Plant Archives Vol. 22, No. 2, 2022 pp.140-142 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2022.v22.no2.025

RESPONSE OF DIFFERENT PRESERVATIVES ON VASE LIFE OF GLADIOLUS SPIKE (*GLADIOLUS HYBRIDUS* L)

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(Date of Receiving : 07-07-2022; Date of Acceptance : 09-10-2022)

ABSTRACT

A postharvest experiment was carried at Department of Horticulture, R.B.S College Bichpuri, Agra (U.P.) during the year 2020-21, to evaluate the response of different preservatives on vase life of gladiolus spike (*gladiolus hybridus* L)". The experiment was conducted in 'Completely Randomized Design' having three replications and eight treatments. Vase solutions were; 3.0% sucrose solution (T_1), 4.0% sucrose solution (T_2), 100 ppm acetic acid solution (T_3), 100 ppm sodium benzoic acid solution (T_4), 100 ppm sodium thiosulphate (T_5), 100 ppm lemon juice (T_6), 3.0% sucrose solution +100 ppm lemon juice (T_7) and tap water (control (T_8). The effect of sucrose 3% + lemon juice 100 ppm recorded significantly maximum under days to basal floret open (3.21 days), fresh weight change (12.51 gm), rachis length (7.98 cm), percentage of florets open (92.55%), solution uptake (181.66 ml), florets length (11.19 cm), diameter of fully open florets (11.09 cm) and vase life of gladiolus spike (15.72 days), While these all the parameters were observed minimum in Tap water (control).

Keywords **:** *Gladiolus hybridus*, Basal floret, Spike, lemon juice, Uptake and Vaselife

Introduction

Gladiolus belongs to the family "Iridaceae" and sub–family "Exioideae". The origin place of this plant is said to be South Africa. The word gladiolus is derived from the Greek word, which means a "Sword leaf". Gladiolus was introduced in India during 16th-17th century by the Britishers. Gladiolus being a potential cut flower grown globally for its attractive spikes. Gladiolus is grown as flower bed in gardens and used in floral arrangements for interior decoration as well as making high quality bouquets (Lepcha *et al.,* 2007).

Owing to unsurpassed beauty and economic value, gladiolus has gained popularity in many parts of the world. It is grown largely for both cut flowers and garden display purposes. There are now a large number of varieties of gladiolus with different colors, types of florets and petal structure available in the world which has arisen as a result of inter specific and inter varietal hybridization in every year, there is remarkable addition in new varieties.

Spikes of gladiolus are most attractive, beautiful and have socio-economical importance in our society. All section of our society uses the spike for the decoration of the houses, irrespective of the cast, creed and religion. In addition to decoration, some flower's spikes are used for the aroma purposes. It is also used on the occasion of auspicious ceremony or programme, like marriage, birthday party, at retirement party, promotion, starting a new job welcome etc. Young people now a days use the spike to express their idea, feeling and emotions through offering the flower spike. Mostly, spikes are used at reception, in hotel, office and many other such places. Whenever, we go to meet any important and V.I.P. Person, usually we go with the floral spikes in the form of bouquets. The use of floral preservatives is the most economical and practical methods for extending post-harvest life of gladiolus cut flower. The vase life of cut flower is influenced by constant water supply, checking of microbial growth, prevention of ethylene formation and energy source. Enhancing the vase life of cut flower is not only one of the prime goals of the researcher but also of the consumer. Prolongation of vase life of cut flower is an important aspect of floriculture. The vase life of flowers varies with the variety and environmental factors. Different varieties perform differently under preservative treatments. The vase life of cut flower is influenced by variety of factors like climate, crop variety, harvesting time, post – harvest handling etc.

Materials and Methods

The experiment was conducted at Research laboratory, Deptt. of horticulture, R.B.S College Bichpuri, Agra (U.P.) during month of Dec-Jan of 2020-21. The experimental area is situated at 27.20 N latitude 78.50 East longitudes at height of 168m above the mean sea level. The climate of experimental site is sub-tropical with large variation between summer and winter temperature. During the summer, temperature ranges from 30°C to 46°C or even more during May and June whereas in winter, it ranges from 1°C to 22°C. The mean annual precipitation fluctuates around 670 mm (average of last decade) and most part (84%) of it is received

during the month of July to September and about 16 per cent of rain in rest of the year which is too erratic in distribution and intensity. The experimental flower spikes were kept in the laboratory at about 22 ± 2º C ambient room temperature and 80 ± 5% relative humidity (RH). It has proper aeration and no direct sunlight effect.

The experiment was conducted in 'Completely Randomized Design' having three replications and eight treatments. Vase solutions were; 3.0% sucrose solution (T_1),4.0% sucrose solution (T_2), 100 ppm acetic acid solution (T_3), 100 ppm sodium benzoic acid solution (T_4), 100 ppm sodium thiosulphate (T_5), 100 ppm lemon juice (T_6), 3.0% sucrose solution +100 ppm lemon juice (T_7) and tap water (control (T_8). The Gladiolus cv. "White friendship" was used for this study. It takes about 99 days for flowering, total no of flower spike 72 were taken which have 68 cm length, 12-14 floret per spike, florets colour white and around 4 cormels produces per plant. After harvesting it was taken to the laboratory where the spikes were cut at a constant length of 45 cm each and the fresh weight of cut spike for each treatment and replication was recorded carefully. The stock solution of acetic acid, Sodium benzoic acid, Sodium thiosulphate, lemon juice and sucrose made on 1000 ppm prepared by dissolving proportionate weight of individual chemical in distilled water and then final volume make up to 500 ml. Observations like days to open of basal florets, Fresh weight change (g), Rachis length (cm), Percentage of florets opened, Solution uptake (ml), Vase life, Floret length (cm) and Flower Diameter (cm) were recorded during the experimentation. The data on various parameters were analysed statistically as suggested by Fisher (1955).

Results and Discussion

Days taken to basal florets

The number of days required for first flower opening was recorded maximum in T_7 (3.21 days) followed by T_5 and $T_6$and minimum days (1.73) were found incontrol (Table 1). The possible reason for behind this the pressure and concentration gradient which pulls the water more quickly to the floret tissues/cells which after entry makes the turgor pressure inside the cell and cell becomes turgid helps in blooming of floret. Similar results were found by Mehraj *et al.* (2013) in gladiolus.

Weight Loss of Spike

Spike weight, vase life and weight loss of spike were significantly influenced due to various preservatives as holding solutions. Maximum (34.3%) weight loss was noted from tape water; whereas minimum (12.51%) was observed from T_7 (Table 1). This might be due to maximum uptake of water with reserve food from T_7. The T_7 treatment contain lemon juice which has the citric acid (Penniston *et al.*, 2008) and citric acid actas a germicide and sucrose support in reserved food. The findings of the study are in close proximity with the findings of Bai *et al.* (2009), Macnish *et al.*(2008), Yamada *et al.* (2003) and Soda *et al.* (2011).

Increase in Rachis

The maximum increase (7.98 cm) in rachis length was recorded with application of sucrose 3% + lemon juice 100 ppm (T_7) followed by T_1 and T_5 (6.45 cm). The minimum increase in rachis length (4.55 cm) was observed in control T_1 (Table 1). The physiology of mechanism behind the increasement of rachis length was may be that T_7 solution supplied less water in comparison of other preservatives including control which caused the respiration rate slow that helped in longer survival but continuous and gradual development in all field like weight, size, length, etc. Similar trends in rachis length was earlier been reported by Mehraj *et al.* (2010) in gladiolus.

Percent opened florets

The maximum fully opened florets per spike (92.55%) were recorded with T_7 followed by treatment T_6 and the minimum percentage (80%) of full open floret was recorded in control (Table 1). It might be due to water movement through osmosis was gradual but continuous and at slow rate that supplied the floral cell, respiratory substrate (sucrose 3%) at required level and water hydrated the protoplasm that helps in the activation of required enzyme, minerals, other Co-factors and also helped in hydrolyzing the sugar into oligosaccharide or monosaccharide. This result confined by Hassan (2005).

Solution uptake

The maximum (181.66 ml) uptake of the solution was noticed in the case of treatment T_7 followed by T_4 (153.33 ml) treatments and minimum (115.0 ml) solution uptake was observed in control (Table 1). The possible reason for this spike placed in T_7 survived for longer period and it developed in size also. The all-activity water and carbohydrate are required, that provided higher uptake of vase solution. Spike placed in control had also up taken the vase solution but due to short life period & not full development, amount of solution remained less than the other preservatives.

Last fully opened florets length

The maximum floret length (11.05 cm) of last fully opened florets was recorded with T_7 which was significantly higher and minimum length of last fully opened floret (8.47 cm) was obtained in control (Table 1). The Length increasement of any plant or its organ depends on respiratory substrate, water minerals and enzyme. Cells of floral meristematic tissue of floret undergoes respiration where respiratory substrate (Sucrose 3%) oxidised to give energy and CO_2 and water hydrolyse the saccharide, dissolve and transport the required minerals form holding solution and floret parts to the divisional (Cell) part of floret. All these factors together build or increase the length. The Similar result was observed by Hassan (2005).

Diameter of last fully open florets

The maximum diameter (11.09 cm) of last fully opened florets was also measured with T_7 and the minimum floret diameter (8.99 cm) was measured with T_1. The entire factor depends on respiratory substrate, enzyme responsible for cellular division, presence of floral meristematic tissue and water balance (Transpiration ratio). Control remained inferior regarding it, because of absence of respiratory substance in tap water and presence of microbes and dirt, dust, etc. that blocked the path of xylem. The Similar results were obtained by Bai *et al.* (2009) in gladiolus.

Vase Life

The maximum vase life (15.72 days) was recorded in the T_7 followed by T5 and T4 which was significantly influenced and the minimum (9.21 days) vase life was

recorded under T_1. It might be due to T_7 Solution provided water, minerals, external saccharide plus smooth flow of water from the solution to the cell due to presence of lemon juice That maintained the pH of water and kept it clean and also avoid the blockage of xylem tissue path. Water having solute concentration caused concentration gradient made the water flow gradual and continuous that helped the spike for longer survival which may increase the vase life. The results of present experiment was in close proximity with the result noted by Mehraj *et al.* (2013)

Conclusion

On the basis of above results it may be concluded that all the floral preservatives tested in the present experiment, the holding vase solution of sucrose 3% + lemon juice 100 ppm performed better than rest of the preservatives. Hence, it could be used as floral preservative in extending the vase life of cut flowers.

Table 1 : Response of different preservatives on vase life of gladiolus spike

Treatment	Days taken to basal floret open	Weight loss of spike (g)	Increase in rachis length (cm)	Percentage of opened florets	Solution uptake (ml)	Last fully opened florets length (cm)	Diameter of last fully opened florets (cm)	Vase Life (days)
Sucrose 3.0%	2.19	20.33	6.45	89.33	118.33	10.33	10.60	12.22
Sucrose 4.0%	2.11	17.33	5.78	91.00	119.00	10.47	10.74	13.11
Acetic acid 100 ppm	1.92	21.66	5.22	84.55	145.00	10.77	9.16	12.33
Sodium benzoic acid 100 ppm	2.03	22.00	6.11	90.77	153.33	9.11	8.99	13.05
Sodium thiosulphate 100 ppm	2.71	18.00	6.45	91.10	151.66	8.55	9.05	14.29
Lemon Juice 100 ppm	2.69	16.33	5.66	83.00	135.00	9.99	10.73	13.42
Sucrose 3.0% + Lemon juice 100 ppm	3.21	12.51	7.98	92.55	181.66	11.05	11.09	15.72
Control	1.73	34.33	4.55	80.00	115.00	8.47	8.99	9.21
SEm±	0.242	1.236	0.413	1.923	0.411	0.200	0.209	0.382
CD at 5%	0.726	3.707	1.238	3.766	0.988	0.600	0.627	1.148

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