Use of Growth Regulators to Induce Shoot Production of Anthurium *(Anthurium andraeanum)*

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Introduction

Anthurium andraeanum is an economically important tropical cut flower species belongs to family Araceae and becoming more popular in the world cut flower industry due to its high varietal diversity and long vase life (Grayum, 1990; Anonymous, 2010). Anthurium ideally suits with the Sri Lankan climatic conditions and encompasses both domestic as well as international trade. However, the absence of efficient propagation methods to produce quality planting material has become a major constraint for the small scale Anthurium growers.

The conventional propagation methods such as basal suckers and stem cuttings are not efficient for the commercial production. On the other hand, tissue culture technology is not a cost effective for local growers. Different studies have shown that exogenous application of cytokinin such as Benzylaminopurine (BAP) and gibberellic acid (GA_3) has a significant effect on lateral shoot production of topped plants of many species. Therefore, the ability of the Anthurium plant to produce lateral shoots through hormones stimulation was studied to disclose an efficient propagation method for Anthurium.

Methodology

The study was carried out inside a shade house, which had 80 % level, at Regional Agricultural Research and Development center, Makandura. About two years old uniform size Anthurium plants with stems grown up to 15 cm height. Two varieties, M30 and M36 were obtained as planting materials and the study was arranged as two experiments in variety wise.

After one month of planting the top of selected plants with two to three roots were removed (topped). The remaining basal parts with three to four leaves were treated with seven different combinations of GA_3 and BAP concentrations. Treatments consisted of four foliar runoff sprays of three different sole GA_3 concentrations (T2, T5) on consecutive weeks and combination of those GA_3 concentrations with three different BAP concentrations(T3, T4, T6, T7) on alternative weeks.

Table 1. Combinations of GA_3 and BAP concentrations.

GA_3 Level (ppm)	BAP Level (ppm)	Treatment(T)
0(G1)	0(B1)	T1
375(G2)	0(B1)	T2
375(G2)	250(B2)	T3
375(G2)	500(B3)	T4
500(G3)	0(B1)	T5
500(G3)	250(B2)	T6
500(G3)	500(B3)	T7

The data on number of lateral shoots per plant was started to record a week after the first hormone application and continued weekly after the every hormone application up to four weeks. The length of each lateral shoots was measured four week after the first hormone

application to evaluate the effect of GA_3 and BAP on induction of lateral shoots of selected varieties.

Results and Discussion

There was a significant treatment effect on number of lateral shoots and lateral shoot length of both M30 and M36 varieties at 0.05 significant level. As indicated by Table 2, the effect of GA_3 and BAP on number of lateral shoots and lateral shoot length of variety M36 and variety M30 was similar. There was a significant increase in number of lateral shoots and lateral shoot length with increasing concentrations of GA_3 and BAP.Both varieties resulted the highest number of lateral shoots and lateral shoot length per plant with the treatment that consisted with alternative application of 500 ppm of GA_3 with 500 ppm of BAP (T7).

Table 2. Mean number of lateral shoots and Mean length of lateral shoots (cm) in Variety M30 and M36.

Treatment(T)	Mean number of lateral shoots		Mean length of lateral shoots(cm)	
	Variety M30	Variety M36	Variety M30	Variety M36
T1	2.00±0.30	2.10±0.35	3.60±0.26	3.63±0.60
T2	2.80±0.17	3.10±0.17	4.60±0.36	5.43±0.63
T3	4.47±0.40	4.20±0.17	5.40±1.15	6.33±0.91
T4	4.70±0.00	4.70±0.00	4.83±0.85	6.13±1.29
T5	3.67±0.58	4.00±0.30	4.33±0.65	5.67±0.90
T6	5.67±0.35	5.57±0.51	5.23±0.95	5.17±0.47
T7	5.80±0.17	5.67±0.35	5.87±0.29	7.00±1.37
	4.157±1.376	4.190±1.247	4.838±0.934	5.624±1.284

The results also showed that alternative application of 500 ppm of GA_3 with 250 ppm of BAP (T6) were similar to the results of alternative application of 500 ppm of GA_3 with 500 ppm of BAP (T7) in both varieties. When considering the cost of production, alternative application of 500 ppm of GA_3 with 250 ppm of BAP (T6) was more economical to obtain higher shoot production with a low cost.

Similar studies with different varieties, hormone concentrations and frequencies and time durations of applications shows different results since the plant variety followed by its genetic constituent, hormone concentration, frequency and time duration of application effect on responses of plants to exogenous hormones (Gastol et al., 2012).

Cytokinine such as BAP is believed to be responsible for the cell division whereas Gibberellic acid has increased cell elongation followed by lateral branching in many plant species. However, in the present study, sole application of Gibberellic acid resulted considerably low number of lateral shoots and lateral shoot length compared to the alternative applications of GA_3 and BAP. Similar studies also have showed low number of lateral shoots and lateral shoot length with the sole BAP applications (Higaki, T. and Rasmussen H.P., 1979).Therefore, these results revealed that combined use of GA_3 and BAP is required for the proper shoot induction than the individual application of each hormone.

Conclusions

Application of 500 ppm of GA_3 with 500 ppm of BAP in alternative weeks was the best treatment for obtaining highest number of lateral shoots and length of lateral shoots per plant in both M30 and M36 varieties. According to the cost analysis, the cost effective recommendation was the alternative spraying of 500 ppm GA_3 twice and 250 ppm BAP twice individually at weekly interval on topped plants of M30 and M36 varieties.

References

Anonymous, 2010. Fact sheet on Anthurium (flamingo flower) [Online] Available at http://www.daff.gov.za/docs/Brochures/Anthuriumflower.pdf [Accessed on 22 April 2013].

Gastol, M., Swiatkiewicz, I.D., Bijak, M., 2012. The effect of different bioregulators on lateral shoot formation in maiden apple trees. Folia Horticulturae, 24(2), 109-166.

Grayum, M.H., 1990. Evolution and phylogeny of the Araceae. Annals of the Missouri Botanical Garden, 77(4), 629-697.

Higaki, T., Rasmussen, H.P., 1979. Chemical induction of adventitious shoots in Anthurium. HortScience, 14(1), 64-65.