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STANDARDIZATION OF NATURAL SWEETNER IN GULKAND FOR OPTIMAL QUALITY AND SHELF STABILITY

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ABSTRACT

The present study entitled “Standardization of natural sweetner in gulkand for optimal quality and shelf stability” was conducted during the year 2025–2026 at Department of Floriculture and Landscaping, on Horticulture Processing Unit of Krantikari Debridhur College of Horticulture and Research Station Jagdalpur. Mahatma Gandhi Udhyanikee Evam Vanikee Vishwavidyalaya, Durg (C.G.). The present investigation was conducted to standardize suitable natural sweeteners and their ratios for the preparation of gulkand with improved physico chemical, sensory and storage qualities. Rose petals were combined with jaggery, honey, dates and stevia powder at two ratios (1:1 and 1:1.5), comprising eight treatments. The prepared gulkand samples were evaluated for physico chemical characteristics, sensory attributes and shelf life at 0, 30 and 60 days of storage. Overall, Tˆ exhibited superior sensory quality and storage stability, indicating the potential of stevia as suitable natural sweeteners for value-added gulkand production.

***Key word*:** Gulkand, Sensory, Stevia, Shelf life etc.

Introduction

Floriculture has become one of the rapidly expanding branches of horticulture, playing an important role in agricultural diversification, employment creation and enhancement of rural livelihoods. The growing demand for flowers in both domestic and global markets has transformed floriculture into a commercially viable and economically rewarding sector. In addition to the production of fresh flowers, the industry serves as a valuable source of raw materials for perfume, cosmetic, pharmaceutical, nutraceutical and food processing sectors (Sudhagar, 2013). Rose (*Rosa* spp.), widely recognized as the “Queen of Flowers” is among the most ancient and highly appreciated ornamental crops cultivated globally (Fayaz *et al*., 2024).

The use of edible flowers has gained significant popularity in recent years due to increasing consumer awareness regarding healthy eating habits and the demand for natural food ingredients. Rose petals are extensively utilized in the preparation of herbal teas, syrups, jams, jellies, confectionery items, bakery products, ice creams, beverages and other functional foods. Traditionally, rose petals have been incorporated into teas, bakery products and flavouring extracts (Mabellini *et al*.,

2011). Research findings indicate that consumption of edible rose-based products may offer antioxidant benefits, support digestive health and contribute to overall well-being.

Gulkand, a traditional preserve prepared from rose petals and gulkand sharbat, a fragrant rose-based syrup, have been used since ancient times in India for the preservation and utilization of rose petals (Kumar and Deen, 2017). Gulkand is also recognized as a cooling tonic that helps relieve weakness, muscle discomfort, itching, bilious disorders and heat-related ailments. Ayurvedic practitioners in India incorporate gulkand with other medicinal herbs to minimize the adverse effects associated with radiation and chemotherapy treatments in cancer patients. In the food industry, gulkand is utilized to enhance the flavour and appearance of products such as milkshakes, cake fillings and bakery items (Nadaf *et al*., 2012).

Material and Method

Experimental site

The experiment on Gulkand was carried out in Horticulture Processing Unit, KDCHRS, Jagdalpur, during the 2025–26 in a Complete Randomize Design (CRD) with 8 treatments and 3 replications under different combination of natural sweetner and rose petal. The treatments were T_1 : Rose petals + Jaggery (1:1), T_2 : Rose petals + Jaggery (1:1.5), T_3 : Rose petals + Honey (1:1), T_4 : Rose petals + Honey (1:1.5), T_5 : Rose petals + Dates (1:1), T_6 : Rose petals + Dates (1:1.5), T_7 : Rose petals + Stevia powder (1:1), T_8 : Rose petals + Stevia powder (1:1.5). Fresh rose flower petals were used for the preparation of gulkand. The calculated quantities of petals either with sugar, jaggery, sugar candy and honey as per treatment were arranged in alternate layers in a wide mouth glass jar. The mouth of gulkand jar was covered and tied with muslin cloth, after that placed in sun light for impregnation of jaggery, honey, dates and stevia into petals up to 30 days. They were then labeled and stored under ambient condition for 0, 30 and 60 days observations. The sensory parameters viz; colour, texture, taste, flavour and overall acceptability based on 9 point hedonic scale (Amerine *et al*.,1965). The data were analysed by using completely randomized design (Fisher, 1950)

Table 1: Effect of natural sweetner on Colour of gulkand.

Treatment	Colour		
	0 Days	30 Days	60 Days
T_1 Rose petals + Jaggery (1:1)	7.36	6.19	6.01
T_2 Rose petals + Jaggery (1:1.5)	7.00	5.71	5.64
T_3 Rose petals + Honey (1:1)	7.36	6.01	5.85
T_4 Rose petals + Honey (1:1.5)	7.21	5.69	5.40
T_5 Rose petals + Dates (1:1)	6.00	4.68	4.47
T_6 Rose petals + Dates (1:1.5)	5.20	3.49	3.37
T_7 Rose petals + Stevia powder (1:1)	6.27	5.02	4.76
T_8 Rose petals + Stevia powder (1:1.5)	6.82	5.14	4.91
C.D. at 0.5%	0.49	0.40	0.38
SE(m)±	0.16	0.13	0.12
C.V.(%)	5.03	4.39	4.26

Result and Discussion

Colour

The data pertaining to Colour of gulkand prepared using different natural sweeteners are presented in Table 1 and Fig. 1. At 0 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Colour (7.36), followed by T_3 and T_4. The lowest Colour was recorded in T_6 (Rose petals + Dates, 1:1.5) (5.20). At 30 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Colour (6.19), significantly *at par* with T_3. The lowest Colour was recorded in T_6 (Rose petals + Dates, 1:1.5) (3.49). At 60 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Colour (6.01), significantly *at par* with T_3 and T_2. The lowest Colour was recorded in T_6 (Rose petals + Dates, 1:1.5) (3.37). Colour decline during storage was attributed

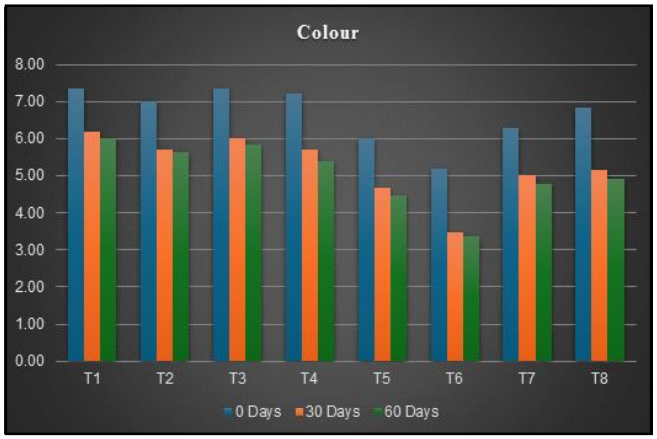


Fig. 1: Effect of natural sweetner on Colour of gulkand.

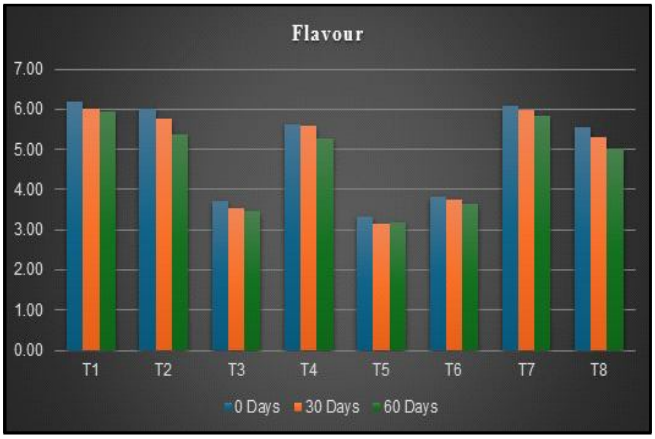


Fig. 2: Effect of natural sweetner on Flavour of gulkand.

Table 2: Effect of natural sweetner on Flavour of gulkand.

Treatment	Flavour		
	0 Days	30 Days	60 Days
T_1 Rose petals + Jaggery (1:1)	6.18	6.02	5.94
T_2 Rose petals + Jaggery (1:1.5)	6.00	5.76	5.37
T_3 Rose petals + Honey (1:1)	3.70	3.55	3.45
T_4 Rose petals + Honey (1:1.5)	5.64	5.59	5.28
T_5 Rose petals + Dates (1:1)	3.33	3.15	3.19
T_6 Rose petals + Dates (1:1.5)	3.82	3.75	3.64
T_7 Rose petals + Stevia powder (1:1)	6.09	5.97	5.84
T_8 Rose petals + Stevia powder (1:1.5)	5.55	5.29	5.01
C.D. at 0.5%	0.40	0.46	0.49
SE(m)±	0.13	0.15	0.16
C.V.(%)	4.59	5.40	6.00

to browning, pigment oxidation and Maillard reactions, accelerated by oxygen, enzymes, sunlight and prolonged storage. Similar findings were reported by Jat *et al.*, (2022), Koli *et al.*, (2004), Prasad and Mali (2005) and Shakir *et al.*, (2009).

Flavour

The data pertaining to Flavour of gulkand prepared using different natural sweeteners are presented in Table 2 and Fig. 2. At 0 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Flavour (6.27), significantly *at par* with T_7 and T_8. The lowest Flavour was recorded in T_5 (Rose petals + Dates, 1:1) (4.00). At 30 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Flavour (6.01), significantly *at par* with T_7 and T_8. The lowest Flavour was recorded in T_5 (Rose petals + Dates, 1:1) (3.86). At 60 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Flavour (5.91), significantly *at par* with T_7 and T_8. The lowest Flavour was recorded in T_5 (Rose petals + Dates, 1:1) (3.57).

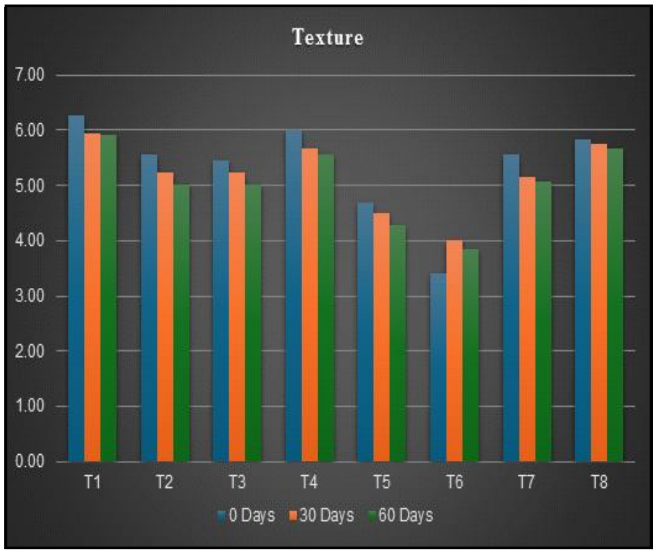


Fig. 3: Effect of natural sweetner on Texture of gulkand.

Table 3: Effect of natural sweetner on Texture of gulkand.

Treatment	Texture		
	0 Days	30 Days	60 Days
T_1 Rose petals + Jaggery (1:1)	6.26	5.93	5.91
T_2 Rose petals + Jaggery (1:1.5)	5.55	5.24	5.02
T_3 Rose petals + Honey (1:1)	5.45	5.22	5.01
T_4 Rose petals + Honey (1:1.5)	6.00	5.67	5.57
T_5 Rose petals + Dates (1:1)	4.70	4.49	4.27
T_6 Rose petals + Dates (1:1.5)	3.40	4.02	3.84
T_7 Rose petals + Stevia powder (1:1)	5.55	5.16	5.07
T_8 Rose petals + Stevia powder (1:1.5)	5.82	5.76	5.67
C.D. at 0.5%	0.42	0.44	0.49
SE(m)±	0.14	0.15	0.16
C.V.(%)	4.48	4.90	5.61

Flavour score declined during storage due to loss of volatile compounds, phenolic degradation and sugar oxidation. Similar findings were reported by Patel *et al.*, (2015) and Jat *et al.*, (2018).

Texture

The data pertaining to Texture of gulkand prepared using different natural sweeteners are presented in Table 3 and Fig. 3. At 0 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Texture (6.26), significantly *at par* with T_4. The lowest Texture was recorded in T_6 (Rose petals + Dates, 1:1.5) (3.40). At 30 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Texture (5.93), significantly *at par* with T_8 and T_4. The lowest Texture was recorded in T_6 (Rose petals + Dates, 1:1.5) (4.02). At 60 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Texture (5.91), significantly *at par* with T_8 and T_4. The lowest Texture was recorded in T_6 (Rose petals + Dates, 1:1.5) (3.84). The texture of gulkand declined gradually during storage, possibly due to biochemical changes and moisture absorption from the atmosphere. Similar findings were reported by Jat *et al.*, (2018).

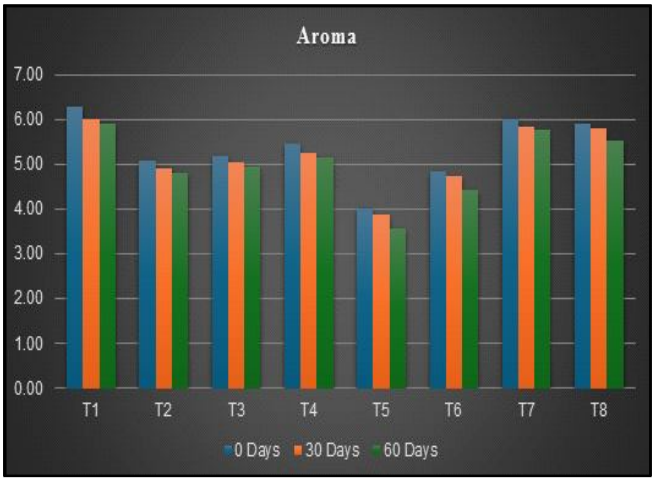


Fig. 4: Effect of natural sweetner on Aroma of gulkand.

Table 4: Effect of natural sweetner on Aroma of gulkand.

Treatment	Aroma		
	0 Days	30 Days	60 Days
T_1 Rose petals + Jaggery (1:1)	6.27	6.01	5.91
T_2 Rose petals + Jaggery (1:1.5)	5.09	4.91	4.80
T_3 Rose petals + Honey (1:1)	5.18	5.03	4.95
T_4 Rose petals + Honey (1:1.5)	5.45	5.24	5.14
T_5 Rose petals + Dates (1:1)	4.00	3.86	3.57
T_6 Rose petals + Dates (1:1.5)	4.82	4.74	4.41
T_7 Rose petals + Stevia powder (1:1)	6.00	5.83	5.75
T_8 Rose petals + Stevia powder (1:1.5)	5.91	5.79	5.54
C.D. at 0.5%	0.43	0.49	0.49
SE(m)±	0.14	0.16	0.16
C.V.(%)	4.64	5.46	5.65

Aroma

The data pertaining to Aroma of gulkand prepared using different natural sweeteners are presented in Table 4 and Fig. 4. At 0 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Aroma (6.18), significantly *at par* with T_7 and T_2 . The lowest Aroma was recorded in T_5 (Rose petals + Dates, 1:1) (3.33). At 30 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Aroma (6.02), significantly *at par* with T_7, T_2 and T_4 . The lowest Aroma was recorded in T_5 (Rose petals + Dates, 1:1) (3.15). At 60 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Aroma (5.94), significantly *at par* with T_7 . The lowest Aroma was recorded in T_5 (Rose petals + Dates, 1:1) (3.19). The aroma score of gulkand showed a gradual decline with advancement of storage period. The reduction in aroma could be attributed to the loss of volatile aromatic compounds and biochemical changes during storage. Among the treatments, jaggery-based gulkand (T_1) retained better aroma, whereas date-based gulkand (T_5) recorded the lowest score throughout storage. Similar findings were reported by Jat *et al.*, (2018) in rose petal jam.

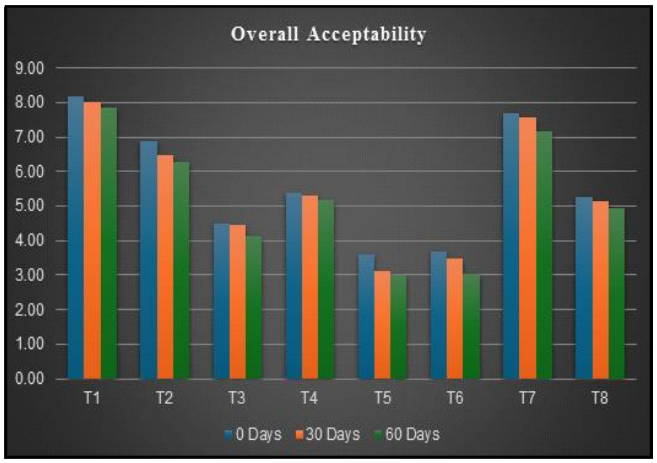


Fig. 5: Effect of natural sweetner on Overall Acceptability of gulkand.

Table 5: Effect of natural sweetner on Overall Acceptability of gulkand.

Treatment	Overall Acceptability		
	0 Days	30 Days	60 Days
T_1 Rose petals + Jaggery (1:1)	8.17	8.01	7.84
T_2 Rose petals + Jaggery (1:1.5)	6.88	6.49	6.29
T_3 Rose petals + Honey (1:1)	4.50	4.44	4.15
T_4 Rose petals + Honey (1:1.5)	5.38	5.30	5.17
T_5 Rose petals + Dates (1:1)	3.62	3.14	2.99
T_6 Rose petals + Dates (1:1.5)	3.67	3.47	3.04
T_7 Rose petals + Stevia powder (1:1)	7.67	7.58	7.17
T_8 Rose petals + Stevia powder (1:1.5)	5.25	5.14	4.95
C.D. at 0.5%	0.45	0.49	0.62
SE(m)±	0.15	0.16	0.20
C.V.(%)	4.52	5.19	6.80

Overall Acceptability

The data pertaining to Overall Acceptability of gulkand prepared using different natural sweeteners are presented in Table 5 and Fig. 5. At 0 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Overall Acceptability (8.17), followed by T_7 and T_2 . The lowest Overall Acceptability was recorded in T_5 (Rose petals + Dates, 1:1) (3.62). At 30 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Overall Acceptability (8.01), significantly *at par* with T_7. The lowest Overall Acceptability was recorded in T_5 (Rose petals + Dates, 1:1) (3.14). At 60 days, T_1 (Rose petals + Jaggery, 1:1) recorded the highest Overall Acceptability (7.84), followed by T_7 and T_2 . The lowest Overall Acceptability was recorded in T_5 (Rose petals + Dates, 1:1) (2.99). The overall acceptability of gulkand showed a gradual decline with advancement of storage period in all the treatments. This reduction could be attributed to the deterioration of colour, flavour, taste and texture during storage, which collectively affected the sensory quality of the product. Similar findings were reported by Jat *et al.*, (2018) in rose petal jam.

Conclusion

The present investigation revealed significant variation among natural sweetener treatments due to differences in their sugar composition, moisture content, acidity and preservative properties. T_1 (Rose petals + Jaggery, 1:1) recorded the highest colour, flavour, texture, aroma and overall acceptability due to the characteristic colour, flavour and aroma of jaggery. Conversely, T_5 (Rose petals + Dates, 1:1) recorded the lowest values for sensory attributes.

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