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EXTENDING THE VASE LIFE AND QUALITY OF ANTHURIUM CUT FLOWERS BY USING CHEMICAL PRESERVATIVES

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Abstract

Anthurium is the largest genus of the Araceae family and very popular with flower arrangers because of lasting qualities of flower. The majority of these species are perennial herbaceous plants, cultivated for ornamental purposes due to their attractive inflorescences**.** For prolonging the vase life of cut flowers chemical preservatives are used in the holding solutions. Ethylene serves as a hormone in plants by stimulating and regulating the opening of flowers and the shedding of flowers. The sugar provides a respiratory substrate, while the germicides control harmful bacteria and prevent plugging of the conducting tissues. Adding chemical preservatives to the holding solution is recommended to prolong the vase life of the cut flowers. All holding solutions must contain essentially two components sugar and germicides. The sugar provides a respiratory substrate, while the germicides control harmful bacteria and prevent plugging of the conducting tissues. Among all the different types of sugars, sucrose has been found to be the most commonly used sugar in prolonging vase life of cut flowers. The present experiment was conducted to find out the appropriate preservative solution for extending the vase life of anthurium cut flowers. Eleven preservative solutions were used for extending the vase life and the experiment was conducted in Completely Randomized Design with three replications. Maximum days taken for spadix necrosis, Days taken for spathe blueing, Physiological loss in weight, Solution uptake and Vase life were recorded. The treatment T_8 - ($Al_2(SO_4)_3$ 400 ppm + sucrose 8%) recorded maximum results in extending the vase life and flower quality.

Key words : Anthurium, vase life, chemical preservative, hormone.

Introduction

Anthuriums are tropical plants grown for their showy cut flowers and attractive foliage. Highly organic, well aerated medium with good water retention capacity and drainage is needed for its growth and development. The plant produces blooms throughout the year, one bloom emerging from the axil of every leaf. Vase life of cut flowers can be prolonged by the addition of chemical preservatives (Nowak and Rudnicki, 1990). Different factors affect the vase life of cut flowers are chemical and physiological factors such as the content of stored foods of flower, humidity, light, and temperature of the place where vase is kept. Cut flowers are forced to continue living with reserved carbohydrates, proteins and fat for their longevity. Factors affecting water uptake such as air embolism and duration of vascular occlusion contribute to cut flower senescence in Anthurium flowers. The major reasons for less vase life may be due to nutrient deficiency, bacterial and fungal infection, water stress induced wilting and vascular blockage and the action of ethylene in plant cells. Ethylene serves as a hormone in plants by stimulating and regulating the opening of flowers and the shedding of flowers. By applying various chemicals the post-harvest life of cut

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flowers can be extended. Wilting is the main cause in the termination of the vase life of cut flowers.

Cut flowers will decay if they are not able to draw water from the vase solution. Also clogging of vascular tissues of the stem by a material produced by phloem will block the absorption of water. Another important factor which helps the vase life is its content of stored foods. Sucrose act as a source of energy required for the continuation of the vase life of the cut flowers and also helped for the improvement in the keeping quality value of Anthurium cut flowers. Among all the different types of sugars, sucrose has been found to be the most commonly used sugar in prolonging vase life of cut flowers. Sugar has an important role in the longevity of flowers, especially cut flowers, because after harvest they receive no nutritional and hormonal support from the mother plant (Van Staden, 1995). Therefore, the present experiment was conducted to find out the appropriate preservative solution for extending the vase life, quality and postharvest behaviour of flowers.

Materials and Methods

The experiment was conducted at Flora-tech floriculture unit at Kottarakara, Kollam Dist, Kerala State, India during June and July 2017 to find out the best chemical preservative solution for extending the vase life of anthurium cut flowers, the variety used for the study is Tropical. Eleven treatments were used and the treatments are T_1 8-HQS 400 ppm, T_2 8-HQS 400 ppm + sucrose 8%, T_3 Citric acid 400 ppm, T_4 Citric acid 400 ppm + sucrose 8%, T_5 GA 400 ppm, T_6 GA 400 ppm + sucrose 8% and T_7 $Al_2(SO_4)_3$ 400 ppm, T_8 $Al_2(SO_4)_3$ 400 ppm + sucrose 8%, T_9- Salysilic acid 400 ppm, T_{10} - Salysilic acid 400 ppm + sucrose 8%, T_{11}-Distilled water (control) without preservative solution and sucrose using Completely Randomized Design with three replications. Each treatment have three flowers with each flower as one replication. Observations on various parameters of postharvest life were recorded on Days taken for spadix necrosis, Days taken for spathe blueing, Physiological loss in weight, Solution uptake and Vase life.

Results and Discussion

Chemical preservative solutions significantly influenced all the treatments and its performances on prolonging the vase life and quality of cut Anthurium flowers. Among the different chemical preservative solutions (T_8) $Al_2(SO_4)_3$ 400 ppm + sucrose 8% recorded the maximum results and enhanced the postharvest life of Anthurium cut flowers (Table 1). $Al_2(SO_4)_3$ 400 ppm + sucrose 8% delayed flower senescence compared to flowers either held in other treatments. Vase life was significantly increased to 30.78 days (Fig. 1). Jowkar, *et al.,* (2012) reported that aluminum sulfate treatment significantly increased vase life and improved postharvest visual quality by retaining freshness even at the end of vase life. Sucrose act as a source of energy required for the continuation of the vase life of the cut flowers and also helped for the improvement in the keeping quality value of Anthurium cut flowers. It is well known that sucrose supply increases the longevity of many cut flowers, since sucrose can act as a source of nutrition for tissues approaching carbohydrate starvation, flower opening and subsequent water relations (Kuiper *et al.,* 1995), similar finding were obtained by Lalonde *et al*., (1999); Nichols (1973); Ichimura, 1998) and Downs (1988).Sucrose act as a source of energy required for the continuation of the vase life of the cut flowers (Halevy

Table 1: Effect of chemical preservatives on extending the quality of anthurium cut flowers.

Treatments	Days taken for gloss loss	Days taken for spadix necrosis	Days taken for spathe blueing	Solution uptake (ml)
T_1 – 8-HQS 400 ppm	20.49	19.67	24.67	3.11
T_2 - 8-HQS 400 ppm + sucrose 8%	20.51	20.12	23.98	3.23
T_3 – Citric acid 400 ppm	20.42	19.34	24.34	3.19
T_4 – Citric acid 400 ppm + sucrose 8%	21.12	19.93	23.57	3.23
T_5 – GA 400 ppm	22.45	20.10	24.67	3.45
T_6 - GA 400 ppm + sucrose 8%	22.15	21.45	25.12	3.16
T_7 – $Al_2(SO_4)_3$ 400 ppm	21.67	20.54	25.34	3.56
T_8 – $Al_2(SO_4)_3$ 400 ppm + sucrose 8%	23.83	21.81	26.98	3.96
T_9 – Salysilic acid 400 ppm	21.41	19.56	23.67	2.99
T_{10} - Salysilic acid 400 ppm + sucrose 8%	20.38	19.04	23.78	2.92
T_{11} - Distilled water (control)	13.14	12.03	16.47	1.58
SE (d)	1.12	0.74	1.15	0.10
CD (p=0.05)	2.23	1.51	2.21	0.21

Table 2: Relative fresh weight of cut flowers as affected by preservative solutions during experiment.

	Days1	3	6	9	12	15	18	21	24	27	30
T_1	38.56	35.23	33.87	32.46	31.02	28.78	26.46	25.12	23.87	21.12	18.67
T_2	38.87	35.93	34.81	33.02	31.56	29.83	27.56	26.67	24.71	22.81	19.48
T_3	38.39	37.13	35.23	33.23	32.21	30.81	28.91	27.03	25.67	23.41	19.91
T_4	38.73	35.57	34.24	32.36	31.67	30.15	29.43	27.45	25.32	23.13	20.02
T_5	38.12	36.98	34.84	34.98	32.76	31.82	29.87	27.65	25.03	22.23	19.97
T_6	38.33	36.91	35.56	34.89	32.71	30.59	28.67	26.83	24.39	22.56	20.82
T_7	38.67	37.32	36.23	35.12	32.98	31.01	28.46	27.12	25.34	23.16	21.89
T_8	38.56	37.45	36.01	35.28	33.56	31.09	28.15	26.85	24.58	23.02	21.08
T_9	38.96	36.73	36.02	34.98	34.03	33.67	31.23	28.65	24.28	21.56	19.03
T_{10}	38.39	37.01	35.74	33.82	33.02	32.56	31.01	27.89	23.34	20.72	18.93
T_{11}	38.85	35.34	31.57	28.45	25.63	21.57	19.65	15.57	14.67	13.98	12.46

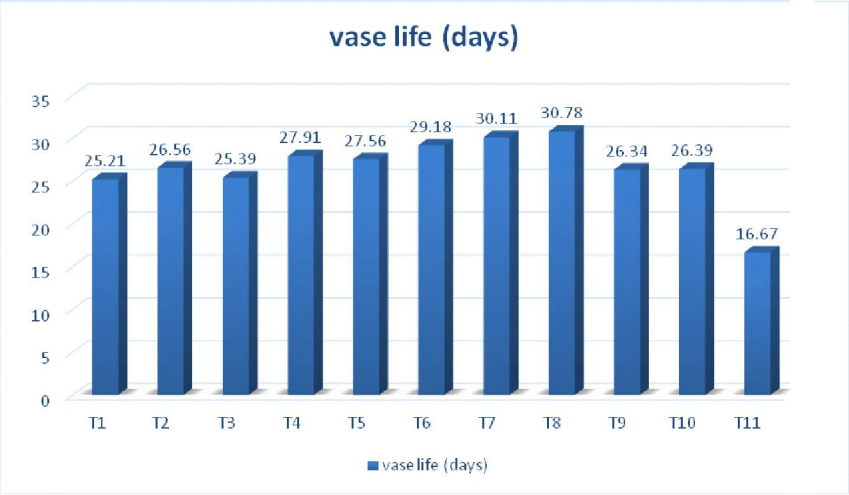

Fig. 1: Effect of chemical preservatives on the Vase life of Anthurium cut flowers.

and mayak, 1981), and may also act as osmotically active molecule, thereby lead to the promoting of subsequent water relations and lengthening their vase life.

Data in table 2 showed that flowers treated with aluminium sulphate 400 ppm + 8% sucrose recorded the highest relative fresh weight among all treatments. Beginning of the senescence phase in cut flowers is characterized by decrease in fresh weight (Adachi *et al.,* 2000; Ichimura and Goto, 2002), aluminium sulphate treatments increased the relative fresh weight. Maximum relative fresh weight was related to T_8 in all days compared to control. $Al_2(SO4)_3$ had positive effect on solution uptake rate and remaining the flowers fresh weight (Liao *et al.,* 2001).

Considering the experimental results it can be concluded that the increased results in (T_8) $Al_2(SO_4)_3$ 400 ppm + sucrose 8% with a significant improvement in days taken for gloss loss and vase life of anthurium cut flowers which attained the best result compared to other treatments. Days taken for spadix necrosis as well as Days taken for spathe blueing has been increased during the postharvest life as the result of using this combination treatment. $Al_2(SO_4)_3$ decreased ethylene production and also highly efficient in reducing bacterial growth in the vase solution and the cut stem ends of anthurium flowers which led to increase in the water uptake of the flower. Sucrose act as a source of energy required for the continuation of the vase life of the cut flowers.

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