	1.30	0.83	8.14	7.81	7.48	6.66	6.41	6.16	2.77
T_1	8.87	0.97	0.73	8.16	7.88	7.60	8.16	7.83	7.50	2.75
T_2	8.98	0.95	0.21	8.27	7.95	7.62	8.54	8.22	7.89	2.73
T_3	8.85	0.99	0.64	8.00	7.78	7.56	8.45	8.17	7.85	2.68
T_4	8.75	0.98	0.55	7.86	7.53	7.20	8.25	8.03	7.81	2.64
T_5	8.70	0.94	0.49	7.68	7.40	7.12	8.14	7.81	7.48	2.6
T_6	8.65	0.88	0.43	7.52	7.19	6.86	7.94	7.66	7.38	2.56
T_7	8.61	0.85	0.36	6.31	6.06	5.81	7.77	7.44	7.11	2.52
F-Test	S	S	S	S	S	S	S	S	S	
S.Ed.(+)	0.029	0.029	0.024	0.079	0.111	0.073	0.038	0.044	0.082	
C.D.at0.5%	0.063	0.061	0.052	0.170	0.239	0.157	0.082	0.094	0.177	

gm yeast/l. Kumar and Kocher (2017) analyzed the characteristics of sugarcane vinegar produced by semi-continuous fermentation on the hedonic scale and categorized it as standard quality. Sharma (2015) studied the sensory characteristics of guava vinegar in terms of colour, aroma, taste and overall acceptability and rated the guava vinegar in superior quality.

Overall Acceptability

After 6th month of storage of jamun vinegar highest overall acceptability was observed (7.89) with the treatment T_2 Jamun juice (100%) + 1 g yeast /l, followed by treatment T3 Jamun juice (100%) +2 g yeast /l, T4 Jamun juice (100%) +3 g yeast /l and T1 Jamun Juice (100%) + 0.5g yeast /l. While the lowest overall acceptability was observed (6.16) with the control treatment T_0 Jamun juice (100%). Kumar and Kocher (2017) analyzed the characteristics of sugarcane vinegar produced by semi-continuous fermentation on the hedonic scale and categorized it as standard quality.

Benefit Cost Ratio

The highest benefit-cost ratio was observed in the treatment T_0 Jamun juice (100%) at 2.77 and the minimum was observed in T_7 at 2.52.

CONCLUSION

The recipe containing 100% jamun fruit juice and 1g/l yeast was found suitable for the preparation of jamun vinegar. The vinegar prepared from treatment T_2 with Jamun 100 % juice + 1g yeast /l shows the highest value of total soluble solid (^{0}Brix) (9.03), ascorbic acid (mg/100 g) (Vitamin C) (21.85), acidity (5.50%), organoleptic score and the lowest pH (2.21), total sugars (0.35) and reducing sugars (0.21). Thus, vinegar made with the above recipe must be consumable. The sensory evaluation like appearance score (7.62), and overall acceptability (7.89) are significantly superior in the treatment T_2 with Jamun juice + 1 g yeast /l. The B:C ratio was highest in T_0 with 2.77.

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