ROLE OF CHEMICAL PRESERVATIVE SOLUTIONS ON EXTENDING THE VASE LIFE OF GERBERA CUT FLOWERS Cv. Pink Elegance

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ABSTRACT

Vase life is the period during which a cut flower retains its appearance in a vase. Freshly cut flower spikes of most cultivars will have a vase life of about a week in water. When the best combination of flower preservatives was used, vase life can be increased by two or three times. Vase life is a major consideration in identifying plant species suitable for use in floristry, as plants with a long vase life are far more desirable than those with a short vase life. Vase life also varies across plant species and cultivars. Chemical treatments that can extend the vase life in flowers and is a major component of floriculture research. The research was conducted to find out the chemical preservative solution to extend the vase life and quality of gerbera flowers in vase. sucrose 4 %, vinegar 1 % and Calcium chloride 1 % was used in a combination of nine treatments in Complete Randomized Design with three replications. The vase life and quality characters were observed. Significant differences were observed in all the characters. The quality characters like days taken for stem bending, discolouration of petals, days taken for petal shriveling, drooping of flower heads were reduced, early flower opening and the maximum vase life (16 23 day) were obtained in the treatment containing sucrose 4 % + vinegar 1% + $CaCl_2$ 1 % in distilled water.

Keywords: $CaCl_2$, vinegar, sucrose

INTRODUCTION

Gerbera (*Gerbera hybrida*) belongs to the family Asteraceae. They are attractive flowers and are available in a wide range of colours such as yellow, orange, pink, crimson, red, purple and white. Gerbera var. “Queen Leen” is widely used as a cut flower for vase decoration and other floral arrangements. Cut flowers with long vase-life, fetches high market prices. Keeping quality is an important parameter for evaluation of cut flowers for both domestic and export markets. Stem (stalk) bending is one of the major problems in gerbera cut flowers, and addition of chemical preservatives to the vase solution increases the vase-lifeof cut flowers (Dissanayake *et al.*, 2009). The vase life of gerbera could be extended by using chemicals such as silver nitrate and 8-

Hydroxyquinoline citrate, which are expensive and hazardous to the environment (Ekanayake *et al.,* 2008) and thus, growers could not use these postharvest treatments. Dissanayake *et al*. (2009) found that Clorox, lime juice and vinegar are inexpensive and less hazardous and could be used as a remedy to extend the vase life of lotus flower.

The usage of $CaCl_2$ can strengthen the stem and can limit the stem bending percentage (Ekanayake *et al.*, 2008). The major consideration in identifying plant species suitable for use in floristry plants with a long vase life being far more desirable than those with a short vase life. Gerbera is a genus of plants in the Asteraceae family. It was named in honour of German botanist and medical doctor Traugott Gerber. Gerbera species bear a large capitulum with striking two-lipped ray florets in yellow, orange, white, pink or red colours. The capitulum, which has the appearance of a single flower is actually composed of hundreds of individual flowers. The morphology of the flowers varies depending on their position in the capitulum. The flower heads can be as small as 7 cm in diameter or up to 12 cm. Gerbera is very popular and widely used as a decorative garden plant and as cut flowers. It is one of the popular cut flower having short vase life and are mostly used freshly, so the improvement vase life is one the required quality to the customers.

All holding solutions must contain essentially two components, sugar and germicides. The sugar provides a respiratory substrate, while the germicides control harmful bacteria and prevent plugging of the conducting tissues. Among all the different types of sugars, sucrose has been found to be the most commonly used sugar in prolonging vase life of cut flowers (Redman, *et al*.,2002). The major reasons for less vase life of cut flowers may be due to nutrient deficiency, bacterial and fungal infection, water stress-induced wilting and vascular blockage (Alaey *et al*., 2011). Water balance in flowers also play important role in maintaining flower turgidity, freshness, petal orientation and proper bud opening. There is important role of sugars in vase solution that increase the postharvest flower quality and life of different cut flowers (Bhattacharjee and De, 2005).

MATERIALS AND METHODS

Experiment was conducted at Department of Horticulture, Faculty of Agriculture, Annamalai University from 2017 to 2018 to find out the best suitable concentration for extending the vase life of gerbera Cv Pink Elegance. The flowers were harvested at stage when two outer rows of disc florets are perpendicular to the stock. Flowers in the same size were selected for the experiment and kept in bucket containing cold water to remove field heat. The stems were re cut leaving about 30 cm from the flower head prior to placing them in the treatment solution. The preservative solution was freshly prepared by using distilled water and then flowers were placed in vase containing solution. The flowers with 30 cm stems were subsequently placed in the solutions. The solutions were renewed once in three days. Flowers were kept in an air conditioned room at 24 °C with a continuous uniform light intensity of two fluorescent bulbs with cool white light each of 60 watts for 12 hrs per day. The experiment with nine treatments were conducted in completely randomized design. Vase life and stem bending were recorded daily. Observations were recorded at 10^{th} day day of the experiment.

Treatment Details

Treatments	Vase solutions
T_1	sucrose 4 %
T_2	vinegar 1%
T_3	$CaCl_2$ 1 %
T_4	sucrose 4 % + vinegar 1%
T_5	sucrose 4 % + $CaCl_2$ 1 %
T_6	vinegar 1% + $CaCl_2$ 1 %
T_7	sucrose 4 % + vinegar 1% + $CaCl_2$ 1 %
T_8	Distilled water
T_9	Tap water

RESULTS AND DISCUSSION

There was a significant effect on all the treatments. The highest fresh weight of flower heads (6.78 g) and stems (5.73 g) were observed in T_7 with sucrose 4% + vinegar 1 % + $CaCl_2$ 1% with distilled water. The lowest fresh weight of flower heads (3.45 g) in T_9 with tap water and stems (2.11 g) were observed in T_9. The Days taken for stem bending is highest in T_7 with 11.12 days and highest vase life were observed in the treatment T_7 with 16.23 days in sucrose 4% + vinegar 1 % + $CaCl_2$ 1% with distilled water. According to Meeteren (1978), the fresh weight of stems increased with uptake of water, which helps to maintain the turgidity of stem and reduce stem bending percentage. Vase solutions with an acidifier resulted in a comparatively higher fresh weight and lower stem bending than T_9 (tap water) and T_8 (distilled water). Byczynski (1997) reported that vinegar and lime act as acidifiers and bactericides, which may reduce the pH of solutions and increases water uptake.

Treatments with sucrose showed a long vase life and a lower stem bending percentage. Sucrose is widely used as a floral preservative in many countries. Steinitz (1982) reported that sucrose act as a food source and a respiratory substrate, which helps delay the degradation of proteins and improves the water balance of cut flowers. Halevy and Mayak (1979) found that the addition of sucrose to the solution increased the mechanical rigidity of the stem by inducing cell wall thickening and lignification of vascular tissues. Sucrose antagonizes the effect of ABA, which promotes senescence. Sugars usually tend to promote microbial growth as observed in the present experiment, and hence the chemical solutions were replaced once in three days. The combination of sugars and biocidesmay have resulted in an extended vase-life of cut flowers. The lowest stem bending percentages were obtained in treatments, which consisted of $CaCl_2$ (1%) in addition to the acidifier and sucrose. Salisbury and Ross (1986) reported that Ca helps to strengthen plant cell wall structure, while Jones (2001) reported that chlorine is an important biocide that prevents contaminations by microorganisms when the solution is rich in food. Ekanayake *et al.*, (2008) found that the stem bending was one of the problems in gerbera cut flowers and lower concentrations of $CaCl_2$ were effective in preventing stem bending in gerbera.

CONCLUSION

The maximum vase life of 16.23 days was recorded in an air conditioned room at 24 °C with a continuous uniform light intensity of two fluorescent bulbs with cool white light each of 60 watts for 12 hrs per day. sucrose 4% + vinegar 1 % + $CaCl_2$ 1% reduces the days taken for petal shriveling, days taken for stem bending, discolouration of petals and days taken for petal shriveling.

Table 1 - Role of chemical preservative solutions on extending the vase life of gerbera

Treatments	Fresh weight of flower heads (g)	Fresh weight of stems (g)	Drooping of flower heads (Days)	Days taken for stem bending (Days)	Vase life (Days)	Time taken to flower opening (Days)	discolouration of petals (Days)	Days taken for petal shriveling (Days)
T_1	6.29	5.16	9.71	10.64	12.67	8.36	6.54	10.23
T_2	5.34	5.38	10.11	11.72	13.12	8.76	7.34	11.56
T_3	5.87	4.85	9.47	10.12	11.23	8.27	7.12	11.14
T_4	6. 12	5.91	9.56	12.13	13.54	8.81	6.19	12.21
T_5	6.75	5.55	10.71	11.36	14.63	7.91	7.32	13.22
T_6	5.97	5.38	10.57	12.23	14.65	7.88	7.91	13.91
T_7	6.78	5.73	11.12	13.29	16.23	7.23	8.62	14.22
T_8	4.18	2.71	6.87	6.96	7.34	9.66	4.16	7.49
T_9	3.45	2.11	5.42	6.11	7.05	10.34	4.02	6.12
SE (d)	0.17	1.37	0.18	1.40	0.26	1.43	0.15	1.73
CD (p=0.05)	0.35	2.81	0.37	2.89	0.53	2.83	0.31	2.47

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