Postharvest Handling Recommendations for Cut Tuberose

by Michael Reid

Tuberose (Polianthes tuberosa L.), native to Mexico and a relative of the century plant (Agave), has long been cherished for the aromatic oils extracted from its fragrant white flowers. It is also a popular cut flower, not only for use in arrangements, but also for the individual florets that can provide fragrance to bouquets and boutonnieres. Because of this popularity, a number of countries including Kenya, India, and Mexico are growing tuberose commercially for export markets in the USA, Europe and Japan.

Tuberose inflorescences (spikes) bear 10 to 20 pairs of florets which open from the base upward. Commercially, spikes 2 to 3 feet long are harvested when the basal florets are open. Normally, fewer than 50% of the remaining buds open after harvest, and florets and buds usually shatter (fall from the spike) after only a few days in the vase.

Postharvest performance is worst in tuberose that have been shipped to distant markets, and this is an important problem for producers in California as well as overseas. A recent sabbatical visitor in our laboratory, Dr. Kimani Waithaka from Kenya, was therefore interested in studying ways of improving the postharvest performance of this fragrant flower. The importance of the problem was amply demonstrated by his comprehensive study of the effects of temperature and of storage duration on vase life of the flowers. As can be seen in the three-dimensional graph the optimal temperature for storing cut tuberose spikes was 0°C to 5°C (32°F to 41°F), although vase life and floret opening were markedly decreased by even short periods of storage at 2°C (36°F). Fresh-cut blooms had a vase life of more than 9 days, and 44% of their buds opened during the vase-life period. Three days' storage halved floret opening, and reduced overall vase life by 30%.

The vase life of flowers stored "wet" (with their stems in preservative solution consisting of 250 ppm 8-HQC and 2% sucrose) was no different from that of flowers stored "dry" (wrapped in newsprint and polyethylene to reduce water loss). In most cold-stored spikes, tight or developing floret buds abscised by the end of vase life and the upper part of the spike often collapsed. Floret buds that were nearly open at the start of storage often opened only partially - one whorl of petals would expand while the rest remained closed.

Table 1. *The influence of vase solution preservatives, dry storage at 2°C and chemical pretreatments on keeping quality of cut tuberose flowers (Polianthes tuberosa L.)*

Pretreatment	**Dry Storage** (days at 2°C)	**Vase Solution**	**Open Florets**(%)	**Vase Life** (days)
None	0	HQC 250ppm	34.3 b*	5.7 c
None	0	HQC+2%sucr.	50.5 a	8.8 b
20% sucrose	0	HQC+2%sucr.	57.5 a	11.3 a
1 µ mol STS	0	HQC+2%sucr.	39.5 b	7.8 b
None	6	HQC+2%sucr.	19.0 c	5.3 c
1 µ mol STS	6	HQC+2%sucr.	33.3 b	5.7 c
20% sucrose	6	HQC+2%sucr.	50.1 a	10.5 a

**Means with the same letter are not significantly different according to Duncan's Multiple Range Test, 5% level.*

In efforts to overcome the obvious postharvest problems with tuberose flowers, we tested the effect of putting freshly-cut tuberose spikes in a preservative vase solution containing 8-HQC and 2% sucrose. The results, shown in the Table, demonstrate that holding flowers in preservative increased floret opening and vase life by over 30%. This result indicates the importance of using a preservative solution in arrangements containing tuberose, or when tuberose are opened in the workroom so that individual florets can be used in bouquets.

In other flowers, we have shown that short-term or ìpulseî pretreatments with chemicals improves vase life, and we also tested these remedies with tuberose. The STS pulse pretreatment that works so well with carnations, gypsophila, and larkspur actually decreased floret opening in tuberose, and did not increase the life of the flowers. On the other hand, a 24 hour pulse treatment (at room temperature) with a solution containing 20% sucrose and 250 ppm 8-HQC further increased vase life of tuberose spikes placed in preservative solution. The key question in this study was whether we could overcome the negative effects of cold storage on the postharvest life of tuberose, so we tried pulsing spikes with a solution containing 20% sucrose and 250 ppm HQC before storing them for 6 days at 36 °F (2°C). This treatment largely overcame the negative effect of 6 days' cold storage. The vase life of sucrose-pulsed flowers was double that of cold-stored controls, and floret opening was more than doubled. Quality of the pulsed and stored flowers was indistinguishable from that of non-stored controls pulsed with sucrose, then held in a sucrose-containing vase preservative.

Conclusions.

Tuberose flowers are very sensitive to the stresses of storage and transportation, particularly at warm temperatures. For florists, it is important that the flowers be placed in a proper vase preservative on receipt. For producers and shippers, we recommend pulse pre-treating the flowers with preservative solution containing 20% sucrose. This can be obtained by making your normal preservative, then adding a pound and a half of sugar to each gallon of the preservative solution. Flowers treated in this way will survive up to a week of cold storage, and still have a long vase life.