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Efficacy of Floral Preservatives on Vase Life of Gladiolus Spikes *cv.* White Prosperity

Key words : *Germicide, gladiolus, spike, sucrose, vase life*

Gladiolus, the queen of bulbous flowers, belongs to the family Iridaceae, is considered to be a high value flower crop. Its elegant flower spikes, which have rich variation of colors, are the main reason for its ever-increasing demand. Gladiolus is a potential money spinner for the aesthetic world. It is cultivated right from the hilly regions to all over the plains of the country, to meet out the increasing cut flower demand. Though, the crop has a wide scope but still the contribution is meager in the international market. This may be due to the lack of authentic information on post harvest management. The spikes last for only 6-7 days when they are placed in water (Gowda and Shobha, 1992, Murali and Reddy, 1993) which is too less a postharvest life for marketing of gladiolus for distinct market. Floral preservative inhibits the synthesis of ethylene after cutting the spikes and an ideal floral preservative should contain sucrose as an energy source with germicidal effect, which ultimately improves vascular system for longer survival of spike during post-harvest (Singh *et al*, 1999). The present study was conducted to determine the best floral preservative for improvement of vase life in cut spikes of Gladiolus *cv.* White Prosperity.

The present investigation was carried out at the Citrus Research Station, Tirupati during 2015-16. The crop was raised under standard uniform cultural conditions planted in November 2015 and the harvesting of spikes was during March 2016. The spikes were harvested early in the morning when lower most 1- 2 florets started showing color and were brought to the laboratory immediately by placing them in bucket containing water. The maximum and minimum laboratory temperatures fluctuated between 23-29ºC and relatively humidity was 70-80% during the course of investigation. The basal 2 cm portion of the spike was re-cut in water to expose fresh tissue and the spikes were put in vase solutions containing sucrose (5%) in combination with different chemicals and compared with control (distilled water). The experiment was laid was in completely randomized design consisting of eight treatments viz., T1–Control (with distilled water), T2–Sucrose 5%, T3– Sucrose 5%+Ag NO_3 (100 mg/l), T4-Sucrose 5%+Ag NO_3 (200 mg/l), T5–Sucrose 5%+ Al_2 $(SO4)_3$ (100 mg/l), T6–Sucrose 5%+ Al_2 $(SO4)_3$ (200 mg/l), T7–Sucrose 5%+Citric acid (100 mg/l) and T8–Sucrose 5%+ Citric acid (200 mg/l) and were replicated four times. Observations were recorded on initial weight of spike, days to open first florets, weight of spike at first floret withering, floret diameter, days taken to first floret opening and withering, solution uptake, number of florets open at a time and vase life.

All treatments were found significantly superior in terms of extending vase life over control (Table 1). The maximum vase life (9.5 days) was observed in treatment T6–Sucrose The diameter of floret was influenced by all floral preservative solutions but maximum floret diameter (8.6 cm) was found in treatment T8–Sucrose 5%+Citric acid (200 mg/l), which was statistically at par with T6– Sucrose 5%+Al_2 $(SO4)_3$ (200 mg/l) and T4–Sucrose 5%+Ag NO_3 (200 mg/l). However the minimum flower diameter (6.3 cm) was observed in treatment T1.

The increase in flower diameter by chemical formulations might be due to the fact that sucrose provides energy for growth and helps in higher uptake of vase solution and simultaneously these formulations have profound effect to check the deleterious microbial activity. These results are also in conformity with results of Gowda and Gowda (1990), Pal *et al*. (2003) and Namita *et al*. (2006). The minimum number of days taken for basal floret opening (2.0 days) was observed in treatment T6 [Sucrose 5%+Al_2 $(SO4)_3$ (200 mg/l)], whereas the maximum (3.5 days) was found in treatment T1 (control). It may be due to the exogenous supply of sucrose which replaced the depleted endogenous carbohydrate, 5%+Al_2 $(SO4)_3$ (200 mg/l), while the minimum vase life (3.6 days) was observed in T1–Control (with distilled water). Similar reports were reported by Murali and Reddy (1993) and Namita *et al*. (2006) that the vase solution containing 5% sucrose and Al2 $(SO4)_3$ (400 ppm) resulted in extended vase life as it helps in lowering the petals pH, stabilizing of anthocyanin, acidification of the holding water, reduction in ion leakage and ethylene evolution by flower spikes.

Table 1. Effect of floral preservatives on vase life of gladiolus cut spikes cv. White Prosperity

Treatments	Vase life (days)	Floret diameter (cm)	Days to opening of basal floret	No of florets open at a time	Solution absorption/spike (ml)	Initial weight of spike	Spike weight at 1st floret withering	Days to wither 1st floret
T1: Control	3.6	6.3	3.5	3.3	50.4	47.1	51.2	5.7
T2: Sucrose 5%	5.3	7.5	3.2	4.3	55.8	50.6	57.4	5.8
T3: Sucrose 5%+AgNO3 (100 mg/l)	6.3	7.8	4.9	5. 3	61.5	49.5	58. 2	7.0
T4: Sucrose 5%+AgNO3 (200 mg/l)	7.5	8.3	2.6	6.0	62.1	50.5	56.1	7.2
T5: Sucrose 5%+Al2 (SO4) 3 (100 mg/l)	7.2	6.8	2.9	6.0	60.3	46.6	56.7	6.5
T6: Sucrose 5%+Al2 (SO4)3 (200 mg/l)	9.5	8.5	2.0	7.6	64.9	47.5	58.9	7.4
T7: Sucrose 5%+Citric acid (100 mg/l)	6.6	7.6	2.9	5.1	63.5	45.3	54.2	7.0
T8: Sucrose 5%+Citric acid (200 mg/l)	8.4	8.6	2.6	6.8	60.1	47.4	54.9	7.4
C D (P=0.05)	0.5	0.6	0.6	0.4	1.7	0.9	1.3	0.5

The maximum initial weight of spike (50.6 g) was recorded in treatment T2 (Sucrose 5%), whereas minimum (45.3 g) was found in T7–Sucrose 5%+Citric acid (100 mg/l). utilized during the vase life of flower and thereby enhanced vase life (Gowda and Shobha 1992). The increase in floret opening and longevity by mineral salts might be due to the fact that mineral salts increase the osmotic concentration and pressure potential of the petal cells, thus improving the water balance and quality of cut spikes (Halevy, 1976). The finding is in accordance with the results of Parmar et al. (2002). The maximum number of florets (7.67) opening at a time was recorded in treatment T6 [Sucrose 5%+Al2 (SO4)3 (200 mg/l)], whereas the minimum (3.3) was recorded in T1 (control). Similar findings were reported by Namita et al. (2006) in gladiolus. The effects of Al_2 $(SO4)_3$ on maximum number of florets opened at a time were apparent due to its antimicrobial nature which helped in preventing vascular blockage and finally increasing water uptake.

Since gladiolus spike has a multi-floret system, the spikes might require considerable quantity of food reserve for efficient opening of floret, therefore, sucrose is the best energy source for cut flower to maintain pH by synergistic effect, which improves the water balance and reduces moisture stress effecting stomata closure. But sucrose is only effective when used with antimicrobial agent; otherwise system xylem is blocked by microbes (Singh et al., 2000). The solution absorption was maximum (64.98 ml) by cut spikes held in T6–Sucrose 5% +Al_2 $(SO4)_3$ (200 mg/l) which may be accredited to its germicidal and acidifying action in the holding solution thereby contributing to reduced vascular blockage and increased water status (Shobha and Gowda, 1992). This was followed by T7–Sucrose 5% + Citric acid (100 mg/l) with the value of 63.5 ml, while distilled water recorded minimum solution absorption (50.4 ml) (Singh et al., 2000). The maximum spike weight (58.9 g) at 1st floret withering was observed in T6– Sucrose 5%+Al_2 $(SO4)_3$ (200 mg/l), whereas minimum (51.2 g) was recorded in T1–Control. It might be due to that sucrose facilitated the higher intake of water and total soluble sugars in the petal cells probably by enhancing the osmotic driving force for the solution uptake by making the cells water potential more negative. The increase in solution uptake in the cut spikes further caused increase in spike weight.

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Citrus Research Station, Tirupati, A.P.

P T Srinivas and
L Mukunda Lakshmi

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