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EFFECT OF DIFFERENT PACKING MATERIALS AND CHEMICALS ON STORAGE AND VASE LIFE OF TUBEROSE *(POLIANTHES TUBEROSA)* FLOWERS

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Tight-bud flowers of tuberose wrapped in aluminum lamination foil and stored at 4°C lasted longer (32.9 days) in the storage compared with partially-open or half-open flowers packed in the cellophane or butter paper. However, longer storage shortened (5.0 days) the vase life of flowers. Dipping the flower stems in the 1000 ppm $AgNO_3$ and then pulsing in 10% sucrose plus 150 ppm citric acid at room temperature prior to storage was not beneficial in lengthening the storage life or extending the vase life. Half open flowers wrapped in aluminum lamination foil and stored at room temperature gave vase life of 10.9 days.

INTRODUCTION

Tuberose recently gained importance in Pakistan as a cut flower crop. Its increasing demand necessitates supply for a prolonged period. In order to regulate flower supply and extension in vase life of many kinds of flowers, the use of suitable wrapping materials and chemical treatments before storage has been made with varying success. Farnham (1975) reported that dipping cut flower stems of Gypsophila in $AgNO_3$ solution was less effective than continuous submersion in vase life preservators. But Reist and Rey (1975) observed reduced vase life in preservatives after cold storage of Chrysanthemum buds at 4°C for 7 days. Reist (1978) found polystyrol better than polypropylene for wrapping cut flowers of Carnations, Roses and Chrysanthemums but it was perforated to avoid condensation. Halevy *et al.* (1984) found that pre-storage pulsing of Cyclamen flowers in 15% sucrose and 30 ppm $AgNO_3$ solutions prolonged the storage for 3 weeks with keeping quality equal or better than that of untreated flowers.

The present research project was initiated to observe the effects of pre-storage treatments and packing materials on the storage period and the subsequent vase life of tuberose flowers.

MATERIALS AND METHODS

Freshly cut first grade tuberose flowers of 'double' variety were selected and harvested at 3 developmental, tight-bud stage (S1), partially-open stage (S2) and half-open stage (S3). The flowers were divided into 2 groups on the basis of pre-storage treatments i.e. no pre-storage treatment (T0) and pre-storage treatment (T1).

In T1, flower stems were cut diagonally with complete defoliation. These were then dipped in 1000 ppm $AgNO_3$ solution for 15 minutes and then pulsed in 10% sucrose + 150 ppm citric acid solution for 16 hours at room temperature (21-23°C).

Treated and non-treated flowers, after punching the wrapping materials because punching or ventilation holes help to maintain optimum concentration of CO_2 and O_2 were packed individually in 3 types of packing materials i.e. cellophane (P1). butter paper (P2) and aluminum lamination foil (P3).

These unsealed but folded packs were stored at room temperatures of 21-23°C (C0) and low temperature of 4°C (C1).

Storage life was noted from the day the flowers were packed and stored to the day when about 10% flowers on each spike wilted or signs of wilting appeared. The flowers were kept individually in distilled water in test tubes after storage for the evaluation of vase life. Vase life was considered terminated when about 50% flowers on each spike wilted or desiccated (Larsen and Scholes, 1966).

The experiment was laid out in Completely Randomized Design with factorial arrangement using 4-spike sample treatment^{-1}. The results were interpreted according to Duncan's Multiple Range (DMR) Test at 5% level of Probability.

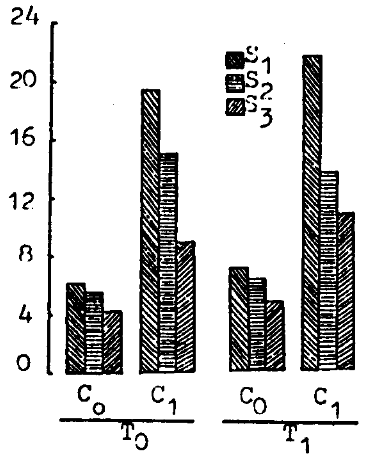

Fig. 1 a. Effect of bud stages, pre-storage treatments and storage temperature on storage life.

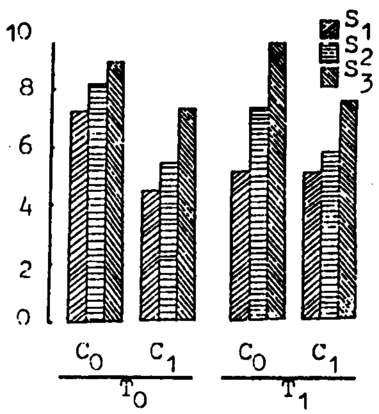

Fig. 1 b. Effect of bud stages, pre-storage treatments and storage temperature on vase life.

RESULTS AND DISCUSSION

Tight bud (S1) flowers exhibited maximum storage life of 13.5 days but vase life (8.3 days) was greatest in half open (S3) flowers (Table 1). Longer storage of tight bud cut flowers may be due to the fact that the buds are less sensitive to the injurious effect of ethylene at low temperature (Camprubi and Nichols, 1978). Aluminum lamination foil (P3) proved the best regarding storage (14.1 days) and vase life (7.3 days). However, it was observed that flowers packed in aluminum lamination foil at their later stages of storage were attacked by fungus, particularly on the lower opened or partially opened flowers on spikes. The incidence of attack was severe at room temperature. The work of Reist (1978) indicates that the packing materials and by treating the flowers with fungicides before packing flowers stored at low temperature (C1) lasted longer (14.8 days) compared with the control (5.9 days). At low temperature, reduced transpiration losses and reduced rate of ethylene and CO_2 production because of slow respiration rate could be responsible

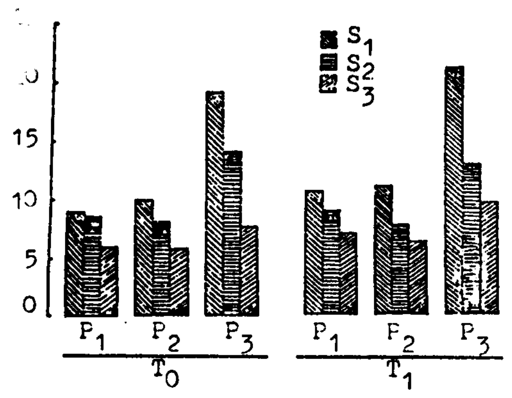

Fig. 2 a. Effect of bud stages, packing materials and pre-storage treatments on storage life.

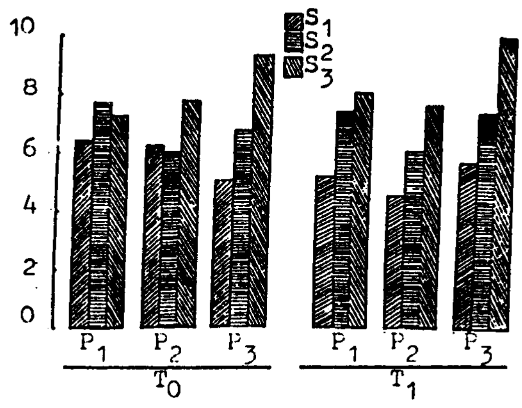

Fig. 3 a. Effect of bud stages, packing materials and storage temperatures on storage life.

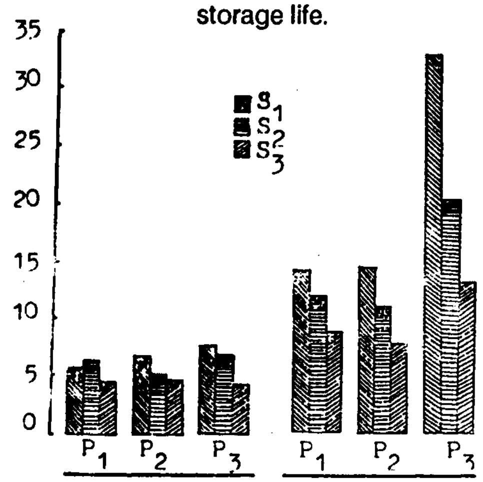

Fig. 2 b. Effect of bud stages, packing materials and pre-storage treatments on vase life.

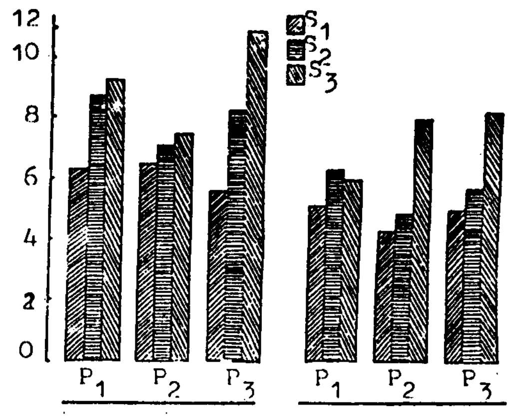

Fig. 3 b. Effect of bud stages, packing materials and storage temperatures on vase life.

for long term storage. Chemical treatment was ineffective in enhancing the storage or vase life of cut flowers. The interaction S1 x P3 gave a storage life of 20.2 days but the maximum vase life (9.5 days) was for S3 x P3 (Table 2). Figures 1 a and 1 b indicates the maximum (21.5 days) storage life but decreased vase life (5.1 days) whereas maximum vase life (9.5 days) was noted S3 x T1. Combination S1T1P3 has proved to be the best of all the interactions as it yielded the highest storage life of 21.2 days, however, the highest vase life of 9.9 days was for S3T1P3 (Fig. 2 a, b). The interaction S1C1P3 gave the maximum storage life

Table 1. Effect of different factors on storage and vase life (days) of tuberose flowers

Treatment		Storage life	Vase life
Bud stage	Tight bud	13.5 a	5.5 c
	Partially open	10.0 b	6.8 b
	Half open	7.0 c	8.3 a
Package material	Cellophane	8.4 b	6.9 b
	Butter paper	8.4 b	6.4 c
	Aluminium foil	14.1 a	7.3 a
Storage temperature	No pre-storage	5.6 b	7.8 a
	Pre-storage	14.8 a	5.9 b

(32.9 days) but the longer vase life (10.9 days) was for S3C0P3 (Fig. 3 a, b).

Table 2. Response of bud stage and packing materials to storage and vase life (days) of tuberose flowers

Observation	Storage life	Vase life
S1P1	9.8 bcd	5.7 c
S1P2	10.5 bc	5.4 c
S1P3	20.2 a	5.3 c
S2P1	8.7 bcde	7.6 b
S2P2	7.9 cde	6.0 c
S2P3	13.4 b	7.0 b
S3P1	6.5 de	7.6 b
S3P2	6.1 c	7.7 b
S3P3	8.6 bcde	9.5 a

The results of these investigations indicate that tight bud flowers of tuberose wrapped in aluminum lamination foil and stored at 4°C lasted longer in the storage. But during Vase life studies, half open flowers stored at room temperature and wrapped in aluminum lamination foil gave the best results.

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