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Effect of Various Chemicals on Vase Life and Quality of Cut Tuberose Flowers

Allah Bakhsh, Muhammad Arif Khan, C.M. Ayyub*, Mubarak All Shah** and M. Afzal**
Mango Research Station, Multan, *Department of Horticulture, University of Agriculture, Faisalabad-38040, **Inservice Agricultural Training Institute, Sargodha, ***Hill Fruit Research Station, Murree, Pakistan

Abstract

These studies were conducted at Floriculture and Landscaping Research Sub-station Multan, during 1996, Cut tuberose were treated with solutions containing various chemicals to test their effects on vase life and quality. Vase life was increased three times by a solution containing 200 ppm silver nitrate ($AgNO_3$) and 4 mM silver thiosulfate (STS). Pulsing cut tuberose stems in a solution containing glucose and sucrose prolonged vase life and improved quality. Flower harvested at tight bud stage had significantly longer vase life compared to flowers cut at half opened bud stage. The quality of flowers was also improved greatly by pulsing flowers in silver nitrate ($AgNO_3$) and silver thiosulfate (STS) chemicals.

Introduction

Bulbous tuberose (*Polianthus tuberose*) a member of amaryllidaceae family is one of the important flowers grown in Pakistan. It is highly valuable flowers for perfume and scent industry.

In Pakistan, the growers and the consumers like to preserve the identity of the flowers because of increasing trends for using it as a cut flower crop and for interior decoration.

The vase life of bulbous tuberose in tap water under good environmental conditions is usually less than a week. Extension of vase life and improvement in spike development and retention of floret colour are highly desirable factors.

Although, not all cut flower respond alike yet the addition of chemicals to the pulsing solution is a practical means of prolonging life of many flowers (Apelbaum and Katchansky, 1977; Cho and Lee, 1979; Lukaszewska, 1981; Amariutei and Burzo, 1981; Mor *et al.,* 1984; Nowak and Mynett, 1985; Piskornik, 1986). Chemicals have their greatest impacts when used within a few hours after the flowers are cut (Mastalerz, 1960; Larsen and Scholes, 1966; Mor *et al*., 1984). Laurie (1936) in his early work found that copper extended cut snapdragon life from 1 to 27 days. Many researchers as Kelly and Hammer (1958), Halevy and Witter (1965) and Bhatt (1965) reported an increased vase life from 4 to 6 days through the use of material ranging from commercial preservatives to growth regulators.

Many authors like Amariutei and Burzo, (1981), Mor *et al*. (1984), Nowak and Mynett (1985), Lukaszewska (1986) and Piskornik (1986) have reported the beneficial effects of silver nitrate ($AgNO_3$), silver thiosulphade (STS) and sucrose on vase life and quality of cut carnations. This project was undertaken to determine the effects of these chemicals on vase life and quality of Tuberose flowers.

Materials and Methods

Bulbous tuberose plants were grown at Floriculture and Land Soaping Research Sub-Station, Multan, during summer, 1996. The glowers of uniform development were selected. Flowers were harvested in the morning at different stages of development, i.e., Half open bud stage (flower spikes had one to two florets completely open) and in the tight bud stage (there were no opened florets on th spike). After harvest, the flowers were brought to the laboratory, All the leaves were discarded to avoid un-due contamination and to minimize transpiration loesses. To examine the effect of various concentration of glucose and sucrose, stems of the spikes were dipped for 10 hours in the said solution, while the spike sets were treated with $AgNO_3$ (200 ppm) and STS 4 mM for 10 minutes and later on pulsed in 10 and 16 per cent sucrose solutions respectively, at room temperature (26°C) for 10 hour duration.

For vase life studies flowers were placed in vases with distilled water while control in tap water. The vase life was noted as described by Larson and Scholes (1966).

The experiment was laid out in a completely randomized design with factorial arrangements using four spikes samples in each treatment. Data were analysed according to methods described by Gomez and Gomez (1984).

Results and Discussion

Vase life: Table 1 indicated that vase life of tuberose was significantly affected due to various treatments. The life of cut flowers increased three to four times with silver nitrate and STS pre-treatments as compared to control. The solutions containing glucose and sucrose in various concentrations as pulsing treatment increased vase life from 3 to 4 days compared to control (Tap water). The striking effects of STS and $AgNO_3$ on the vase life are about certainly, due to effectiveness of these chemicals inhibiting the action and production of ethylene in flowers (Veen, 1979; Mor *et al*., 1984). The improved vase life of tuberose. treated with STS and silver nitrate is not only due to the extension of the life of the individual florets but also the inhibition of floret abscission (Mor *et al*., 1984; Apelbaum

and Katchansky, 1977; Larsen and Scholes, 1965). There was no advantage to a glucose concentration above 10 percent and no significant difference in vase life for flower pulsing in solutions with 10 and 15 percent sucrose. Vase life increased significantly when glucose concentration increased from 10 to 15 percent. The primary function of sucrose is undoubted as a source of energy for metabolic processes. Vase life was significantly affected due to harvesting of flowers at tight bud and half opened bud stage. The flowers took about 1 to 2 days more to maintain freshness under tight bud stage compared to half opened bud stage. The present findings fully support the other writers (Larsen and Scholes, 1965, Amariutei and Burzo, 1981, Mor *et al*., 1984; Lukaszewska, 1986).

Table 1: Effects of glucose or sucrose in vase solution or treatment with AgNO, and STS on flower opening percentage and vase life (days) of tuberose

	Harvest stage			
	Days		Percentage	
Treatments (%)	1	2	1	2
Glucose 5	6	5	77	82
Glucose 10	6	5	79	86
Glucose 15	7	6	82	88
Sucrose 10	7	6	82	86
Sucrose 15	7	6	82	84
Silver Nitrate (200 ppm) + 100 Sucrose	12	10	99	100
STS (4 mM) + 15 Sucrose	16	14	100	100
Control (Tap water)	4	3	52	64
S.,E.**	0.24	0.68	1.11	3.15

Table 2: Effects of glucose or sucrose in vase solution or treatment with $AgNO_3$ and STS on flower diameter (mm) and quality (days).

	Harvest stage			
	Days		Percentage	
Treatments (%)	1	2	1	2
Glucose 5	30.6	33.10	4	3
Glucose 10	32.5	33.2	4	4
Glucose 15	33.1	34.2	4	4
Sucrose 10	32.5	33.5	4	4
Sucrose 15	33.4	34.0	4	3
Silver Nitrate (200 ppm) + 100 Sucrose	38.8	41.3	5	5
STS (4 mM) + 15 Sucrose	38.8	42.3	5	6
Control (Tap water)	30.2	31.1	3	3
S.E.**	0.54	1.52	0.11	0.31

** = Highly significant; 1 = Tight bud; 2 = Half opened bud

Open flowers percentage: Table 1 shows that treatments produced significant effects on the percentage of fully opened flowers. Almost hundred per cent flowers were opened with silver nitrate and STS pulsing flowed by eighty percent opening by glucose and sucrose treatments compared to control. About 3 to 12 percent more flowers were opened in half opened spikes compared to those harvested at tight bud stage. The treatments produced pronounced stimulation of opening the bud by sugar pulsing. These results corroborate with those of Halevy and Mayak (1981) and Mor *et al*. (1984).

Flower Diameter: The results presented in Table 2 indicates that flower diameter was significantly affected due to various treatments. The maximum diameter was obtained in flowers which had been treated with silver nitrate and silver thiosulfate compared to control. The addition of glucose and sucrose in different concentrations in pulsing operation also increased diameter of cut flowers compared to tap water (control). The spikes which had half opened buds attained significantly greater diameter compared to spikes picked at tight bud stage. These results corroborate with those of Larsen and Scholes (1965), Apelbaum and Kachansky (1977) and Nowak and Mynett (1985) who reported increase in the diameter of individual flower in treatments with various concentrations of sucrose and pre-treated with silver nitrate and STS.

Quality of Flowers: Data presented in Table 2 shows that quality of flowers was greatly improved in various treatments. Tuberose flowers were considered to satisfy aesthetic sense with maximum percentage of healthy flowers. The treatments with silver nitrate and STC improved opening and flowers. The treatments with silver nitrate and STC improved opening and flowers became acceptable for interior decoration on the 6th day after harvest while, spikes harvested at an early stage of development could not attain decorative standard when held in tap water. These results agree with those of Apelbaum and Katchansky (1977), Lukaszewska (1981), Nowak and Maynett (1985), Amariutei and Burzo, (1981) and Mor *et al*. (1984).

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