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POSTHARVEST HANDLING OF *ANTHURIUM ANDREANUM* CUT FLOWERS USING SILVER THIOSULPHATE (STS)

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Abstract

Anthurium is one of the main tropical species due to its beauty and increased postharvest life. The majority of these species are perennial herbaceous plants, cultivated for ornamental purposes due to their attractive inflorescences. Anthurium is the largest genus of the Araceae family, composed of over 1000 species and very popular with flower arrangers because of lasting qualities of flowers. Ethylene serves as a hormone in plants by stimulating and regulating the opening of flowers and the shedding of flowers. For prolonging the vase life of cut flowers chemical preservatives are used in the holding solutions. The sugar provides a respiratory substrate, while the germicides control harmful bacteria and prevent plugging of the conducting tissues. Silver Thiosulfate (STS) commonly block the action of ethylene in plant cells more effectively. The present experiment was conducted to find out the appropriate concentration of preservative solution for extending the vase life of anthurium cut flower. Seven 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_4 (Silver Thiosulphate @100 ppm + 3% sucrose) recorded best results in extending the vase life and flower quality.
Keywords : Anthurium, Silver Thiosulfate, vase life

Introduction

Anthurium belongs to the Araceae family. These beautiful tropical plants are grown for their showy cut flowers and attractive foliage. Anthurium flowers are produced and sold as ornamental flowers throughout the world (Croat, 1980). Anthurium growing is a potential source of commercial farming and it makes best use of ready market for cut flowers with high returns both for its cut flower and whole plant. The plant produces blooms throughout the year, one bloom emerging from the axil of every leaf. Flowers are usually harvested once a week at three quarters maturity (Cibes, 1957). 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 chemical and physiological factors such as the content of stored foods of flower, humidity, light, and temperature of the place where vase is kept. Factors affecting water uptake such as air embolism and duration of vascular occlusion contribute to cut flower senescence in Anthurium flowers. Vascular occlusion is a mechanism for and as a result of water stress that induces senescence in Anthurium. 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. By applying various chemicals the post-harvest life of cut flowers can be extended. 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.

Material and Methods

The experiment was conducted at Flora-tech floriculture unit at Kottarakara, Kollam Dist., Kerala state, India during December 2016 to find out the best concentration of Silvar Thiosulphate solution for extending the vase life of anthurium cut flowers and the variety used for the study is Tropical. Six concentrations of STS along with 3% sucrose were used for extending the vase life and the treatments are T_1 Silver Thiosulphate (25 ppm), T_2 Silver Thiosulphate (50 ppm), T_3 Silver Thiosulphate (75 ppm), T_4 Silver Thiosulphate (100 ppm), T_5 Silver Thiosulphate (125 ppm), T_6 Silver Thiosulphate (25 ppm) and T_7 Distilled water without 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

The holding solutions significantly influenced all the treatments and its performances on prolonging the vase life of cut Anthurium flowers. Among the different concentrations of STS used, (T_4) Silver Thiosulphate @100 ppm + 3% sucrose recorded the maximum results and enhanced the postharvest life of Anthurium cut flowers (Figure 1, 2 and 3). Silver Thiosulfate blocks the action of ethylene more effectively. Ethylene is a hormone that is present in the gaseous state and increases during senescence. Silver Thiosulfate may decreased the 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 (Jiang *et al*., 2004), (Liu *et al*., 2009). 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. In addition, under

STS treatment the percentage of wilting and carbohydrate degradation was minimized and as a consequence, the vase life was extended. These result are in harmony with the result of Singh and Tiwari (2002) and Reddy *et al*., (1988). STS is one of the most common forms of silver salts used as a strong antimicrobial agent in flower preservative solutions (Halevy and Mayak, 1981), (Lü *et al*., 2010). The data on Days taken for spadix necrosis, Days taken for spathe blueing and Vase life show the positive role of STS on preserving the flowers in good condition by lowering the per cent of wilting similar result were obtained by Serek *et al*. (1996).

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 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. In addition to sucrose, the presence of strong antimicrobial agent STS increase water uptake and improve water relations, thereby increase fresh weight and the vase life of the flower. Similar results were reported by (Lu *et al*., 2010)

Considering the experimental results it can be concluded that the increased results in (T_4) Silver Thiosulphate 100 ppm + 3% sucrose with a significant improvement in vase life of anthurium cut flowers was occurred when treated with STS at 100 ppm combined with 3% sucrose which attained the best result compared to other concentrations. Days taken for spadix necrosis as well as Days taken for spathe blueing and Vase life has been increased during the postharvest life as the result of using this combination treatment. STS 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 and Sucrose act as a source of energy required for the continuation of the vase life of the cut flowers.

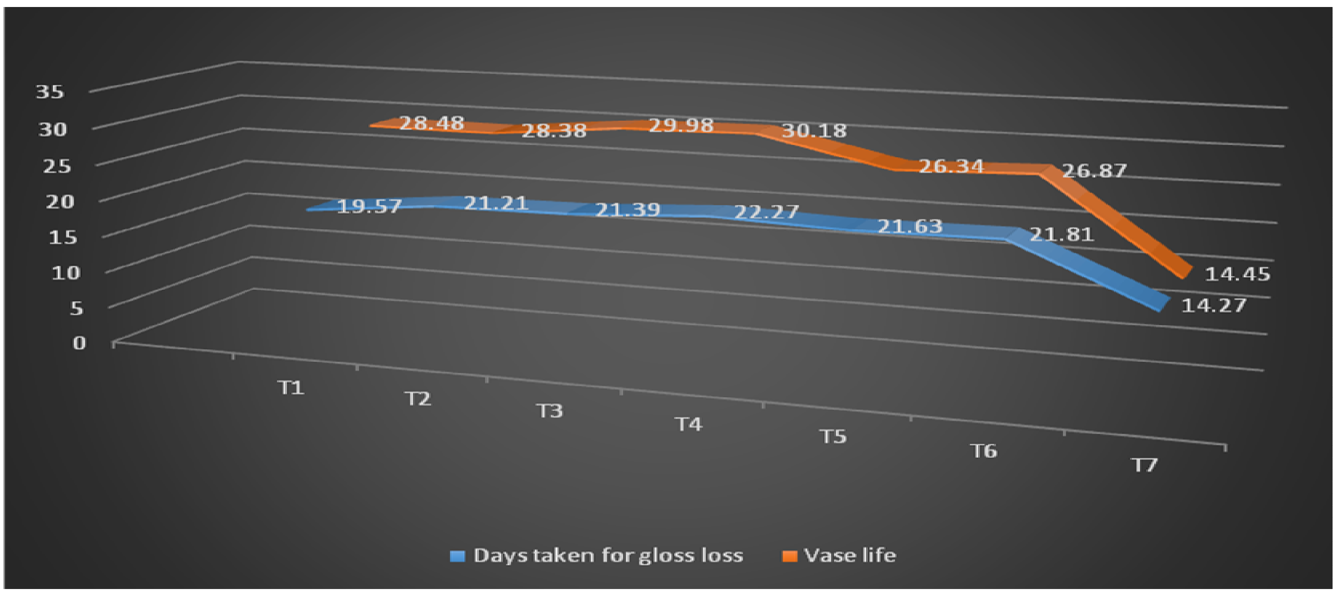

Fig. 1 : T_4 influenced on days taken for gloss loss and vase life of *Anthurium andreanum* cut flowers

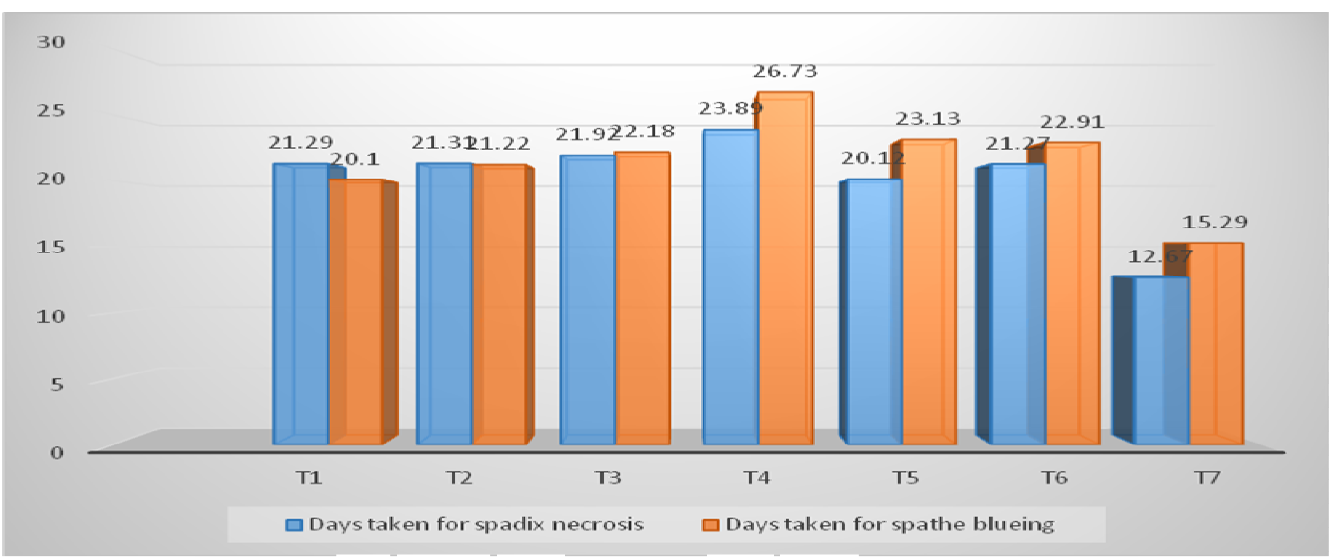

Fig. 2 : T_4 influenced on Days taken for spadix necrosis and spathe blueing of *Anthurium andreanum* cut flowers

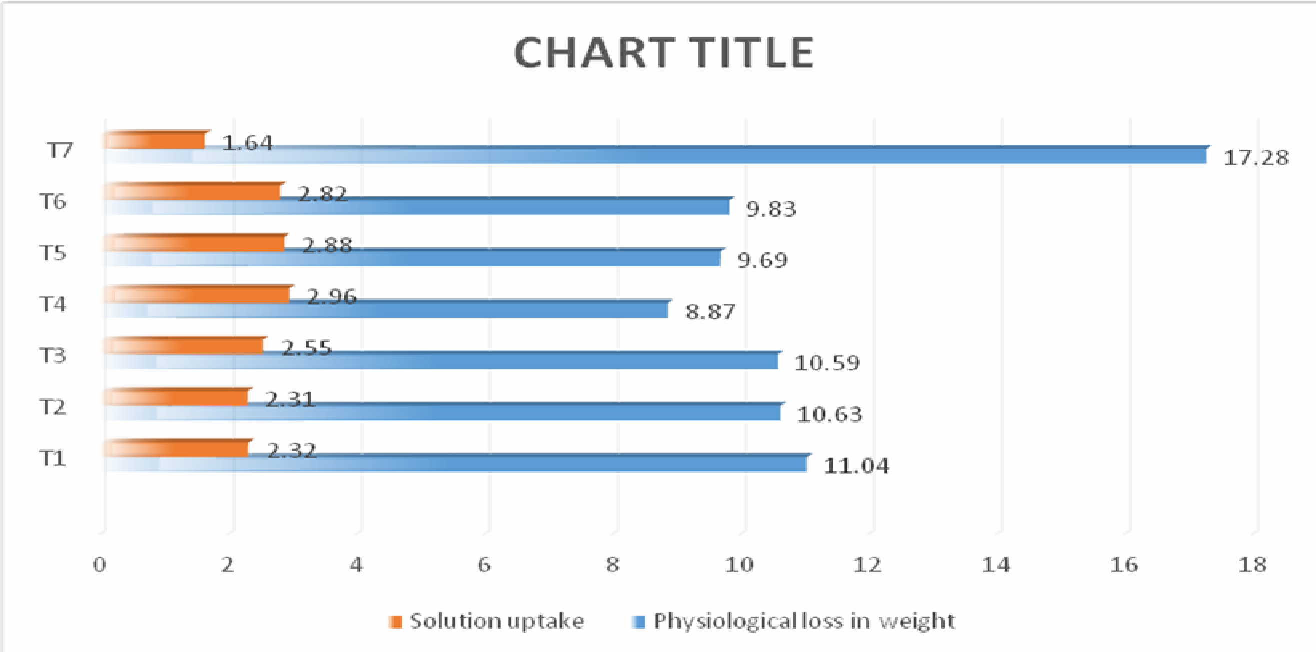

Fig. 3 : T_4 influenced on Physiological loss in weight and Solution uptake of *Anthurium andreanum* cut flowers

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