Selection of an effective biofilmed biofertilizer formulation and best potting medium for anthurium (*Anthurium andraeanum*)

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Introduction

Anthurium is identified as one of the crops prioritized for the development and export promotion in Sri Lanka (Kelegama, 2001). Optimum growth and flowering of Anthurium mainly depend on potting medium, fertilizer and light levels (Higaki et al, 1994). Potting medium rich in nutrients and effective fertilizers can be used for the optimum growth of this plant. Beneficial biofilm based biofertilizers called biofilmed biofertilizers (BFBFs) have been introduced recently (Seneviratne et al., 2010). Present study was focused to select an effective biofilmed biofertilizer formulation and evaluate the comparative effect of different potting media on vegetative growth of Anthurium andreanum plant.

Methodology

The present study was carried out at the Royal Botanic Gardens, Peradeniya. Two experiments with different treatments were conducted during this study. First experiment was conducted under shade house conditions with different fertilizer treatments; 50 % chemical fertilizer (CF), 50 % CF + BFBF and100 % CF recommended for Anthurium was selected as the control. In the second experiment, four different potting media (inert particle mixture, coir chips, leaf litter with sand, control) were used and the existing potting medium, which was used at the Royal Botanic Gardens, Peradeniya was taken as the control. Different BFBF with 50 % CF application was under taken at one week interval for the plants of the first experiment and 50 % CF application was under taken at one week interval for the plants of second experiment. Initial data were collected before the plants establishment and final vegetative growth parameters were measured after three months of plant establishment in both experiments. Plant height (cm), plant weight (g), total root length (cm), leaf number, leaf area, root number and the chlorophyll content were considered as the vegetative growth parameters. Treatments were arranged in a Complete Randomized Design (CRD). Mean separation was conducted using the Tukey method ($P< 0.05$). MINITAB 16 statistical package (Minitab Inc.) was used for data analysis in both experiments.

Results and Discussion

Experiment 01

As indicated in the Table 1, treatment 16 (BF4 alone treatment) recorded the highest rank value over the other 16 treatments. Thus, the treatment 16 was effective in the increment of all

vegetative growth parameters in Anthurium plant. As indicated in Table 1, treatment 13 (50 % CF) significantly contributed to increment of plant growth and development than treatment 14 (100 % CF).

Table 1: Ranked data (increment percentages of vegetative growth parameters) of experiment 01

Treat-ments	Fresh Weight (g)	Number of Roots	Total Root Length (cm)	Number of Leaves	Plant Height (cm)	Chloro-phyll Content	Leaf Area	Sum of Rank	Final Rank
BF_1+ 50 % CF	1 (58 ^{e})	2 (15^{c})	1 (0^{b})	1 (0^{b})	1(33$^{abcd)}$	6 (13^{a})	3 (42^{a})	18	1
BF_2 + 50 % CF	2 (62 ^{de})	6 (58^{abc})	2 (1^{b})	2 (53^{abcd})	12 (49^{abcd})	9 (26^{ab})	9 (40^{a})	43	3
BF_3 + 50 % CF	12 (197^{ab})	12 (84^{abc})	3 (25^{ab})	3 (18^{bcd})	4 (60^{abc})	13 (26^{ab})	8 (80^{ab})	62	7
BF_4 + 50 % CF	15 (250^{ab})	17 (134^{a})	13 (111^{a})	13 (32^{abcd})	8 (42^{abcd})	7 (61^{a})	17 (60^{a})	96	13.5
BF_5+ 50 % CF	11 (198^{abcd})	8 (66^{abc})	8 (66^{a})	8 (37^{bcd})	9 (44^{abcd})	8 (29^{ab})	6 (11^{ab})	68	8
BF_6 + 50 % CF	8(169^{ab})	1(13^{bc})	10 (81^{a})	10 (28^{abcd})	7 (21^{cde})	4(9^{a})	2 (98^{ab})	50	4
BF_7 + 50 % CF	5(110^{ce})	14 (105^{a})	16 (131^{a})	16 (4^{cd})	2 (10^{le})	2 (2^{a})	1 (56^{a})	61	6
BF_8 + 50 % CF	3(94^{cde})	15 (116^{ab})	6 (58^{ab})	6 (9^{cd})	3 (3^{a})	1 (24^{ab})	7 (42^{a})	43	2
BF_9 + 50 % CF	10 (190^{abcd})	13 (96^{ab})	14 (119^{ab})	14 (71^{ab})	16 (20^{bcde})	3 (30^{a})	13 (106^{ab})	92	12
BF_{10}+ 50 % CF	6 (123^{bcde})	9 (73^{abc})	9 (70^{a})	9 (27^{bcd})	6 (63^{abc})	14 (38^{ab})	16 (53^{a})	73	9.5
BF_{11}+ 50 % CF	4 (109^{cde})	7(64^{abc})	7 (62^{a})	7 (40^{abcd})	10 (60^{abc})	12 (30^{ab})	12(171^{a})	73	9.5
BF_{12} +50 % CF	17 (293^{a})	4 (41^{abc})	11 (95^{a})	11 (93^{a})	17 (59^{abc})	11 (26^{ab})	11(78^{ab})	96	13.5
50 % CF	13 (218^{abc})	11 (79^{ab})	1 (100^{a})	12 (57^{abc})	13 (53^{abc})	10 (28^{ab})	10 (216^{a})	99	15
100 % CF	7 (127^{bcde})	3 (35^{abc})	4 (33^{ab})	4 (25^{bcd})	5 (21^{bcde})	5 (33^{ab})	5 (146^{ab})	53	5
BF_3 alone	14 (249^{ab})	5 (35^{abc})	15 (129^{a})	15 (51^{abcd})	11 (122^{a})	17(35^{ab})	17 (208^{a})	108	16
BF_4 alone	16 (270^{a})	16 (57^{abc})	17 (186^{a})	17 (66^{ab})	14 (91^{ab})	16 (18^{a})	16 (165^{ab})	113	17
BF_{10} alone	9 (172^{abcd})	10 (77^{abc})	5 (53^{a})	5 (68^{ab})	15 (78^{abc})	15 (19^{a})	15 (160^{ab})	76	11

Experiment 02

According to the Table 2, the highest rank recorded in treatment 1 (Inert particle mixture). Treatment 3 (Leaf litter with sand) was better than the treatment 4 (control) for the growth of Anthurium andreaenum plant under prevailing climate condition. Coir chips potting medium was seen to prove less effective for better plant growth due to its less contribution for the availability of nutrients.

Treatments	Fresh Weight (g)	No. of Roots	Total Root Length (cm)	No.of Leaves	Plant Height (cm)	Chloro-phyll Conte-nt	Leaf Area	Sum of Rank	Final Rank
Inert Particle Mixture	4 (197^{a})	2 (23^{a})	3 (61^{a})	3 (36^{a})	4 (50^{a})	4 (33^{a})	4 (142^{a})	24	4
Coir Chips	1 (81^{a})	1(5^{a})	1 (22^{a})	2 (35^{a})	1 (3^{c})	2 (10^{a})	1(48^{b})	9	1
Leaf Litter with Sand	2 (124^{a})	3 (32^{a})	2 (46^{a})	4 (41^{a})	3 (29^{ab})	3 (12^{a})	3 (68^{b})	20	3
Control	3 (132^{a})	4 (54^{a})	4 (67^{a})	1 (19^{a})	1(10^{bc})	2 (8^{a})	2 (49^{b})	17	2

Table 2: Ranked data of (increment percentages of vegetative growth parameters) experiment 02

Conclusions

According to the first experiment, BFBF alone treatments (BF4 alone treatment and BF3 alone treatment) improved the vegetative growth of *Anthurium andreanum* plant. Thus, BFBF alone treatments highly influenced than the BFBF combined with 50 % CF. In apparent, that the 50 % CF significantly contributed to increment of plant growth and development than 100 % CF. This indicated, reduction of 50 % CF not negatively affected to vegetative growth parameters in Anthurium. Results of second experiment suggested that potting medium of inert particle mixture (charcoal, coir dust, sand and bricks particles (1:1:1:1) can be recommended as a standard potting medium for *Anthurium andreanum* to maintain satisfactory plant growth, development and ultimately plant quality.

References

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