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Assessing the role of natural floral preservatives on the physical traits of gerbera cut flowers

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Abstract

Gerbera is a popular ornamental flower known for its vibrant colors, elegant appearance, and wide application in floral arrangements, bouquets, and home décor. The cut flowers of Gerbera are highly valued for their long vase life as they are cared properly. Research continues to focus on innovative ways to enhance the vase life of Gerbera flowers, including the use of sustainable preservatives, bioactive compounds. These efforts aim to reduce waste and maintain the flowers' aesthetic appeal for extended periods. Natural preservatives reduce disposal costs, avoid regulatory penalties, and promote sustainable practices, making them economically advantageous and environmentally friendly. An investigation was carried out to study the role of natural floral preservatives on the physical traits of gerbera cut flower cv. Brilliance in completely randomized design consisting of seventeen treatments. Cut stalk of uniform size were used and observations were recorded. The results revealed that Sucrose 2% showed significant performance at third, sixth, ninth, twelfth, fifteenth day under physical attributes on various parameters as Weight of flower (9.07), Flower diameter (78.63), Stem diameter (4.99), Water uptake (12.58), Transpiration-al loss of water (8.80). Cut gerbera benefit farmers in fetching good prices upto to demand.

Keywords: Gerbera (*Gerbera jamesonii* Bolus), natural floral preservatives, physical traits, water uptake, transpirational loss of water

Introduction

Gerbera (*Gerbera jamesonii* Bolus) is a member of the Asteraceae family, known by various names such as Transvaal daisy, African daisy, and Barberton daisy. It originates from South Africa and parts of Asia. While there are around 40 species in the Gerbera genus, *Gerbera jamesonii* is the primary species cultivated (Kumar *et al.*, 2020) ^[1]. It is an Important cut flower ranked first among the most-traded ornamental plants in the global market. In India, it is cultivated in an area of 5,730 ha with the production of 28,620 MT. Proper harvesting, post-harvest handling and use of floral preservative improve the keeping quality of flower for maintaining the freshness and quality of cut flowers (Murthy *et al.*, 2015) ^[3]. Most preservative are costly for farmers to prolong the vase life even additionally for one week, especially during high-demand occasions. Keeping these points in view, a study was carried out to identify natural preservative such as sucrose, vinegar, lime juice etc. extend the postharvest longevity and physical attributes of cut flowers (Asrar *et al.*, 2012) ^[2].

Materials and Methods

The experiment was conducted at Pt. K.L.S College of Horticulture & Research Station, Rajnandgaon (C.G.) during 2023 -24. The goal of the study was to determine the role of natural floral preservatives on the physical traits of gerbera cut flower cv. Brilliance. The experiment was laid out in completely randomized design having 17 treatments which was repeated thrice to confirm the results *viz.* (T₀) Distilled water, (T₁) Vinegar 0.5%, (T₂) Vinegar 1%, (T₃) Lime juice 0.5%, (T₄) Lime juice 1%, (T₅) Sucrose 1%, (T₆) Sucrose 2%, (T₇) Cow urine 5%, (T₈) Cow urine 10%, (T₉) Moringa leaf extract 5%, (T₁₀) Moringa leaf extract 10%, (T₁₁) Betel vine leaf extract 5%, (T₁₂) Betel vine leaf extract 10%, (T₁₃) *Aloe vera* 5%, (T₁₄) *Aloe vera* 10%, (T₁₅) Coconut water 50%, (T₁₆) Coconut water 100% at third, sixth, ninth, twelfth, fifteenth day. Immediately after harvesting, a 5-10 cm section of basal woody portion was trimmed under deionized water before being immersed in the same water.

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Individual scape heads were then carefully encased in plastic sleeves, bundled in groups of ten, and swiftly transported to the laboratory within one hour to maintain freshness. According to the treatment and its concentration of solutions, gerbera stalk were dipped in various preservative solutions. To test the impact of natural floral preservatives on the physical traits of gerbera, cut flower were dipped to the solution at ambient condition. Weight loss due to normal physiological processes was measured. Vernier calliper was used to measure the diameter.

Results and Discussion

The data recorded on weight of flower during vase life period of cut gerbera Cv. Brilliance held in floral preservative solutions are presented in the Table 1. The floral preservative solutions differed significantly on weight of flowers. Sucrose 2% recorded significantly highest weight of flower (9.07) which was followed by Lime juice 1% (8.57). There were significant differences in weight of flower during different days of vase life period. The flower's weight peaked on day 3rd (11.02) of the vase life period, then significantly decreased at successive intervals on day 6th (10.70), day 9th (10.38), day 12th (7.74). The lowest weight was recorded on day 15th (7.35), marking a consistent decline from the initial observation on day 3rd. Sucrose 2% improved flower weight compared to the control, likely due to its impact on osmotic concentration, which enhances water uptake. Similar result obtained by Ichimura and Shimizu (2007) [13] reported that application of Sucrose 2% increased fresh weight of cut.

Data presented in Table 1 provides an overview of floral preservative solutions on flower diameter during vase life period. The preservative treatments differed significantly on flower diameter of cut gerbera flowers. The treatment, Sucrose 2% recorded highest flower diameter (78.63) which was followed by Lime juice 1% (77.22) whereas lowest in control (64.01). The highest flower diameter was recorded on day 3rd (83.65) and significantly decreased at each successive interval from day 6th (81.51), day 9th (80.04), day 12th (74.80) by recording flower diameter lowest on day 15th (70.50). Sucrose 2% probably reduced moisture stress in cut

flowers by affecting stomatal closure, preventing transpiration and water loss. The findings of the experiment were further supported by Sayed *et al.* (2018) [6], Maitra *et al.* (2024) [7] in gerbera.

The data recorded on changes in water uptake (WU) during vase life period of cut gerbera cv. Brilliance held in floral preservative solution are presented in the Table 2. Treatment mean Sucrose 2% recorded highest water uptake (12.58) followed by Lime juice 1% (12.25) whereas lowest water uptake was registered in control (8.86). The highest WU was recorded on day 3rd (14.99) and significantly decreased at each successive interval from day 6th (13.73), day 9th (10.87), day 12th (8.17) by recording water uptake lowest on day 15th (5.95). Sucrose 2% helps to sustain water balance and turgidity. It increase water uptake in flowers by influencing various physiological and cellular processes that help maintain the flower's hydration. This was in conformity with the findings of Zamani *et al.* (2011) [9] in chrysanthemum, Krishnappa *et al.* (2000) [10] cut carnation.

The Table 2 represents the data recorded on changes in transpiration-al loss of water (TLW) during vase life period of cut gerbera cv. Brilliance held in vase solution of floral preservative. sucrose 2% recorded lowest TLW (8.80) which was followed by Lime juice 1% (9.18) whereas highest in control (12.52). There were significant differences in TLW during different days of vase life period. The highest TLW was recorded on day 3rd (14.90) and significantly decreased at each successive interval from day 6th (13.66), day 9th (10.76), day 12th (8.08) by recording TLW lowest on day 15th (5.90). Water loss from the flower tissue by transpiration during the experimental period was influenced significantly by sucrose. Sucrose 2% helped reduce moisture stress in by affecting stomatal closure, preventing water loss due to transpiration. If water loss through transpiration exceeds water uptake, the flowers can wilt, leading to reduced turgidity and a shorter vase life. Managing transpirational water loss is crucial. The findings of the experiment corroborate the results of Jamil *et al.* (2016) [11] in cut Hippeastrum flowers, Nagaraja *et al.* (2001) [12] in cut gerbera.

Table 1: Effect of different vase solutions on weight of flower (gm) and flower diameter during postharvest vase life of cut gerbera.

Treatment	3 rd Day	6 th Day	9 th Day	12 th Day	15 th Day	3 rd Day	6 th Day	9 th Day	12 th Day	15 th Day
	Weight of flower (gm)					Flower Diameter(cm)				
T ₀ (Distilled water)	10.09	8.95	8.77	6.34	6.28	80.68	75.84	72.35	67.68	64.01
T ₁ (Vinegar 0.5%)	10.18	9.72	9.33	6.82	6.37	82.22	80.24	78.44	71.58	66.82
T ₂ (Vinegar 1%)	10.86	10.65	10.46	7.70	7.44	83.85	82.14	80.66	74.16	69.83
T ₃ (Lime juice 0.5%)	11.04	10.84	10.50	7.77	7.65	84.49	82.32	81.03	77.78	72.15
T ₄ (Lime juice 1%)	12.39	12.23	12.03	9.41	8.57	86.96	84.97	83.63	79.90	77.22
T ₅ (Sucrose 1%)	12.28	12.04	11.68	8.92	8.30	86.80	83.91	82.44	78.63	74.78
T ₆ (Sucrose 2%)	12.56	12.50	12.31	9.47	9.07	88.95	86.57	85.24	80.55	78.63
T ₇ (Cow urine 5%)	10.16	9.63	9.26	6.53	6.32	81.58	79.39	78.39	69.43	65.09
T ₈ (Cow urine 10%)	10.10	9.43	9.14	6.52	6.30	81.17	79.19	74.43	68.78	64.78
T ₉ (Moringa Leaf Extract 5%)	10.36	10.05	9.80	6.96	6.96	82.99	80.88	78.91	72.72	68.18
T ₁₀ (Moringa Leaf Extract 10%)	10.22	9.93	9.58	6.93	6.45	82.39	80.82	78.67	71.82	67.24
T ₁₁ (Betel Vine Leaf Extract 5%)	10.79	10.49	9.97	7.58	7.00	83.70	81.26	80.49	72.92	69.39
T ₁₂ (Betel Vine Leaf Extract 10%)	10.61	10.36	9.95	7.37	6.97	83.26	81.10	79.92	72.85	68.80
T ₁₃ (Aloe vera 5%)	11.28	10.95	10.60	8.11	7.81	84.62	82.49	81.33	78.15	72.62
T ₁₄ (Aloe vera 10%)	12.15	12.04	11.67	8.92	7.99	85.49	82.82	81.99	78.62	73.90
T ₁₅ (Coconut water 50%)	11.01	10.83	10.47	7.73	7.48	84.15	82.18	80.85	77.66	72.02
T ₁₆ (Coconut water 100%)	11.31	11.22	10.87	8.52	7.92	84.78	82.78	81.82	78.35	72.99
Mean	11.02	10.70	10.38	7.74	7.35	83.65	81.51	80.04	74.80	70.50
SEM±	0.51	0.54	0.53	0.48	0.34	0.32	0.33	0.40	0.37	0.46
CD at 5%	1.47	1.57	1.53	1.39	0.99	0.92	0.94	1.14	1.06	1.33

Table 2: Effect of different vase solutions on water uptake (ml/flower) and Transpiration-al loss of water (ml/flower) during postharvest vase life of cut gerbera

Treatment	3 rd Day	6 th Day	9 th Day	12 th Day	15 th Day	Mean	3 rd Day	6 th Day	9 th Day	12 th Day	15 th Day	Mean
	Water uptake						Transpiration-al loss of water					
T ₀ (Distilled water)	12.58	11.41	9.08	6.27	4.97	8.86	16.32	15.30	12.37	10.39	8.24	12.52
T ₁ (Vinegar 0.5%)	14.50	12.52	9.66	7.04	5.45	9.84	15.50	14.62	11.56	9.07	6.32	11.41
T ₂ (Vinegar 1%)	14.88	14.11	11.11	8.07	5.60	10.75	14.78	14.10	11.02	8.05	5.55	10.70
T ₃ (Lime juice 0.5%)	15.39	14.39	11.28	8.58	6.02	11.13	14.66	13.42	10.47	7.43	5.45	10.29
T ₄ (Lime juice 1%)	16.40	15.16	12.27	10.27	7.13	12.25	13.42	11.68	9.32	6.43	5.05	9.18
T ₅ (Sucrose 1%)	16.24	15.01	11.90	9.90	6.93	12.00	14.34	12.35	9.34	6.52	5.07	9.52
T ₆ (Sucrose 2%)	16.41	15.41	12.41	10.41	8.28	12.58	12.58	11.37	9.05	6.05	4.93	8.80
T ₇ (Cow urine 5%)	14.41	12.49	9.58	6.66	5.09	9.65	16.21	15.00	11.72	9.90	6.92	11.95
T ₈ (Cow urine 10%)	13.38	11.72	9.49	6.58	5.09	9.25	16.27	15.15	12.22	10.24	7.13	12.20
T ₉ (Moringa Leaf Extract 5%)	14.63	13.50	10.48	7.48	5.50	10.32	15.31	14.43	11.30	8.58	6.05	11.13
T ₁₀ (Moringa Leaf Extract 10%)	14.52	12.58	10.38	7.45	5.48	10.08	15.36	14.44	11.47	9.01	6.27	11.31
T ₁₁ (Betel Vine Leaf Extract 5%)	14.82	13.58	10.57	7.57	5.57	10.42	15.23	14.23	11.18	8.27	5.71	10.92
T ₁₂ (Betel Vine Leaf Extract 10%)	14.78	13.57	10.53	7.49	5.53	10.38	15.23	14.33	11.19	8.40	5.96	11.02
T ₁₃ (Aloe vera 5%)	15.45	14.45	11.45	8.60	6.07	11.20	14.53	13.33	10.33	7.32	5.43	10.19
T ₁₄ (Aloe vera 10%)	15.60	14.68	11.77	9.11	6.36	11.50	14.36	12.36	9.61	6.87	5.31	9.70
T ₁₅ (Coconut water 50%)	15.25	14.25	11.22	8.31	5.75	10.96	14.67	13.56	10.51	7.57	5.48	10.36
T ₁₆ (Coconut water 100%)	15.57	14.63	11.60	9.04	6.31	11.43	14.48	12.48	10.22	7.25	5.41	9.97
Mean	14.99	13.73	10.87	8.17	5.95	---	14.90	13.66	10.76	8.08	5.90	---
SEm±	0.27	0.19	0.19	0.24	0.16	---	0.28	0.20	0.21	0.22	0.17	---
CD at 5%	0.77	0.55	0.54	0.68	0.47	---	0.80	0.57	0.59	0.64	0.50	---

Conclusion

The conclusion drawn from the experimental analysis highlights that (Sucrose 2%) T₆ exhibited superior performance across all evaluated parameters. This is because the Sucrose 2% can make flowers more attractive in terms of freshness of physical attributes and longevity of flower. The results revealed that Sucrose 2% showed significant performance on various parameters as Weight of flower (9.07), Flower diameter (78.63), Stem diameter (4.99), Water uptake (12.58), Transpiration-al loss of water (8.80). Thus, preservation could be adopted by the gerbera producers which needs less skill and fetches higher price for beautifully fresh flowers in eco-friendly ways.

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