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STUDIES ON THE EFFECT OF DIFFERENT CHEMICALS ON THE VASE LIFE OF CUT GERBERA (*GERBERA JAMESONII* BOLUS EX. HOOK) *cv.* ALPPRAZ

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Abstract

Gerbera (*Gerbera jamesonii*) is one of ten most important cut flowers in the world. One of the important problem is low-life after harvest. Producers want to increase longevity of these flowers with using chemical solutions. The flowers maintained in vase solution containing sodium hypochlorite 20 ppm has recorded significantly longest vase life (10.570 days) with higher values in water uptake (8.089 g/flower spike), transpirational loss of water (8.405 g/flower spike), fresh weight change of flowers (100.463% of initial of flower weight) and total sugars content (3.700 mg/g fresh weight). SH 20 ppm also recorded significantly lower values in scape bending curvature (10.017 degrees) and electrolyte leakage (27.738%), which have contributed to increased vase life of cut gerbera flowers.

Key words : *Gerbera jamesonii,* cut flower, sodium hypochlorite, calcium hypochlorite, vase life.

Introduction

Gerbera (*Gerbera jamesonii* Bolus ex. Hook) is an important commercial cut flower, belongs to the family Asteraceae, it occupies the fourth place after rose, spray chrysanthemum and tulip (Choudhary and Prasad, 2000). The export oriented production of gerbera is rapidly increasing in India with some foreign collaborations recently. The total annual production of gerbera cut flowers in India is about 112.8 Lakh cut stems (NHB, 2013). The attractive blooms of gerbera are suitable for any type of floral arrangements like bouquets, floral ornaments and in making dry flower crafts.

The postharvest longevity of cut flowers having economic value can often be improved by the use of different chemicals and sugars in vase solution (Halevy *et al*., 1978 and Prashanth, 2006). An effective flower food *i.e*., a preservative solution should contain three basic components to extend the life of cut flowers. A sugar to provide energy to the flowers, a biocide to kill the microbes and an acidifier to lower the pH of solution, which increases and maintains the uptake of water and nutrients by the flower (Coake, 1997). Many agents have been used in cut flower vase solutions to extend vase life by reduced microbes contamination. The bactericides are the most important components in the preservative solutions to control harmful bacteria and help to prevent bacterial embolism (Halevy and Mayak, 1981).

Improper postharvest handling and short postharvest life (Wernett *et al*., 1996) are the major problems with gerbera cut flowers. Short vase life of cut flowers is related to wilting, ethylene production and vascular blockage by air and micro organisms (Elgimabi, 2011). The vase life of cut gerbera flowers is often limited by bending of the flower stalk called as scape bending (Wilberg, 1973 and Fischer *et al*., 1982) and a premature senescence apart from normal senescence. Moreover, lack of proper postharvest technical knowledge about floriculture in general and gerbera in particular is a major constraint in gerbera cultivation in Andhra Pradesh. So, the objective of this study was to investigate the effect of preservative chemicals Sodium hypochlorite and Calcium hypochlorite at different concentrations on vase life of cut gerbera cv. Alppraz.

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Materials and Methods

The experimental was located at Post Graduate Laboratory of Floriculture & Landscape Architecture, Horticultural College and Research Institute, Dr. Y.S.R Horticultural University, Venkataramannagudem, West Godavari District. The experiment was carried out on 'Alppraz' variety with seven treatments i.e. Sodium Hypochlorite ($NaOCl_2$) 20 ppm (SH 20),Sodium Hypochlorite ($NaOCl_2$) 40 ppm (SH 40), Sodium Hypochlorite ($NaOCl_2$) 60 ppm (SH 60), Calcium Hypochlorite ($CaOCl_2$) 20 ppm (CH 20), Calcium Hypochlorite ($CaOCl_2$) 40 ppm (CH 40), Calcium Hypochlorite ($CaOCl_2$) 40 ppm (CH 40) and Control (Distilled water) and each treatment replicated three times.The flowers were continuously held in the treatment solution (Holding solution) till the end of the vase life period. In each glass bottle 350 ml of aqueous test solution / holding solution of different treatments was filled and their weight was recorded.

Flasks were weighed at alternate day of interval along with solution without flower and the consecutive difference in weight represents the water uptake by the flowers and expressed in grams per flower scape. Flasks were weighed at alternate day of interval along with solution and flowers. The consecutive difference in weight represents the water loss from the flowers for that particular period and expressed in grams per flower scape. The water balance in the tissue offlower scapes was calculated by deducting the total transpirational loss of water from the total water uptake.The difference between the weight of bottle + solution + flower scape and weightof bottle + solution represents the fresh weight of the flowers and expressed in as percentage of theinitial value. At the onset of vase life, the scapes were fully turgid and were placed in the bottles with an angle of 20° with respect to vertical. Scape curvature was individually determined during vase life bymeasuring the angle of the scape with respect to their angle to initial day, using protractor. Scape curvature was measured at every alternate day and expressed in degrees (van Doorn *et al*., 1994). Flower stalks were discarded when one-third of the petals were brown or wilted. This stage was considered to be the end of potential useful longevity of gerbera flower stalks and the number of days taken for this was recorded as vase of the cut flowers. Ion leakage percentage for estimation of membrane permeability was measured using an electrical conductivity meter based on Poovaiah (1973) method. The amount of total sugars content present in the flower scape was analyzed by phenol-sulphuric acid method (Dubois *et al*., 1956).

Statistical analysis

The data were subjected to statistical analysis as per the procedure outlined by Panse and Sukhatme (1985). Results on vase life experiments were analyzed using analysis of variance (ANOVA) and F-test analysis. Least significant difference (LSD or CD) was used for the comparison between treatments during vase life.

Results and Discussion

Significantly highest WU was recorded with SH 20 (8.089 g) followed by SH 40 (7.483 g). Control recorded significantly lowest WU (4.431). Significantly lowest water uptake was recorded on day 10 (3.107 g) (table 1). The highest WU was observed due to effective transportation within the floral stems and reduced stem blockage, which was supported by the findings of Marousky (1969) in cut roses. Significantly highest TLW was recorded with SH 20 (8.405) followed by SH 40 (7.971). Control recorded significantly lowest TLW (5.379). Higher WU might have led to increased TLW to avoid the temporary stress (Halevy *et al.,* 1978) and thus led to an increase the membrane viscosity (Faragher, 1986) of the cell. Lowest TLW observed in control was due to reduced water uptake thereby the quantity of water retained in the floral tissue was meager which led to wilting of cut flowers (Balakrishna *et al*., 1989) in cut tuberose. Significantly highest FWC was recorded with SH 20 (100.463 g) followed by CH 20 (98.127 g). Control recorded significantly lowest FWC (89.238 g). An increase in fresh weight could be attributed to improved water balance in the floral tissue. Similar findings were also reported by Larsen and Frolich (1969) in cut carnations and Marousky (1969) and De Jong (1978), Yoo and Kim (2003).

Among the different treatments the flowers held in SH 20 recorded significantly longest vase life (10.570 days) followed by CH 20 (8.507 days). Significantly lowest vase life period was however observed with control (4.700 days) (table 2, fig. 1). The present results were in accordance with findings of Dineshbabu *et al*. (2002) in Dendrobium flowers, who suggested that improved water consumption, fresh weight and flower freshness and reduced the respiration rate and physiological loss in weight thereby extending the vase life.

Significantly lowest EL was recorded with SH 20 (27.738%) followed by SH 40 (28.869%). However, control has recorded significantly highest EL (32.671%). Scape bending curvature was significantly lowest with SH 20 (10.017 degrees), whereas, significantly highest

Table 1 : Effect of post-harvest application of preservative solutions combination on mean water relations during vase life period of cut gerbera *cv.* Alppraz.

Treatments	Mean water uptake (g/f)	Mean TLW (g/f)	Mean Water Balance (g/f)	Mean Fresh weight change (% of initial weight)
SH 20	8.089	8.405	3.753 (-0.247)	100.463
SH 40	7.483	7.971	3.508 (-0.492)	95.418
SH 60	6.527	7.252	3.275 (-0.725)	92.191
CH 20	6.885	7.629	3.261 (-0.739)	98.127
CH 40	6.145	6.917	3.235 (-0.765)	96.307
CH 60	5.663	6.611	3.045 (-0.955)	91.199
Control (DW)	4.431	5.379	3.053 (-0.947)	89.238
S.Em ±	**0.06**	**0.06**	**0.02**	**0.02**
C.D. 5%	**0.17**	**0.10**	**0.06**	**0.37**

Table 2 : Effect of post-harvest application of preservative solutions combination on scapebending curvature, opticaldensity of vase solution, electrolyte leakage and vase life period of cut gerbera *cv.* Lamborgini.

Treatments	Scape Bending Curvature (degrees)	Electrolyte leakage (%)	Total Sugars (%)	Vase life
SH 20	10.017	27.738	3.700	10.570
SH 40	12.591	28.869	3.574	7.897
SH 60	23.303	30.107	2.928	6.490
CH 20	25.810	29.419	3.074	8.507
CH 40	30.662	30.717	2.613	7.173
CH 60	41.944	31.792	2.482	6.270
Control (DW)	54.687	32.671	2.031	4.700
S.Em ±	**0.06**	**0.02**	**0.01**	**0.05**
C.D. 5 %	**0.03**	**0.05**	**0.08**	**0.16**

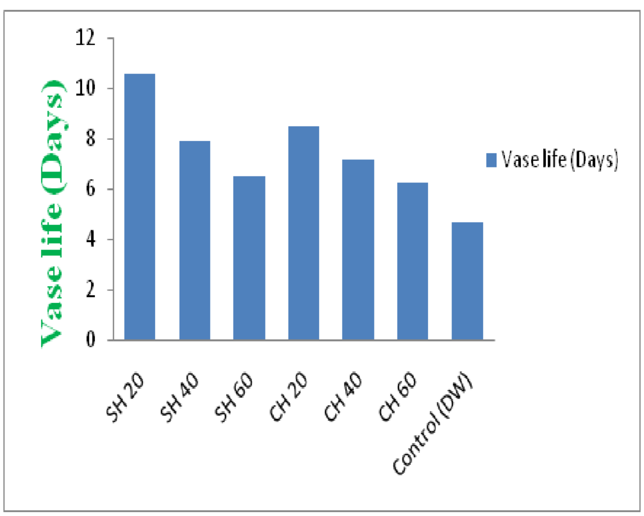

Fig. 1 : Effect of postharvest application of biocides onvase life (days) during vase life period of cut gerbera *cv.* Alppraz.

scape bending curvature was recorded with control (54.687 degrees). Improved water balance as a result of high turgidity and mechanical strength of the scape could be the cause for the least scape bending curvature with $NaOCl_2$ 20 ppm in the vase solution (Van Meeteran, 1979). Highest scape bending curvature in control might be due to poor water relations and vascular blockage by microbes resulting in lower turgor in the scapes.

Significantly highest total sugars content was recorded in flower petals held in SH 20 (3.700 mg) followed by SH 40 (3.574 mg). Significantly lowest total sugars content was observed in control (2.031 mg). The total sugars content slightly increased from day 0 of experimentation to day 3 and then steadily decreased towards the end of vase life period. The reduced levels of sugars towards the end of vase life period might be due to decreased translocation and accumulation in the flower petals (Nichols, 1975).

Conclusion

Based on the results obtained from the experiment by employing the biocides in the vase solution, SH 20 has been found as the best treatment in suppressing the microbial growth in the vase solution there by increased the water relations in the floral tissue which has resulted in the extension of vase life to 10.570 days in cut gerbera.

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