



Investigation of the Most Suitable Pot Type and Growing Media Combination to Enhance Growth and Flowering Performance of *Anthurium andraeanum* var. 'Lalani'

R. M. C. S. K. Rathnayaka ^a, H. K. L. K. Gunasekera ^{a*},
M. M. D. J. Senarathne ^b and Y. M. U. Anjali ^b

^a Department of Agricultural and Plantation Engineering, Faculty of Engineering Technology, The Open University, Sri Lanka.

^b Department of National Botanical Gardens, Floriculture Research and Development Unit, Peradeniya, Sri Lanka.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The "Lady Jane" type potted plant *Anthurium andraeanum* named 'Lalani' is a recently introduced hybrid and the Royal Botanical Gardens, Peradeniya needs scientifically proven information in order to recommend the best pot type and growing media combination for commercial *Anthurium* growers. Therefore, this study was conducted with the aim of determining the most suitable pot type and growing media combination to enhance the growth of *Anthurium andraeanum* var. 'Lalani'. Eight different pot types and growing media combinations were selected as treatment for the study, i.e., T1M1- Plastic pot filled with leaf mold-2 parts+cow dung-1 part+sand-1/2 part+brick pieces-1/4 part+charcoal-1/4 part of growing media, T2M1- Net plastic pot filled with leaf mold-2 parts+cow dung-1 part+sand-1/2 part+brick pieces-1/4 part+charcoal-1/4 part of growing media, T3M1- Clay pot filled with leaf mold-2 parts+cow dung-1 part+sand-1/2 part+brick pieces-1/4 part+charcoal-1/4 part of growing media, T4M1- Cement pot filled with leaf mold-2 parts+cow dung-1 part+sand-1/2

*Corresponding author: E-mail: hkgun@ou.ac.lk;

part+brick pieces-1/4 part+charcoal- 1/4 part of growing media, T5M2- Plastic pot filled with coconut husk-1 part+gravel-1 part of growing media, T6M2-Net plastic pot filled with coconut husk-1 part+gravel-1 part of growing media, T7M2-Clay pot filled with coconut husk-1 part+gravel-1 part of growing media, T8M2- Cement pot filled with coconut husk-1 part+gravel-1 part of growing media. Randomly selected *Anthurium* plantlets (hybrid Lalani) were planted in and kept in six months in a shade house. The experiment was laid out in a Completely Randomized Design (CRD) combined with two factors (pot types and growing media) and the eight treatments randomized in ten replicates and data were collected on growth and flowering parameters. The plants grown on net plastic pot filled with coconut husk- 1 part+gravel-1 part of growing media combination was showed the best performance for number of leaves, number of suckers, time taken for initiation of first flower bud, number of flower buds, plant height, number of flowers, length of roots and number of roots. The Cement pot filled with coconut husk-1 part+gravel-1 part of growing media combination was the best for number of flowers, number of roots, length of roots and plant height. Based on the study findings, the Net plastic pot filled with coconut husk-1 part+gravel-1 part of growing media combination and the Cement pot filled with coconut husk-1 part+gravel-1 part of growing media combination can be recommended as the most suitable pot type and growing media combination for enhancing the growth and flowering performance of *Anthurium andraeanum* var.' Lalani'.

Keywords: *Anthurium* hybrid Lalani; growing media; pot type; growth; flowering performance.

1. INTRODUCTION

The "Lady Jane" type potted plant *Anthurium andraeanum* named 'Lalani' is a beautiful new variety produced in 2015 by the Floriculture Research and Development Unit (FRDU), Department of National Botanic Gardens (DNBG) Peradeniya, Sri Lanka. The plant is commercially popular as an indoor plant as well as an ornamental plant in landscape gardening [1]. However, very few experiments have been carried out for the 'Lady-Jane' varieties under local conditions (personal communications) and none have been done to assess the most suitable growing medium and fertilizer combination for the variety 'Lalani', since it is a new product of the Department of National Botanic Gardens. This research study was implemented with the aim of determining the most suitable pot type and growing media combination for the growing stage of this new variety, "Lalani" under local climatic conditions. The Peradeniya Royal Botanical Gardens, Sri Lanka needs to be provided with scientifically proven information to be recommended for the best pot type & growing media combination for the commercial *Anthurium* growers. And also, finding best pot type & growing media combination for local *Anthurium* varieties is very important because local varieties have a good market demand and growers can get good profit using the best pot type & growing media combination for local varieties of *Anthurium andraeanum*. This research is carried out to assess the suitable pot type & growing media combination to the growth of *Anthurium*

andraeanum. Compared to other research findings, no research has been done for studying the effect of pot type and growing media combination on the growth of *Anthurium andraeanum*. Therefore, present study is aimed to fulfill that research gap as well.

2. MATERIALS AND METHODS

2.1 Experimental Site

The experiment was conducted at the Floriculture Research and Development Unit of the Royal Botanical Gardens, located at Peradeniya (Mid country Wet zone of Sri Lanka). The soil group of the area belongs to the Red Yellow Podsollic (RYP) type. This experiment was laid out as a pot experiment under 80% shade at a plant house.

2.2 Experimental Design and Treatments

The experiment was laid out in a Completely Randomized Design (CRD) combined with two factors (pot types and growing media). This experimental design has eight treatments randomizing in ten replicates as T1M1-Plastic pot filled with leaf mold-2 parts+cow dung-1 part+sand-1/2 part+brick pieces-1/4 part+charcoal-1/4 part of growing media, T2M1-Net plastic pot filled with leaf mold-2 parts+cow dung-1 part+sand-1/2 part+brick pieces-1/4 part+charcoal-1/4 part of growing media, T3M1-Clay pot filled with leaf mold-2 parts+cow dung-1 part+sand-1/2 part+brick pieces-1/4 part+charcoal- 1/4 part of growing media, T4M1-

Cement pot filled with leaf mold-2 parts+cow dung- 1 part+sand-1/2 part+brick pieces-1/4 part+charcoal-1/4 part of growing media, T5M2- Plastic pot filled with coconut husk-1 part+gravel-1 part of growing media, T6M2-Net plastic pot filled with coconut husk-1 part+gravel-1 part of growing media, T7M2-Clay pot filled with coconut husk-1 part+gravel-1 part of growing media, T8M2- Cement pot filled with coconut husk-1 part+gravel-1 part of growing media.

2.3 Plant Management and Data Collection

Randomly selected plantlets were planted in selected pots with relevant potting media and kept for six months in a shade house (80% shade). All cultural and management practices were done according to the recommendations given by the Floriculture

Research and Development Unit, Peradeniya, Sri Lanka. The data were collected once a week on growth and flowering parameters of each plant.

2.4 Data Analysis

Data were tabulated and analyzed by using analysis of variance (ANOVA) procedure of Statistical Analysis System (SAS). Least Significant Difference (LSD) test was performed to compare the differences among treatment means at $p=0.05$.

3. RESULTS AND DISCUSSION

3.1 Number of Leaves

The study findings clearly revealed that the T6M2 (Net plastic pot filled with coconut husk + gravel media) showed the highest number of leaves per plant (Table 1). Warigajeshta et al. [1] also indicated that growing media (Coconut husk pieces) was the best medium for leaf production for Lalani variety. According to Pawar et al. [2] coconut coir pieces produced a significant maximum number of leaves/plant, while the leaf sheath length and leaf area were significantly higher in coconut coir pieces+ brick piece + wooden charcoal followed by coconut coir + wooden charcoal for *Anthurium andraeanum* cv. Tropical Red. Similar findings were observed in the present study as well. Madurangani et al., [3] showed that the growing media consists with coconut husk pieces + gravel media enhance the growth and flowering performance of potted ornamental plants. Present study clearly

revealed that the net plastic pot filled with coconut husk + gravel media has the highest formation of new leaves of *Anthurium andraeanum* var. Lalani. Compared to other research findings there is no research done to study the effect of pot type and growing media combination on the growth of *Anthurium andraeanum*. So this research finding fulfills that research gap also.

3.2 Number of Suckers

Number of suckers at growing stage was significantly different ($p=0.05$) among all evaluated treatments. T6M2 showed a significant difference compared with other treatments. There were no significant difference among T5M2, T3M1, T7M2, T1M1 and T2M1 during the study period. T6M2 (Net plastic pot filled with coconut husk+ gravel media) showed the highest number of suckers per plant compared to the other treatments. The lowest sucker content per plant was shown by T2M1 (Net plastic pot filled with leaf mould + cow dung + sand + brick pieces + charcoal media) (Table 1).

Average number of new suckers is a good indicator for growth of plants. *Anthurium andraeanum* cv. Lalani is a pot plant which is more beautiful with many suckers and flowers. Therefore, number of new suckers per plant is a very important parameter.

3.3 Plant Height (cm)

The findings clearly revealed that the T8M2 (which is cement pot filled with coconut husk + gravel media) and T6M2 (which is net plastic pot filled with coconut husk + gravel media) induced the plant height. Ajish Muraleedharan and P. Karuppaiah [4] also recorded the maximum plant height, plant spread, number of flowers per plant, flower stalk length, spathe length and spathe breadth in 75% shade x coir pith + coconut husk. Binas Jr et al., [5] also found the plants applied with coconut husk + chicken manure obtaining significantly higher plant height. According to these results, it could be inferred that coconut husk growing media is a good potting media for the growth of *Anthurium andraeanum*.

3.4 Length of Roots and Number of Roots

Results of the present study indicate that T8M2 which is cement pot filled with coconut husk + gravel media and T6M2 which is net plastic pot filled with coconut husk + gravel media showed

the highest number of roots per plant in *Anthurium andreanum* var. 'Lalani' (Table 1). Similar findings have been obtained by Tatte Sumathi et al., [6] and Widurugewatte et al., [7] *Anthurium* is epiphytic in nature with creeping, climbing or arborescent stems including lots of aerial roots that aid in tapping water and nourishment, whereas coconut husk + charcoal media provide favourable conditions like aeration and drainage to the plant growth.

3.5 Time Taken (days) for Initiation of First Flower Bud

Results of the present study indicate that coconut husk + gravel media is the most suited growing media for the time taken for initiation of first flower bud (Table 2). Findings of Singh et al., [8] indicated that the minimum days were required in the case of flowering in the mixture of saw dust + brick pieces + wooden charcoal + soil + sand + FYM, while soil + sand + FYM required maximum days to flower after planting. According to Dufour & Guérin [9] floral initiation begins approximately 90 days before emergence, indicating there by

that each flower begins its growth almost 50 days before the anterior flower is harvested. Ajish Muraleedharan and P. Karuppaiah [4] also found that the days required for flower bud initiation were less in case of 75% shade & coir pith + coconut husk.

3.6 Number of Flower Buds

Present study clearly revealed that the net plastic pot filled with coconut husk + gravel media has an effect on flower bud induction of *Anthurium* (Fig. 1). The aim of potting is to provide a confined space for roots in conditions that favour healthy growth. The interior of the pot is a microclimate and the potting material (or medium) is expected to provide a reasonable lasting combination of moisture and aeration to form a suitable microclimate. It is recommended that growing media should be well aerated [10] with good porosity [11] and optimum drainage, but with the ability to retain sufficient moisture and provide support to the plant [11,12].

Table 1. Effect of different pot types and growing media combination on growth parameters of *Anthurium andreanum* var. Lalani

Treatments	Number of leaves	Number of suckers	Plant height (cm)	Length of roots (cm)	Number of roots
T1M1	15.7 ^b	2.28 ^{bc}	24.33 ^{bc}	9.04 ^c	6 ^{bc}
T2M1	14.36 ^b	2.22 ^c	24.55 ^{bc}	9.16 ^c	6.2 ^{bc}
T3M1	14.41 ^b	2.53 ^{bc}	22.94 ^c	8.84 ^c	5.1 ^c
T4M1	15.52 ^b	2.68 ^b	26.49 ^b	9.33 ^{bc}	6.25 ^{bc}
T5M2	13.91 ^b	2.55 ^{bc}	26.85 ^b	12.06 ^b	7.9 ^b
T6M2	23.84 ^a	3.38 ^a	27.37 ^{ab}	12.11 ^a	8.45 ^a
T7M2	13.87 ^b	2.41 ^{bc}	24.7 ^{bc}	11.34 ^{bc}	7.75 ^b
T8M2	13.03 ^b	2.65 ^b	28.27 ^a	12.13 ^a	8.5 ^a

Note: Means of each category with the same letter/s are not significantly different at $p=0.05$

Table 2. Effect of different pot types and growing media combination on time taken for initiation of first flower bud of *Anthurium andreanum* var. Lalani

Treatments	Time taken for initiation of first flower bud
T6M2	98.8 ^a
T7M2	61.9 ^b
T5M2	57.3 ^b
T8M2	52 ^b
T1M1	24.1 ^{bc}
T4M1	16.8 ^{bc}
T2M1	6.9 ^c
T3M1	4.7 ^c

Note: Means of each category with the same letter/s are not significantly different at $p=0.05$

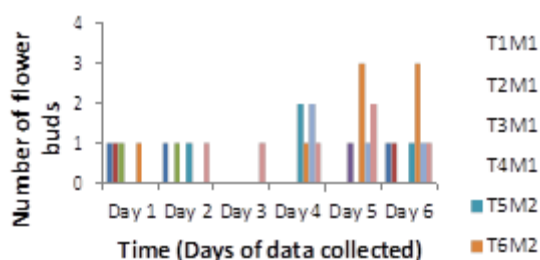


Fig. 1. Effect of different pot types and growing media combination on formation of new flower buds of *Anthurium andreanum* var. Lalani

3.7 Number of Flowers

In the present experiment, T6M2 (Net plastic pot filled with coconut husk + gravel media) and T8M2 (Cement pot filled with coconut husk + gravel media) showed the highest number of flowers per plant in *Anthurium andreanum* var. Lalani (Fig. 2).

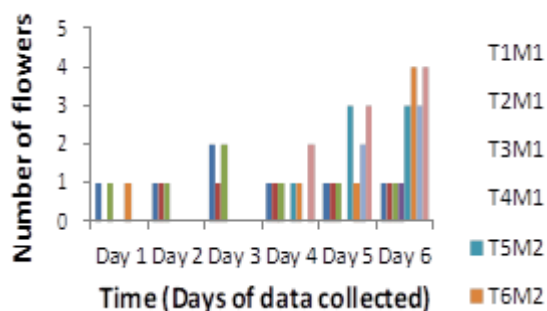


Fig. 2. Effect of different pot types and growing media combination on formation of new flowers of *Anthurium andreanum* var. Lalani

Thus the leaf mold + cow dung + sand + brick pieces + charcoal media is not suitable or economical to all *Anthurium* growers. Locally available low cost material is needed to replace the above medium. This experiment shows that coconut husk + gravel media combined with cement pot and net plastic pot can be used for the growth of *Anthurium*.

4. CONCLUSION

Based on the findings of this study, Net plastic pot filled with coconut husk-1 part + gravel-1 part of growing media combination (T6M2) can be considered as the most effective treatment for

obtaining better results in inducing high number of leaves, number of suckers, time taken for initiation of first flower bud, number of flower buds, plant height, number of flowers, length of roots and number of roots. This could also help enhance the overall growth of *Anthurium andreanum* var. Lalani. Cement pot filled with coconut husk-1 part + gravel-1 part of growing media combination (T8M2) is recorded as the best treatment to enhance the growth of plant height, number of flowers, number of roots and length of roots in *Anthurium andreanum* var. Lalani. The overall findings revealed that the Net plastic pot filled with coconut husk-1 part + gravel-1 part of growing media combination and Cement pot filled with coconut husk-1 part + gravel-1 part of growing media combination can be considered as the most suitable pot type and growing media combination that could enhance the growth of *Anthurium andreanum* var. Lalani. Therefore, the Net plastic pot filled with coconut husk-1 part + gravel-1 media combination and Cement pot filled with coconut husk-1 part + gravel-1 part of growing media combination can be recommended as the best pot type and growing media combination for the commercial growers.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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