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Response of Different Vase Solution on Keeping Quality of Cut Spikes of Gladiolus

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ABSTRACT: The present study was carried out to find out the "Response of different vase solution on keeping quality of cut spikes of gladiolus" was study at laboratory of Department of Floriculture and Landscape Architecture, College of Agriculture, IGKV, Raipur, (C.G.) during season 2022-23. The experiment was laid out in Completely Randomized design (CRD). There were 7 treatments *i.e.* T_0 (Tap water), T_1 Salicylic acid (150ppm), T_2 Citric acid (100 mg), T_3 Aluminium sulphate (200 ppm), T_4 GA_3 (200 ppm), T_5 Boric acid (4%), T_6 8-HQS (200 ppm) which were replicated thrice. The result suggested that among the different vase solutions, treatment Salicyclic acid @ 150 ppm (T_1) had found most appropriate in improving most of the post-harvest parameters in cut spikes of gladiolus under present investigation & resulted more physiological weight loss (41.57 %), increased water uptakes ratio (1.45 g), florets remained open at a time (4.00), diameter of floret (77.27 mm), floret opening (97.40 %), days taken to deterioration of florets (4.00 days), vase life of gladiolus spike (10.22 days) and longevity of spike (12.22 days).

Keywords: Gladiolus, Salicylic acid, Vase life.

INTRODUCTION

Gladiolus (*Gladiolus grandiflorus* L.) "Queen of bulbous flowers", belonging to the Iridaceae family and (subfamily Ixioideae). It is glamorous flower, flower of perfection also known as "sword lily" because of the shape of its leaves. It is one of the most famous cutflowers in the world (Bai *et al*. 2009) gladiolus was spread over the world at the end of the 16th century (Azimi, 2020). There are about 200 species of gladiolus. Gladiolus possesses the fundamental chromosome's no =15. The bulk of the genus (Diploid, triploid, tetraploid, pentaploid, hexaploid, octaploid, and hyperaneauploid) are heteroploids with relatively tiny chromosomes ranging from 2n=30 to 120 (Mahawer *et al*., 2013). Post-harvest of Cut flower crop has a unique vase life which is greatly influenced by cultural practices and post-harvest treatment procedures. According to some claims, 20–40% of cut flowers are lost due to unsuitable post-harvest handling procedures, and 30–70% of the potential maintaining quality of flower crops is predetermined at harvest (Sangama, 1997). Salicylic Acid (SA), a well-known phenol, can reduce reactive oxygen species (ROS) by increasing enzyme antioxidant activity and inhibiting the activity of the enzyme (Ansari and Misra 2007; Mahdavian *et al*., 2007).

MATERIALS AND METHODS

The influence of different vase solution onpost-harvest life of gladiolus cut spikes cv. Candyman was conducted at Research Laboratory of Department of Floriculture and Landscape Architecture, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh During the year of 2022-23. The experiment was laid out in Completely Randomized design (CRD). There were 7 treatments *i.e*. T_0 (Tap water), T_1 Salicylic acid (150ppm), T_2 Citric acid (100 mg), T_3 Aluminium sulphate (200 ppm), T_4 GA_3 (200 ppm), T_5 Boric acid (4%), T_6 8-HQS (200 ppm).

The spikes were harvested at tight bud stage when 1-3 basal buds show colour in the morning hours. Immediately after harvesting, spikes were kept in a bucket containing cold water and brought to the laboratory. The stem lengths of all the spikes were maintained 60 cm from the end of the base to the lowest bud. After recording the fresh weight, per spike was placed in 250 ml glass bottle containing 250 ml preservative solutions of each preservative act as individual treatment. Each treatment was replicated thrice during the experimental study in the laboratory.

RESULTS AND DISCUSSION

Data presented in Table 1. The minimum physiological weight loss (41.57 %) was noted when gladiolus spike was kept in treatment Salicyclic Acid @ 150 ppm (T_1)

which was found at par with treatments T_5 Boric Acid @ 4 % (43.38 %). While, the significantly maximum physiological weight loss (60.40%) was observed in treatment T_0 (Tap water). The minimum physiological weight loss under treatment (Salicyclic acid) @ 150 ppm Tuna *et al*. (2007) also reported due to improved water status of the spikes in long period. Similar result also been reported by sunny *et al*. (2022).

Water uptakes ratio (g) is calculated by this method

Water loss ratio was measured using the following formula

$$\text{Water uptake l ratio} = \frac{\text{Solution/water uptake}}{\text{Transpiration/water loss}}$$

Solution/water uptake = (Initial weight of bottle + solution) – (Final weight of bottle + solution)

Transpiration/water loss = Initial weight (Glass Bottle + water + stalk) – Final weight (Glass Bottle + water + Stalk).

The significantly affected by various vase solution. The maximum water uptake ratio (1.45) was recorded in (Salicylic Acid @ 150 ppm) T_1 which was found *at par* with treatment T_5 Boric Acid @ 4% (1.03), while, the significantly minimum water uptake ratio (0.17) was observed in treatment T_0 (Tap water). Salicylic acid is known to be a bactericide that reduces bacteria growth and vascular blockage, maintains a more favourable water uptake and suppresses water loss (Mori *et al*., 2001). Joseph *et al*. (2010) who suggested that salicylic acid is considered a coating material that prevents water loss and allow gases to permeate but not liquids, allowing normal plant respiration and reduces transpiration.

The total number of opened florets at a time was significantly varied due to different floral preservative solutions. The total number of opened florets at a time was varied from 1.33 florets to 4.00 florets. Significantly higher total number of opened florets at a time (4.00 florets) were recorded in treatment Salicyclic Acid @ 150 ppm (T_1). Whereas, significantly the minimum total number of opened florets at a time (1.33) were observed in treatment (T_0) Tap water. These results may be probably due to that using salicylic acid at a suitable concentration in vase solution led to decrease the respiration rate (Ezhilmathi *et al*., 2007) and increase the vase solution uptake (Alaey *et al*., 2011). All these attributes led to increase the cumulative synthesis materials in the cut gladiolus spikes, consequently the number of the fully opened florets per spike could be increased (Saeed *et al*., 2016).

Table 1: Effect of different preservative solutions on different parameters of cut spike of gladiolus cv. Candyman.

Treatment	Physiological weight loss (%)	Water uptakes ratio (g)	Florets remained open at a time
Tap water	60.40	0.17	1.33
SA (150 ppm)	41.57	1.45	4.00
Citric acid (100 mg)	47.14	0.72	1.56
Aluminium Sulphate (200 ppm)	48.37	0.73	2.22
GA_3 (200 ppm)	48.13	0.57	2.00
Boric acid (4%)	43.38	1.03	3.33
8-HQS (200 ppm)	51.71	0.48	2.00
S.Em±	**0.68**	**0.08**	**0.21**
CDat0.05%	**2.00**	**0.23**	**0.62**

The Different floral preservative (Table 2) is significantly influenced the days taken to deterioration of florets. The significantly maximum number of days taken to deterioration of florets (4.00 days) was recorded in treatment Salicyclic Acid @ 150 ppm (T_1) which was found at par with treatment Boric Acid @ 4% (3.67) T_5 and GA_3 @ 200 ppm (3.56) T_4. Whereas, significantly the minimum number of days taken to deterioration of florets (2.11 days) was recorded in treatment to (Tap water). These data confirmed the results obtained with cut gladiolus, chrysanthemum and anthurium flowers (Hassan & Ali 2014). SAas a powerful hydroxyl radical scavenger, prevented the peroxidation of membrane lipids. Moreover, it also increased antioxidant enzyme activities (Ezhilmathi *et al.*, 2007). Might be the reason of delayed deterioration of florets under this treatment.

The interpretating of the data clearly revealed that different preservative vase solutions at different concentration had significant effect on diameter of florets. Among the different treatments, treatment SA 150 ppm (77.27 mm) i.e. observed maximum diameter of florets which was found *at par* with treatments Boric Acid 4% (76.48mm) and Citric Acid 100 mg (75.53 mm). Whereas, significantly the minimum floret diameter (38.04 mm) was noted with treatment T_0 i.e. (Tap water). Tamrakar *et al*. (2021) also suggest that the plant growth regulators are found helpful in improving the carbohydrate levels of cut spikes by increasing water uptake and cell turgidity might be the possible reason of increased diameter of basal flower in vase. Salicylic acid has a vital role in plant defence and is implicated in the activation of defence systems against different disease-causing pathogens (Grant and Lamb 2006; Miura *et al*., 2010).

The florets opening percentage in a gladiolus spike was found significantly with different floral preservative, significantly maximum florets opening per cent of gladiolus spikes (97.40 %) was recorded in treatment in Salicylic Acid @ 150 ppm T_1 which was found *at par* with treatment Boric Acid @ 4% (94.54 %) and GA_3 @ 200 ppm (94.04 %). Whereas, significantly the minimum opening florets per cent of gladiolus spikes (40.89 %) was noted under treatment T_0 (Tap water).

Tamrakar *et al*. (2021) reported the higher floret opening % (85.88%) under GA_3 @ 200 ppm followed by SA @ 100 ppm. They found that higher floret opening percentage attributed to better over all food and nutrient status of spike under these treatments. Salicylic acid improved the water uptake (Ezhilmathi *et al*., 2007) and sugar translocation in plants which might accumulate more resources and exerted turgor pressure for cell division and elongation, respectively. This turgidity and accumulation of resources resulted in floral opening. Similar results of improved percentage of opened florets were observed by Ezhilmathi *et al*. (2007).

The significantly longest vase life (10.22 days) was observed in treatment Salicyclic Acid @ 150 ppm(T_1) which was found *at par* with treatment Boric Acid @ 4% (9.89 days) T_5. The significantly shortest vase life (5.00 days) was observed with treatment to (Tap water). Tamrakar *et al*. (2021) reported that SA @ 100 ppm recorded significantly maximum vase life (10.88 days) in gladiolus. Salicylic acid enhanced the vase life of the gladiolus flowers. It might be due to the role of salicylic acid in vase solution and ion uptake (Tuna *et al*., 2007). Saeed *et al*. (2016) who reported that longest vase life (13 days) was recorded when spike was kept in salicylic acid (150 ppm).

Significantly the maximum longevity of gladiolus spike vase days (12.22 days) was observed in treatment Salicyclic Acid @ 150 ppm(T_1) which was found at par with treatment Boric Acid @ 4% (10.56 days) T_5. Whereas, significantly the minimum longevity (5.33 days) of gladiolus spike was noted in treatment to (Tap water). The flowers treated in different concentrations of salicylic acid (50, 100, 150 and 200 ppm) delayed gladiolus flower senescence and leakage of ion in petals (Hatamzadeh *et al*., 2012). SA is known to be a bactericide that reduces bacteria growth and vascular blockage, maintains a more favourable water uptake and suppresses water loss (Mori *et al*., 2001). Salicylic acid (10 mg/L) and sucrose (20 g/l) gave less vase life period but extended longevity of cut gladiolus flowers. This may be attributed to the involvement of several factors, and the role of salicylic acid in enhancing longevity of cut gladiolus flowers Amin (2017).

Table 2: Effect of different preservative solutions on different parameters of cut spike of gladiolus cv.

Treatment	Days taken to deterioration of florets (days)	Diameter of floret (mm)	Floret opening (%)	Vase life of spike (days)	Longevity of spike (days)
Tap water	2.11	38.04	40.89	5.00	5.33
SA (150 ppm)	4.00	77.27	97.40	10.22	12.22
Citric acid (100 mg)	3.33	75.53	91.40	7.44	8.56
Aluminium Sulphate (200 ppm)	3.11	68.77	87.52	7.78	8.89
GA_3(200ppm)	3.56	63.76	94.04	8.33	9.44
Boric acid (4%)	3.67	76.48	94.54	9.89	10.56
8-HQS (200 ppm)	3.44	73.05	80.80	5.89	7.35
S.Em±	**0.17**	**1.42**	**2.85**	**0.30**	**0.26**
CDat0.05%	**0.50**	**4.16**	**8.39**	**0.89**	**0.77**

CONCLUSIONS

On the basis of results obtained from present investigation, it may be conducted that The different floral preservatives are found very useful in improving most of the post-harvest qualities of gladiolus spike as compare to Tap water. Among the different vase solutions, treatment Salicyclic acid @ 150 ppm (T1) had found most appropriate in improved most of the post-harvest parameters in cut spikes of gladiolus under present investigation & resulted increased total number of opened florets at a time, diameter of floret (cm), floret opening (%), vase life of gladiolus spike and longevity of spike (days) of cut gladiolus spike. The same treatment also reduced physiological weight loss (%) and delayed deterioration of florets.

FUTURE SCOPE

1. Different preservative may be tried under ambient condition for enhancing the vase life of Gladiolus and other flowers.
2. Different varieties of gladiolus spike may be tried with similar treatments.
3. Similar experiment can be done on other cut flowers.
4. Similar experiment can be done in different climatic condition and different month.

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