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Effect of pulsing and storage conditions on vase-life and quality of Tuberose (*Polianthes tuberosa* L.) C.v. Phule Suhasini

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Abstract
The experiment was conducted at Post Graduate Institute of post- harvest management Killa-Roha, Dr. Balashebh Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist., Raigad, and Maharashtra, India. The effects of sucrose and citric acid in pulsing treatments on vase-life of cut spikes of tuberose cv. Phule Suhasini were carried in complete randomised design in three replications. Cut ends of tuberose spikes were immersed in 5% sucrose solution at ambient condition. The treatments T_1, T_3, $T_4$and T_5 were kept for 8 days at room temperature and T_2 kept under refrigeration at 4 ^{0}C and 92.5% RH in PG laboratory. The pulsing solution treatment 2% sucrose and citric acid 0.2% (T_4) resulted in the maximum weight of single cut spike (78.28 gm.), number of opened flowers (15.08 per spike), vase life of spike (9 days) in tuberose cv. Phule Suhasini.

Keywords: Sucrose, citric acid, single cut spike, Storage

1. Introduction

Tuberose is grown commercially in India, China France, Italy USA, Kenya, Mexico, Morocco, Hawaii, South Africa, Taiwan, North Carolina, Egypt, South Africa and many other tropical and subtropical areas in the world. In India, commercial cultivation of tuberose is popular in Maharashtra at Pune, Nashik, Ahmednagar, Satara.

The cut flower like aster, gladiolus, rose, tube rose, chrysanthemum, etc., have commonly and frequently demanded in both local as well as international market. Among them tuberose is most important cut flower. The tube rose is grown on a wide range of soil and climatic conditions in the country but it flowers best in warm and humid climatic conditions. The total area under tuberose cultivation in the country is about 7.95 lakh hectares. The production of loose and cut-flowers is estimated to be 21.84 '000 MT and 2780 lakh hectors (Anon, 2017). There are reports that improper post-harvest handling accounts for 20 to 30% of cut-flower loss during harvesting and marketing. Still an important commercial cut flower despite a substantial decline in production in recent years, gladiolus responds well to proper post-harvest management practises. Tuberose flowers are in demand for their fragrant elegant attractive spikes of different hues and good keeping quality. Tuberose flowers are very sensitive to stresses of storage condition and transportation, particularly at warm temperatures. The post-harvest management is one of the most important factor for cut flower industries. The best quality of spike is very important for marketing point of view. Improvement of the keeping quality and enhancement of vase life of cut flowers are important areas of floricultural research. Presently our cultivators are not aware about standardization post-harvest technologies including treatment of increasing the vase life of tuberose. So it is necessary to study the simple and easily available chemical materials for increasing the vase life of the tuberoses.

2. Material and Methods

The good appearance and healthy spikes were selected for this research. The trial was conducted with two different storage condition along with five different treatments and four replication during 2017 in Factorial complete randomised design (Panse and Sukhatme, 1985) [6] at Post Graduate Institute of Post-Harvest Management Killa-Roha laboratory of PHM of fruit, vegetable and flower crops Dr. BSKKV, Dapoli.

The spikes were kept in different solutions for vase life study *viz*. T_1-only tap water (Ambient condition), T_2-only tap water (Refrigerated Condition), T_3-Sucrose 2%,T_4- Sucrose 2% + 0.2% citric acid, T_5-Lime Water 0.2% + Sugar 2%, all the above treatment were replicated in four replications and the study is carried out up to 10 days *viz*- 1st day(S_1), 2nd day(S_2), 4th day (S_3), 6th day(S_4) and 8th day(S_5) observation were recorded during the vase life period.

3. Results Discussion

Table 1: Effect of different pulsing solutions on average weight of Spike.

Treatments	Weight of spike Storage period (Days)					Mean
	1(S1)	**2(S2)**	**4(S3)**	**6(S4)**	**8(S5)**	
T1	64.06	67.25	34.77	27.20	18.17	52.86
T2	39.73	44.14	44.62	39.53	31.44	49.87
T3	63.28	66.98	57.78	39.71	35.08	65.71
T4	73.53	77.85	68.18	57.03	36.52	78.28
T5	72.07	77.27	59.44	49.46	33.90	73.03
Mean	62.53	66.70	52.96	40.23	31.02	
	S.Em ±		CD at 5%			
Treatments (T)	3.40		9.61			
Storage (S)	3.04		8.60			
Interaction (T×S)	6.80		NS			

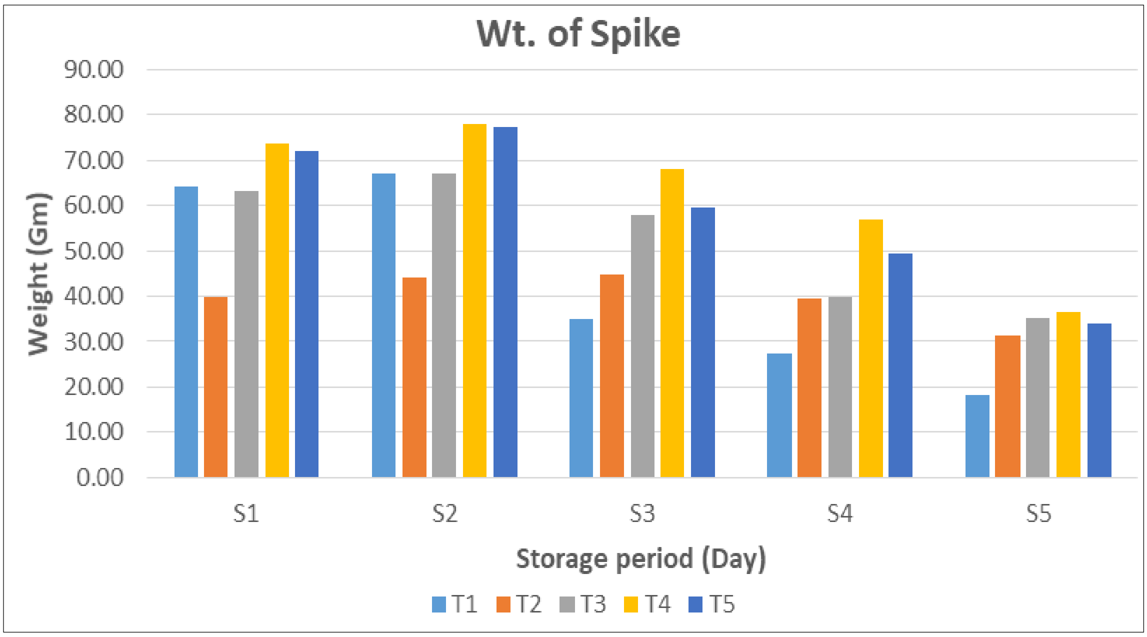

Fig 1: The effect of different pulsing solution on the weight of spike calculated against the storage period (days),the maximum average weight of spikes (78.28gm)is observed in T 4 (Sucrose 2% + 0.2% citric acid) pulsing solution while It minimum average weight of spike is observed T 2 only tap water (Refrigerated Condition)pulsing solution

Table 2: Effect of different pulsing solutions on Average number of Opened Flowers.

Treatments	Opened Flowers Storage period (Days)					Mean
	1(S1)	**2(S2)**	**4(S3)**	**6(S4)**	**8(S5)**	
T1	9.67	10.33	5.33	3.33	0.00	7.17
T2	4.33	7.33	7.33	8.67	4.33	8.00
T3	4.33	8.33	8.00	8.00	4.33	8.25
T4	14.33	14.33	12.33	13.33	6.00	15.08
T5	13.33	13.00	10.67	11.00	3.33	12.83
Mean	9.20	10.67	8.73	8.87	3.60	
	S.Em ±		CD at 5%			
Treatments (T)	1.07		3.02			
Storage (S)	0.95		2.70			
Interaction (T×S)	2.13		NS			

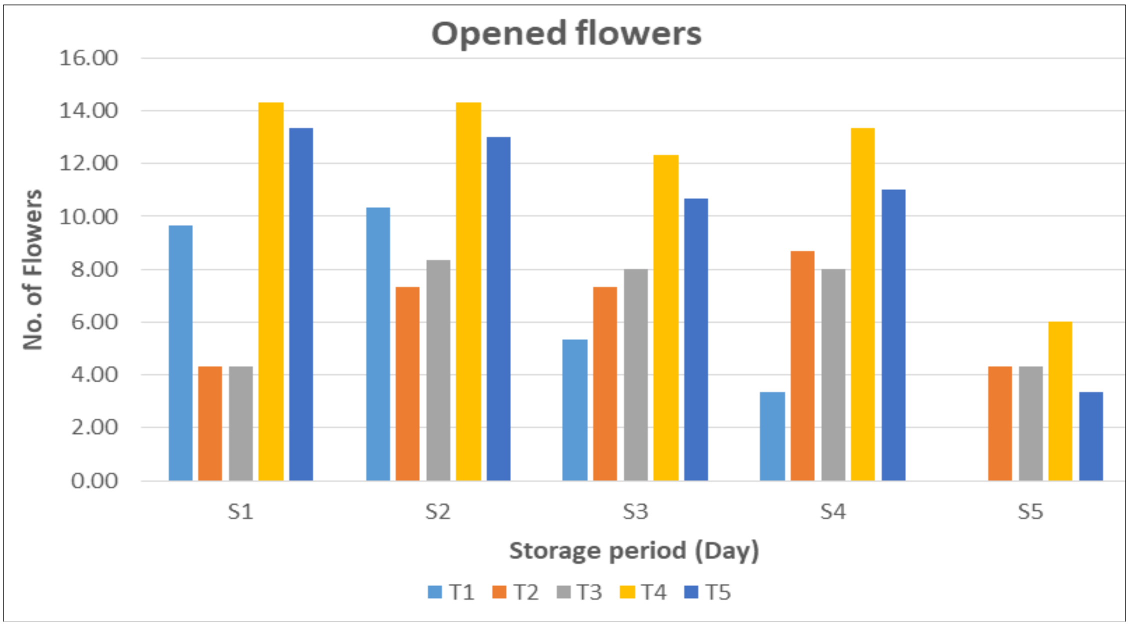

Fig 2: The effect of different pulsing solution on the average number of opened flowers. are calculated against the storage period (days), the maximum average number of opened flowers are (15.08) observed in T 4 (Sucrose 2% + 0.2% citric acid) pulsing solution while It minimum average number of opened flowers (7.17) are observed T 1 on only tap water (Ambient condition), pulsing solution

Table 3: Effect of different pulsing solutions on Average number of Unopened Flowers.

Treatments	**Unopened Flowers**					**Mean**
	Storage period (Days)					
	1(S1)	2(S2)	4(S3)	6(S4)	8(S5)	
T1	14.33	8.67	0.67	0.00	0.00	5.92
T2	16.33	14.33	8.33	9.67	5.00	13.42
T3	17.33	15.00	14.67	4.67	5.33	14.25
T4	22.67	20.67	15.33	11.67	6.33	19.17
T5	20.67	18.33	12.67	8.00	5.33	16.25
Mean	18.27	15.40	10.33	6.80	4.40	

	S.Em ±		CD at 5%
Treatments (T)	0.98		2.77
Storage (S)	0.88		2.48
Interaction (T×S)	1.96		NS

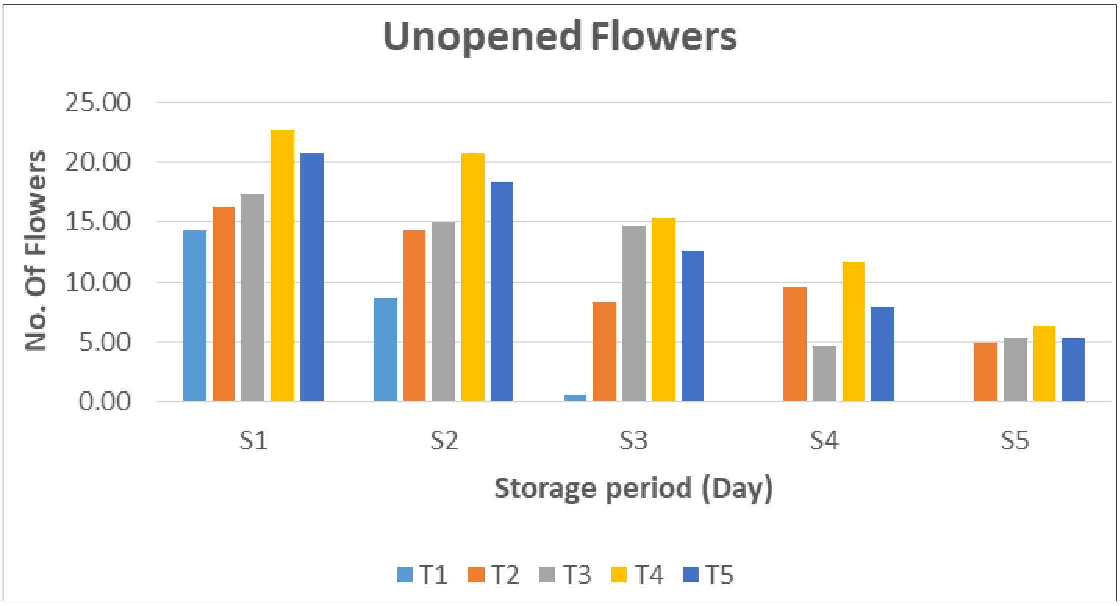

Fig 3: The effect of different pulsing solution on the average number of unopened flowers. are calculated against the storage period (days), the maximum average number of unopened flowers are (19.17) observed in T 4 (Sucrose 2% + 0.2% citric acid) pulsing solution while It minimum average number of unopened flowers (5.92) are observed T 1 on only tap water (Ambient condition), pulsing solution

Table 4: Effect of different pulsing solutions on Average Vase life of Spike.

Treatments	Vase life of Spike					Mean
	Storage period (Days)					
	1(S1)	2(S2)	4(S3)	6(S4)	8(S5)	
T1	3.50	4.00	4.00	4.50	5.00	4.20
T2	6.25	6.00	600	7.25	6.00	6.30
T3	5.50	4.50	6.75	6.75	6.75	6.05
T4	8.75	8.75	9.75	9.25	8.50	9.00
T5	5.25	5.75	5.75	575	7.00	5.90
Mean	5.23	5.80	6.45	6.70	6.45	6.29

	S.Em ±		CD at 5%
Treatments (T)	2.07		5.85
Storage (S)	1.85		5.23
Interaction (T×S)	4.14		NS

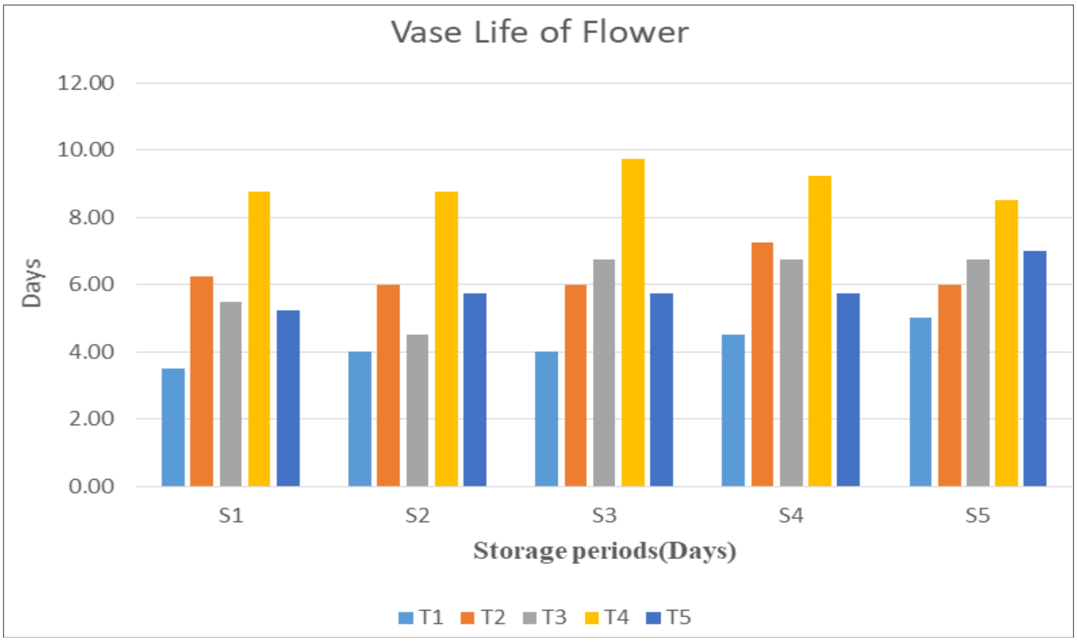

Fig 4: The effect of different pulsing solution on the average vase life of flowers. are calculated against the storage period (days), the maximum average vase life of the flower are (9days) observed in T 4 (Sucrose 2% + 0.2% citric acid) pulsing solution while It minimum average number of opened flowers (4.20) are observed T 1 on only tap water (Ambient condition), pulsing solution

From the Table 1 (Figure 1), the average single cut flower spike weight (78.28gm) was observed to be the maximum in treatment sucrose T_4 (Sucrose 2% + 0.2% Citric acid) in trials after the 2nd, 4th, 6th, and 8th days (under ambient condition) and after the 1st and 2nd day simulation (RT), then followed by treatment T_5 (Lime Water 0.2% + Sugar 2%,) and T_3 (Sucrose 2%). Similarly, at the end of the experiment, the minimum cut-flower stalk weight was recorded in treatment T_1. The maximum percentage of opened flowers per spike found in T_4; (Sucrose 2% + 0.2% Citric acid) and the maximum percentage of unopened flowers per spike was obtained in T_4 (Sucrose 2% + 0.2% Citric acid) and then was followed by treatments T_5; (Sucrose 2% Lime Water 0.2% + Sugar 2%,), T_3; (Sucrose2%), T_2; (Tap water refrigerator condition) and minimum un opened flower found in T_1.

Also, in a trial, the vase-life conducted up to 10 days and vase life of cut stalk (days) was observed to be higher under treatment T_4 and then followed by T_2; (tap water in refrigerator condition), T_3; (Sucrose 2%) T_5; (Lime Water 0.2% + Sugar 2%) and minimum in T_1 (tap water). Babaji P (2017) [3] found similar results under eco frost conditions and ambient condition, thus, the results due to the treatment presumably allow the accumulation of adequate sucrose in the leaves and the stem during that time period to aid the development of flowers. When Tuberose spikes are pulsed (held) overnight for 24 hours, a flower opening ensues faster with the minimum unopened flower percentage. Thus, results due to treatment presumably allow the accumulation of adequate sucrose in the leaves and stem during that time period to aid the development of flowers.

Mayak *et al.* (1973) [5] found that When, Gladioli are pulsed (held) overnight, in a flower opening faster, the maximum number open florets per spike, the minimum unopened florets per spike and the stem has a longer vase-life. Paulin A (1986) [7] found that when they added sucrose because the addition of sugars in vase solutions is essential for good flower development by Sucrose feeding of cut carnations caused an acceleration of enzyme activity and proline accumulation in the petals at the end of the vase-life. The development of buds when treated with a sucrose solution was suppressed which might be due to growth of some micro-organisms. This contributed to the increase of amylase activity and proline content established in the late senescence phase. Recently it has been suggested that in stress situations cells require more sugars to fulfil the energy and carbon needs for the defensive response to stresses. Koizuka N, *et al.* (1995) [4] suggested that since the cut-flowers suffer from energy deficiency and are susceptible to different stresses, the demand for hexoses in petals might be satisfied partially by the hydrolysis of starch. Moreover, according Tirosh T, Mayak S (1988) [8], the activity of α-amylase plays an important role in the mechanism of petal opening and regulates the senescence syndrome.

4. Conclusion

From above data it was reported that pulsing solution treatments can extend the longevity of tuberose cut spikes cv. Phule Suhasini. Its effects may vary depending on the preservative chemicals. In this study, treatment T_4 (0.2% Citric acid + Sucrose 2%) was found to be the best among all treatment for tuberose cultivar 'Phule Suhasini' for long storage life of spikes.

5. References

1. Anonymous. National horticultural Board, Indian Horticulture Database-(2014). Ministry of Agriculture, Government of India, 2013.
2. Anonymous. International flower bulb centre. Postharvest treatment Forcing Guide, 2014, p. 5.
3. Babaji P. Evaluations of the Vase-Life of Tuberose (*Polianthes tuberosa* L.) Cut-Flower Spikes Cv. 'Bizet' in Micro-Cold Storage (mCS of Ecofrost Technologies Pvt. Ltd.) and Room Temperature (Rt). J Plant Biochem Physiol 5: 183. J Plant Biochem Physiol, an open access journal, 2017, 5(2). ISSN: 2329-9029-1000183.
4. Koizuka N, Tanaka Y, Morohashi Y. Expression of α-amylase in response to wounding in mung bean. Planta. 1995; 195:530-534.
5. Mayak S, Bravdo B, Gvilli A. Improvement of opening of cut gladioli flowers by pre-treatment with high sugar concentrations. Scientia Horticulture. 1973; 1:357-365.
6. Panse VG, Sukhatme PV. Statistical Methods for Agricultural Workers. Indian Council of Agricultural Research, New Delhi, 1985.
7. Paulin A. Influence of exogenous sugars the evolution of some senescence parameters in plants. Acta Horticulture. 1986; 181:183-193.
8. Tirosh T, Mayak S. Changes in starch content during the development of carnation petals. Journal of Plant Physiology. 1988; 113:361-363.