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Effect of holding solutions on post-harvest life of anthurium flowers cv. tropical red

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Abstract
An experiment was conducted at College of Horticulture, Dapoli to study the effect of holding solution on post harvest life of anthurium cv. Tropical Red with ten treatments in Completely Randomised Design. The treatment comprised of different holding solutions *viz*., T_1- Tapwater, T_2- Tapwater + Bavistin 0.2%, T_3- Distilled water, T_4- 8 HQC 200ppm, T_5- 8 HQC 400ppm, T_6- BA 25 ppm, T_7- BA 50 ppm, T_8- Triadimefon 30 ppm, T_9- $AgNO_3$ 10 ppm, T_{10}- $AgNO_3$ 20 ppm. The results revealed that, significantly maximum uptake of vase solution, days to spadix necrosis initiation, days to spathe blueing initiation, days to gloss loss/fading, vase life of inflorescence and minimum physiological loss in weight and final volume of holding solution was recorded in treatment BA 25 ppm.

Keywords: Anthurium, physiological loss in weight, holding solutions, vase life

Introduction
Anthurium (*Anthurium andreanum* L.) is tropical plant and mainly grown for its attractive foliage and showy cut flowers. It is commonly called as 'tail flower' and very famous among florists due to its eye-catching bloom, elegance, smoothness, variety of dazzling colours. Anthurium is a high valued flower which attracts spectators due to its heart shaped colour ful attractive spa the. These special characters of anthurium have created high demand in domestic as well as international markets.

In anthurium, about thirty to seventy per cent of potential losses in quality are predetermined at harvest. Under natural conditions, anthurium flowers stay fresh for a period of about 10-12 days. Cut flowers are harvested from the parent plant therefore flow of water column from roots to flower is disturbed and this result in the wilting and early senescence of flower. Water relations play a dominant role in the post-harvest physiology of cut flowers (Halevy and Mayek, 1974). Floral preservatives contains water to maintain turgidity, sugar to serve as an energy source, a biocide to inhibit the growth of microorganisms by directly or indirectly by acidifing the pH of the vase solution. Use of floral preservatives at all stages of flower handling and marketing are known to improve the flower quality and results in better consumer acceptability. The vase life and post harvest quality of flowers are the pre determinant requisits for the market and these qualities are influencing the market value of the anthurium flowers. With this view, the present investigation was undertaken to study the effect of holding solutions on post harvest life of anthurium cv. Tropical Red flowers.

Materials and Methods
The investigation was carried out at College of Horticulture, Dapoli in Completely Randomised Design with ten treatments of holding solutions and three replications. The treatments comprised of different holding solutions *viz*., T_1- Tapwater, T_2- Tapwater + Bavistin 0.2%, T_3- Distilled water, T_4- 8 HQC 200ppm, T_5- 8 HQC 400ppm, T_6- BA 25 ppm, T_7- BA 50 ppm, T_8- Triadimefon 30 ppm, T_9- $AgNO_3$ 10 ppm, T_{10}- $AgNO_3$ 20 ppm. The cut flowers of Anthurium cv. Tropical red, employed for the studies were procured from the Hi-Tech unit, Dapoli. The harvesting of flower stalk was done when fully open and one third of the flower on the spadix opened matured. After harvesting, flower spikes were pre-cooled by dipping basal ends in bucket containing water and then bought to laboratory. These selected flower stalks were kept in conical flask containing different holding solutions of preservatives. The bottom ends of spikes were cut about 5mm every day to prevent clogging of vascular tissues. Various observations *viz*., initial weight of flowers, final weight of flower, uptake of vase solution, physiological loss in weight, final volume of holding solution, days to spadix

necrosis initiation, days to spathe blueing initiation, days to gloss loss/fading and vase life of inflorescence were recorded at proper stage. Data was analysed statistically by the method suggested by Panse and Sukhatme (1985) [5].

Results and Discussion

The data presented in Table 1 revealed that, the physiological loss in weight of flowers (%), final volume of solution and uptake of vase solution was significantly varied due to different holding solutions. The lowest physiological loss in weight (32.20%55) was recorded by treatment T_6 *i.e.*,BA 25 ppm which was at par with treatment T_8 *i.e.*, Triadimefon 30 ppm (35.10%55),T_5 *i.e.*,8 HQC 400ppm(35.30%55),T_7 *i.e.*,BA 50 ppm (36.58%55) and T_2 *i.e.*, Tapwater + Bavistin 0.2% (37.47%55), whereas, the treatment T_3 *i.e.*,distilled water registered maximum physiological loss in weight (65.64%55). This might be due to slower down process of plugging of stem vascular tissue in BA which decreases the absorption of water and causes physiological loss in weight. These results are in concurrence with the findings of Salvi *et al*. (1997) [6] in anthurium.

Final volume of holding solution was noted significantly lowest in treatment T_6 *i.e.*, BA 25 ppm (79.56 ml), however, the treatment T_3 *i.e.*, distilled water recorded maximum final volume of holding solution (91.95 ml) of anthurium. This might be due to increase in water uptake by flower stems to retain fresh weight of flowers. The balance between the rate of water uptake and the rate of transpiration is directly related to anthurium flower turgidity and flower keeping quality. Similar results were also reported by Sankat and Mujaffar (1994). Uptake of vase solution was maximum in treatment T_6 i.e., BA 25 ppm (20.45%) which was at par with T_8 i.e., Triadimefon 30 ppm (17.89%55) and T_7 i.e., BA 50 ppm (17.45%55), whereas minimum uptake of vase solution was recorded in treatment T_3 i.e., distilled water (8.06%55). This might be due to the effect of benzyladenine which by reducing ethylene production could help for increasing water absorption and preventing blockage of cells, thereby increases the vase life of flowers. The results are supported by Singh *et al*., (2008) [8] in gladiolus.

The data presented in Table 2 revealed that, the maximum days to spadix necrosis initiation (15.35days) was registered by treatment T_6 (BA 25 ppm), however, minimum days to spadix necrosis initiation (07.71 days) was recorded in treatment T_3 (Distilled water).This might be due to benzyl adenine which reduces the rate of respiration which is a natural anti-senescence agent which helps to maintain flower quality. The results are conformity with the findings of Salvi *et al*. (1997) [6] and Mawlong *et al*. (2020) [4] in anthurium. Maximum days to spathe blueing initiation (17.72 days) was recorded in treatment T_6 *i.e.*, BA 25 ppm, however, treatment T_3 *i.e.*, distilled water (09.44 days) recorded minimum days to spathe blueing initiation in anthurium. This might be due to benzyladenine which is a synthetic cytokinin which has anti-ethylene property which delays senescence and reduces aging of flowers and retains colour. Similar results were also reported by Asil and Karim (2010) [1] in Eustoma and Salvi *et al*. (1997) [6] in anthurium.

Significantly the maximum days to gloss loss (16.08 days) was recorded in treatment T_6 i.e., BA 25 ppm and minimum days to gloss loss was recorded in treatment T_3 i.e., distilled water (8.07 days) in anthurium. This might be due to BA which inhibits anthocyanin pigment discoloration in flowers by retention in the petals which helps to retain flower colour and delay senescence. Results are in line with Asil and Karim (2010) [1] in Eustoma flowers and Matak and Hashemabadi (2016) [3] in Alstomeria.

Vase life of flower was recorded maximum in treatment T_6 i.e., BA 25 ppm (20.96 days) of anthurium, whereas, minimum vase life of flower was recorded in treatment T_3 i.e., distilled water (13.64 days).This might be due to the application of benzyl adenine which lead to extend the vase life of flowers by reducing the abscission process. The enhancement of vase life by exogenous application of cytokinins might have resulted into decrease in the rate of respiration that leads to delayed flower senescence. Results are in line with those of Salvi *et al*., (1997) [6] and Mawlong *et al*. (2020) [4] in anthurium, Asil and Karim (2010) [1] in eustoma flowers.

Table 1: Effect of holding solutions on weight of flower, physiological loss in weight, final volume of holding solution, uptake of vase solution of anthurium cv. Tropical Red

Treatments No.	Initial weight of flower (g)	Final weight of flower (g)	Physiological loss in weight (%)	Final volume of holding solution (ml)	Uptake of vase solution (%)
T_1	7.17	3.37	51.96	88.39	11.61
T_2	8.11	5.03	37.47	85.05	14.95
T_3	6.97	2.38	65.64	91.95	8.06
T_4	7.69	4.20	46.57	86.06	13.94
T_5	8.46	5.47	35.30	88.17	11.84
T_6	7.32	4.69	32.20	79.56	20.45
T_7	9.39	6.29	36.58	82.56	17.45
T_8	8.91	5.79	35.10	82.11	17.89
T_9	6.77	3.89	44.54	89.44	10.56
T_{10}	6.57	3.59	47.44	90.72	9.28
SE(m) ±	-	0.06	1.31	0.82	0.82
CD at 1%	-	0.26	5.27	3.28	3.30

Table 2: Effect of holding solutions on post-harvest characters of anthurium flower cv. Tropical Red

Treatments No.	Days to Spadix necrosis initiation (days)	Days to Spa the blueing initiation (days)	Days to gloss loss (days)	Vase life of flower (days)
	Pooled	Pooled	Pooled	Pooled
T_1	07.73	09.78	8.52	15.22
T_2	10.21	12.42	10.67	16.36
T_3	07.71	09.44	8.07	13.64

T_4	08.66	10.71	9.04	15.39
T_5	09.45	11.27	10.18	15.75
T_6	15.35	17.72	16.08	20.96
T_7	11.62	13.40	11.51	16.59
T_8	13.60	15.47	14.08	17.52
T_9	08.39	10.24	9.75	14.41
T_{10}	08.09	10.01	8.72	14.87
SE(m) ±	0.13	0.16	0.39	0.21
CD at 1%	0.54	0.66	1.58	0.86

Conclusion

Considering the inferences it is concluded that BA 25 ppm as holding solution had highest uptake of vase solution, extended days to spadix necrosis initiation and days to spa the blueing initiation, days to gloss loss/fading, vase life of flower and minimum physiological loss in weight in anthurium.

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