## STANDARDIZATION OF GROWING MEDIA AND ORGANIC NUTRITION FOR JUVENILE ANTHURIUM PLANTS

(Anthurium andreanum Lind.)

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# Dedicated to My Daughter

#### DECLARATION

I hereby declare that this thesis entitled "Standardization of growing media and organic nutrition for juvenile anthurium plants (Anthurium andreanum Lind.)" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar title, of any other university or society.

Vellayani, 7-10-2005.

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#### CERTIFICATE

Certified that this thesis entitled "Standardization of growing media and organic nutrition for juvenile anthurium plants (Anthurium andreanum Lind.)" is a record of research work done independently by Ms. Shajma Nafeesa Basheer (2003-12-03) under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to her.

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Introduction

#### 1. INTRODUCTION

Anthuriums are herbaceous perennials of the tropics and belong to the largest genus of the Aroid family. Because of their spectacular blooms, elegance, variety of colour and long shelf life, anthuriums attract a vast majority of growers.

Anthuriums are native to the tropical zones of Central and South America. Among the various species, *Anthurium andreanum* Lind. and *Anthurium scherzerianum* Schott. are the two important species cultivated extensively for the production of flowers. The latter is a low temperature adapted species commonly referred to as the 'Flamingo flower'.

Anthurium andreanum Lind. called the 'Painter's palette' flower is the most important species grown in the tropics. It is a perennial herbaceous plant cultivated as a terrestrial, producing epiphytic aerial roots for anchorage. It is adapted to high temperatures ranging from 18 to 28°C and a high humidity of 70-75 per cent.

In India, the major anthurium growing states are Kerala, Karnataka and Maharashtra. Anthurium cultivation on a commercial basis is gaining popularity in Kerala because of its high demand in the foreign market. Kerala is identified as one of the best places for growing Anthurium because of the congenial climatic conditions. However, the cultivation and management practices adopted are varying and yet to be standardized.

For commercial cultivation of Anthuriums, suckers, cuttings and in vitro cultured plantlets are used. Hardened tissue cultured anthurium plants available for planting have a pre-flowering period of 1-1½ years. The flowers produced in the early flowering stage are undersized and not marketable. The lack of proper management practices has increased the

total period taken for the production of marketable flowers to nearly 2-2½ years. By the use of a suitable growing media and nutrition regime, early vegetative and reproductive growth can be enhanced and the time required for the production of marketable flowers can be reduced.

The present work was thus taken up with a view to standardize growing media and organic nutrient dosage for young anthurium plants, for enhancing their early vegetative growth and for earlier production of flowers having desirable floral attributes of size and quality.

Review of Literature

#### 2. REVIEW OF LITERATURE

Anthurium is the largest genus of the Monocot family Araceae. The elegant blooms of this tropical aroid are produced and sold throughout the world. *Anthurium andreanum* Lind. is the most important cut flower of the modern world. Several research works have been done to evaluate a suitable media and nutrition regime to enhance the vegetative growth and flowering of anthurium plants. Some of the important research works are described in this chapter.

#### 2.1 GROWING MEDIUM

Anthuriums are grown in a variety of media composed of substances or materials of organic or inorganic origin. The medium for growing anthurium should be well drained and rich in organic matter.

Verwer and Welleman (1984) reported that rockwool granulates as growing medium gave good results with Anthurium. Powdered bark as a constituent of growing medium was found to be good for a wide range of plants including Anthurium by Tesi *et al.* (1985). Prasad and Fietje (1989) evaluated ground tree fern as a growing medium for a range of plants including Syngonium, Kalanchoe, Begonia, Tomatoes and Anthuriums. Anthuriums and tomatoes performed better in ground tree fern when compared to peat.

Sethuratnam (1992) recommended the use of standard compost mix prepared from locally available materials such as coconut husk, leaf mould, coir fibre, wood shavings, burnt brick, tile pieces and cattle manure for Anthuriums

According to Sreelatha (1992) sand was the best potting medium for planting out tissue cultured plants of *Anthurium andreanum* cv. Pink. Ravidas (2003) reported that the survival percentage of tissue cultured Anthurium plantlets were highest in a mixture of sand, coco peat and husk piece.

## 2.1.1 Influence of Growing Medium on Vegetative Characters from Juvenile to the Mature or Flowering Stage

Nakasone and Kamemoto (1957) found that a 1:1 mixture of wood shavings and cow's manure and tree fern fibre produced best plant growth in *Anthurium andreanum*.

Plant growth increased in a growing medium consisting of coniferous litter and in peat tailings and fibrous sphagnum peat in Anthurium andreanum Lind. (Boertje, 1978). The use of washed river gravel as a growing medium for Anthurium showed increased growth and yield with minimal disease problems (Tai-Chun and Ricketts, 1991).

For the *ex vitro* establishment of tissue cultured Anthurium plantlets, soilrite was the best recording the maximum number of leaves and showing a high rate of leaf production (Ajithkumar, 1993). Jacob *et al.* (1994) reported differential growth of micropropagated Anthurium plantlets in different potting media. Growth was enhanced in a mixture of coarse sand and leaf mould (4:1) when compared to sand alone.

Ravenea rivularis and Anthurium andreanum cv. Lady Jane when grown using coir dust as a container medium amendment, the growth index and shoot dry weight of Anthurium cv. Lady Jane was marginally higher in coir than in sedge peat medium (Meerow, 1995).

Yu-Kwang Jin et al. (1995) reported that the survival rate of in vitro produced Anthurium plants was high (>90%) in a medium of fine bark or peatmoss + perlite. The bark medium was more effective in promoting shoot and root growth than the peatmoss + perlite medium.

The effect of various substrates such as coconut coir pieces (CCP), brick pieces(BP) and wood charcoal(WC) alone or in combination, on the vegetative growth of *Anthurium andreanum* cv. Tropical Red was evaluated by Pawar et al.

(2002). The total number of leaves produced ranged from 5.38 in BP to 6.58 in CCP. Maximum values of leaf lamina diameter (20.16cm), leaf area (326.94cm<sup>2</sup>) and leaf sheath length (17.34cm) were recorded in CCP + BP+ WC.

The effects of substrates viz., cherry coffee husk, sand, soil and FYM applied in different ratios on the growth of tissue culture derived plantlets of A. andreaneum cv. Singapore hybrid were studied by Dhananjaya and Sulladmath (2003). Application of 2:1:1 of FYM: Soil: Sand and Coirpeat: Soil: Sand resulted in tallest plants (47.75cm) and highest number of leaves/plant (5.80) respectively.

In an experiment to evaluate the suitability of coir pith as a growing medium for 3 varieties of *Anthurium andreanum viz.*, Lima White, Eureka Red and Hawaiian Red, greater vegetative growth was observed with coir pith, sand and cowdung as media components (Rajeevan *et al.*, 2003).

#### 2.1.2 Influence of Medium on Flowering

Composition of media used for growing Anthurium cultivars were found to influence flowering.

In a trial carried out with Anthurium andreanum cv. Kozohara Red using 4 media, Higaki and Imamura (1985) found that flower production, flower stem length and flower size effectiveness of the media decreased in the order: wood bark > wood chips > bagasse = red wood bark. Different grades of pine bark also influenced the flowering of 2 cultivars of Anthurium namely 'Von' Egmont's Favourite and 'Miriam' (Holcroft and Laing, 1995). The effect of 5 different growing media on flower production of Anthurium andreanum plants were evaluated by Simon et al. (1999). Plants grown in a medium of coconut husks and coconut fibre bast gave the highest yields. The medium of gravel and fibre bast gave the second highest yield, followed by brick medium. The lowest yields were obtained in the gravel medium.

The effect of various potting media on growth and flowering in Vanda was reported by Jawaharlal *et al.* (2001c). Plants grown in the potting media comprising of brick pieces and coir dust was found to produce highest number of flowers per inflorescence. Jawaharlal *et al.* (2001a) found that for *Anthurium andreanum* cv. Temptation, cocopeat applied alone or in combination with leaf mould or FYM resulted in the highest number of branches and suckers per plant. Cocopeat alone as medium resulted in the highest flower number. Cocopeat alone or cocopeat + leaf mould resulted in the shortest preblooming period.

An experiment conducted to evaluate the effect of substrate on Anthurium culture has shown that the largest flower (63.25 cm²) was produced in Coconut Coir Pieces (CCP) + Wood Charcoal (WC), and the longest flower stalk (41.44 cm) was produced in Wood Charcoal (Pawar et al., 2002). In an experiment conducted to assess the effect of substrate media on tissue culture derived plants of A. andreanum cv. Singapore hybrid, the medium coffee cherry husk, soil and sand at a 2:1:1 ratio was found to produce the higher number of flowers per plant, stalk length and spathe area and the lowest number of days for flowering (Dhananjaya and Sulladmath, 2003). Enhancement of floral attributes were reported in cultivar Agnihotri, Cherry Red and Sunset Orange (Hatibarua et al., 2003) grown in sand based medium containing coconut husk or rice husk.

In other crops such as the epiphytic and semiterrestrial orchids, growing media are reported to influence flowering. Singh *et al.* (2003) reported that potting media containing charcoal +coir dust + coconut husk +leaf mould in equal parts resulted in better flowering in an endemic orchid. Coconut fibre as a growing medium recorded positive results for plant height, early flowering and number of florets in Dendrobium orchid cultivar Sonia -17 (Arumugam and Jawaharlal, 2004).

#### 2.1.3 Influence of Medium on Vase Life of Flowers

The medium in which Anthurium plants are grown has been reported to influence the vase life of flowers produced.

Jawaharlal *et al.* (2001a) reported increased inflorescence longevity in a medium of cocopeat alone or cocopeat + leaf mould for *Anthurium andreanum* cv. Temptation. The vase life of Anthurium flowers was maximum in plants grown in CCP substrate (14.40 days) (Pawar *et al.*, 2002). Arumugam and Jawaharlal (2004) reported increased vase life in Dendrobium flowers produced in coconut fibre medium.

#### 2.2 NUTRITION

Anthuriums need adequate amount of fertilizer for their proper growth and flowering. The requirement of applied nutrients was reported to be dependent on light intensity, irrigation and the medium in which Anthurium plants are grown (Poole *et al.*, 1990).

The Package of Practices (KAU, 2002) recommends the use of cowdung or neemcake (unspecified quantities) and cow's urine at high dilutions for Anthuriums.

#### 2.2.1 Influence of Nutrients on Plant Growth

The leaf area, plant height, petiole length, leaf number etc were found to be influenced by the nutrients given to the plants.

George and Sherrington (1984) recommended the application of unique combinations of macronutrient salt solutions for tissue cultured *Anthurium* andreanum plants such as Knop's solution and Hoaglands solution (KNO<sub>3</sub>, Ca (NO<sub>3</sub>)<sub>2</sub>. 4H<sub>2</sub>O, MgSO<sub>4</sub>.H<sub>2</sub>O and KH<sub>2</sub>PO<sub>4</sub> in varying concentrations) at half strength or at full strength for better growth.

Singh (1987) recommended a complex fertilizer (16:16:16) for Anthurium andreanum so as to supply 341 kg each of N,P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O/ha/year. Anthurium andreanum cv. Lady Jane grown with a weekly application of 20:20:20 NPK fertilizer at 200, 400, 600 or 800 mg/litre showed better plant

growth at the lower two fertilizer levels. Higher levels were found to be detrimental (Henny and Fooshee, 1988).

Fertilizer damage to plants, as indicated by decayed roots, burnt leaves and flowers was reported by Mercy and Dale(1994) due to excess application. Tropbacterin' rich in a strain of *Azotobacter chroococcum* @ 50g/plant when applied to 4 month old seedlings, the growth rate was increased compared to untreated ones. (Money, 1994).

A fertigation solution with mineral nitrogen @ 3 meq/l was sufficient to allow good growth (Dufour and Clairon, 1997). Salvi (1997) reported that 17:17:17 fertilizer complex @ 1% at weekly interval produced the maximum plant spread, leaf breadth, total leaf area and maximum number of branches in A. andreanum cv. 'Hawaiian Red'.

A combination of an organic manure such as farm yard manure with 2g of 17:17:17:2 NPK and Mg/plant, once or twice a month was found to be highly beneficial for growth of Anthurium plants. Foliar sprays of 0.5-1% of 17:17:17 complex fertilizer was also recommended to be given to the plants at biweekly intervals. Decreasing the level of N was beneficial when the plant switched over from vegetative to flowering phase. An overdose of fertilizer, applied shortly before harvest of spikes inhibited the vase life of flowers (Rajeevan and Valsalakumari, 1998).

Four nutrient solutions, differing in nitrogen and calcium concentrations, were tested on 'CanCan' hybrid plants. The growth, yield and the quality of the flowers were determined. The best results regarding plant growth and yield were obtained with the solution having the lowest calcium (2.25meq Ca litre<sup>-1</sup>) and the highest ammonium (2.43meq NH<sub>4</sub> litre<sup>-1</sup>) concentrations (Dufour *et al.*, 2001).

For the cultivar Temptation, NPK @ 20:20:40 at 0.25% along with BA 500 ppm produced the maximum number of leaves/plant and high leaf area (Anand and Jawaharlal, 2003). The application of NPK @ 30:10:10 @ 0.2% +

GA<sub>3</sub> 200 ppm in combination with Azospirillum, Phosphobacteria and VAM, each at 2g/ plant by root dip treatment increased the growth of Anthuriums. (Jawaharlal and Padmadevi, 2003).

In Anthurium andreanum cv. Lady Jane, Jothi et al. (2003) observed that the highest number of leaves and suckers were produced in 1 year old plants with a nutrient regime consisting of NPK 20:20:20 + Ca (0.1%) + Mg (0.1%) applied at fortnightly intervals.

#### 2.2.2 Influence of Nutrients on Flowering

The flower quality and number of flowers produced per year were found to be influenced by the quantity of nutrients applied.

An experiment conducted to test the effects of N at 0,300 and 600 lbs/acre/year and P and K at 0 and 300 lbs/acre/year on flowering and chemical composition of leaves of *Anthurium andreanum* cv. Nitta and Kaumana showed that major nutrients such as N, P, and K enhanced flower number, stem length and spathe size (Poole and Greaves, 1969).

Poole and Mc Connel (1971) recommended the use of a commonly used 14:14:14 dry fertilizer mixture for Anthurium in Florida. Five other fertilizers tried (Mag Amp, Osmocote, urea form and 2 formulations of Agriform) were on par with this mixture and no difference was noticed in the number of flowers produced.

In container studies with *Anthurium andreanum* high N application was reported to have an adverse effect on both flower production and flower quality. The best results were obtained with 126 mg N/container /week. An increase in K<sub>2</sub>O from 19 to 225 mg /container /week improved both flower yield and quality but further increase had adverse effects (Bik, 1976).

In an experiment with 5 levels of N and 3 levels of K on Anthurium andreanum in Netherlands the best results were obtained with an

annual dressing of 20 g N+30 g K<sub>2</sub>O/m<sup>2</sup> (Boertje, 1978). Higaki and Poole (1978) found that among the various nutrition regimes the lower rate of 20 g N and 30 g K<sub>2</sub>O gave as good or better results in flower production as high rates. Flower production decreased with age of the plant, but both stem length and flower size increased.

Irrigated and non- irrigated plants of Anthurium andreanum cv. Ozaki Red, grown in black cinder beds or sugarcane bagasse beds and fertilized with 800, 1600 or 3200 kg/ha per year of slow release 14N-6.1 P-112.6 K fertilizer, showed that flower yield, flower size and flower stem length obtained in irrigated cinder beds were similar to values obtained in irrigated and non- irrigated bagasse beds at the two highest fertilizer rates (Higaki and Imamura, 1985). Improvement in flowering and floral characteristics were observed by Money (1994) when 'Tropbacterin' @ 50g/ pot was applied to mature Anthurium andreanum plants.

The effect of frequencies and rates of application of foliar fertilizer on growth and flowering of Anthurium cv. 'Kaumana' was reported by Nikado (1994). No significant differences was observed among the treatments tried. The first bloom appeared 8 months after planting. Small flowers were produced during the first few months which later increased in size as the plant matured.

In an experiment on the effect of Nitrogen and Potassium fertilization rates on growth and flowering of 3 Anthurium hybrids, the highest quality plants with improved flowering and overall appearance were produced by fertilizers containing lower Nitrogen and Potassium levels (Conover and Henry, 1995).

Application of NPK @ 20:20:40 at 0.25% in combination with GA<sub>3</sub> at 250 ppm improved the flower yield and quality in *Anthurium andreanum* var. Temptation (Anand, 2001).

The effect of NPK fertilizer complexes (10:10:10, 20:10:10 and 30:10:10 N: P: K ratio, at 0.1 and 0.2% concentration each and Benzyl adenine and Gibberellic acid at 100 and 200 ppm, on growth and flowering in *Anthurium* 

andreanum cv. Temptation evaluated by Jawaharlal et al. (2001b) showed that the shortest pre blooming period was obtained with 30:10:10 N: P: K at 0.2% + GA 100 ppm.

The application of NPK @ 30:10:10 @ 0.2% + GA<sub>3</sub> 200 ppm in combination with Azospirillum, Phosphobacteria and VAM each at 2g/ plant by root dip treatment was found to improved the flowering of Anthuriums (Jawaharlal and Padmadevi, 2003). In *Anthurium andreanum* cv. Lady Jane, the highest number of flowers were observed in plants with a nutrient regime consisting of NPK 20:20:20 (0.5%) + Ca (0.1%) + Mg (0.1%) applied at fortnightly intervals (Jothi et. al., 2003). Nagaraju et al. (2003) reported that in field grown rose cv. Landora, plants receiving pongamia and neem cake produced higher yield and higher percentage of quality flowers.

#### 2.2.3 Influence of Nutrients on Vase Life of Flowers

Paul et al. (1992) recommended an optimum annual fertilizer rate of 0 kgN/ha and 224/448 kgN/ha for maximum post harvest life in A. andreanum cv Ozaki.

In an experiment on regulation of flowering and post harvest behaviour of *A. andreanum* cv. Hawaiian Red, the vase life of flowers was significantly influenced by the nutrients applied. The highest vase life for ground grown and pot grown plants (19.0 days each) was recorded by the plants sprayed with lower levels of N and higher levels of K (20:20:40) 0.25% at weekly interval (Abdussamed, 1999). Valsalakumari *et al.* (2001) obtained increased vase life in *Anthurium andreanum* flowers with the application of 20:20:40 NPK complex at 0.25% and at weekly intervals.

#### 2.3 NUTRIENT UPTAKE

Poole and Greaves (1969) reported that in Anthuriums raising of N levels increased the tissue N content but decreased P content. K application increase the

K content and lowered the Mg content Foliar N, P, K, Ca and Mg levels that produced the maximum flowers were 2.00, 0.16, 1.1, 1.5 and 0.75 % dry weight respectively. At optimum nutrition levels, mature Anthurium leaves were reported to contain 2 % N and 3 % K (Boertje, 1978).

Higaki et al. (1992) reported that the maximum flower yield in anthurium was obtained when leaf tissue level was 1.87% for N, 0.17% for P and 2.07% for K. Stem length and flower size were maximum with N at 1.59% and K at 1.67%. However no relationship was observed between the P content in leaves and flower size/ stem length.

In an experiment conducted for the adjustment of sufficiency ranges of selected ornamentals and for assessing nitrogen status, the sufficiency range of A. andreanum for N was 1.9-3.6 % (Simmone et al., 1995). Salvi (1997) reported that leaf nutrient content varied from 0.49 to 2.29 % for N, 0.19% to 0.36% for P and 1.4 to 2.44% for K.

In an experiment conducted to compare the nutritional levels of young and mature anthurium leaves, a comparatively lower level of macronutrients and certain micronutrients in the mature leaves was observed. This was attributed to the export of selected nutrients to the developing flower (Mills and Scoggins, 1998).

## 2.4 INFLUENCE OF pH AND EC OF MEDIA AND NUTRIENTS ON GROWTH AND FLOWERING

The effect of adding supra-normal concentrations of various salts and of rising EC values of the irrigation water on the flower production of A. andreanum in inert substrates was reported by Spek and Sonneveld (1985). Excess NaCl, Na<sub>2</sub>SO<sub>4</sub> or MgCl<sub>2</sub> was highly detrimental in lowering flower production by 40-46%. EC values of the irrigation water higher than 1.5 also reduced flower fresh weight.

Soluble salt concentration in leachates from a growing substrate (Peat: pinebark, 1:1) receiving various amounts of fertilizers, were examined and related

to the growth rates of 6 ornamental plants. Among them, Anthurium was found to tolerate a wide range of fertilizer levels (Poole and Chase, 1989).

In Anthurium andreanum cv. Tropical and Cuba, flower production decreased linearly with increasing nutrient concentrations. The result suggested that EC value of nutrient solution of 0.7 dsm<sup>-1</sup> could be recommended for optimal production (Sonnaveld and Voogt, 1993). Potting medium with a pH range of 5-6 was found to be conducive for good growth in Anthurium (Mercy and Dale, 1994).

Ozcelik et al. (2002) studied the EC and pH changes of the growing media and nutrient solution of Anthurium plants grown in a closed system. The pH and EC changes of both the nutrient solution and the substrates were assessed. It was found that the pH of the nutrient solution and the substrates decreased after applying the nutrient solution. EC values of the solutions and substrates was found to increase during the applying period.

Pot medium pH, dry weight, plant appearance and N uptake by Anthurium plants were significantly affected by N rates in irrigation water amended with either liquid urea or nitric acid (Li and Zhang, 2002). The optimum growth and the best appearance of Anthuriums were achieved when N was added to irrigation well water as either urea/nitric acid at the rate of 20 mgl<sup>-1</sup> with EC in a range of 0.36 to 0.42dsm<sup>-1</sup>. Nitrogen rates at 80 and 120mgl<sup>-1</sup> induced adverse plant growth due to lower pH of the medium.

Aswath and Pillai (2004) found that for Gerbera, a medium containing higher proportion of cocopeat had good physico-chemical properties. The pH of the medium was found to decrease with increase in nutrient EC levels. The medium containing 100% cocopeat supplied with nutrient solution having EC of 1.8 dSm<sup>-1</sup> produced good quality flower. The build up of EC was high in 100% cocopeat medium. Phosphorus, manganese, zinc, copper and sodium contents were high in 100% cocopeat medium. The nutrient contents increased with increased cocopeat proportion. Sheeba (2004) reported an increase in pH and EC of the soil by the addition of organic manures.

## Materials and Methods

14.

3. MATERIALS AND METHODS

An investigation was carried out for standardizing growing media and

organic nutrient dosage for young Anthurium plants. The experiment was

conducted during 2003-2005 at the Department of Pomology and Floriculture.

College of Agriculture, Vellayani under the Kerala Agricultural University.

The materials and methods used for the study are described in this chapter.

3.1 MATERIALS UTILIZED FOR STUDY

3.1.1 Variety

The Anthurium cultivar chosen for study was Anthurium andreanum

cv. Tropical, a commercially important cultivar of Kerala.

3.1.2 Planting Material

Seven month old tissue cultured plants after hardening and

acclimatization to 75 per cent shade were used as the planting material.

Uniform sized plants having 5 to 6 cm height and 4 to 6 leaves with a

maximum width of 2 cm were selected.

3.2 METHOD

Pot culture was the cultivation method adopted. Plants were grown in

clay pots. Shade was provided with black high-density polyethylene shade

net calibrated for 75 per cent shade. Diurnal variation in temperature and

humidity within the shade house recorded from 10.00 am to 3.00 pm ranged

from 29.1 to 33.4° C and 50 per cent to 88 per cent respectively. General

view of the experimental plot is given in Plate 1.

3.2.1 Experimental Design and Layout

Design : Factorial CRD

Variety: A. andreanum cv. Tropical



Plate 1. General view of the experimental plot

Treatment combinations : Thirty-six combinations of four media

treatments and nine nutrient treatments.

Number of replications : 4

Number of plants per plot : One potted plant/plot

#### 3.2.2 Media Treatments (Plate 2)

Media treatments consisted of combinations (3:1) of coarse sand or gravel as the major components (75%) and two kinds of compost (25%) namely leaf compost and coir pith compost as follows:

M<sub>1</sub>. Sand + leaf compost

M2 - Sand + coir pith compost

M<sub>3</sub> - Granite chips + leaf compost

M<sub>4</sub> - Granite chips + coir pith compost

#### 3.2.3 Nutrient Treatments

Nutrient treatments consisted of an organic manure mix containing leaf compost, neem cake, bone meal, poultry manure and wood ash in the proportion 2: 2: 2: 1: 1 by volume @ 25, 50 and 75 g plant<sup>-1</sup> along with fresh cowdung extract @ 2.0, 4.0 and 6.0 g l<sup>-1</sup>.

#### 3.2.3.1 Cowdung Extract

C<sub>1</sub>- 2.0 g l<sup>-1</sup> extract

C2- 4.0 g l-1 extract

C<sub>3</sub>-6.0 g l<sup>-1</sup> extract

#### 3.2.3.2 Organic Manure Mix

O<sub>1</sub>- 25 g mix

O2- 50 g mix

O<sub>3</sub>- 75 g mix



a. Sand + leaf compost



b. Sand + coirpith compost



c. Granite + leaf compost



d. Granite + coirpith compost

Plate 2. Media treatments

#### The treatment combinations were:

```
Sand + leaf compost + 2.0 g l<sup>-1</sup> extract + 25 g mix
1.
       M_1C_1O_1
                   Sand + leaf compost + 2.0 g l<sup>-1</sup> extract + 50 g mix
2.
       M_1C_1O_2
                    Sand + leaf compost + 2.0 g l<sup>-1</sup> extract + 75 g mix
3.
       M_1C_1O_3
                   Sand + leaf compost + 4.0 g l<sup>-1</sup> extract + 25 g mix
4.
       M_1C_2O_1
                    Sand + leaf compost + 4.0 g l<sup>-1</sup> extract + 50 g mix
5.
       M_1C_2O_2
                   Sand + leaf compost + 4.0 g l<sup>-1</sup> extract + 75 g mix
6.
       M_1C_2O_3
                    Sand + leaf compost + 6.0 g l<sup>-1</sup> extract + 25 g mix
7.
       M_1C_3O_1
                    Sand + leaf compost + 6.0 g l<sup>-1</sup> extract + 50 g mix
8.
       M_1C_3O_2
                    Sand + leaf compost + 6.0 g l<sup>-1</sup> extract + 75 g mix
9.
       M_1C_3O_3
                    Sand + coir pith compost + 2.0 g \Gamma^{-1} extract + 25 g mix
       M_2C_1O_1
10.
                    Sand + coir pith compost + 2.0 g l<sup>-1</sup> extract + 50 g mix
       M_2C_1O_2
11.
                    Sand + coir pith compost + 2.0 g l<sup>-1</sup> extract + 75 g mix
12.
       M_2C_1O_3
                    Sand + coir pith compost + 4.0 g [-1] extract + 25 g mix
       M_2C_2O_1
13.
                    Sand + coir pith compost + 4.0 g l<sup>-1</sup> extract + 50 g mix
14.
       M_2C_2O_2
                    Sand + coir pith compost + 4.0 g l<sup>-1</sup> extract + 75 g mix
15.
       M_2C_2O_3
                    Sand + coir pith compost + 6.0 g l<sup>-1</sup> extract + 25 g mix
16.
       M_2C_3O_1
                    Sand + coir pith compost + 6.0 g l<sup>-1</sup> extract + 50 g mix
17.
       M_2C_3O_2
                    Sand + coir pith compost + 6.0 g l<sup>-1</sup> extract + 75 g mix
18.
       M_2C_3O_3
                    Granite + leaf compost + 2.0 g l<sup>-1</sup> extract + 25 g mix
       M_3C_1O_1
19.
                    Granite + leaf compost + 2.0 g l<sup>-1</sup> extract + 50 g mix
20.
       M_3C_1O_2
                    Granite + leaf compost + 2.0 g l<sup>-1</sup> extract + 75 g mix
21.
       M_3C_1O_3
                    Granite + leaf compost + 4.0 g l<sup>-1</sup> extract + 25 g mix
22.
       M_3C_2O_1
                    Granite + leaf compost + 4.0 g 1<sup>-1</sup> extract + 50 g mix
        M_3C_2O_2
23.
                    Granite + leaf compost + 4.0 g l<sup>-1</sup> extract + 75 g mix
24.
        M_3C_2O_3
                    Granite + leaf compost + 6.0 g 1<sup>-1</sup> extract + 25 g mix
25.
        M_3C_3O_1
                    Granite + leaf compost + 6.0 g l<sup>-1</sup> extract + 50 g mix
26.
        M_3C_3O_2
                    Granite + leaf compost + 6.0 g l<sup>-1</sup> extract + 75 g mix
27.
        M_3C_3O_3
                    Granite + coir pith compost + 2.0 g l<sup>-1</sup> extract + 25 g mix
28.
        M_4C_1O_1
                    Granite + coir pith compost + 2.0 g l<sup>-1</sup> extract + 50 g mix
29.
        M_4C_1O_2
                    Granite + coir pith compost + 2.0 g l<sup>-1</sup> extract + 75 g mix
30.
        M_4C_1O_3
                    Granite + coir pith compost + 4.0 g l<sup>-1</sup> extract + 25 g mix
31.
        M_4C_2O_1
                    Granite + coir pith compost + 4.0 g l<sup>-1</sup> extract + 50 g mix
32.
        M_4C_2O_2
                    Granite + coir pith compost + 4.0 g l<sup>-1</sup> extract + 75 g mix
33.
        M_4C_2O_3
                    Granite + coir pith compost + 6.0 g l<sup>-1</sup> extract + 25 g mix
34.
        M_4C_3O_1
                    Granite + coir pith compost + 6.0 g l<sup>-1</sup> extract + 50 g mix
35.
        M_4C_3O_2
                    Granite + coir pith compost + 6.0 g l<sup>-1</sup> extract + 75 g mix
36.
        M_4C_3O_3
```

#### 3.2.3.3 Nutrient Application

The fresh cow dung extract was applied at weekly intervals and the organic manure mix was applied at bimonthly intervals. As per the package of practices Ad hoc recommendation (KAU, 2002), liquid inorganic nutrients (NPK 20: 20: 20) @ 1 g/litre (100 ml/plant) was applied at weekly intervals during acclimatization (14 weeks) and thereafter @ 2 g/litre to all the experimental plants. Cow's urine at 25 times dilution @ 100 ml/plant was also given to all the experimental plants. Plants were irrigated twice daily on all rainless days.

#### 3.2.4 Acclimatization and Planting

Plants maintained in coarse sand medium in plastic cups were transferred to a 1:1 sand + gravel medium in tubular pots of 12 cm diameter and 16 cm height under 75 per cent shade. After hardening and acclimatization for fourteen weeks, they were transplanted into pots of 22 cm top diameter and 22 cm height containing media treatments filled upto half of the total depth on 12<sup>th</sup> November 2004.

#### 3.2.5 Plant Protection

Prophylactic application of Malathion (0.2%) and Indofil (0.2%) was carried out at bimonthly intervals.

#### 3.3 OBSERVATIONS RECORDED

#### 3.3.1 Plant height (cm)

The length of the main stem was measured in centimeters from the base of the plant to the tip of the top most leaf and recorded at fortnightly intervals through out the period of experimentation.

#### 3.3.2 Number of leaves per plant

The total number of leaves present on the plant was counted and recorded at fortnightly intervals.

#### 3.3.3 Leaf area (cm<sup>2</sup>)

The maximum length and breadth of all the leaves on the plant was measured in centimetre at fortnightly intervals and the total leaf area (cm<sup>2</sup>) was computed using a constant (K) derived from a sample of 50 stratified leaves which was equal to 0.8136.

Leaf area =  $K \times length \times breadth$ .

#### 3.3.4 Length of the petiole (cm)

Length of the petiole was measured in centimetre from the base of the petiole to the part of attachment to the lamina of the newly emerged bronze colored leaf at weekly intervals upto the attainment of maximum length.

#### 3.3.5 Phyllachron (days)

Time taken for the emergence of successive leaves was counted and recorded in days.

#### 3.3.6 Leaf duration (days)

The number of days from the emergence of the furled leaf to the appearance of symptoms of senescence of the leaf was recorded.

#### 3.3.7 Fresh and dry weight of the leaves (g)

The fresh weight of the leaves was recorded in grams. Then the leaves were oven dried and the dry weight was recorded in grams at 165 days after transplanting (DAT) and 225 DAT.

## 3.3.8 N, P and K content of leaves (per cent)

The oven dried leaf samples were ground and one gram of the sample was used for analysis. The procedures followed were as below:

| Nutrient   | Method                                       | Reference      |
|------------|--|----------------|
| Nitrogen   | Microkjeldal                                 | Jackson (1973) |
| Phosphorus | Nitric-perchloric acid and spectrophotometry | Jackson (1973) |
| Potassium  | Nitric-perchloric acid + flame photometry    | Jackson (1973) |

### 3.3.9 pH and EC of the medium

Ten gram of the medium was taken and dissolved in 25 ml of water and the pH was recorded using pH meter (Jackson, 1973). The Electrical Conductivity of the samples was recorded and expressed as deci Seimens per metre (dSm<sup>-1</sup>) using conductivity meter (Jackson, 1973).

#### 3.3.10 Days to flowering

The number of days taken for the first flower bud to appear after planting was noted and recorded.

### 3.3.11 Number of flowers/plant

The total number of flowers produced per plant during study period was recorded.

#### 3.3.12 Inclination of spadix

The angle between the base of the spadix to the plane of the subtending spathe was measured with a protractor and recorded in degrees as inclination of the spadix.

### 3.3.13 Length and thickness of the spadix (cm)

The length of the spadix was measured in centimetre. The thickness of the spadix was measured in centimetre at the base.

## 3.3.14 Size of spathe

The length of the spathe from the base of the lobes to the tip and the maximum width of the spathe were measured in centimetre and the sum was recorded as spathe size as per Mercy and Dale (1994).

### 3.3.15 Length and thickness of the flower stalk

The length of the flower stalk was measured from the point of emergence to the point of attachment to the spathe. The thickness of the flower stalk below the spathe-spadix junction was measured and recorded.

#### 3.3.16 Days to harvestable maturity of flowers

Time taken for the appearance of the furled spathe to the progress of flower opening upto half of the total length of spadix was observed and recorded as days to the harvestable maturity of flowers.

#### 3.3.17 Vase life of flowers

Number of days taken for the flower to show the first signs of wilting when placed in distilled water at harvestable maturity was recorded as the vase life of the flower.

### 3.3.18 Statistical Analysis

The experimental data was analysed as per Panse and Sukhatme (1985).

Results

#### 4. RESULTS

The results of the experiment conducted on the standardisation of growing media and organic nutrition of juvenile Anthurium plants is presented in this chapter.

Biometric characters such as plant height, leaf area, leaf number and petiole length were influenced by the growing media and nutrient treatments.

#### 4.1 BIOMETRIC CHARACTERS

### 4.1.1 Plant Height (Tables 1 to 4, Fig. 1 and Appendix I)

## 4.1.1.1 Effect of Media and Nutrient Treatments on Plant Height

The media treatments significantly influenced the height of the plants from 60 days after transplanting (DAT) onwards. Plants grown in media comprising of sand + coir pith compost recorded significantly greater height than those grown in the other media from 60 DAT (12.12) to 225 DAT (41.66 cm). This was followed by plants grown in granite + leaf compost from 106 DAT to 255 DAT (17.34 cm to 35.24 cm). Plants grown in granite + leaf compost and sand + leaf compost were on par at 60 DAT and 90 DAT recording 13.02 and 12.81 cm at 60 DAT and 15.38 and 15.17 at 90 DAT respectively. At 75 DAT, plants grown in sand + leaf compost recorded significantly greater height (14.27 cm) than those grown in granite + leaf compost and granite + coir pith compost. Plants grown in granite + coir pith compost recorded significantly lower height from 60 DAT to 105 DAT (11.99 cm to 15.68 cm). Plants grown in sand + leaf compost recorded significantly lower height from 120 DAT to 225 DAT (17.97 cm to 25.44 cm).

Plant height was significantly influenced by the different concentrations of fresh cowdung extract. Plant height was significantly higher for the treatment with 4 g l<sup>-1</sup> cowdung extract (13.56 cm) at 60 DAT. The height of plants treated with 2 g l<sup>-1</sup> and 6 g l<sup>-1</sup> cowdung extract were on par at 60 DAT (12.53 and 12.86 cm respectively). At 75 and 90 DAT, 150 and 165 DAT, plant height was not influenced by the cowdung treatments. From 105 DAT to 135 DAT plants receiving 6 g l<sup>-1</sup> cowdung extract recorded significantly greater height (18.86 to 22.56 cm). At 105 DAT those receiving 4 g l<sup>-1</sup> had a significantly greater height (17.03 cm) than those receiving 2 g l<sup>-1</sup>. At 120 DAT and 135 DAT, plants receiving 2 g l-1 and 4 g l-1 were on par. From 180 to 225 DAT plant height was significantly highest in those receiving 4 g l<sup>-1</sup> cowdung extract (30.4 cm to 34.25). Plants receiving 2 g l<sup>-1</sup> and 6 g l<sup>-1</sup> were on par from 180 DAT to 210 DAT (28.4 and 28.65 cm respectively to 31.85 and 31.62 respectively). At 225 DAT those receiving 2 g l<sup>-1</sup> recorded significantly greater height (32.69 cm) than those receiving 6 g l<sup>-1</sup> (32.13 cm).

The different concentration of organic manure mix was also found to significantly influence plant height throughout the period under observation. At 60 DAT and 75 DAT, significantly greater plant height of 13.56 cm and 14.72 cm was recorded for the treatment 75 g organic manure mix. However 25 g organic manure mix was found to be on par with this treatment at 75 DAT. Plant height was significantly lower for the treatment with 50 g organic manure mix at 60 DAT and 75 DAT (12.45 cm and 13.46 cm respectively).

The effect of organic manure treatments were not significant at 90, 105 and 135 DAT.

At 120 DAT and from 150 to 225 DAT, plants receiving 25 g OM mix recorded significantly greater heights (20.77 cm at 120 DAT, 26.22 cm at 150 DAT to 34.55 cm at 225 DAT). At 120, 150 and

180 DAT, 50 g OM mix treated plants recorded significantly greater heights (19.77, 23.93 and 28.5 cm respectively) than those receiving 75 g OM mix. However, at 165 DAT and from 195 to 225 DAT, 75 g OM mix receiving plants were found to be on par with 50 g OM receiving plants.

# 4.1.1.2 Interaction Effect of Media and Nutrient Treatments on Plant Height

Plant height was significantly influenced by the interaction between growing media and cowdung treatments during the observation period. At 60 DAT, interaction effects resulted in significantly greater heights in plants grown in sand + leaf compost (13.95 cm) receiving 6 g l<sup>-1</sup> cowdung extract (M<sub>1</sub>C<sub>3</sub>), in those grown in sand + coir pith compost receiving 2g l<sup>-1</sup> (14.57 cm) or 4g l<sup>-1</sup> extract (14.72 cm) and those grown in granite + leaf compost receiving 2 g l<sup>-1</sup> extract (14.6 cm). Plant height (11.3 cm) was significantly lower in plants grown in granite + coir pith compost receiving 2 g l<sup>-1</sup> extract (M<sub>4</sub>C<sub>1)</sub> and in those grown in granite + leaf compost (11.55 cm) receiving 2 g l<sup>-1</sup> extract (M<sub>3</sub>C<sub>1</sub>). At 75 DAT, these effects were maintained and plants receiving M<sub>1</sub>C<sub>1</sub> and M<sub>3</sub>C<sub>2</sub> also recorded greater heights (14.73 and 15.00 cm respectively). At 90 DAT the interaction M<sub>4</sub>C<sub>3</sub> recorded significantly lower height (12.2 cm)

At 105 to 135 DAT, interaction resulted in greater heights (20.12 and 25.5 cm respectively) in the interaction M<sub>2</sub>C<sub>3</sub> and the M<sub>2</sub>C<sub>2</sub> plants were also on par. At 105 DAT plants grown in sand + coir pith compost receiving 2 g l<sup>-1</sup> extract (M<sub>2</sub>C<sub>1</sub>) were also on par with respect to maximum height recorded. At 135 DAT, M<sub>3</sub>C<sub>2</sub> and M<sub>3</sub>C<sub>3</sub> plants too recorded greater heights. At 150 DAT and 180 to 225 DAT, M<sub>2</sub>C<sub>2</sub> plants maintained greater heights (30.05 cm at 150 DAT, 37.8 cm at 180 DAT to 42.7 cm at 225 DAT). At 195 DAT, the M<sub>2</sub>C<sub>3</sub> plants were also on par and they were also found to maintain greater heights at 165 DAT. The lowest height was recorded in the plants grown in sand + leaf compost receiving 4 g l<sup>-1</sup>

Table 1. Effects of media and nutrient treatments on plant height (cm) in Anthurium andreanum cv. Tropical

| Treatments        | 60 DAT | 75 DAT | 90 DAT | 105 DAT | 120 DAT | 135 DAT | 150 DAT | 165 DAT | 180 DAT | 195 DAT | 210 DAT | 225 DAT |
|-------------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Growing<br>Media  |        |        |        |         |         |         |         |         |         |         |         |         |
| $\overline{M_1}$  | 13.02  | 14.27  | 15.17  | 16.39   | 17.97   | 18.19   | 20.49   | 20.71   | 23.03   | 23.47   | 25.44   | 25.44   |
| $M_2$             | 14.12  | 14.17  | 17.69  | 19.69   | 23.11   | 24.97   | 28.48   | 30.16   | 35.18   | 37.16   | 40.74   | 41.66   |
| M <sub>3</sub>    | 12.81  | 13.86  | 15.38  | 17.34   | 19.47   | 23.14   | 25.64   | 27.89   | 31.53   | 32.94   | 34.20   | 35.24   |
| M <sub>4</sub>    | 11.99  | 12.98  | 13.57  | 15.68   | 18.87   | 20.11   | 22.46   | 23.96   | 26.86   | 27.93   | 29.56   | 29.76   |
| SE                | 0.17   | 0.29   | 0.51   | 0.25    | 0.25    | 0.29    | 0.31    | 0.28    | 0.29    | 0.27    | 0.22    | 0.19    |
| CD                | 0.49   | 0.83   | 1.45   | 0.70    | 0.73    | 0.83    | 0.89    | 0.81    | 0.83    | 0.77    | 0.62    | 0.55    |
| Cowdung extract   |        | -      |        |         |         |         |         |         |         |         |         |         |
| C <sub>1</sub>    | 12.53  | 31.61  | 15.10  | 15.94   | 19.16   | 20.92   | 24.00   | 25.47   | 28.40   | 29.83   | 31.85   | 32.69   |
| C <sub>2</sub>    | 13.56  | 14.44  | 16.03  | 17.03   | 19.72   | 21.33   | 24.34   | 25.40   | 30.40   | 31.10   | 33.96   | 34.25   |
| C <sub>3</sub>    | 12.86  | 14.16  | 15.23  | 18.86   | 20.69   | 22.56   | 24.47   | 26.16   | 28.65   | 30.20   | 31.62   | 32.13   |
| SE                | 0.15   | -      |        | 0.21    | 0.22    | 0.25    |         | •       | 0.25    | 0.23    | 0.19    | 0.17    |
| CD                | 0.42   | NS     | NS     | 0.61    | 0.63    | 0.71    | NS _    | NS      | 0.72    | 0.67    | 0.54    | 0.48    |
| Organic<br>manure | -      |        |        |         |         |         |         |         |         | -       |         |         |
| Oı                | 12.95  | 14.03  | 15.80  | 17.60   | 20.77   | 21.82   | 26.22   | 26.73   | 31.28   | 31.80   | 34.29   | 34.55   |
| O <sub>2</sub>    | 12.45  | 13.46  | 15.54  | 16.94   | 19.77   | 21.71   | 23.93   | 25.30   | 28.50   | 29.37   | 31.77   | 32.02   |
| O <sub>3</sub>    | 13.56  | 14.72  | 15.02  | 17.28   | 19.03   | 21.28   | 22.65   | 25.01   | 27.67   | 29.96   | 31.38   | 32.50   |
| SE                | 0.15   | 0.25   |        | -       | 0.22    | -       | 0.27    | 0.24    | 0.25    | 0.23    | 0.19    | 0.17    |
| CD                | 0.42   | 0.72   | NS     | NS      | 0.63    | NS      | 0.77    | 0.70    | 0.72    | 0.67    | 0.54    | 0.48    |

DAT – Days after transplanting NS – Not significant

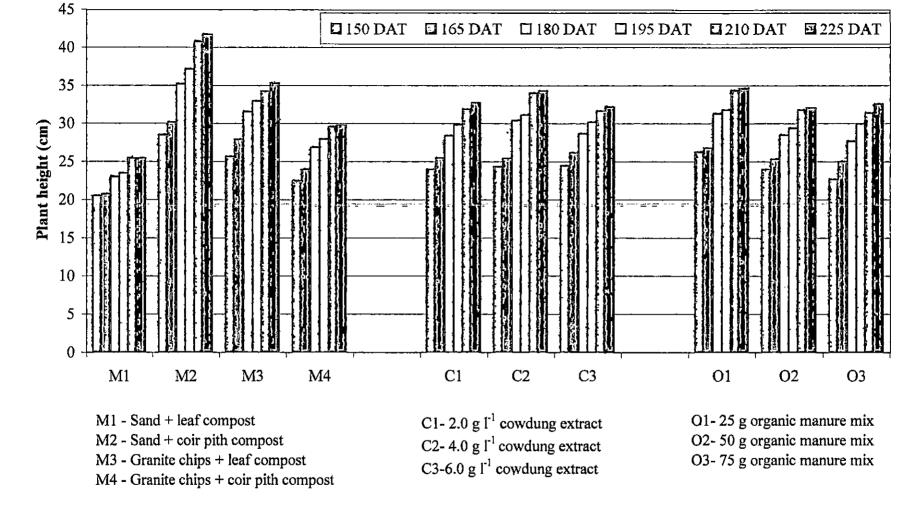


Fig. 1. Effect of media and nutrient treatments on plant height (cm) in Anthurium andreanum cv. Tropical

extract  $(M_1C_2)$  from 120 DAT (15.7 cm) to 225 DAT (24.3 cm). The  $M_1C_1$  plants too recorded lesser heights at 180 and 195 DAT and the  $M_1C_3$  plants at 180 DAT.

The interaction effects of growing media and organic manure mix significantly affected plant height during the observation period. At 60 DAT, interaction effects resulted in significantly greater heights in plants grown in sand + coir pith compost (14.52 cm) receiving 75 g organic manure mix  $(M_2O_3)$ , sand +coir pith compost (14.07) receiving 50 g OM mix  $(M_2O_2)$ , sand + coir pith compost (13.77 cm) receiving 25 g OM mix  $(M_2O_1)$ , granite +leaf compost (13.88 cm) receiving 25 g OM mix  $(M_2O_1)$ , granite + leaf compost (13.93 cm) receiving 75 g OM mix  $(M_3O_3)$ .

At 60 and 75 DAT, significantly lower height was recorded in plants grown in granite + leaf compost (10.6 cm and 11.3 cm respectively) receiving 50 g OM mix (M<sub>3</sub>O<sub>2</sub>) and granite + coir pith compost (11.33 cm and 12.37 cm respectively) receiving 25 g OM mix (M<sub>4</sub>O<sub>1</sub>). From 75 DAT to 135 DAT, plants receiving M<sub>2</sub>O<sub>2</sub> recorded greater heights (15.9 cm to 27.55 cm) and at 75 DAT plants grown in M<sub>1</sub> and M<sub>3</sub> receiving O<sub>1</sub> and O<sub>3</sub> and those grown in M<sub>2</sub> receiving O<sub>3</sub> and at 105 DAT the M<sub>2</sub>O<sub>1</sub> plants also recorded greater heights. At 90 DAT, plants receiving M<sub>4</sub>O<sub>3</sub> and M<sub>3</sub>O<sub>2</sub> recorded significantly lower height (11.72 cm and 13.63 cm respectively). At 105 DAT, plants receiving M<sub>4</sub>O<sub>2</sub>, M<sub>4</sub>O<sub>1</sub>, M<sub>3</sub>O<sub>2</sub> and M<sub>1</sub>O<sub>1</sub> recorded significantly lower height (15.02 cm, 15.37 cm, 15.57 cm and 15.98 cm respectively). At 120 and 135 DAT, plants receiving sand + leaf compost  $(M_1)$  and receiving  $O_1$ ,  $O_2$  or  $O_3$  and  $M_4O_2$  recorded lowest height (17.95) cm, 17.93 and 18.27 cm and 18.7 cm at 120 DAT and 17.95, 18.27, 18.35 and 18.82 cm at 135 DAT respectively). At 120 DAT lowest height was also recorded by the M<sub>4</sub>O<sub>3</sub> and M<sub>3</sub>O<sub>2</sub> plants (17.5 cm and 17.95 cm respectively).

Table 2. Interaction effect of media and cowdung treatments on plant height (cm) in Anthurium andreanum cv. Tropical

| Treatments                    | 60 DAT | 75 DAT | 90 DAT | 105 DAT | 120 DAT | 135 DAT | 150 DAT              | 165 DAT | 180 DAT | 195 DAT | 210 DAT | 225 DAT |
|-------------------------------|--------|--------|--------|---------|---------|---------|----------------------|---------|---------|---------|---------|---------|
| $M_1C_1$                      | 12.72  | 14.73  | 15.43  | 15.52   | 18.87   | 18.87   | 20.83                | 20.83   | 23.22   | 23.20   | 26.05   | 26.10   |
| $M_1C_2$                      | 12.40  | 12.93  | 14.33  | 15.08   | 15.70   | 15.92   | 19.55                | 19.55   | 22.57   | 22.57   | 24.30   | 24.30   |
| M <sub>1</sub> C <sub>3</sub> | 13.95  | 15.15  | 15.73  | 18.58   | 19.35   | 19.78   | 21.10                | 21.75   | 23.32   | 24.65   | 25.92   | 25.93   |
| M <sub>2</sub> C <sub>1</sub> | 14.57  | 15.47  | 17.98  | 19.10   | 21.95   | 23.97 - | - <del>-</del> 26.85 | 28.78   | 33.65   | 35.73 - | 39.30   | 41.25   |
| M <sub>2</sub> C <sub>2</sub> | 14.72  | 15.95  | 18.30  | 19.85   | 23.10   | 25.42   | 30.05                | 30.05   | 37.80   | 38.00   | 42.70   | 42.70   |
| M <sub>2</sub> C <sub>3</sub> | 13.07  | 14.08  | 16.80  | 20.12   | 24.28   | 25.53   | 28.53                | 31.63   | 34.08   | 37.75   | 40.22   | 41.03   |
| M <sub>3</sub> C <sub>1</sub> | 11.55  | 12.55  | 13.63  | 14.52   | 17.95   | 20.95   | 24.32                | 26.23   | 29.27   | 31.30   | 32.22   | 33.55   |
| M <sub>3</sub> C <sub>2</sub> | 14.60  | 15.00  | 16.33  | 18.13   | 20,12   | 24.20   | 26.38                | 29.55   | 34.97   | 36.00   | 38.87   | 39.55   |
| M <sub>3</sub> C <sub>3</sub> | 12.27  | 14.02  | 16.18  | 19.37   | 20.33   | 24.27   | 26.22                | 27.88   | 30.35   | 31.52   | 31.52   | 32.62   |
| M <sub>4</sub> C <sub>1</sub> | 11.30  | 11.68  | 13.35  | 14.62   | 17.87   | 19.90   | 23.98                | 26.03   | 27.45   | 29.10   | 29.85   | 29.85   |
| M <sub>4</sub> C <sub>2</sub> | 12.52  | 13.87  | 15.13  | 15.03   | 19.97   | 19.77   | 21.38                | 22.47   | 26.27   | 27.82   | 29.98   | 30.47   |
| M <sub>4</sub> C <sub>3</sub> | 12.17  | 13.40  | 12.22  | 17.38   | 18.78   | 20.67   | 22.02                | 23.38   | 26.87   | 26.87   | 28.83   | 28.95   |
| SE                            | 0.29   | 0.50   | -      | 0.43    | 0.44    | 0.50    | 0.54                 | 0.49    | 0.50    | 0.46    | 0.38    | 0.33    |
| CD                            | 0.84   | 1.44   | NS     | 1.22    | 1.27    | 1.43    | 1.54                 | 1.40    | 1.43    | 1.33    | 1.08    | 0.95    |

DAT – Days after transplanting NS – Not significant

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At 150 DAT, greater heights were recorded by the M<sub>2</sub> plants receiving O<sub>1</sub> (29.98 cm), O<sub>2</sub> (29.43 cm) and the M<sub>3</sub>O<sub>1</sub> plants were also found to be on par (29.3 cm). From 165 DAT to 225 DAT, M<sub>2</sub>O<sub>2</sub> recorded greater heights (32.53 cm to 41.78 cm). This was on par with M<sub>2</sub>O<sub>1</sub> at 180, 210 and 225 DAT. At 180 DAT and 195 DAT the maximum height was also recorded by M<sub>3</sub>O<sub>1</sub>. At 195 and 225 DAT the interaction M<sub>2</sub>O<sub>3</sub> was also on par (37.17 cm and 41.71 cm respectively) with the maximum height recorded. At 150 and 165 DAT and 195 DAT, significantly lower height were recorded by plants grown in sand + leaf compost (M<sub>1</sub>) receiving O<sub>1</sub> (25 g), O<sub>2</sub> (50 g) or O<sub>3</sub> (75 g mix) and plants grown in M<sub>4</sub> (granite + coir pith compost) receiving O<sub>2</sub>. At 180 DAT, significantly lower height was recorded in M<sub>1</sub> plants receiving O<sub>1</sub>, O<sub>2</sub> or O<sub>3</sub> (23.73, 22.9 and 22.48 cm respectively). At 210 and 225 DAT, M<sub>1</sub> plants receiving O<sub>2</sub> recorded lowest heights (24.52 cm and 24.57 cm respectively) At 210 DAT, M<sub>1</sub>O<sub>3</sub> plants were also on par with this.

Interaction between fresh cowdung extract and organic manure mix significantly influenced the plant height during the observation period. From 60 to 90 DAT, plants receiving  $C_2O_3$  (4 g l<sup>-1</sup> cowdung extract + 75 g OM mix) recorded significantly greater height (15.26 to 17.13 cm). At 60 DAT significantly lower height was recorded in plants receiving  $C_3O_2$  (6 g l<sup>-1</sup> extract + 50 g mix) and also  $C_1O_1$  (2 g l<sup>-1</sup> extract + 25 g mix),  $C_1O_2$  (2 g l<sup>-1</sup> extract + 50 g mix),  $C_1O_3$  (2 g l<sup>-1</sup> extract + 75 g mix),  $C_2O_1$  (4 g l<sup>-1</sup> extract + 25 g mix),  $C_2O_1$  (4 g l<sup>-1</sup> extract + 50 g OM mix). The values were 12.23 cm, 12.93, 12.33, 12.35, 12.63 and 12.79 cm respectively. At 75 DAT these effects were also extended to  $C_3O_1$  plants (6 g l<sup>-1</sup> extract + 25 OM mix). At 90 DAT, the lowest height of 13.7 cm was recorded by plants receiving 6 g l<sup>-1</sup> extract + 75 g OM mix ( $C_3O_3$ ).

At 105 DAT, significantly greater heights were recorded by plants receiving C<sub>3</sub>O<sub>1</sub> (19.85 cm) and at 120 DAT significantly greater height were recorded by plants receiving C<sub>3</sub>O<sub>2</sub> (22 cm), C<sub>3</sub>O<sub>7</sub> (21.16 cm) and

Table 3. Interaction effect of media and organic manure treatments on plant height (cm) in Anthurium andreanum cv.

Tropical

|                               |        |        |        |         |         |         |         | _       |         |         |         |         |
|-------------------------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Treatments                    | 60 DAT | 75 DAT | 90 DAT | 105 DAT | 120 DAT | 135 DAT | 150 DAT | 165 DAT | 180 DAT | 195 DAT | 210 DAT | 225 DAT |
| $M_1O_1$                      | 12.82  | 14.48  | 15.78  | 15.98   | 17.95   | 17.95   | 21.23   | 21.23   | 23.72   | 23.70   | 26.15   | 26.15   |
| $M_1O_2$                      | 12.63  | 13.45  | 14.10  | 16.67   | 17.93   | 18.27   | 20.38   | 20.38   | 22.90   | 22.90   | 24.52   | 24.57   |
| $M_1O_3$                      | 13.62  | 14.88  | 15.62  | 16.53   | 18.03   | 18.35   | 19.87   | 20.52   | 22.48   | 23.82   | 25.60   | 25.62   |
| $M_2O_1$                      | 13.77  | 14.07  | 16.92  | 19.97   | 23.12   | 24.07   | 29.98   | 29.98   | 36.13   | 36.33   | 41.50   | 41.50   |
| $M_2O_2$                      | 14.07  | 15.90  | 19.70  | 20.52   | 24.50   | 27.55   | 29.43   | 32.53   | 36.17   | 37.98   | 41.68   | 41.78   |
| $M_2O_3$                      | 14.52  | 15.53  | 16.47  | 18.58   | 21.72   | 23.30   | 26.02   | 27.95   | 33.23   | 37.17   | 39.03   | 41.70   |
| M <sub>3</sub> O <sub>1</sub> | 13.88  | 15.20  | 16.25  | 19.10   | 21.58   | 24.72   | 29.33   | 30.45   | 35.90   | 36.68   | 37.95   | 38.87   |
| $M_3O_2$                      | 10.60  | 11.30  | 13.63  | 15.57   | 17.95   | 22.22   | 24.90   | 26.73   | 30.90   | 32.57   | 34.17   | 34.63   |
| M <sub>3</sub> O <sub>3</sub> | 13.93  | 15.07  | 16.27  | 17.35   | 18.87   | 22.48   | 22.68   | 26.48   | 27.78   | 29.57   | 30.48   | 32.22   |
| M <sub>4</sub> O <sub>1</sub> | 11.33  | 12.37  | 14.27  | 15.37   | 20.42   | 20.53   | 24.32   | 25.25   | 29.38   | 30.47   | 31.57   | 31.68   |
| M <sub>4</sub> O <sub>2</sub> | 12.48  | 13.18  | 14.72  | 15.02   | 18.70   | 18.82   | 21.02   | 21.55   | 24.03   | 24.03   | 26.70   | 27.18   |
| M <sub>4</sub> O <sub>3</sub> | 12.17  | 13.40  | 11.72  | 16.65   | 17.50   | 20.98   | 22.05   | 25.09   | 27.17   | 29.28   | 30.40   | 30.40   |
| SE                            | 0.29   | 0.50   | 0.88   | 0.43    | 0.44    | 0.50    | 0.54    | 0.49    | 0.50    | 0.46    | 0.38    | 0.33    |
| CD                            | 0.84   | 1.44   | 2.52   | 1.22    | 1.27    | 1.43    | 1.54    | 1.40    | 1.43    | 1.33    | 1.08    | 0.95    |

C<sub>1</sub>O<sub>1</sub> (21.31 cm). At 105 and 120 DAT, lower height were recorded in plants receiving C<sub>1</sub>O<sub>3</sub> (17.31 cm). At 105 DAT, C<sub>1</sub>O<sub>2</sub> and C<sub>2</sub>O<sub>1</sub> plants were also on par with the lowest height recorded. At 135 and 150 DAT, plants receiving C<sub>3</sub>O<sub>1</sub> recorded greater heights (23.59 cm and 27.14 cm respectively). At 135 DAT plants receiving C<sub>2</sub>O<sub>3</sub> and C<sub>3</sub>O<sub>2</sub> were also on par with the maximum height recorded. The lowest height was recorded by plants receiving C<sub>1</sub>O<sub>2</sub>, C<sub>1</sub>O<sub>3</sub>, C<sub>2</sub>O<sub>1</sub> and C<sub>3</sub>O<sub>3</sub> at 135 DAT (20.05 cm, 20.74 cm, 19.89 cm and 20.8 cm respectively). At 150 DAT plants receiving C<sub>1</sub>O<sub>3</sub> and C<sub>3</sub>O<sub>3</sub> recorded lowest height (21.33 and 24.01 cm respectively).

At 165 DAT, plants receiving  $C_1O_1$ ,  $C_2O_3$ ,  $C_3O_1$  and  $C_3O_2$  recorded greater heights (27.36, 26.68, 27.14 and 27.2 cm respectively) and the lowest height was recorded by plants receiving  $C_2O_2$ ,  $C_1O_3$  and  $C_3O_3$  (23.66,24.01 and 24.15 cm respectively). At 180 DAT,  $C_2O_1$  and  $C_3O_1$  receiving plants recorded maximum heights (31.88 cm and 31.96 cm respectively). From 195 to225 DAT greater heights were recorded by plants receiving  $C_2O_3$  (32.51 to 35.5 cm) and plants receiving  $C_3O_1$  and  $C_2O_1$  were on par with this. At 195 DAT, the effect of greater height was also extended to  $C_1O_1$ . From 180 to 225 DAT, the lowest height was recorded by plants receiving  $C_3O_3$  (25.18 to 29.89 cm). At 195 DAT, the effect was also extended to  $C_1O_2$ ,  $C_1O_3$  and  $C_2O_2$ .

## 4.1.2 Leaf Area (Tables 5 to 8, Fig. 2 and Appendix II)

## 4.1.2.1 Effect of Media and Nutrient Treatments on Leaf Area

The media treatments significantly influenced the leaf area of the plants from 60 DAT onwards. From 60 DAT to 225 DAT, plants grown in media consisting of sand + coir pith compost recorded significantly higher leaf area (66.15 cm<sup>2</sup> to 574.48 cm<sup>2</sup>). This was followed by plants grown in granite + leaf compost (61.9 cm<sup>2</sup> to 448.6 cm<sup>2</sup>) during the period and plants grown in granite + coir pith compost (53.73 cm<sup>3</sup> to 356.62 cm<sup>2</sup>).

Table 4. Interaction effect of cowdung and organic manure treatments on plant height (cm) in Anthurium andreanum cv.

Tropical

| Treatments                    | 60 DAT | 75 DAT | 90 DAT | 105 DAT | i20 DAT | 135 DAT | 150 DAT | 165 DAT | 180 DAT | 195 DAT | 210 DAT | 225 DAT |
|-------------------------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| $C_1O_1$                      | 12.93  | 14.33  | 15.90  | 17.05   | 21.31   | 21.97   | 26.15   | 27.36   | 30.01   | 31.40   | 33.59   | 33.95   |
| $C_1O_2$                      | 12.33  | 13.24  | 15.17  | 15.80   | 18.85   | 20.05   | 24.51   | 25.04   | 27.99   | 29.04   | 31.59   | 31.99   |
| C <sub>1</sub> O <sub>3</sub> | 12.35  | 13.26  | 14.23  | 14.96   | 17.31   | 20.74   | 21.33   | 24.01   | 27.19   | 29.06   | 30.39   | 32.13   |
| C <sub>2</sub> O <sub>1</sub> | 12.63  | 13.64  | 15.56  | 15.91   | 19,83   | 19.89   | 25.36   | 25.69   | 31.88   | 31.88   | _ 34.69 | 34.69   |
| C <sub>2</sub> O <sub>2</sub> | 12.79  | 13.56  | 15.39  | 16.60   | 18.46   | 21.79   | 22.81   | 23.66   | 28.69   | 28.90   | 32.21   | 32.58   |
| C <sub>2</sub> O <sub>3</sub> | 15.26  | 16.11  | 17.13  | 18.56   | 20.88   | 22.30   | 24.85   | 26.86   | 30.67   | 32.51   | 34.99   | 35.50   |
| C <sub>3</sub> O <sub>1</sub> | 13.30  | 14.13  | 15.95  | 19.85   | 21.16   | 23.59   | 27.14   | 27.14   | 31.96   | 32.11   | 34.60   | 35.01   |
| C <sub>3</sub> O <sub>2</sub> | 12.23  | 13.58  | 16.05  | 18.42   | 22.00   | 2330    | 24.48   | 27.20   | 28.83   | 30.17   | 31.50   | 31.50   |
| C <sub>3</sub> O <sub>3</sub> | 13.06  | 14.79  | 16.70  | 18.31   | 18.90   | 20.80   | 21.79   | 24.15   | 25.18   | 28.30   | 28.76   | 29.89   |
| SE                            | 0.25   | 0.43   | -      | 0.37    | 0.38    | 0.43    | 0.47    | 0.42    | 0.43    | 0.40    | 0.33    | 0.29    |
| CD -                          | 0.73   | 1.25   | NS     | 1.06    | 1.10    | 1.24    | 1.34    | 1.21    | 1.24    | 1.16    | 0.93    | 0.83    |
| <del>-</del>                  |        |        |        |         |         |         |         |         |         |         |         |         |

DAT – Days after transplanting NS – Not significant

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Plants grown in sand + leaf compost recorded significantly lower leaf area (46.1 cm<sup>2</sup> to 347.77 cm<sup>2</sup>) during the period.

Leaf area was significantly influenced by different concentrations of fresh cowdung extract. Plants receiving 4 g l<sup>-1</sup> extract recorded significantly higher leaf area from 60 DAT to 120 DAT (63.09 cm<sup>2</sup> to 140 .16 cm<sup>2</sup>). This was followed by plants receiving 2 g l<sup>-1</sup> extract at 60 DAT (55.3 cm<sup>2</sup>). From 75 DAT to 120 DAT the plants receiving 6 g l<sup>-1</sup> extract was found to record significantly higher leaf area (59.68 cm<sup>2</sup> to 132.43 cm<sup>2</sup>) than those receiving 2 g l<sup>-1</sup> extract. The plants receiving 2 g l<sup>-1</sup> extract recorded significantly lower leaf area (56.85 cm<sup>2</sup> at 75 DAT to 109.76 cm<sup>2</sup> at 120 DAT).

At 135 DAT, plants receiving 6 g l<sup>-1</sup> extract recorded significantly greater leaf area (156.13 cm<sup>2)</sup> than those receiving 4 g l<sup>-1</sup> extract (153.44 cm<sup>2</sup>) and 2 g l<sup>-1</sup> extract (130.75 cm<sup>2</sup>). From 150 DAT to 225 DAT, plants receiving 4 g l<sup>-1</sup> extract were found to recorded significantly greater leaf area (223.13 cm<sup>2</sup> to 451.23 cm<sup>2</sup>). This was followed by plants receiving 6 g l<sup>-1</sup> extract which recorded leaf area ranging from 212.4 cm<sup>2</sup> to 442.62 cm<sup>2</sup> during the period. The lowest leaf area was recorded by plants receiving 2 g l<sup>-1</sup> extract (181.2 cm<sup>2</sup> to 401.75 cm<sup>2</sup>) during the period.

Leaf area was significantly influenced by organic manure mix from 60 DAT onwards. At 60 DAT, plants receiving 50 g OM mix and 75 g OM mix recorded significantly greater leaf area (58.96 cm<sup>2</sup> and 57.3 cm<sup>2</sup> respectively). At 75 DAT, plants receiving 50 g OM mix recorded significantly greater leaf area (62.74 cm<sup>2</sup>) followed by plants receiving 75 g OM mix. At both 60 DAT and 75 DAT, significantly lower leaf area was recorded by plants receiving 25 g OM mix (54.66 and 58.77 cm<sup>2</sup> respectively).

At 90 DAT, plants receiving 75 g OM mix recorded significantly greater leaf area of 88.39 cm<sup>2</sup>. This was followed by plants receiving 50 g

OM mix (86.26 cm<sup>2</sup>) which was on par with those receiving 25 g OM mix (85.14 cm<sup>2</sup>). At 105 DAT and 135 DAT, plants receiving 25 g OM mix recorded significantly greater leaf area (99.97 and 155.54 cm<sup>2</sup> respectively). This was followed by plants receiving 75 g mix at 105 DAT (95.75 cm<sup>2</sup>) and those receiving 50 g mix (146.08 cm<sup>2</sup>) at 135 DAT. At 120 DAT, significantly greater leaf area was recorded by plants receiving 25 g mix (130.61 cm<sup>2</sup>) and 75 g (130.44 cm<sup>2</sup>).

At 105 DAT and at 120 DAT, significantly lower leaf area was recorded by plants receiving 25 g OM mix (92.17 cm<sup>2</sup> and 121.3 cm<sup>2</sup> respectively). At 135 DAT, significantly lower leaf area was recorded by plants receiving 75 g mix (138.69 cm<sup>2</sup>). At 150 DAT, significantly higher leaf area was recorded by plants receiving 50 g OM mix (208.74 cm<sup>2</sup>) which was followed by those receiving 75 g mix (206.87 cm<sup>2</sup>) and 25 g mix (201.05 cm<sup>2</sup>). From 165 to 225 DAT, significantly higher leaf area was recorded by plants receiving 25 g mix (266.34 cm<sup>2</sup> to 446.46 cm<sup>2</sup>).

At 165, 180, 195, 225 DAT, plants receiving 75 g mix recorded significantly greater leaf area (242.48, 309.52, 362.06 and 444.67 cm<sup>2</sup> respectively) than those receiving 50 g mix. At 210 DAT, plants receiving 50 g mix recorded significantly greater leaf area (390.46 cm<sup>2</sup>) than those receiving 75 g mix.

# 4.1.2.2 Interaction Effect of Media and Nutrient Treatments on Leaf Area

Interaction between growing media and cowdung treatments significantly influenced leaf area. At 60 DAT and from 90 DAT to 225 DAT, interaction resulted in significantly higher leaf area in plants grown in sand + coir pith compost receiving 4 g l<sup>-1</sup> extract (M<sub>2</sub>C<sub>2</sub>). The values were 75.52 cm<sup>2</sup> at 60 DAT and ranged from 14.08 cm<sup>2</sup> to 601.88 cm<sup>2</sup> from 90 DAT to 225 DAT. At 75 DAT, significantly greater leaf area was recorded in plants grown in sand + coir pith compost (76.41 cm<sup>2</sup>)

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Table 5. Effects of media and nutrient treatments on leaf area (cm<sup>2</sup>) in Anthurium andreanum cv. Tropical

| Treatments       | 60 DAT | 75 DAT | 90 DAT | 105 DAT | 120 DAT | 135 DAT | 150 DAT | 165 DAT | 180 DAT        | 195 DAT | 210 DAT     | 225 DAT |
|------------------|--------|--------|--------|---------|---------|---------|---------|---------|----------------|---------|-------------|---------|
| Growing          | -      |        |        |         |         |         |         | _       |                |         |             |         |
| media            |        |        |        |         |         |         |         |         |                |         | <del></del> | 40.00   |
| M <sub>t</sub>   | 46.10  | 52.09  | 65.29  | 70.73   | 79.55   | 96.45   | 157.38  | 189.23  | 254.79         | 281.24  | 315.22      | 347.77  |
| $M_2$            | 66.15  | 73.49  | 119.24 | 137.15  | 194.39  | 227.07  | 276.88  | 337.78  | 39 <u>5.73</u> | 477.49  | 546.83      | 574.48  |
| M <sub>3</sub>   | 61.90  | 61.90  | 91.50  | 96.68   | 135.63  | 149.81  | 219.60  | 257.76  | 356.51         | 380.28  | 427.82      | 448.60  |
| $\overline{M_4}$ | 53.73  | 55.89  | 70.30  | 79.32   | 100.23  | 113.76  | 168.36  | 210.62  | 261.75         | 292.39  | 319.17      | 356.62  |
| SE               | 1.00   | 0.80   | 0.67   | 0.79    | 1.06    | 1.06    | 0.57    | 0.42    | 0.28           | 0.31    | 0.31        | 0.34    |
| CD               | 2.87   | 2.29   | 1.93   | 2.26    | 3.04    | 3.06    | 1.64    | 1.22    | 0.81           | 0.88    | 0.90        | 0.96    |
| - Cowdung        | ·      | 3      | = -    | - =     |         | - =     | ='      |         | = =            |         |             | -       |
| C <sub>1</sub>   | 55.30  | 56.85  | 73.20  | 83.41   | 109.76  | 130.75  | 181.12  | 209.58  | 271.64         | 310.55  | 361.33      | 401.75  |
| C <sub>2</sub>   | 63.09  | 65.92  | 97.55  | 107.87  | 140.16  | 153.44  | 223.13  | 283.71  | 352.09         | 393.14  | 430.22      | 451.23  |
| C <sub>3</sub>   | 52.52  | 59.68  | 89.04  | 96.63   | 132.43  | 156.13  | 212.40  | 253,26  | 327.86         | 369.86  | 415.23      | 442.62  |
| SE               | 0.87   | 0.69   | 0.58   | 0.68    | 0.92    | 0.92    | 0.49    | 0.37    | 0.24           | 0.27    | 0.54        | 0.29    |
| CD               | 2.49   | 1.99   | 1.67   | 1.96    | 2.63    | 2.65    | 1.42    | 1.05    | 0.70           | 0.76    | 1.56        | 0.83    |
| Organic          |        |        |        |         |         |         |         |         |                |         |             |         |
| manure           | ļ I    |        |        |         |         |         |         |         |                |         |             |         |
| O <sub>1</sub>   | 54.66  | 58.77  | 85.14  | 99.97   | 130.44  | 155.54  | 201.05  | 266.34  | 312.88         | 368.04  | 431.66      | 446.46  |
| O <sub>2</sub>   | 58.96  | 62.74  | 86.26  | 92.19   | 121.30  | 146.08  | 208.74  | 237.74  | 301.70         | 343.45  | 390.46      | 404.47  |
| O <sub>3</sub>   | 57.30  | 60.94  | 88.39  | 95.75   | 130.61  | 138.69  | 206.87  | 242.48  | 309.52         | 362.06  | 384.66      | 444.67  |
| SE               | 0.87   | 0.69   | 0.58   | 0.68    | 0.92    | 0.92    | 0.49    | 0.37    | 0.24           | 0.27    | 0.54        | 0.29    |
| CD               | 2.49   | 1.99   | 1.67   | 1.96    | 2.63    | 2.65    | 1.42    | 1.05    | 0.70           | 0.76    | 1.56        | 0.83    |

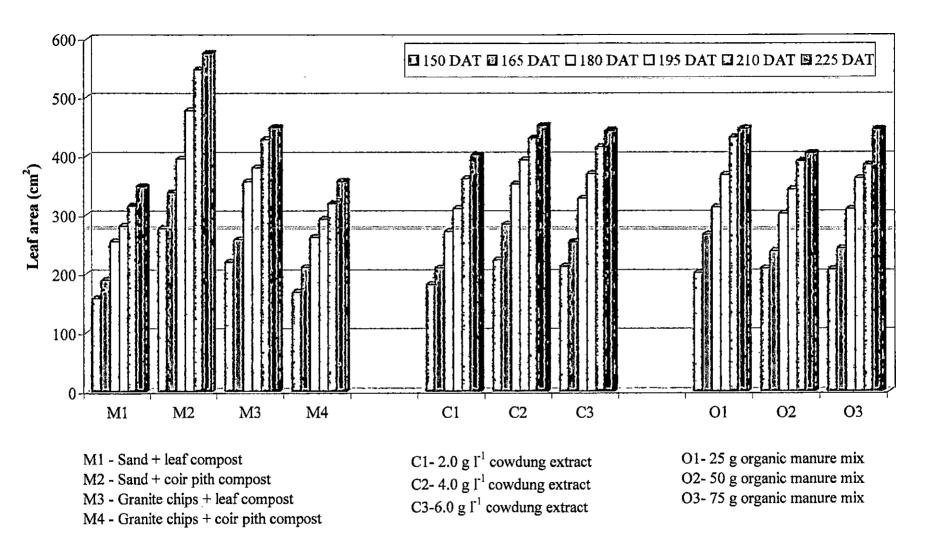


Fig. 2. Effect of media and nutrient treatments on leaf area (cm²) in Anthurium andreanum cv. Tropical

receiving 6 g  $l^{-1}$  extract  $(M_2C_3)$  and sand + coir pith compost  $(75.52 \text{ cm}^2)$  receiving 2 g  $l^{-1}$  extract  $(M_2C_1)$ .

Plants grown in sand + leaf compost receiving 6 g  $I^{-1}$  extract (M<sub>1</sub>C<sub>3</sub>) recorded significantly lower leaf area at 60, 75 and 105 DAT. The values were 41.74, 44.12 and 63.74 cm<sup>2</sup> respectively. At 105 DAT, the interaction effect was extended to plants grown in granite + coir pith compost receiving 6 g  $I^{-1}$  (64.24 cm<sup>2</sup>).

At 90 DAT, significantly lower leaf area was recorded in plants grown in granite + leaf compost (57.38 cm<sup>2</sup>) receiving 6 g l<sup>-1</sup> extract. At 120 DAT plants grown in sand + leaf compost receiving 2 g l<sup>-1</sup>, 4 g l<sup>-1</sup> and 6 g l<sup>-1</sup> extract ( $M_1C_1$ ,  $M_1C_2$  and  $M_1C_3$ ) recorded lower leaf area (77.76, 80.12 and 80.77 cm<sup>2</sup> respectively).

At 135, 150, 180, 195 and 225 DAT, lowest leaf area was recorded in plants grown in granite + coir pith compost receiving 6 g  $l^{-1}$  extract (M<sub>4</sub>C<sub>3</sub>). The values were 93.83, 132.38, 219.75, 237.53 and 307.87 cm<sup>2</sup> respectively. At 135 DAT, plants grown in sand + leaf compost receiving 2, 4 and 6 g  $l^{-1}$  were also on par with the lowest leaf area recorded (95.93, 95.95 and 97.46 cm<sup>2</sup> respectively). At 210 DAT, the lowest leaf area was recorded in plants grown in M<sub>1</sub> receiving C<sub>1</sub> (259.23 cm<sup>2</sup>).

Leaf area was also significantly influenced by the interaction between media and organic manure. From 60 to 105 DAT, maximum leaf area was recorded in plants grown in sand + coir pith compost  $(M_2C_2)$  receiving 50 g OM mix  $(73.29 \text{ cm}^2 \text{ to } 148.9 \text{ cm}^2)$ . The lowest leaf area was recorded by plants grown in sand + leaf compost receiving 25 g mix  $(M_1O_1)$  at 60 DAT and 90 DAT  $(41.59 \text{ cm}^2 \text{ and } 59.83 \text{ cm}^2)$ . At 90 DAT, plants grown in sand + leaf compost receiving 50 g mix  $(M_1O_2)$  and  $M_4$  plants receiving  $O_1$  or  $O_2$  were also on par with lowest leaf area recording 62.97, 60.89 and 62.08 cm<sup>2</sup> respectively.

Table 6. Interaction effect of media and cowdung treatments on leaf area (cm<sup>2</sup>) in Anthurium andreanum cv. Tropical

| Treatments                    | 60 DAT | 75 DAT | 90 DAT | 105 DAT | 120 DAT | 135 DAT | 150 DAT  | 165 DAT | 180 DAT | 195 DAT | 210 DAT | 225 DAT |
|-------------------------------|--------|--------|--------|---------|---------|---------|----------|---------|---------|---------|---------|---------|
| M <sub>1</sub> C <sub>1</sub> | 49.69  | 53.31  | 65.47  | 73.10   | 77.76   | 95.93   | 150.07   | 168.88  | 223.61  | 243.63  | 259.23  | 321.12  |
| M <sub>1</sub> C <sub>2</sub> | 46.85  | 55.84  | 66.66  | 75.36   | 80.12   | 95.95   | 155.33   | 195.83  | 245.04  | 267.21  | 321.37  | 345.29  |
| M <sub>1</sub> C <sub>3</sub> | 41.74  | 47.12  | 63.74  | 63.74   | 80.77   | 57.46   | 166.75   | 202.99  | 295.71  | 332.87  | 376.90. | 376.90  |
| M <sub>2</sub> C <sub>1</sub> | 68.55  | 68.55  | 86.65  | 109.05  | 154.40  | 193.99  | - 251.69 | 294:87  | 363.72  | 408.80  | 542.96  | 542.96  |
| M <sub>2</sub> C <sub>2</sub> | 75.52  | 75.52  | 140.08 | 161.61  | 237.48  | 261.65  | 319.96   | 395.12  | 436.12  | 539.20  | 559.32  | 601.88  |
| M <sub>2</sub> C <sub>3</sub> | 54.38  | 76.41  | 131.00 | 140.78  | 191.28  | 225.57  | 258.98   | 323.36  | 387.37  | 484.45  | 538.21  | 578.60  |
| M <sub>3</sub> C <sub>1</sub> | 54.06  | 53.75  | 68.22  | 68.81   | 103.13  | 103.13  | 150.87   | 160.20  | 254.29  | 309.61  | 3460.01 | 371.84  |
| $M_3C_2$                      | 67.90  | 67.90  | 102.27 | 103.48  | 138.64  | 138.63  | 216.41   | 295.48  | 406.65  | 406.65  | 466.85  | 466.85  |
| $M_3C_3$                      | 36.73  | 3.73   | 104.03 | 117.77  | 168.13  | 207.68  | 291.51   | 317.59  | 408.60  | 424.59  | 470.59  | 507.11  |
| M <sub>4</sub> C <sub>1</sub> | 48.88  | 51.79  | 72.46  | 82.70   | 103.74  | 129.93  | 171.86   | 214.36  | 244.95  | 280.15  | 297.12  | 371.10  |
| M <sub>4</sub> C <sub>2</sub> | 62.07  | 64.42  | 81.21  | 91.03   | 104.38  | 117.52  | 200.83   | 248.40  | 320,55  | 359.50  | 373.34  | 390.89  |
| M <sub>4</sub> C <sub>3</sub> | 50.24  | 57.45  | 57.38  | 64.24   | 92.55   | 93.83   | 132.38   | 169.11  | 219.75  | 237.56  | 275.22  | 307.87  |
| SE                            | 1.73   | 1.38   | 1.17   | 1.36    | 1.83    | 1.84    | 0.99     | 0.73    | 0.49    | 0.53    | 0,54    | 0.58    |
| CD                            | 4.97   | 3.97   | 3.35   | 3.91    | 5.27    | 5.29    | 2.84     | 2.11    | 1.39    | 1.53    | 1.56    | 1.67    |

At 75 DAT, the lowest leaf area was recorded in plants grown in sand + leaf compost  $(M_1O_3)$  receiving 75 mix  $(49.62 \text{ cm}^2)$ . At 105 DAT, the lowest leaf area of 63.43 cm<sup>2</sup> was recorded in  $M_4O_2$ . At 75 and 105 DAT, the plants grown in  $M_1$  receiving  $O_2$  were on par with the lowest leaf area recorded.

At 120, 210 and 225 DAT, the highest leaf area was given by plants grown in sand + coir pith compost receiving 75 g mix  $(M_2O_3)$  recording 208.27, 584.62 and 596.71 cm<sup>2</sup> respectively. From 135 DAT to 195 DAT, the highest leaf area was given by plants grown in sand + coir pith compost receiving 50 g mix  $(M_2O_2)$ , with values ranging from 251.68 to 506.4 cm<sup>2</sup>.

From 125 DAT to 225 DAT, the lowest leaf area was recorded in plants grown in sand + leaf compost receiving 50 g OM mix (76.28 to 295.94 cm<sup>2</sup>). At 120 DAT, M<sub>1</sub>O<sub>1</sub> plants were on par with this (76.7 cm<sup>2</sup>). At 135 DAT and 165 DAT, M<sub>1</sub>O<sub>3</sub> plants were found to be on par with the lowest leaf area. At 150 DAT, plants grown in M<sub>4</sub> receiving O<sub>1</sub> were found to be on par with the lowest leaf area.

Leaf area was significantly influenced by the interaction between organic manure and cowdung treatments during the observation period. From 60 DAT to 150 DAT, the highest leaf area was recorded by plants receiving  $C_2O_3$  (4 g l<sup>-1</sup> extract and 75 g OM mix). The values ranged from 68.7 to 158.38 cm<sup>2</sup>. At 75 DAT, the plants receiving  $C_1O_2$  (2 g l<sup>-1</sup> extract + 50 g OM mix) were on par with the highest leaf area recorded (65.66 cm<sup>2</sup>).

The plants receiving  $C_3O_3$  (6 g l<sup>-1</sup> extract + 75 g OM mix) and  $C_1O_1$  (2 g l<sup>-1</sup> extract + 25 g OM mix) recorded the lowest leaf area (45.24 and 45.88 cm<sup>2</sup> respectively) at 60 DAT. At 75 and 90 DAT, the lowest leaf area was given by plants receiving  $C_1O_1$  (2 g l<sup>-1</sup> extract + 25 g mix) recording 46.93 cm<sup>2</sup> and 68.98 cm<sup>2</sup> respectively).

Table 7. Interaction effect of media and organic manure treatments on leaf area (cm<sup>2</sup>) in Anthurium andreanum cv.

Tropical

|                               |        |                |        | <del></del> | ,       |         |         |         | r       |         |          | Τ-      |
|-------------------------------|--------|----------------|--------|-------------|---------|---------|---------|---------|---------|---------|----------|---------|
| Treatments                    | 60 DAT | 75 DAT         | 90 DAT | 105 DAT     | 120 DAT | 135 DAT | 150 DAT | 165 DAT | 180 DAT | 195 DAT | 210 DAT  | 225 DAT |
| $M_1O_1$                      | 41.59  | 54.49          | 59.83  | 71.31       | 76.70   | 107.39  | 164.48  | 243.71  | 290.06  | 332.26  | 356.33   | 411.94  |
| M <sub>1</sub> O <sub>2</sub> | 49.97  | 52.19          | 62.97  | 64.89       | 76.28   | 89.83   | 145.53  | 161.85  | 217.03  | 254.19  | 265.74   | 295.94  |
| M <sub>1</sub> O <sub>3</sub> | 46.75  | 49.62 <u>.</u> | 73.06  | 75.99       | 85.67   | 92.12   | 162.14  | 162.14  | 257.27  | 257.27  | _ 335.43 | 335.43  |
| M <sub>2</sub> O <sub>1</sub> | 62.44  | 92.44          | 123.14 | 135.44      | 196.22  | 214.90  | 252.238 | 293.24  | 374.27  | 459.27  | 490.81   | 561.67  |
| M <sub>2</sub> O <sub>2</sub> | 73.29  | 83.61          | 129.03 | 148.91      | 178.68  | 251.68  | 308.15  | 368.96  | 426.62  | 506.40  | 565.07   | 565.07  |
| M <sub>2</sub> O <sub>3</sub> | 62.73  | 74.43          | 105.57 | 127.10      | 208.27  | 214.63  | 270.10  | 351.14  | 386.32  | 466.79  | 584.62   | 596.71  |
| $M_3O_1$                      | 62.17  | 62.17          | 96.71  | 106.87      | 137.41  | 172.32  | 239.90  | 255.56  | 350.39  | 402.93  | 413.79   | 450.31  |
| M <sub>3</sub> O <sub>2</sub> | 63.52  | 63.20          | 90.96  | 91.55       | 143.78  | 145.63  | 202.54  | 229.84  | 332.56  | 351.32  | 400.66   | 426.49  |
| M <sub>3</sub> O <sub>3</sub> | 60.00  | 60.00          | 86.84  | 91.63       | 125.70  | 128.50  | 216.33  | 287.88  | 386.60  | 386.60  | 469.00   | 469.00  |
| M <sub>4</sub> O <sub>1</sub> | 52.43  | 56.00          | 60.89  | 86.26       | 111.43  | 124.57  | 147.42  | 177.39  | 236.78  | 277.71  | 277.71   | 354.78  |
| M <sub>4</sub> O <sub>2</sub> | 49.04  | 51.95          | 62.08  | 63.46       | 86.45   | 97.18   | 178.75  | 190.30  | 261.88  | 261.88  | 330.37   | 330.37  |
| M <sub>4</sub> O <sub>3</sub> | 59.71  | 59.71          | 88.08  | 88.27       | 102.80  | 119.53  | 178.90  | 264.19  | 286.57  | 337.58  | 337.58   | 384.70  |
| SE                            | 1.73   | 1.38           | 1.17   | 1.36        | 1.83    | 1.84    | 0.99    | 0.73    | 0.49    | 0.53    | 0.54     | 0.58    |
| CD                            | 4.97   | 3.97           | 3.35   | 3.91        | 5.27    | 5.29    | 2.84    | 2.11    | 1.39    | 1.53    | 1.56     | 1.67    |

At 105 DAT, the lowest leaf area of 77.18 cm<sup>2</sup> was recorded by plants receiving C<sub>1</sub>O<sub>3</sub> (2 g l<sup>-1</sup> extract + 75 g OM mix). At 120 DAT, greater leaf area was recorded by plants receiving C<sub>1</sub>O<sub>2</sub> and C<sub>1</sub>O<sub>3</sub> (104.26 and 104.65 cm<sup>2</sup> respectively). The highest leaf area of 178.53 cm<sup>2</sup> was recorded by plants receiving C<sub>3</sub>O<sub>1</sub> (6 g l<sup>-1</sup> extract 25 g mix) at 135 DAT. The lowest leaf area was recorded in plants receiving C<sub>1</sub>O<sub>3</sub> (116.34 cm<sup>2</sup>) during the period. From 150 to 225 DAT, plants receiving C<sub>2</sub>O<sub>3</sub> were found to record highest leaf area (239.73 to 512.35 cm<sup>2</sup>).

At 150 DAT and 180 DAT, the lowest leaf area was recorded by plants receiving  $C_1O_1$  (175.66 and 244.17 cm<sup>2</sup> respectively). At 165, 210 and 225 DAT, the lowest leaf area was recorded by plants receiving  $C_1O_2$  (198.5, 338.7 and 380.73 cm<sup>2</sup> respectively). The lowest leaf area was recorded by plants grown in  $C_1O_3$  at 195 DAT (295.71 cm<sup>2</sup>).

## 4.1.3 Number of Leaves per Plant (Tables 9 to 12 and Appendix III)

## 4.1.3.1 Effect of Media and Nutrient treatments and their Interactions on Number of Leaves

The growing media influenced the number of leaves at 60, 75 and 90 DAT. At 60 DAT, significantly higher number of leaves were produced by the plants grown in granite + coir pith compost (6.44) followed by those grown in sand + coir pith compost (6.39) and granite + leaf compost (5.67). Plants grown in sand + leaf compost (5.17) recorded significantly lower number of leaves at 60 DAT.

At 60, 75 DAT and 90 DAT, the highest number of leaves were recorded in plants grown in granite + coir pith compost (6.44, 7.06 and 7.22 respectively) which were followed by sand + coir pith compost recording 6.39, 6.72 and 6.94 respectively. The lowest number of leaves during the period was recorded by plants grown in sand + leaf compost (5.17, 5.56 and 5.72 respectively) which was on par with those grown in

Table 8. Interaction effect of cowdung and organic manure treatments on leaf area (cm<sup>2</sup>) in Anthurium andreanum cv.

Tropical

| Treatments                    | 60 DAT | 75 DAT | 90 DAT | 105 DAT | 120 DAT | 135 DAT            | 150 DAT | 165 DAT | 180 DAT | 195 DAT | 210 DAT | 225 DAT |
|-------------------------------|--------|--------|--------|---------|---------|--------------------|---------|---------|---------|---------|---------|---------|
| $C_1O_1$                      | 45.88  | 46.93  | 68.98  | 91.46   | 120.37  | 144.11             | 175.66  | 214.34  | 244.17  | 337.84  | 361.49  | 417.88  |
| C <sub>1</sub> O <sub>2</sub> | 62.05  | 65.66  | 73.58  | 81.59   | 104.29  | 131.80             | 187.63  | 198.50  | 284.02  | 298.09  | 338.70  | 380.73  |
| C <sub>1</sub> O <sub>3</sub> | 57.96  | 57.96  | 77.04  | 7718    | 104.65  | <sup></sup> 116.34 | 180.07  | 215.89  | 286.73  | 295.71  | 383.80  | 406.66  |
| C <sub>2</sub> O <sub>1</sub> | 56.72  | 65.21  | 90.14  | 106.99  | 128.16  | 143.99             | 205.82  | 260.15  | 329.15  | 369.10  | 377.24  | 431.20  |
| C <sub>2</sub> O <sub>2</sub> | 63.86  | 63.86  | 96.48  | 98.93   | 133.93  | 148.43             | 223.85  | 257.48  | 319.49  | 354.08  | 410.13  | 410.13  |
| C <sub>2</sub> O <sub>3</sub> | 68.70  | 68.70  | 106.04 | 117.68  | 158.38  | 167.89             | 239.73  | 333.49  | 407.60  | 456.25  | 503.29  | 512.35  |
| C <sub>3</sub> O <sub>1</sub> | 61.37  | 64.17  | 96.31  | 101.46  | 142.78  | 178.53             | 221.67  | 252.94  | 365.31  | 397.19  | 415.25  | 484.94  |
| C <sub>3</sub> O <sub>2</sub> | 50.96  | 58.70  | 88.73  | 96.06   | 125.71  | 158.01             | 214.75  | 257.23  | 328.06  | 378.18  | 422.56  | 422.56  |
| C <sub>3</sub> O <sub>3</sub> | 45.25  | 56.17  | 82.07  | 92.38   | 128.80  | 131.86             | 200.80  | 249.63  | 293.20  | 334.22  | 407.89  | 420.36  |
| SE                            | 1.50   | 1.20   | 1.01   | 1.18    | 1.59    | 1.60               | 0.86    | 0.64    | 0.42    | 0.46    | 0.47    | 0.50    |
| CD                            | 4.30   | 3.44   | 2.90   | 3.39    | 4.56    | 4.58               | 2.46    | 1.83    | 1.21    | 1.32    | 1.35    | 1.45    |

granite + leaf compost (5.67, 6.00 and 6.39 respectively). During the rest of the observational period, leaf number was not found to be significantly influenced by the media treatments.

The nutrient treatments did not significantly influence the number of leaves produced by the plants during the observation period.

Interaction between media and cowdung treatments was found to influence the number of leaves at 60 DAT. The highest number of leaves were recorded by plants grown in  $M_2$  receiving  $C_1$  (6.67),  $C_2$  (6.83) or  $C_3$  (5.67),  $M_1$  receiving  $C_1$  (6.00),  $M_3$  receiving  $C_2$  (6.00) or  $C_3$  (6.5) and  $M_4$  receiving  $C_1$  (6.63)  $C_2$  (5.83) or  $C_3$  (6.67). The lowest number of leaves were recorded by plants grown in  $M_1$  receiving  $C_2$  (4.83) or  $C_3$  (4.67) and in  $M_3$  receiving  $C_1$  (4.5) at 60 DAT. Interaction did not significantly influence the leaf number during the rest of the period.

Interaction between media and organic manure treatments did not significantly influence the leaf number during the observational period. There was no significant difference between the treatments regarding the number of leaves due to interaction between cowdung and organic manure treatments.

## 4.1.4 Length of the Petiole (Tables 13 to 16 and Appendix IV)

## 4.1.4.1 Effect of Media and Nutrient Treatments on Petiole Length

The petiole length was also significantly influenced by the media and nutrient treatments. During the first week after emergence the increase in petiole length was highest for plants grown in granite + coir pith media (6.4 cm) and thereafter the petiole length was more in plants grown in sand + coir pith compost recording 12.44, 15.28 and 16.29 cm during the second, third and fourth week after emergence respectively. However, lowest values during the second, week and third week after emergence was recorded in plants grown in granite + coir pith compost media.

Table 9. Effect of media and nutrient treatments on number of leaves in Anthurium andreanum cv. Tropical

| Treatments     | 60<br>DAT | 75<br>DAT | 90<br>DAT | 105<br>DAT | 120<br>DAT | 135<br>DAT | 150<br>DAT | 165<br>DAT | 180<br>DAT | 195<br>DAT | 210<br>DAT | 225<br>DAT |
|----------------|-----------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Growing media  |           |           |           |            |            |            |            |            |            |            |            |            |
| M <sub>1</sub> | 5.17      | 5.56      | 5.72      | 6.33       | 6.39       | 6.89       | 6.78       | 6.89       | 7.22       | 7.78       | 7.83       | 8.28       |
| M <sub>2</sub> | 6.39      | 6.72      | 6.40      | 7.17       | 7.11       | 7.28       | 7.44       | 7.44       | 7.78       | 7.83       | 8.28       | 8.50       |
| M <sub>3</sub> | 5.67      | 6.00      | 6.39      | 6.83       | 7.17       | 7.44       | 7.83       | 8.22       | 8.28       | 8.61       | 8.72       | 9.00       |
| M <sub>4</sub> | 6.44      | 7.06      | 7.22      | 7.28       | 7.33       | 7.39       | 7.33       | 7.33       | 7.61       | 7.78       | 8.06       | 8.33       |
| SE             | , 0.29    | 0.33      | 0.32      | -          | _          | -          | _          | -          | -          | -          | -          | -          |
| CD             | 0.83      | 0.95      | 0.91      | NS         | NS         | NS _       | NS         | NS         | NS         | NS         | NS         | NS         |
| Cowdung        |           |           |           |            |            |            | e e        |            |            |            |            |            |
| $C_1$          | 6.00      | 6.17      | 6.29      | 6.54       | 6.67       | 6.75       | 7.21       | 7.50       | 7.67       | 8.17       | 8.29       | 8.58       |
| C <sub>2</sub> | 5.88      | 6.42      | 6.58      | 6.96       | 7.00       | 7.42       | 7.29       | 7.33       | 7.71       | 8.08       | 8.38       | 8.58       |
| C <sub>3</sub> | 5.88      | 6.42      | 6.83      | 7.21       | 7.54       | 7.58       | 7.54       | 7.58       | 7.79       | 7.75       | 8.00       | 8.42       |
| SE             | -         | -         | -         |            | -          | -          | -          | -          | · -        | -          | _          | -          |
| CD             | NS        | NS        | NS        | NS         | NS         | NS         | NS         | NS         | NS         | NS         | NS         | NS         |
| Organic manure |           |           |           |            | -          |            |            |            | _          |            |            |            |
| O <sub>1</sub> | 5.88      | 6.25      | 6.54      | 6.88       | 7.08       | 7.50       | 7.54       | 7.75       | 7.96       | 8.04       | 8.38       | 8.83       |
| O <sub>2</sub> | 6.08      | 6.46      | 6.54      | 6.88       | 6.96       | 7.08       | 7.63       | 7.58       | 7.75       | 7.71       | 8.21       | 8.46       |
| O <sub>3</sub> | 5.79      | 6.29      | 6.63      | 6.96       | 6.96       | 7.17       | 6.88       | 7.08       | 7.46       | 8.25       | 8.08       | 8.29       |
| SE             | -         | _         | -         | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| CD             | NS        | NS        | NS        | NS         | NS         | NS         | NS         | NS         | NS         | NS         | NS         | NS         |
| DATE D         |           |           |           |            |            |            |            |            |            |            |            |            |

NS - Not significant

Table 10. Interaction effect of media and cowdung treatments on number of leaves in Anthurium andreanum cv. Tropical

| Treatments                    | 60<br>DAT | 75<br>DAT | 90<br>DAT | 105<br>DAT | 120<br>DAT | 135<br>DAT | 150<br>DAT | 165 .<br>DAT | 180<br>DAT | 195<br>DAT | 210<br>DAT | 225<br>DAT |
|-------------------------------|-----------|-----------|-----------|------------|------------|------------|------------|--------------|------------|------------|------------|------------|
| $M_1C_1$                      | 6.00      | 6.00      | 5.67      | 6.33       | 6.33       | 7.00       | 7.33       | 7.50         | 7.50       | 8.50       | 8.00       | 8.17       |
| $M_1C_2$                      | 4.83      | 5.33      | 5.67      | 6.17       | 6.00       | 6.67       | 6.67       | 6.83         | 7.50       | 6.83       | 8.17       | 8.83       |
| $M_1C_3$                      | 4.67      | 5.33      | 5.83      | 6.50       | 6.83       | 7.00       | 6.33       | 6.33         | 6.67       | 8.00       | 7.33       | 7.83       |
| $M_2C_1$                      | 6.67      | 6.67      | 7.33      | 7.33       | 7.00       | 7.17       | -7.67      | 7.83         | 8=1-7      | 7.83       | 8:33-      | 8.83       |
| $M_2C_2$                      | 6.83      | 7.33      | 7.17      | 7.50       | 7.33       | 7.67       | 7.17       | . 7.00       | 7.50       | 8.17       | 8.50       | 8.17       |
| $M_2C_3$                      | 5.67      | 6.17      | 6.33      | 6.67       | 7.00       | 7.00       | 7.50       | 7.50         | 7.67       | 7.50       | 8.00       | 8.50       |
| $M_3C_1$                      | 4.50      | 4.67      | 5.00      | 5.67       | 5.83       | 6.00       | 6.50       | 7.17         | 7.50       | 8.17       | 8.33       | 8.67       |
| M <sub>3</sub> C <sub>2</sub> | 6.00      | 6.33      | 6.67      | 7.00       | 7.33       | 7.67       | 7.83       | 8.17         | 8.00       | 9.50       | 8.50       | 8.67       |
| M <sub>3</sub> C <sub>3</sub> | 6.50      | 7.00      | 7.50      | 7.83       | 8.33       | 8.67       | 9.17       | 9.33         | 9.33       | 8.17       | 9.33       | 9.67       |
| $M_4C_1$                      | 6.83      | 7.33      | 7.17      | 6.83       | 6.67       | 6.83       | 7.33       | 7.50         | 7.50       | 8.17       | 8.50       | 8.67       |
| $M_4C_2$                      | 5.83      | 6.67      | 6.83      | 7.17       | 7.33       | 7.67       | 7.50       | 7.33         | 7.83       | 7.83       | 8.33       | 8.67       |
| $M_4C_3$                      | 6.67      | 7.17      | 7.67      | 7.83       | 8.00       | 7.67       | 7.17       | 7.17         | 7.50       | 7.33       | 7.33       | 7.67       |
| SE                            | 0.50      | -         | -         | -          | -          | -          | -          | -            | -          | -          | -          | -          |
| CD                            | 1.44      | NS        | NS        | NS         | NS         | NS         | NS         | NS           | NS         | NS         | NS         | NS         |

Table 11. Interaction effect of media and organic manure treatments on number of leaves in Anthurium andreanum cv.

Tropical

| Treatments                    | 60<br>DAT | 75<br>DAT | 90<br>DAT | 105<br>DAT | 120<br>DAT | 135<br>DAT | 150<br>DAT | 165<br>DAT | 180<br>DAT | 195<br>DAT | 210<br>DAT | 225<br>DAT |
|-------------------------------|-----------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| $M_1O_1$                      | 5.67      | 5.67      | 6.00      | 6.50       | 6.67       | 7.33       | 7.00       | 7.17       | 7.33       | 7.33       | 7.83       | 8.33       |
| $M_1O_2$                      | 5.33      | 5.50      | 5.50      | 5.83       | 6.17       | 6.50       | 6.67       | 6.50       | 7.00       | 7.67       | 7.67       | 8.00       |
| $M_1O_3$                      | 4.50      | 5.50      | 5.67      | 6.67       | 6.3        | 6.83       | 6.67       | 7.00       | 7.33       | 8.33       | 8.00       | 8.50       |
| M <sub>2</sub> O <sub>1</sub> | 6.33      | 6.50      | 6.67      | 6.83       | 7.17       | 7.83       | 7.67       | 7.83       | 8.00       | 8.17       | 8.67       | 9.00       |
| $M_2O_2$                      | 6.83      | 7.33      | 7.33      | 7.67       | 7.00       | 7.00       | 8.00       | 7.83       | 8.00       | 7.33       | 8.33       | 8.50       |
| $M_2O_3$                      | 6.00      | 6.33      | 6.83      | 7.00       | 7.17       | 7.00       | 6.67       | 6.67       | 7.33       | 8.00       | 7.83       | 8.00       |
| $M_3O_1$                      | 5.17      | 5.83      | 6.50      | 7.00       | 7.17       | 7.50       | 8.00       | 8.67       | 8.67       | 8.33       | 9.17       | 9.67       |
| $M_3O_2$                      | 6.17      | 6.17      | 6.33      | 6.67       | 7.33       | 7.50       | 7.83       | 8.00       | 8.17       | 8.33       | 8.50       | 8.67       |
| $M_3O_3$                      | 5.67      | 6.00      | 6.33      | 6.83       | 7.00       | 7.33       | 7.67       | 8.00       | 8.00       | 9.17       | 8.50       | 8.67       |
| M <sub>4</sub> O <sub>1</sub> | 6.33      | 7.00      | 7.00      | 7.17       | 7.33       | 7.33       | 7.50       | 7.33       | 7.83       | 8.33       | 7.83       | 8.33       |
| M <sub>4</sub> O <sub>2</sub> | 6.00      | 6.83      | 7.00      | 7.33       | 7.33       | 7.33       | 8.00       | 8.00       | 7.83       | 7.50       | 8.33       | 8.67       |
| $M_4O_3$                      | 7.00      | 7.33      | 7.67      | 7.33       | 7.33       | 7.50       | 6.50       | 6.67       | 7.17       | 7.50       | 8.00       | 8.00       |
| SE                            |           | -         | -         | -          | -          | ï          | -          | -          | -          | -          | =          | -          |
| CD                            | NS        | NS        | NS        | NS         | NS         | NS         | NS         | NS         | NS         | NS         | NS         | NS         |

NS - Not significant

Table 12. Interaction effect of cowdung and organic manure treatments on number of leaves in Anthurium andreanum cv. Tropical

| Treatments                    | 60<br>DAT | 75<br>DAT | 90<br>DAT | 105<br>DAT | 120<br>DAT | 135<br>DAT | 150<br>DAT | 165<br>DAT | 180<br>DAT | 195<br>DAT | 210<br>DAT | 225<br>DAT |
|-------------------------------|-----------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| $C_1O_1$                      | 5.88      | 5.88      | 6.13      | 6.13       | 6.50       | 6.88       | 7.13       | 7.38       | 7.63       | 8.50       | 8.38       | 8.63       |
| $C_1O_2$                      | 6.75      | 7.00      | 6.88      | 7.38       | 6.88       | 7.00       | 7.75       | 8.00       | 8.00       | 7.63       | 8.38       | 8.88       |
| C <sub>1</sub> O <sub>3</sub> | 5.38      | 5.63      | 5.88      | 6.13       | 6.00       | 6.38       | 6.75       | 7.13       | 7.38       | 8.38       | 8.13       | 8.25       |
| $C_2O_1$                      | 5.88      | 6.50      | 6.50      | 7.13       | 7.13       | 7.75       | 7.63       | 7.75       | .88        | 7.88       | 8.50       | 9.00       |
| C <sub>2</sub> O <sub>2</sub> | 5.75      | 6.13      | 6.25      | 6.50       | 6.63       | 6.75       | 7.00       | 7.0        | 7.38       | 8.13       | 8.25       | 8.25       |
| C <sub>2</sub> O <sub>3</sub> | 6.00      | 6.63      | 7.00      | 7.25       | 7.25       | 7.75       | 7.25       | 7.25       | 7.88       | 8.25       | 8.38       | 8.50       |
| C <sub>3</sub> O <sub>1</sub> | 5.88      | 6.38      | 7.00      | 6.38       | 7.63       | 7.88       | 7.88       | 8.13       | 8.38       | 7.75       | 8.25       | 8.88       |
| C <sub>3</sub> O <sub>2</sub> | 5.75      | 6.25      | 6.50      | 6.75       | 7.38       | 7.50       | 8.13       | 7.75       | 7.88       | 7.38       | 8.00       | 8.25       |
| C <sub>3</sub> O <sub>3</sub> | 6.00      | 6.63      | 7.00      | 7.50       | 7.63       | 7.38       | 6.63       | 6.88       | 7.13       | 8.13       | 7.75       | 8.13       |
| SE                            | -         | -         | -         | -          | -          | -          |            | -          | <b>-</b>   | -          | -          | -          |
| CD                            | NS        | NS        | NS        | NS         | NS         | NS         | NS         | NS         | NS         | NS         | NS         | NS         |

NS - Not significant

Among the cowdung treatments, petiole length was highest for plants receiving 4 g l<sup>-1</sup> extract during the first, second, third and fourth week after emergence (6.59, 12.59, 13.81 and 14.98 cm respectively). The lowest values were recorded in plants receiving 2 g l<sup>-1</sup> extract.

Among the organic manure treatments the highest petiole length in during the first and second week after emergence was recorded in plants receiving 25 g OM mix (6.34 and 11.83 cm respectively). During the third and fourth week after emergence highest values were recorded in plants receiving 75 g OM mix (14.29 and 15.9 cm respectively). The lowest values were recorded in plants receiving 50 g OM mix during the period.

# 4.1.4.2 Interaction Effect of Media and Nutrient Treatments on Petiole Length

Interaction between media and nutrient treatments significantly influenced petiole length increase.

Among the media and cowdung treatments, the highest values for petiole length was recorded in  $M_3$  plants receiving  $C_2$  during the first week after emergence (7.01 cm). Thereafter highest values for petiole length was obtained in  $M_2$  plants receiving  $C_2$ .

Among the media and organic manure treatments, the highest values for petiole length during the first and second week after emergence was recorded in  $M_3O_2$  (6.94 cm) and  $M_2O_1$  (12.9 cm) respectively. During the third and fourth week after emergence, interaction  $M_2O_2$  recorded highest petiole length (15.5 and 16.62 respectively).

Interaction between cowdung and organic manure treatments recorded highest petiole length in the interaction  $C_2O_3$  during first week, third week and fourth week after emergence (7.56, 14.78 and 16.61 respectively). However during the second week after emergence.  $C_2O_1$  recorded the highest petiole length (13.18 cm).

Table 13. Effect of media and nutrient treatments on petiole length (cm) in Anthurium andreanum cv. Tropical

| Treatments     | 1 WAE | 2 WAE   | 3 WAE | 4 WAE |
|----------------|-------|---------|-------|-------|
| Growing media  |       |         |       |       |
| M <sub>1</sub> | 5:89  | 11.74   | 13.35 | 14.71 |
| M <sub>2</sub> | 6.20  | . 12.44 | 15.28 | 16.29 |
| M <sub>3</sub> | 6.32  | 11.41   | 13.75 | 15.03 |
| M <sub>4</sub> | 6.40  | 10.62   | 13.03 | 14.50 |
| SE             | 0.06  | 0.07    | 0.06  | 0.07  |
| CD             | 0,16  | 0.19    | 0.16  | 0.21  |
| Cowdung        |       |         |       |       |
| C <sub>1</sub> | 5.48  | 10.02   | 13.47 | 15.03 |
| C <sub>2</sub> | 6.59  | 12.59   | 14.28 | 15.40 |
| C <sub>3</sub> | 6.54  | 12.05   | 13.81 | 14.98 |
| ŞE             | 0.05  | 0.06    | 0.05  | 0.06  |
| CD             | 0.14  | 0.16    | 0.14  | 0.18  |
| Organic manure |       |         |       |       |
| Oı             | 6.34  | 11.83   | 13.94 | 15.21 |
| O <sub>2</sub> | 3.05  | 11.30   | 13.33 | 14.51 |
| O <sub>3</sub> | 3.22  | 11.54   | 14.29 | 15.69 |
| SE             | 0.05  | 0.06    | 0.05  | 0.06  |
| CD             | 0.14  | 0.16    | 0.14  | 0.18  |

Table 14. Interaction effect of media and cowdung treatments on petiole length (cm) in Anthurium andreanum cv. Tropical

| Treatments                    | 1 WAE | 2 WAE | 3 WAE | 4 WAE |
|-------------------------------|-------|-------|-------|-------|
| M <sub>1</sub> C <sub>1</sub> | 5.48  | 10.59 | 12.91 | 14.90 |
| M <sub>1</sub> C <sub>2</sub> | 6.14  | 12.77 | 13.84 | 14.96 |
| M <sub>1</sub> C <sub>3</sub> | 6.04  | 11.86 | 13.30 | 14.28 |
| M <sub>2</sub> C <sub>1</sub> | 5.21  | 9.81  | 15.40 | 16.36 |
| M <sub>2</sub> C <sub>2</sub> | 6.67  | 14.54 | 15.86 | 16.72 |
| M <sub>2</sub> C <sub>3</sub> | 6.73  | 12.98 | 14.58 | 15.78 |
| M <sub>3</sub> C <sub>1</sub> | 5.59  | 9.10  | 12.72 | 14.74 |
| M <sub>3</sub> C <sub>2</sub> | 7.01  | 13.46 | 13.69 | 14.77 |
| M <sub>3</sub> C <sub>3</sub> | 6.36  | 11.67 | 14.84 | 15.59 |
| M <sub>4</sub> C <sub>1</sub> | 5.64  | 10.58 | 12.86 | 14.11 |
| M <sub>4</sub> C <sub>2</sub> | 6.54  | 9.60  | 13.72 | 15.14 |
| M <sub>4</sub> C <sub>3</sub> | 7.02  | 11.69 | 12.52 | 14.26 |
| SE                            | 0.10  | 0.11  | 0.10  | 0.13  |
| CD                            | 0.27  | 0.32  | 0.27  | 0.36  |

Table 15. Interaction effect of media and organic manure treatments on petiole length (cm) in Anthurium andreanum cv. Tropical

| Treatments                    | 1 WAE | 2 WAE | 3 WAE | 4 WAE |
|-------------------------------|-------|-------|-------|-------|
| $M_1O_1$                      | 6.28  | 12.26 | 14.01 | 15.37 |
| $M_1O_2$                      | 5.48  | 10.61 | 12.47 | 13.06 |
| $M_1O_3$                      | 5.91  | 12.34 | 13.58 | 15.71 |
| M <sub>2</sub> O <sub>1</sub> | 6.52  | 12.90 | 15.19 | 16.56 |
| M <sub>2</sub> O <sub>2</sub> | 6.17  | 11.97 | 15.50 | 16.62 |
| M <sub>2</sub> O <sub>3</sub> | 5.92  | 12.47 | 15.14 | 15.68 |
| M <sub>3</sub> O <sub>1</sub> | 5.87  | 11.46 | 14.29 | 14.66 |
| $M_3O_2$                      | 6.94  | 11.41 | 12.93 | 14.76 |
| M <sub>3</sub> O <sub>3</sub> | 6.14  | 11.36 | 14.03 | 15.69 |
| M <sub>4</sub> O <sub>1</sub> | 6.69  | 10.69 | 12.28 | 14.26 |
| M <sub>4</sub> O <sub>2</sub> | 5.61  | 11.20 | 12.41 | 13.59 |
| M <sub>4</sub> O <sub>3</sub> | 6.91  | 9.98  | 14.41 | 15.67 |
| SE                            | 0.10  | 0.11  | 0.10  | 0.13  |
| CD                            | 0.27  | 0.32  | 0.27  | 0.36  |

Table 16. Interaction effect of cowdung and organic manure treatments on petiole length (cm) in Anthurium andreanum cv. Tropical

| Treatments                    | 1 WAE | 2 WAE | 3 WAE | 4 WAE |
|-------------------------------|-------|-------|-------|-------|
| $C_1O_1$                      | 5.67  | 9.23  | 12.77 | 15.08 |
| C <sub>1</sub> O <sub>2</sub> | 5.57  | 9.98  | 13.66 | 14.49 |
| $C_1O_3$                      | 5.20  | 10.85 | 13.99 | 15.52 |
| C <sub>2</sub> O <sub>1</sub> | 6.23  | 13.18 | 14.76 | 15.03 |
| $C_2O_2$                      | 5.99  | 12.02 | 13.30 | 14.56 |
| $C_2O_3$                      | 7.56  | 12.58 | 14.78 | 16.61 |
| C <sub>3</sub> O <sub>1</sub> | 7.13  | 13.08 | 14.30 | 15.53 |
| C <sub>3</sub> O <sub>2</sub> | 6.59  | 11.89 | 13.03 | 14.47 |
| C <sub>3</sub> O <sub>3</sub> | 5.90  | 11.17 | 14.11 | 14.93 |
| SE                            | 0.08  | 0.10  | 0.08  | 0.11  |
| CD                            | 0.24  | 0.28  | 0.24  | 0.31  |

### 4.1.5 Phyllachron (Tables 17 to 18, Fig. 3 and Appendix IV)

## 4.1.5.1 Effect of Media and Nutrient Treatments on Phyllachron

Phyllachron was found to be significantly influenced by different media treatments. Phyllachron was found to be shortest (39.94 days) for plants grown in sand + coir pith compost followed by plants grown in granite + leaf compost (42.67 days). Phyllachron was longest for plants grown in granite + coir pith compost (45.33 days).

Different concentrations of fresh cowdung extract also influenced phyllachron. Phyllachron was shortest for plants receiving 2 g l<sup>-1</sup> extract (42.83 days) and 4 g l<sup>-1</sup> extract (43.04 days). The longest phyllachron was observed for plants receiving 6 g l<sup>-1</sup> extract (43.71 days).

The phyllachron was influenced by different doses of organic manure mix. The shortest phyllachron was observed for plants receiving 50 g OM mix (42.33 days). Phyllachron was observed to be longest for plants receiving 75 g mix (43.79 days) and 25 g mix (43.46 days).

## 4.1.5.2 Interaction Effect of Media and Nutrient Treatments on Phyllachron

Phyllachron was significantly influenced by the interaction between growing media and cowdung treatments. The phyllachron was shortest for  $M_2$  plants receiving  $C_1$  (39.83 days),  $C_2$  (39.83 days) or  $C_3$  (40.17 days). The phyllachron was longest for  $M_1$  plants receiving  $C_3$  (46.33 days),  $M_4$  plants receiving  $C_2$  (45.83 days) or  $C_3$  (46.5 days).

The interaction between growing media and organic manure treatments also significantly influenced phyllachron. The shortest phyllachron was observed for  $M_2$  plants receiving  $O_1$  (39.83),  $O_2$  (39.83 days) and  $O_3$  (40.17 days). The longest phyllachron was observed for  $M_4$  plants receiving  $O_3$  (47.33 days).

Phyllachron was also influenced by the interaction between cowdung and organic manure treatments. Phyllachron was observed to be shortest for plants receiving  $C_2O_2$  (41.88 days),  $C_2O_3$  (41.88 days) and those receiving  $C_3O_2$  (42.38 days). Longest phyllachron was observed for plants receiving  $C_3O_3$  (45.75 days) and those receiving  $C_2O_1$  (45.38 days).

### 4.1.6 Leaf Duration (Tables 17 to 18 and Appendix IV)

## 4.1.6.1 Effect of Media and Nutrient Treatments on Leaf Duration

Leaf duration was found to be significantly influenced by different media treatments. Plants grown in sand + coir pith compost recorded highest leaf duration (147.06 days). The lowest leaf duration was recorded by plants grown in granite + leaf compost (144.94 days), granite + coir pith compost (146 days) and sand + coir pith compost (145.33 days).

Leaf duration was not found to be significantly influenced by different concentrations of fresh cowdung extract.

Different doses of organic manure mix was found to significantly influence the duration of leaves. The number of days from emergence to senescence of leaves was found to be highest for plants receiving 25 g OM mix (146.92 days). The lowest number of days for senescence of leaves was recorded by plants receiving 50 and 75 g OM mix (145.33 and 145.25 days respectively).

## 4.1.6.2 Interaction Effect of Media and Nutrient Treatments on Leaf Duration

The duration was significantly influenced by the interaction between growing media and cowdung treatments. The highest duration was observed for  $M_2$  plants receiving  $C_1$  (146.5 days),  $C_2$  (147.17 days) or  $C_3$  (147.5 days) and  $M_3$  plants receiving  $C_1$  (146.17 days),  $M_4$  plants receiving  $C_1$  (145.83 days) or  $C_3$  (147 days) and  $M_1$  plants receiving  $C_2$  (147.17 days). The leaf duration was found to be lowest for  $M_1$  plants

receiving  $C_1$  (144.67 days).  $C_3$  (144.17 days),  $M_3$  plants receiving  $C_2$  (144.33 days) or  $C_3$  (144.33 days) and  $M_4$  plants receiving  $C_2$  (145.17 days).

Interaction between growing media and organic manure treatments also significantly influenced the duration of leaves. It was highest for M<sub>1</sub> plants receiving O<sub>1</sub> (146.17 days) or O<sub>2</sub> (146.33 days), M<sub>2</sub> plants receiving O<sub>1</sub> (147.83) or O<sub>3</sub> (148.5 days), M<sub>3</sub> plants receiving O<sub>1</sub> (146.5 days) or O<sub>2</sub> (145.83 days), M<sub>4</sub> plants receiving O<sub>1</sub> (147.17 days) or O<sub>3</sub> (146.5 days). The duration was found to be lowest for M<sub>3</sub> plants receiving O<sub>3</sub> (142.5 days), M<sub>4</sub> plants receiving O<sub>2</sub> (144.33 days) and M<sub>1</sub> plants receiving O<sub>3</sub> (143.5 days).

The leaf duration was not found to be significantly influenced by the interaction between organic manure and cowdung treatments.

#### 4.1.7 Fresh Weight of Leaves (Tables 19 to 22 and Appendix IV)

# 4.1.7.1 Effect of Media and Organic Manure Treatments on Fresh Weight of Leaves

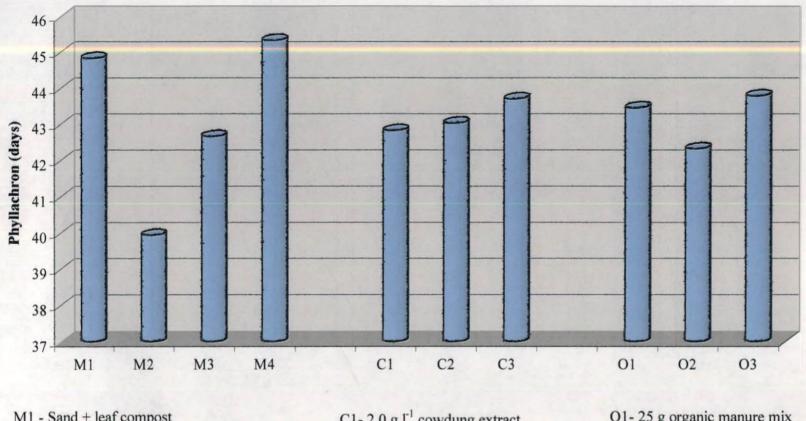
The different growing media tried significantly influenced the fresh weight of leaves. AT 165 and 225 DAT, the highest fresh weight was recorded for leaves of plants grown in sand + coir pith compost (5.05 and 5.14 g respectively). The lowest fresh weight was recorded for leaves of plants grown in granite + coir pith compost at 165 and 225 DAT (4.52 and 4.55 g respectively).

Fresh weight of leaves was also significantly influenced by different doses of fresh cowdung extract. The highest fresh weight of the leaves was recorded for the plants receiving 4 g l<sup>-1</sup> extract (5.08 and 5.12 g respectively at 165 and 225 DAT). The fresh weight of the leaves was found to be lowest for the plants receiving 2 g l<sup>-1</sup> extract (4.55 and 4.6 g at 165 and 225 DAT).

Table 17. Effect of media and nutrient treatments on phyllachron (days) and leaf duration (days) in Anthurium andreanum cv. Tropical

| Treatments     | Phyllachron (days) | Leaf duration (days) |
|----------------|--------------------|----------------------|
| Growing media  |                    |                      |
| M <sub>I</sub> | 44.83              | 145.33               |
| M <sub>2</sub> | 39.94              | 147.06               |
| M <sub>3</sub> | 42.67              | 144.94               |
| M <sub>4</sub> | 45.33              | 14.60                |
| SE             | 0.17               | 0.44                 |
| CD             | 0.48               | 1.26                 |
| Cowdung        |                    |                      |
| Cı             | 42.83              | 145.79               |
| C <sub>2</sub> | 43.04              | 145.96               |
| C <sub>3</sub> | 43.71              | 145.75               |
| SE             | 0.14               | -                    |
| CD             | 0.41               | NS                   |
| Organic manure |                    |                      |
| Oı             | 43.46              | 146.92               |
| O <sub>2</sub> | 42.33              | 145.33               |
| O <sub>3</sub> | 43.79              | 145.25               |
| SE             | 0.14               | 0.38                 |
| CD             | 0.41               | 1.09                 |

NS - Not significant



M1 - Sand + leaf compost

M2 - Sand + coir pith compost

M3 - Granite chips + leaf compost

M4 - Granite chips + coir pith compost

C1-2.0 g \(\Gamma^1\) cowdung extract

C2-4.0 g l<sup>-1</sup> cowdung extract

C3-6.0 g l<sup>-1</sup> cowdung extract

O1-25 g organic manure mix

O2-50 g organic manure mix

O3-75 g organic manure mix

Fig. 3. Effect of media and nutrient treatments on phyllachron (days) in Anthurium andreanum cv. Tropical

Table 18. Interaction effects of media and nutrient treatments on phyllachron (days) and leaf duration (days) in Anthurium andreanum cv. Tropical

|                               | Interaction effect of media and cowdung treatments |                  |                               | effect of media<br>anure treatmen | . –              | Interaction effect of cowdung and organic manure treatments |             |                  |  |
|-------------------------------|--|------------------|-------------------------------|-----------------------------------|------------------|---|-------------|------------------|--|
| Treatments                    | Phyllochron  | Leaf<br>duration | Treatments                    | Phyllochron                       | Leaf<br>duration | Treatments  | Phyllochron | Leaf<br>duration |  |
| $M_1C_1$                      | 44.67  | 144.67           | M <sub>1</sub> O <sub>1</sub> | 46.33                             | 146.17           | $C_1O_1$  | 42.00       | 146.88           |  |
| $M_1C_2$                      | 43.0   | 147.17           | $M_1O_2$                      | 43.50                             | 146.33           | $C_1O_2$  | 42.75       | 144.75           |  |
| $M_1C_3$                      | 46.33  | 144.17           | M <sub>1</sub> O <sub>3</sub> | 44.67                             | 143.55           | C <sub>1</sub> O <sub>3</sub>                               | 43.75       | 145.75           |  |
| $M_2C_1$                      | 39.83  | 146.50           | M <sub>2</sub> O <sub>1</sub> | 39.83                             | 147.83           | C <sub>2</sub> O <sub>1</sub>                               | 45.38       | 146.63           |  |
| $M_2C_2$                      | 39.83  | 147.17           | M <sub>2</sub> O <sub>2</sub> | 39.83                             | 144.83           | C <sub>2</sub> O <sub>2</sub>                               | 41.88       | 146.00           |  |
| $M_2C_3$                      | 40.17  | 147.50           | M <sub>2</sub> O <sub>3</sub> | 40.17                             | 148.50           | C <sub>2</sub> O <sub>3</sub>                               | 41.88       | 145.25           |  |
| $M_3C_1$                      | 43.17  | 146.17           | $M_3O_1$                      | 43.17                             | 146.50           | C <sub>3</sub> O <sub>1</sub>                               | 43.00       | 147.25           |  |
| M <sub>3</sub> C <sub>2</sub> | 43.00  | 144.33           | M <sub>3</sub> O <sub>2</sub> | 41.83                             | 145.83           | C <sub>3</sub> O <sub>2</sub>                               | 42.38       | 145.25           |  |
| M <sub>3</sub> C <sub>3</sub> | 41.83  | 144.33           | $M_3O_3$                      | 43.00                             | 142.50           | C <sub>3</sub> O <sub>3</sub>                               | 45.75       | 144.75           |  |
| M <sub>4</sub> C <sub>1</sub> | 43.67  | 145.83           | $M_4O_1$                      | 44.50                             | 147.17           | SE  | 0.25        | -                |  |
| M <sub>4</sub> C <sub>2</sub> | 45.73  | 145.17           | $M_4O_2$                      | 44.17                             | 144.33           | CD  | 0.72        | NS               |  |
| M <sub>4</sub> C <sub>3</sub> | 46.50  | 147.00           | M <sub>4</sub> O <sub>3</sub> | 47.33                             | 146.50           |   |             |                  |  |
| SE                            | 0.29   | 0.76             | SE                            | 0.29                              | 0.76             |   |             |                  |  |
| CD                            | 0.83   | 2.18             | CD                            | 0.83                              | 2.18             |   |             |                  |  |

Different doses of organic manure mix significantly influenced the fresh weight of leaves. The highest fresh weight of leaves was obtained for plants receiving 75 g mix at 165 and 225 DAT (5.13 and 5.15 g respectively). The lowest fresh weight was recorded for plants receiving 25 g organic manure mix (4.43 and 4.53 g at 165 and 225 DAT respectively).

# 4.1.7.2 Interaction Effect of Media and Nutrient Treatments on Fresh Weight of Leaves

Interaction between growing media and cowdung treatments significantly influenced the fresh weight of leaves. The fresh weight of leaves was found to be highest for M<sub>2</sub> plants receiving C<sub>1</sub> at 165 and 225 DAT (5.43 and 5.48 g respectively). At 165 and 225 DAT, the fresh weight of leaves was found to be lowest for the M<sub>1</sub> plants receiving C<sub>1</sub> (3.97 and 4.02 g respectively).

Fresh weight of leaves was also significantly influenced by the interaction between media and organic manure treatments. The highest value for fresh weight of leaves was obtained for M<sub>2</sub> plants receiving O<sub>3</sub> at 165 and 225 DAT (5.8 and 5.84 respectively). The lowest value for fresh weight of leaves was recorded for M<sub>3</sub> plants receiving O<sub>1</sub> at 165 DAT (4.09 g). At 225 DAT, the lowest value for fresh weight of leaves was recorded for M<sub>3</sub> plants receiving O<sub>1</sub> and M<sub>4</sub> plants receiving O<sub>3</sub> (4.2 and 4.36 g respectively).

Interaction between cowdung and organic manure treatments significantly influenced the fresh weight of leaves. Fresh weight of the leaves was found to be highest for plants receiving  $C_2O_2$  and  $C_2O_3$  at 165 and 225 DAT (5.32 and 5.17 at 165 DAT and 5.36 and 5.24 at 225 DAT). The lowest value for fresh weight of leaves was recorded for  $C_1$  plants receiving  $O_1$  at 165 and 225 DAT (4.05 and 4.12 g respectively).

#### 4.1.8 Dry Weight of Leaves (Tables 19 to 22 and Appendix IV)

# 4.1.8.1 Effect of Media and Nutrient Treatments on Dry Weight of Leaves

The dry weight of leaves was significantly influenced by different media treatments. The highest leaf dry weight was recorded for plants grown in sand + leaf compost at 165 DAT (1.22 g). At 225 DAT, the highest leaf dry weight was recorded for plants grown in sand + coir pith compost (1.2 g). The lowest value for leaf dry weight at 165 DAT was recorded for plants grown in granite + coir pith compost (1.06 g). At 225 DAT, lowest value for leaf dry weight was recorded for plants grown in granite + leaf compost (1.04 g).

The dry weight of leaves was also significantly influenced by different concentrations of fresh cowdung extract. The leaf dry weight was found to be highest for plants receiving 4 g l<sup>-1</sup> extract at 165 and 225 DAT (1.24 and 1.29 g respectively). The lowest value for leaf dry weight was recorded for plants receiving 2 g l<sup>-1</sup> extract at 165 and 225 DAT (1.02 and 1.05 g respectively).

Different doses of organic manure mix also significantly influenced the leaf dry weight. The highest value for leaf dry weight was recorded by plants receiving 75 g organic manure mix at 165 and 225 DAT (1.24 and 1.26 g respectively). The lowest value for leaf dry weight was obtained for plants receiving 25 g mix at 165 and 225 DAT (0.93 and 0.97 g respectively).

# 4.1.8.2 Interaction Effect of Media and Nutrient Treatments on Dry Weight of Leaves

Interaction between media and cowdung treatments significantly influenced the dry weight of leaves. The  $\dot{M}_2$  plants receiving  $C_2$  recorded highest dry weight at 165 and 25 DAT (1.38 and 1.5 g respectively). The

Table 19 Effect of media and nutrient treatments on on fresh weight (g) and dry weight (g) of leaves in Anthurium andreanum cv.

Tropical

| Treatments     | Fresh we | eight (g) | Dry we  | ight (g) |
|----------------|----------|-----------|---------|----------|
| Treatments     | 165 DAT  | 225 DAT   | 165 DAT | 225 DAT  |
| Growing media  |          |           |         |          |
| Mı             | 4.95     | 4.97      | 1.22    | 1.17     |
| M <sub>2</sub> | 5.05     | 5.14      | 1.13    | 1.20     |
| M <sub>3</sub> | 4.84     | 4.89      | 1.07    | 1.04     |
| M <sub>4</sub> | 4.52     | 4.55      | 1.06    | 1.08     |
| SE             | 0.04     | 0.03      | 0.002   | 0.01     |
| CD             | 0.10     | 0.10      | 0.01    | 0.02     |
| Cowdung        |          | _         |         |          |
| C <sub>1</sub> | 4.55     | 4.60      | 1.021   | 1.05     |
| C <sub>2</sub> | 5.08     | 5.12      | 1.24    | 1.29     |
| C <sub>3</sub> | 4.90     | 4.94      | 1.09    | 1.09     |
| SE             | 0.03     | 0.03      | 0.0018  | 0.01     |
| CD             | 0.09     | 0.08      | 0.01    | 0.02     |
| Organic manure |          |           |         |          |
| O <sub>1</sub> | 4.43     | 4.53      | 0.93    | 0.97     |
| O <sub>2</sub> | 4.96     | 4.99      | 1.13    | 1.14     |
| O <sub>3</sub> | 5.13     | 5.15      | 1.24    | 1.26     |
| SE             | 0.03     | 0.03      | 0.0018  | 0.01     |
| CD             | 0.09     | 0.08      | 0.01    | 0.02     |

lowest dry weight was recorded by  $M_1$  plants receiving  $C_1$  (0.81 and 0.85 g respectively).

The dry weight of the leaves was also significantly influenced by the interaction between media and organic manure treatments. At 165 DAT and 225 DAT, the dry weight of leaves was found to be highest for the  $M_2$  plants receiving  $O_3$  (1.33 g at 165 DAT and 1.37 at 225 DAT) and  $M_2$  plants receiving  $O_1$  (1.32 at 165 DAT and 1.39 at 225 DAT).

Interaction between cowdung treatments and organic manure treatments also significantly influenced the dry weight of leaves. The dry weight of the leaves was found to be highest for  $C_2O_3$  at 165 and 225 DAT (1.34 and 1.36 g respectively). The dry weight of the leaves was found to be lowest for plants receiving  $C_1O_1$  and  $C_3O_1$  at 165 DAT (0.91 and 0.9 g respectively). At 225 DAT, the dry weight of the leaves was found to be lowest for plants receiving  $C_1O_1$ ,  $C_1O_2$  and  $C_3O_1$  (0.93, 0.91 and 0.92 g respectively).

#### 4.1.9 N Content of Leaves (Tables 23 to 26 and Appendix V)

### 4.1.9.1 Effect of Media and Nutrient Treatments on N Content of the Leaves

The media treatments significantly influenced the N content of the leaves. At 165 and 225 DAT, the highest N content in the leaves were recorded by plants grown in sand + coir pith compost (1.51 and 1.61 per cent respectively). It was followed by plants grown in granite + leaf compost with leaf N content of 1.41 and 1.46 per cent at 165 and 225 DAT respectively. The lowest leaf N content was obtained in plants grown in sand + leaf compost recording 1.17 and 1.23 per cent at 165 and 225 DAT respectively.

The N content of leaves was also significantly influenced by different doses of fresh cowdung extract. The highest N content in the

Table 20. Interaction effect of media and cowdung treatments on fresh weight (g) and dry weight (g) of leaves in Anthurium andreanum cv. Tropical

| Treatments                    | Fresh   | eight (g) | Dry wei | ght (g) |
|-------------------------------|---------|-----------|---------|---------|
| Treatments                    | 165 DAT | 225 DAT   | 165 DAT | 225 DAT |
| $M_1C_1$                      | 3.97    | 4.02      | 0.81    | 0.85    |
| $M_1C_2$                      | 5.21    | 5.29      | 1.14    | 1.09    |
| $M_1C_3$                      | 5.09    | 5.16      | 1.06    | 1.05    |
| M <sub>2</sub> C <sub>1</sub> | 5.43    | 5.48      | 1.35    | 1.28    |
| M <sub>2</sub> C <sub>2</sub> | 5.39    | 5.45      | 1.38    | 1.50    |
| M <sub>2</sub> C <sub>3</sub> | 4.86    | 4.98      | 1.00    | 1.98    |
| M <sub>3</sub> C <sub>1</sub> | 4.61    | 4.64      | 1.11    | 1.17    |
| M <sub>3</sub> C <sub>2</sub> | 5.02    | 5.05      | 1.15    | 1.14    |
| M <sub>3</sub> C <sub>3</sub> | - 4.90  | 4.97      | 1.13    | 1.15    |
| M <sub>4</sub> C <sub>1</sub> | 4.53    | 4.58      | 1.11    | 1.11    |
| M <sub>4</sub> C <sub>2</sub> | 4.68    | 4.69      | 1.18    | 1.21    |
| M <sub>4</sub> C <sub>3</sub> | 4.35    | 4.39      | 0.89    | 0.94    |
| SE                            | 0.06    | 0.06      | . 0.01  | 0.01    |
| CD                            | 0.17    | 0.17      | 0.02    | 0.03    |

Table 21. Interaction effect of media and organic manure treatments on fresh weight (g) and dry weight (g) of leaves in Anthurium andreanum cv. Tropical

| Tractments                    | Fresh we | eight (g) | Dry we  | ight (g) |  |
|-------------------------------|----------|-----------|---------|----------|--|
| Treatments                    | 165 DAT  | 225 DAT   | 165 DAT | 225 DAT  |  |
| $M_lO_l$                      | 4.38     | 4.50      | 1.06    | 0.92     |  |
| $M_1O_2$                      | 4.75     | 4.97      | 1.00    | 0.97     |  |
| M <sub>1</sub> O <sub>3</sub> | 4.60     | 4.62      | 0.84    | 0.89     |  |
| M <sub>2</sub> O <sub>1</sub> | 5.29     | 5.26      | 1.32    | 1.39     |  |
| M <sub>2</sub> O <sub>2</sub> | 5.17     | 5.14      | 1.27    | 1.25     |  |
| M <sub>2</sub> O <sub>3</sub> | 5.80     | 5.84      | 1.33    | 1.37     |  |
| M <sub>3</sub> O <sub>1</sub> | 4.09     | 4.20      | 0.80    | 0.85     |  |
| M <sub>3</sub> O <sub>2</sub> | 5.24     | 5.32      | 1.25    | 1.25     |  |
| M <sub>3</sub> O <sub>3</sub> | 5.19     | 5.25      | 1.31    | 1.30     |  |
| M <sub>4</sub> O <sub>1</sub> | 4.49     | 4.55      | 1.98    | 0.99     |  |
| M <sub>4</sub> O <sub>2</sub> | 4.69     | 4.75      | 1.12    | 1.15     |  |
| M <sub>4</sub> O <sub>3</sub> | 4.38     | 4.36      | 1.07    | 1.10     |  |
| SE                            | 0.06     | 0.06      | 0.01    | 0.01     |  |
| CD                            | 0.17     | 0.17      | 0.02    | 0.03     |  |

Table 22. Interaction effect of cowdung and organic manure treatments on fresh weight (g) and dry weight (g) of leaves in Anthurium andreanum cv. Tropical

| Treatments                    | Fresh we | eight (g) | Dry we  | ight (g) |
|-------------------------------|----------|-----------|---------|----------|
| Treauments                    | 165 DAT  | 225 DAT   | 165 DAT | 225 DAT  |
| $C_1O_1$                      | 4.05     | 4.12      | 0.93    | 0.91     |
| $C_1O_2$                      | 4.50     | 4.54      | 0.91    | 0.96     |
| C <sub>1</sub> O <sub>3</sub> | 5.10     | 5.13      | 1.22    | 1.20     |
| $C_2O_1$                      | 4.74     | 4.76      | 1.06    | 0.97     |
| $C_2O_2$                      | 5.32     | 5.36      | 1.31    | 1.29     |
| C <sub>2</sub> O <sub>3</sub> | 5.17     | 5.24      | 1.36    | 1.34     |
| $C_3O_1$                      | 4.51     | 4.70      | 0.92    | 0.90     |
| C <sub>3</sub> O <sub>2</sub> | 5.06     | 5.06      | 1.18    | 1.17     |
| C <sub>3</sub> O <sub>3</sub> | 5.13     | 5.07      | 1.19    | 1.19     |
| SE                            | 0.05     | 0.05      | 0.01    | 0.01     |
| CD                            | 0.15     | 0.15      | 0.02    | 0.03     |

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leaves was recorded by plants receiving 4 g l<sup>-1</sup> fresh cowdung extract (1.36 and 1.44 per cent at 165 and 225 DAT respectively). The lowest N content was obtained in plants receiving 2 g l<sup>-1</sup> extract (1.33 and 1.39 per cent at 165 and 225 DAT respectively).

Different doses of organic manure mix also influenced the N content of leaves. The highest leaf N content was obtained for plants receiving 25 g organic manure mix and 50 g organic manure mix at 165 DAT (1.36 and 1.35 respectively). The lowest leaf N content was obtained for plants receiving 75 g mix at 165 DAT (1.34 %). At 225 DAT, the highest N content of leaves was obtained for plants receiving 25 and 75 g organic manure mix (1.42 % for both). The lowest N content (1.39 %) was obtained in plants receiving 50 g mix.

### 4.1.9.2 Interaction Effect of Media and Nutrient Treatments on N Content of Leaves

The N content of leaves was significantly influenced by the interaction between growing media and cowdung treatments. At 165 DAT, the highest N content of leaves was obtained for  $M_2$  plants receiving  $C_1$ ,  $C_2$  or  $C_3$  (1.5, 1.51 and 1.52 per cent respectively). The lowest N content of leaves during the period was recorded for  $M_1$  plants receiving  $C_1$ ,  $C_2$  or  $C_3$  (1.17, 1.17 and 1.18 per cent respectively). At 225 DAT, the highest leaf N content was obtained for the  $M_2$  plants receiving  $C_2$  (1.66 %). The lowest value for leaf N content during the period was obtained for  $M_1$  plants receiving  $C_1$ ,  $C_2$  or  $C_3$  (1.24, 1.23 and 1.22 per cent respectively).

The interaction between growing media and organic manure treatments also significantly influenced the N content of leaves. The highest value for leaf N content was obtained for the  $M_2$  plants receiving  $O_3$  (1.54 %) at 165 DAT. The lowest value for leaf N content was obtained for  $M_1$  plants receiving  $O_1$ ,  $O_2$  or  $O_3$  (1.17, 1.18 and 1.17 per cent respectively) at 165 DAT. At 225 DAT, the highest value for leaf N

content was obtained for the  $M_2$  plants receiving  $O_3$  (1.68 %). The lowest value for leaf N content was obtained for the  $M_1$  plants receiving  $O_1$ ,  $O_2$  or  $O_3$  (1.22, 1.23 and 1.23 per cent respectively).

Interaction between cowdung and organic manure treatments also significantly influenced the N content of leaves. The highest value for leaf N content was obtained for the plants receiving  $C_2O_3$  and  $C_3O_1$  (1.41 and 1.41 per cent respectively) at 165 DAT. The lowest value for leaf N content was obtained for the interaction  $C_3O_3$  (1.3 %) during the period. At 225 DAT, the highest value for leaf N content was obtained for plants receiving  $C_2O_3$  (1.52 %). The lowest value for leaf N content was obtained for the plants receiving  $C_3O_3$  (1.34 %) during the period.

#### 4.1.10 P Content of Leaves (Tables 23 to 26 and Appendix V)

### 4.1.10.1 Effect of Media and Nutrient Treatments on P Content of Leaves

The P content of leaves was significantly influenced by different media treatments. At 165 DAT, the highest value for P content of leaves was obtained for the plants grown in sand + coir pith compost (0.16 %) and sand + leaf compost (0.17 %). The lowest value for P content of leaves was obtained for the plants grown in granite + leaf compost (0.14 %) and granite + coir pith compost (0.13 %). The highest value for P content of leaves at 225 DAT was obtained for plants grown in sand + leaf compost (0.19 %), sand + coir pith compost (0.18 %) and granite + leaf compost (0.17 %). The P content of leaves was lowest for plants grown in granite + coir pith compost (0.15 %) during the period.

Different concentrations of fresh cowdung extract significantly influenced the P content of leaves. At 165 and 225 DAT P content of leaves was highest for plants receiving 6 g l<sup>-1</sup> extract (0.16 % and 0.18 %).

The lowest value for P content of leaves was obtained for plants receiving 2 g l<sup>-1</sup> extract (0.14 % and 0.16 %) at 165 and 225 DAT respectively.

The P content of leaves was also significantly influenced by different doses of organic manure mix. The highest value for P content of leaves was obtained by plants receiving 50 g organic manure mix (0.16 and 0.18 %) at 165 and 225 DAT respectively. The lowest value for P content of leaves at 165 DAT was obtained for plants receiving 25 g mix (0.14 %). At 225 DAT, the lowest value for P content of leaves was obtained for plants receiving 25 and 75 g mix (0.17 % for both).

# 4.1.10,2 Interaction Effect of Media and Nutrient Treatments on P Content of Leaves

The leaf P content was significantly influenced by the interaction between growing media and cowdung treatments. The leaf P content was found to be highest for  $M_1$  plants receiving  $C_3$  and  $M_2$  plants receiving  $C_3$  at 165 DAT (0.18 % for both). At 225 DAT the highest P content was obtained for  $M_1$  plants receiving  $C_3$  (0.21 %) or  $C_2$  (0.19 %) and  $M_2$  plants receiving  $C_2$  (0.19 %) or  $C_3$  (0.2 %).

The lowest leaf P content was observed for  $M_4$  plants receiving  $C_1$  (0.12 %) and  $M_3$  plants receiving  $C_3$  (0.13 %) at 165 DAT. At 225 DAT, the lowest leaf P content was obtained for  $M_4$  plants receiving  $C_1$  (0.14 %),  $C_2$  (0.16 %) or  $C_3$  (0.16 %),  $M_3$  plants receiving  $C_2$  (0.16 %) or  $C_3$  (0.16 %) and  $M_2$  plants receiving  $C_1$  (0.16 %).

Interaction between growing media and organic manure treatments also significantly influenced the P content of leaves. The P content of leaves was found to be the highest for  $M_1$  plants receiving  $O_2$  (0.19 %) and  $M_2$  plants receiving  $O_2$  (0.19 %) at 165 DAT. At 225 DAT the P content of leaves was found to be highest for  $M_1$  plants receiving  $O_2$  (0.21 %) of  $O_3$  (0.19 %) and  $M_2$  plants receiving  $O_2$  (0.21 %). At 165 and 225 DAT, the

lowest value for P content of leaves was obtained for  $M_4$  plants receiving  $O_3$  (0.13 and 0.15 % respectively).

The leaf P content was also significantly influenced by the interaction between cowdung and organic manure treatments. At 165 DAT and 225 DAT, the highest leaf P content was obtained for C<sub>1</sub> plants receiving O<sub>2</sub> (0.17 % and 0.19 % respectively), C<sub>3</sub> plants receiving O<sub>1</sub> (0.16 and 0.18 % respectively), C<sub>3</sub> plants receiving O<sub>3</sub> (0.16 and 0.19 % respectively). The lowest leaf P content was obtained for C<sub>1</sub> plants receiving O<sub>1</sub> at 165 and 225 DAT (0.12 and 0.15 per cent respectively).

#### 4.1.11 K Content of Leaves (Tables 23 to 26 and Appendix V)

### 4.1.11.1 Effect of Media and Nutrient Treatments on K Content of Leaves

The K content of leaves was significantly influenced by different media treatments. At 165 and 225 DAT the highest value for K content of leaves was obtained for plants grown in sand + coir pith compost (2.2 and 2.23 %). K content of the leaves was found to be lowest for plants grown in sand + leaf compost (1.74 and 1.78 % respectively at 165 and 225 DAT).

The K content of leaves was also significantly influenced by different concentrations of fresh cowdung extract. The K content of the leaves was highest for plants receiving 4 g l<sup>-1</sup> extract at 165 and 225 DAT recording 1.95 and 2.01 per cent respectively. The leaf K content was the lowest for plants receiving 2 g l<sup>-1</sup> extract at 165 and 225 DAT (1.88 and 1.93 %). At 225 DAT plants receiving 6 g l<sup>-1</sup> extract also recorded lowest leaf K content (1.94 %).

Different doses of organic manure mix also significantly influenced the leaf K content of leaves at 165 DAT. The highest value for leaf K content was obtained for plants receiving 25 g organic manure mix (1.94 %).

The lowest value for leaf K content was obtained for plants receiving 75 g and 50 g organic manure mix (1.9 % for both).

# 4.1.11.2 Interaction Effect of Media and Nutrient Treatments on K Content of Leaves

Interaction between growing media and cowdung treatments significantly influenced the K content of leaves. The M<sub>2</sub> plants receiving C<sub>2</sub> recorded the highest value for K content of leaves at 165 and 225 DAT (2.3 and 2.34 % respectively). At 165 DAT, the lowest K content was obtained for M<sub>1</sub> plants receiving C<sub>1</sub> (1.69 %). The lowest value for K content of leaves was obtained for M<sub>1</sub> plants receiving C<sub>1</sub>, C<sub>2</sub> or C<sub>3</sub> and M<sub>4</sub> plants receiving C<sub>3</sub> (1.73, 1.8, 1.81 and 1.76 % respectively) at 225 DAT.

The K content of leaves was significantly influenced by interaction between growing media and cowdung treatments. K content of the leaves was the highest for the interaction M<sub>2</sub>O<sub>3</sub> at 165 and 225 DAT recording 2.3 and 2.33 per cent respectively. The lowest value for K content of leaves was obtained for M<sub>1</sub> plants receiving O<sub>3</sub> during the period recording 1.67 and 1.7 per cent respectively.

Interaction between cowdung and the organic manure treatments significantly influenced the K content of leaves. At 165 DAT the highest K content of leaves was obtained for the plants receiving  $C_2O_3$  and plants receiving  $C_2O_2$  (1.97 and 1.98 %). The lowest value for leaf K content was obtained for plants receiving  $C_1O_2$  (1.8 %). At 225 DAT, the highest leaf K content was obtained for the plants receiving  $C_2O_2$ ,  $C_2O_3$ ,  $C_3O_1$ ,  $C_3O_2$  and  $C_1O_1$  (2.02, 2.06, 1.99, 2.00 and 2.00 per cent respectively). The lowest leaf K content was obtained for the plants receiving  $C_1O_2$  and plant receiving  $C_3O_3$  (1.83 and 1.87 per cent respectively).

Table 23. Effect of media and nutrient treatments on N, P and K content of leaves (per cent) in Anthurium andreanum ev. Tropical

| Treatments        | , i      | 1       | I I     |         | ŀ       | ζ       |
|-------------------|----------|---------|---------|---------|---------|---------|
| Treatments        | 165 DAT  | 225 DAT | 165 DAT | 225 DAT | 165 DAT | 225 DAT |
| Growing<br>media  |          |         |         |         |         | _       |
| M <sub>I</sub>    | 1.17     | 1.23    | 0.17    | 0.19    | 1.74    | 1.78    |
| M <sub>2</sub>    | 1.51     | 1.61    | 0.16    | 0.18    | 2.20    | 2.23    |
| M <sub>3</sub>    | 1.41     | 1.46    | 0.14    | 0.17    | 1.93    | 1.95    |
| M <sub>4</sub>    | 1.30     | 1.34    | 0.13    | 0.15    | 1.79    | 1.87    |
| SE                | 0.0018   | 0.0023  | 0.0020  | 0.0019  | 0.0019  | 0.02    |
| CD                | 0.01     | 0.01    | 0.01    | 0.01    | 0.01    | 0.05    |
| Cowdung           |          |         |         |         |         |         |
| Ci                | 1.33     | 1.39    | 0.14    | 0.16    | 1.88    | 1.93    |
| C <sub>2</sub>    | 1.36     | 1.44    | 0.15    | 0.17    | 1.95    | 2.01    |
| C <sub>3</sub>    | 1.36     | 1.40    | 0.16    | 0.18    | 1.92    | 1.94    |
| SE                | . 0.0016 | 0.002   | 0.0018  | 0.0017  | 0.0017  | 0.02    |
| CD                | 0.01     | 0.01    | 0.01    | 0.01    | 0.01    | 0.05    |
| Organic<br>manure |          |         |         |         |         |         |
| O <sub>1</sub>    | 1.36     | 1.42    | 0.14    | 0.17    | 1.94    | 1.96    |
| O <sub>2</sub>    | 1.35     | 1.39    | 0.16    | 0.18    | 1.90    | 1.95    |
| O <sub>3</sub>    | 1.34     | 1.42    | 0.15    | 0.17    | 1.90    | 1.96    |
| SE                | 0.0016   | 0,002   | 0.0018  | 0.0017  | 0.0017  | -       |
| CD                | 0.01     | 0.01    | 0.01    | 0.01    | 0.01    | NS      |

DAT – Days after transplanting NS – Not significant

Table 24. Interaction effect of media and cowdung treatments on N, P and K content of leaves (per cent) in Anthurium andreanum cv.

Tropical

| Trantmenta                    | 1       | 1       | I       |           | F       | ζ       |
|-------------------------------|---------|---------|---------|-----------|---------|---------|
| Treatments                    | 165 DAT | 225 DAT | 165 DAT | 225 DAT   | 165 DAT | 225 DAT |
| M <sub>1</sub> C <sub>1</sub> | 1.17    | 1.24    | 0.16    | 0.18      | 1.69    | 1.73    |
| $M_1C_2$                      | 1.17    | 1.23    | 0.16    | 0.19      | 1.76    | 1.80    |
| M <sub>1</sub> C <sub>3</sub> | 1.18    | 1.22    | 0.18    | 0.21      | 1.76    | 1.81    |
| M <sub>2</sub> C <sub>1</sub> | 1.50    | ,1.60   | 0.14    | 0.16      | 2.12    | 2.15    |
| M <sub>2</sub> C <sub>2</sub> | 1.51    | 1.66    | 0.16    | 0.19      | 2.30    | 2.34    |
| M <sub>2</sub> C <sub>3</sub> | 1.52    | 1.57    | 0.18    | 0.20      | 2.17    | 2.20    |
| M <sub>3</sub> C <sub>1</sub> | 1.34    | 1.39    | 0.16    | 0.16 0.18 |         | 1.90    |
| $M_3C_2$                      | 1.44    | 1.50    | 0.14    | 0.16      | 1.90    | 1.97    |
| M <sub>3</sub> C <sub>3</sub> | 1.46    | 1.49    | 0.13    | 0.16      | 1.97    | 2.04    |
| M <sub>4</sub> C <sub>1</sub> | 1.31    | 1.35    | 0.12    | 0.14      | 1.86    | 1.93    |
| M <sub>4</sub> C <sub>2</sub> | 1.32    | 1.37    | 0.14    | 0.16      | 1.83    | 1.93    |
| M <sub>4</sub> C <sub>3</sub> | 1.26    | 1.31    | 0.14    | 0.16      | 1.70    | 1.76    |
| SE                            | 1.01    | 0.01    | 0.0035  | 0.01      | 0.01    | 0.03    |
| CD                            | 0.02    | 0.02    | 0.01    | 0.02      | 0.02    | 0.09    |

DAT - Days after transplanting

Table 25. Interaction effect of media and organic manure treatments on N, P and K content of leaves (per cent) in Anthurium andreanum cv.

Tropical

| Treatments                    | Ŋ       | 1       | I       | ,       | F         | ζ       |
|-------------------------------|---------|---------|---------|---------|-----------|---------|
| Treatments                    | 165 DAT | 225 DAT | 165 DAT | 225 DAT | 165 DAT   | 225 DAT |
| $M_1O_1$                      | 1.17    | 1.22    | 0.16    | 0.18    | 1.74      | 1.80    |
| $M_1O_2$                      | 1.18    | 1.23    | 0.19    | 0.21    | 1.79      | 1.83    |
| $M_1O_3$                      | 1.17    | 1.23    | 0.16    | 0.19    | 1.67      | 1.70    |
| M <sub>2</sub> O <sub>1</sub> | 1.50    | 1.60    | 0.14    | 0.16    | 2.14      | 2.17    |
| $M_2O_2$                      | 1.49    | 1.54    | 0.19    | 0.21    | 0.21 2.14 |         |
| $M_2O_3$                      | 1.54    | 1.68    | 0.15    | 0.18    | 2.30      | 2.33    |
| M <sub>3</sub> O <sub>1</sub> | 1.39    | 1.45    | 0.14    | 0.17    | 1.87      | 1.96    |
| M <sub>3</sub> O <sub>2</sub> | 1.48    | 1.51    | 0.15    | 0.16    | 1.96      | 2.01    |
| $M_3O_3$                      | 1.37    | 1.42    | 0.14    | 0.17    | 1.88      | 1.96    |
| M <sub>4</sub> O <sub>1</sub> | 1.38    | 1.43    | 0.14    | 0.16    | 1.92      | 2.00    |
| $M_4O_2$                      | 1.24    | 1.27    | 0.14    | 0.16    | 1.70      | 1.79    |
| M <sub>4</sub> O <sub>3</sub> | 1.27    | 1.33    | 0.13    | 0.15    | 1.76      | 1.86    |
| SE                            | 0.01    | 0.01    | 0.0035  | 0.01    | 0.01      | 0.03    |
| CD                            | 0.02    | 0.02    | 0.01    | 0.02    | 0.02      | 0.09    |

DAT - Days after transplanting

Table 26. Interaction effect of cowdung and organic manure treatments on N, P and K content of leaves (per cent) in Anthurium andreanum cv. Tropical

| Treatments                    | N       | 1       | F       | );        | ŀ       | ζ.      |
|-------------------------------|---------|---------|---------|-----------|---------|---------|
| Treatments                    | 165 DAT | 225 DAT | 165 DAT | 225 DAT   | 165 DAT | 225 DAT |
| $C_1O_1$                      | 1.36    | 1.43    | 0.12    | 0.15      | 1.94    | 2.00    |
| C <sub>1</sub> O <sub>2</sub> | 1.32    | 1.36    | 0.17    | 0.19      | 1.80    | 1.86    |
| $C_1O_3$                      | 1.31    | 1.39    | 0.14    | 0.16      | 1.90    | 1.94    |
| C <sub>2</sub> O <sub>1</sub> | 1.32    | 1.39    | 0.15    | 0.17      | 1.90    | 1.94    |
| C <sub>2</sub> O <sub>2</sub> | 1.35    | 1.41    | 0.17    | 0.19      | 1.97    | 2.02    |
| C <sub>2</sub> O <sub>3</sub> | 1.41    | 1.52    | 0.14    | 0.14 0.16 |         | 2.06    |
| C <sub>3</sub> O <sub>1</sub> | 1.40    | 1.45    | 0.16    | 0.18      | 1.94    | 1.99    |
| C <sub>3</sub> O <sub>2</sub> | 1.37    | 1.40    | 0.15    | 0.17      | 1.93    | 2.00    |
| C <sub>3</sub> O <sub>3</sub> | 1.30    | 1.34    | 0.16    | 0.19      | 1.83    | 1.87    |
| SE                            | 0.01    | 0.01    | 0.0031  | 0.0029    | 0.01    | . 0.03  |
| CD                            | 0.01    | 0.02    | 0.01    | 0.01      | 0.02    | 0.08    |

DAT - Days after transplanting

#### 4.1.12 pH of the Media (Tables 27 to 30 and Appendix VI)

### 4.1.12.1 Effect of pH of the Media and Nutrient Treatments on pH of the Media

The pH of the growing media recorded before application of organic manure treatments showed that the values were the highest in granite + coir pith compost (7.49) and the lowest in sand + leaf compost (4.53). Sand + leaf compost recorded the highest values during the first second and third week after application (7.98, 7.41 and 7.01 respectively). One week after application the pH was found to rise significantly in sand + leaf compost media and during the period sand + coir pith media maintained a significantly lower pH (7.68). Sand + coir pith media maintained lower values than sand + leaf compost during first and second week and granite + coir pith showed a similar effect during second and third week.

Before second application and from first to the third week thereafter sand + leaf compost medium recorded high pH values 6.81, 8.08, 7.51 and 7.02 respectively. The lower values were maintained before second application by granite + coir pith and the effects were found to persist during second and their week. Sand + coir pith recorded lower values during the first week after the second application of organic manure mix and were on par with granite + coir pith compost during third week.

Before the third application and from first to third week thereafter sand + leaf compost recorded high pH values (8.14 to 7.01). Sand + coir pith along with granite + coir pith maintained lower levels before third application and the latter showed similar effect persistently from second to the third week. During the third week after third application also granite and leaf compost media recorded lower values than sand + leaf compost.

The effect of cowdung extract also influenced the pH of the media. Before the first application of organic manure mix plants receiving 6 g and 4 g I<sup>-1</sup> maintained significantly higher pH (5.81) than those receiving 2 g I<sup>-1</sup> (5.57). However from first week after application upto the second week, plants receiving 4 g I<sup>-1</sup> cowdung recorded lower values and higher values were recorded by those receiving 2 g I<sup>-1</sup> extract. During the third week, lower pH were maintained by plants receiving 4 g I<sup>-1</sup> and higher value was recorded by those receiving 6 g I<sup>-1</sup> cowdung extract. Before the second application this effect was maintained. However during the first and second week after second application of organic manure mix, plants receiving 2 g I<sup>-1</sup> extract again recorded higher value. The lowest value were recorded by plants receiving 4 g I<sup>-1</sup> cowdung throughout the period.

Plants receiving higher doses of organic manure mix were also found to record higher pH value from first week onwards. Similar effects were observed after second and third application. By second and third application 50 g dosage also recorded lower pH.

### 4.1.12.2 Interaction Effect of Media and Nutrient Treatments on pH of Media

The interaction between growing media and cowdung treatments was also found to significantly influence the pH.

The interaction  $M_4C_1$  recorded the highest pH (7.63) before the first application of organic manure mix and at two weeks after the first application of organic manure mix. During the third week after the first application of organic manure mix and before the second application  $M_1C_3$  recorded the highest pH (7.22 and 7.1 respectively). At two weeks and three weeks after the second application of organic manure mix and before the third application of organic manure mix those affects were maintained.

Table 27. Effect of media and nutrient treatments on pH of the media (recorded at weekly intervals)

| Treatments     | OM*  | 1    | 2    | 3    | OM*  | 1    | 2      | 3    | OM*    | 1    | 2    | 3    |
|----------------|------|------|------|------|------|------|--------|------|--------|------|------|------|
| Growing media  |      |      |      |      |      |      |        |      |        |      |      |      |
| $M_1$          | 4.53 | 7.98 | 7.41 | 7.01 | 6.81 | 8.10 | 7.51   | 7.02 | 6.85   | 8.14 | 7.60 | 7.01 |
| M <sub>2</sub> | 5.84 | 7.68 | 7.02 | 6.49 | 6.39 | 7.93 | 7.06   | 6.41 | 6.37   | 7.90 | 7.46 | 6.64 |
| M <sub>3</sub> | 5.03 | 7.94 | 7.29 | 6.69 | 6.45 | 7.95 | 7.27   | 6.79 | 3.70   | 7.85 | 7.58 | 6.34 |
| M <sub>4</sub> | 7.49 | 7.75 | 7.09 | 6.29 | 6.18 | 8.08 | 6.92   | 6.48 | 6.39   | 7.57 | 7.16 | 6.40 |
| SE -           | 0.03 | 0.02 | 0.03 | 0.03 | 0:02 | 0:02 | - 0.03 | 0.03 | 0.03   | 0.02 | 0.02 | 0.02 |
| CD             | 0.09 | 0.07 | 0.07 | 0.08 | 0.06 | 0.06 | 0.07   | 0.09 | 0.07   | 0.07 | 0.07 | 0.06 |
| Cowdung        |      |      |      |      |      |      |        |      |        |      |      |      |
| Cı             | 5.57 | 8.26 | 8.05 | 6.65 | 6.47 | 8.27 | 7.34   | 6.65 | 6.53   | 8.07 | 7.52 | 6.50 |
| C <sub>2</sub> | 5.78 | 7.47 | 6.99 | 6.50 | 6.38 | 7.72 | 7.01   | 6.67 | 6.55   | 7.63 | 7.28 | 6.47 |
| C <sub>3</sub> | 5.82 | 7.78 | 7.16 | 6.72 | 6.53 | 8.06 | 7.21   | 6.71 | 6.65   | 7.89 | 7.56 | 6.82 |
| SE             | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02   | -    | 0.02   | 0.02 | 0.02 | 0.02 |
| CD             | 0.08 | 0.06 | 0.06 | 0.07 | 0.05 | 0.05 | 0.06   | NS   | 0.06   | 0.06 | 0.06 | 0.05 |
| Organic manure |      |      |      |      |      |      |        |      |        |      |      |      |
| O <sub>1</sub> |      | 7.78 | 6.85 | 6.30 | 6.27 | 7.92 | 7.10   | 6.46 | 6.43   | 7.90 | 7.48 | 6.50 |
| O <sub>2</sub> |      | 7.65 | 7.74 | 6.64 | 6.41 | 7.90 | 7.06   | 6.69 | 6.51   | 7.70 | 7.38 | 6.64 |
| O <sub>3</sub> |      | 8.08 | 7.42 | 6.93 | 6.70 | 8.23 | 7.41   | 6.88 | 6.78   | 8.00 | 7.49 | 6.64 |
| SE             |      | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02   | 0.03 | 0.02   | 0.02 | 0.02 | 0.02 |
| CD             |      | 0.06 | 0.06 | 0.07 | 0.05 | 0.05 | 0.06   | 0.08 | . 0.06 | 0.06 | 0.06 | 0.05 |

<sup>\*</sup>Before organic manure application

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The lowest pH before the first application of organic manure mix was recorded by M<sub>1</sub>C<sub>1</sub> (4.33). During the second and third week after first application lowest pH was recorded in M<sub>2</sub>C<sub>2</sub> (7.02 and 5.72 respectively). Before the second application of organic manure mix M<sub>3</sub>C<sub>3</sub> recorded the lowest pH (6.09). Thereafter during second week after application the lowest pH was recorded in M<sub>4</sub>C<sub>2</sub> (6.78). M<sub>4</sub>C<sub>2</sub> also recorded the lowest pH during the second and third week after the third application of organic manure were 6.77 and 6.05 respectively.

Before the third application of OM mix lowest pH was recorded by  $M_2C_1$  (6.28). During the second week after the second application of organic manure mix, the interaction  $M_2C_2$  was on par with the lowest pH recorded (6.87) and during third week after second application  $M_2C_1$  and  $M_2C_2$  were found to be on par with the lowest pH recorded (6.38 and 6.34 respectively).

Interaction between media and organic manure treatments also significantly influenced the pH of the media.

The interaction  $M_3O_3$  recorded the highest pH after the first application of organic manure mix (8.35) and thereafter during the second and third week after the application the effect was maintained even before and after the second application of organic manure mix (6.97 and 8.42 respectively). The highest pH during the third week after the second application and before the third application was also for interaction  $M_3O_3$ . Thereafter the highest pH was recorded for the interaction  $M_1O_3$ .

The lowest pH after the first application of organic manure mix was recorded for the interaction  $M_4O_1$  (7.48). During the second week after the first application of organic manure mix also the effect was maintained. The interaction  $M_3O_1$  recorded the lowest pH during the third week after application and before the second application of organic manure mix (5.87 and 5.88 respectively).

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Table 28. Interaction effect of media and cowdung treatments on pH of the media (recorded at weekly intervals)

| Treatments                    | OM*  | 1    | 2    | 3    | OM*  | 1    | 2    | 3    | OM*  | 1    | 2    | 3    |
|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| $M_1C_1$                      | 4.33 | 8.54 | 7.29 | 6.73 | 6.52 | 8.50 | 7.38 | 6.74 | 6.56 | 8.43 | 7.55 | 6.73 |
| $M_1C_2$                      | 4.39 | 7.17 | 7.25 | 7.09 | 6.82 | 7.69 | 7.30 | 7.13 | 6.94 | 7.82 | 7.53 | 7.12 |
| $M_1C_3$                      | 4.86 | 8.22 | 7.69 | 7.22 | 7.10 | 8.12 | 7.86 | 7.20 | 7.04 | 8.18 | 7.73 | 7.17 |
| $M_2C_1$                      | 5.62 | 8.08 | 7.16 | 6.37 | 6.24 | 8.40 | 7.21 | 6.38 | 6.28 | 8.31 | 7.40 | 6.35 |
| $M_2C_2$                      | 5.98 | 7.07 | 6.72 | 6.29 | 6.22 | 7.58 | 6.87 | 6.34 | 6.32 | 7.54 | 7.42 | 6.40 |
| $M_2C_3$                      | 5.94 | 7.89 | 7.15 | 6.82 | 6.71 | 7.82 | 7.11 | 6.52 | 6.52 | 7.85 | 7.55 | 7.16 |
| $M_3C_1$                      | 4.71 | 8.78 | 7.77 | 7.09 | 6.92 | 8.27 | 7.75 | 7.14 | 6.88 | 8.17 | 7.89 | 6.53 |
| M <sub>3</sub> C <sub>2</sub> | 5.29 | 7.77 | 7.20 | 6.48 | 6.35 | 7.65 | 7.71 | 6.83 | 6.61 | 7.58 | 7.38 | 6.29 |
| M <sub>3</sub> C <sub>3</sub> | 5.10 | 7.26 | 6.90 | 6.52 | 6.09 | 7.93 | 6.95 | 6.40 | 6.63 | 7.80 | 7.46 | 6.19 |
| M <sub>4</sub> C <sub>1</sub> | 7.63 | 7.63 | 7.41 | 6.41 | 6.20 | 7.92 | 7.04 | 6.33 | 6.39 | 7.38 | 7.23 | 6.39 |
| M <sub>4</sub> C <sub>2</sub> | 7.46 | 7.88 | 6.79 | 6.14 | 6.14 | 7.96 | 6.78 | 6.37 | 6.36 | 7.57 | 6.77 | 6.05 |
| M <sub>4</sub> C <sub>3</sub> | 7.38 | 7.73 | 6.91 | 6.32 | 6.21 | 8.37 | 6.93 | 6.73 | 6.41 | 7.75 | 7.49 | 6.75 |
| SE                            | 0.05 | 0.01 | 0.05 | 0.05 | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 | 0.04 | 0.04 | 0.04 |
| CD                            | 0.15 | 0.12 | 0.14 | 0.14 | 0.11 | 0.10 | 0.12 | 0.15 | 0.13 | 0.12 | 0.12 | 0.11 |

<sup>\*</sup>Before organic manure application

During the first week and third week after application of organic manure mix the lowest pH was maintained by  $M_3O_2$  (7.63) and  $M_3O_1$  (6.31) respectively. The lowest pH before the third application of organic manure mix and during the third week after application was recorded by  $M_2O_2$  (6.31) and  $M_3O_1$  (6.2) respectively.

Interaction between cowdung and organic manure treatments also significantly influenced the pH of medium. The highest pH was recorded by the interaction  $C_1O_3$  after the first application of organic manure mix. Thereafter the interaction  $C_3O_3$  was found to record the highest pH throughout the observation period. The lowest pH after the first application of organic manure mix was recorded in  $C_2O_1$  (7.42) and thereafter during the third week after application of organic manure mix and before the second application these effects were maintained. During first, second and third week after second application of organic manure, the lowest pH was recorded by  $C_2O_1$ ,  $C_3O_2$  and  $C_2O_2$  respectively. Before the third application the lowest pH was recorded for the interaction  $C_1O_1$ . Thereafter during first, second and third week after application the lowest pH was recorded by  $C_2O_1$ ,  $C_2O_2$  and  $C_2O_3$  respectively.

#### 4.1.13 EC of the Media (Tables 31 to 34 and Appendix VII)

#### 4.1.13.1 Effect of Media and Nutrient Treatments on EC of the Media

The EC of the media was significantly influenced by different media and nutrient treatments. The EC of the growing media before application of organic manure mix showed that the highest values were obtained in granite + coir pith compost (0.3 dSm<sup>-1</sup>) and the lowest in sand + leaf compost (0.18 dSm<sup>-1</sup>). During the first week after the application of organic manure mix the EC was found to rise significantly and granite + leaf compost media recorded the highest value (1.54). The effect was maintained during the second week after application. During the third week after application sand + coir pith media and granite + coir pith media

Table 29. Interaction effect of media and organic manure treatments on pH of the media (recorded at weekly intervals)

| Treatments                    | 1    | 2    | 3    | OM*  | 1    | 2    | 3    | OM*  | 1    | 2    | 3    |
|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| $M_1O_1$                      | 8.17 | 7.18 | 6.72 | 6.72 | 7.99 | 7.32 | 6.73 | 6.60 | 8.08 | 7.49 | 6.78 |
| $M_1O_2$                      | 7.53 | 7.44 | 7.16 | 6.78 | 7.91 | 7.46 | 7.17 | 6.95 | 7.95 | 7.58 | 7.04 |
| M <sub>1</sub> O <sub>3</sub> | 8.23 | 7.60 | 7.16 | 6.94 | 8.40 | 7.76 | 7.17 | 6.99 | 8.40 | 7.74 | 7.20 |
| $M_2O_1$                      | 7.86 | 7.01 | 6.49 | 6.37 | 8.12 | 7.17 | 6.46 | 6.47 | 8.07 | 7.47 | 6.45 |
| $M_2O_2$                      | 7.56 | 6.89 | 6.33 | 6.23 | 7.70 | 6.91 | 6.40 | 6.31 | 7.78 | 7.40 | 6.70 |
| $M_2O_3$                      | 7.62 | 7.16 | 6.67 | 6.57 | 7.98 | 7.11 | 6.38 | 6.34 | 7.86 | 7.52 | 6.75 |
| $M_3O_1$                      | 7.59 | 6.85 | 5.87 | 5.88 | 7.80 | 7.16 | 6.31 | 6.34 | 7.79 | 7.57 | 6.20 |
| $M_3O_2$                      | 7.87 | 7.13 | 6.80 | 6.51 | 7.63 | 6.89 | 6.73 | 6.44 | 7.58 | 7.49 | 6.40 |
| M <sub>3</sub> O <sub>3</sub> | 8.35 | 7.88 | 7.42 | 6.97 | 8.42 | 7.75 | 7.33 | 7.33 | 8.19 | 7.68 | 6.34 |
| M <sub>4</sub> O <sub>1</sub> | 7.48 | 6.75 | 6.11 | 6.09 | 7.78 | 6.75 | 6.33 | 6.33 | 7.65 | 7.38 | 6.57 |
| M <sub>4</sub> O <sub>2</sub> | 7.65 | 7.23 | 6.26 | 6.12 | 8.37 | 6.99 | 6.45 | 6.36 | 7.49 | 7.07 | 6.35 |
| M <sub>4</sub> O <sub>3</sub> | 8.12 | 7.02 | 6.49 | 6.34 | 8.11 | 7.01 | 6.65 | 6.47 | 7.56 | 7.05 | 6.27 |
| SE                            | 0.04 | 0.05 | 0.05 | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 | 0.04 | 0.04 | 0.04 |
| CD                            | 0.12 | 0.14 | 0.14 | 0.11 | 0.01 | 0.12 | 0.15 | 0.13 | 0.12 | 0.12 | 0.11 |

<sup>\*</sup>Before organic manure application

Table 30. Interaction effect of cowdung and organic manure treatments on pH of the media (recorded at weekly intervals)

| Treatments                    | 1    | 2    | 3    | OM*  | 1    | 2    | 3    | OM*  | 1.   | 2    | _ 3  |
|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| $C_1O_1$                      | 8.46 | 7.27 | 6.33 | 6.23 | 8.07 | 7.34 | 6.37 | 6.34 | 8.12 | 7.54 | 6.30 |
| $C_1O_2$                      | 7.97 | 7.34 | 6.76 | 6.50 | 8.30 | 7323 | 6.81 | 6.46 | 7.91 | 7.45 | 6.52 |
| C <sub>1</sub> O <sub>3</sub> | 8.35 | 7.43 | 6.86 | 6.68 | 8.46 | 7.47 | 6.78 | 6.78 | 8.19 | 7.57 | 6.69 |
| C <sub>2</sub> O <sub>1</sub> | 7.42 | 6.84 | 6.20 | 6.21 | 7.55 | 6.93 | 6.65 | 6.46 | 7.46 | 7.35 | 6.66 |
| $C_2O_2$                      | 7.54 | 7.14 | 6.54 | 6.31 | 7.73 | 7.14 | 6.61 | 6.50 | 7.56 | 7.20 | 6.48 |
| $C_2O_3$                      | 7.46 | 6.99 | 6.76 | 6.62 | 7.88 | 6.98 | 6.74 | 6.71 | 7.86 | 7.31 | 6.25 |
| C <sub>3</sub> O <sub>1</sub> | 7.45 | 6.74 | 6.36 | 6.36 | 8.15 | 7.04 | 6.35 | 6.50 | 8.11 | 7.57 | 6.54 |
| C <sub>3</sub> O <sub>2</sub> | 7.44 | 6.92 | 6.62 | 6.43 | 7.69 | 6.82 | 6.65 | 6.58 | 7.62 | 7.51 | 6.93 |
| C <sub>3</sub> O <sub>3</sub> | 8.44 | 7.83 | 7.18 | 6.80 | 8.34 | 7.78 | 7.13 | 6.86 | 7.96 | 7.61 | 6.98 |
| SE                            | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.04 | 0.05 | -    | 0.04 | -    | 0.03 |
| CD                            | 0.10 | 0.10 | 0.12 | 0.09 | 0.09 | 0.11 | 0.13 | NS   | 0.11 | NS   | 0.09 |

<sup>\*</sup>Before organic manure application NS - Not significant

recorded lower EC values (0.29 and 0.22 respectively). The lowest EC values before the organic manure mix application (0.18 dSm<sup>-1</sup>) and after the application was maintained by sand + leaf compost media.

Before the second application of organic manure mix the highest EC values were recorded in granite + coir pith compost media (0.27 dSm<sup>-1</sup>). The effects was maintained during the first and second week after application. During the third week after application of organic manure mix, granite + leaf compost media recorded highest EC (0.75 dSm<sup>-1</sup>). The lowest EC before the second organic manure application and thereafter during third week after application was recorded in sand + leaf compost (0.24 and 0.59 dSm<sup>-1</sup>). During the first and second week after application granite + leaf compost used recorded lowest values.

Before the third application of organic manure mix, sand + leaf compost media recorded highest EC value (0.27 dSm<sup>-1</sup>). During second week after application, sand + coir pith media and granite + coir pith media recorded higher EC values. The lowest EC values during first and second week after application was recorded in granite + leaf compost media. During second and third week after application, sand + coir pith media and granite + coir pith media recorded the highest values used respectively. The lowest EC values during the period was recorded by sand + leaf compost and sand + coir pith compost respectively.

The EC values were significantly influenced by the application of cow dung extract. Before the first application of organic manure mix and thereafter during first and second week after application plants receiving 6 g l<sup>-1</sup> extract recorded the highest EC values (0.21, 0.99 and 0.72 dSm<sup>-1</sup> respectively). During the third week after application the highest and the lowest values were recorded by plants receiving 4 g l<sup>-1</sup> and 6 g l<sup>-1</sup> extract respectively.

Before the second application of organic manure mix the highest EC values were recorded in plants receiving 2 g l<sup>-1</sup> and 6 g l<sup>-1</sup> extract (0.26 dSm<sup>-1</sup> each). During the second and third week thereafter after plants receiving 2 g l<sup>-1</sup> extract recorded the highest EC values. During the third week after application plants receiving 6 g l<sup>-1</sup> extract recorded the highest EC values. The lowest EC values before second organic manure application recorded by plants receiving 4 g l<sup>-1</sup> extract. The effect was maintained during the first week after application and thereafter during the second and third week after application the lowest values were recorded by those receiving 6 g l<sup>-1</sup> and 2 g l<sup>-1</sup> extract respectively.

Before the third application of organic manure mix, the highest values were recorded by plants receiving 4 g l<sup>-1</sup> and 6 g l<sup>-1</sup> cowdung extract. The lowest EC values during the period was recorded by plants receiving 2 g l<sup>-1</sup> cowdung extract. During the second and third week after application, the highest values were recorded by those receiving 6 g l<sup>-1</sup> and the lowest by those receiving 4 g l<sup>-1</sup> cowdung extract. During the third week after application, plants receiving 4 g l<sup>-1</sup> cowdung extract recorded the highest values and those receiving 2 g l<sup>-1</sup> cowdung extract recorded the lowest values.

The application of organic manure mix also significantly influenced the EC values. Plants receiving 75 g organic manure were found to recorded higher EC values from the first week after first application onwards. Similar effects were observed after the second and third application of organic manure mix also. After the third application of organic manure mix, plants receiving 50 g organic manure mix also recorded higher EC values.

The EC of the medium was also significantly influenced by the interaction between media and nutrients treatments.

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Table 31. Effect of media and nutrient treatments on EC (dSm<sup>-1</sup>) of the media (recorded at weekly intervals)

| Treatments     | OM*    | 1      | 2      | 3      | OM*    | 1      | 2    | 3      | OM*    | 1      | 2      | 3      |
|----------------|--------|--------|--------|--------|--------|--------|------|--------|--------|--------|--------|--------|
| Growing media  |        |        |        |        |        |        |      |        |        |        |        |        |
| M <sub>I</sub> | 0.18   | 0.69   | 0.60   | 0.22   | 0.024  | 2.43   | 1.44 | 0.59   | 0.27   | 2.81_  | 1.77   | 0.80   |
| M <sub>2</sub> | 0.27   | 1.12   | 0.78   | 0.29   | 0.026  | 2.40   | 1.53 | 0.60   | 0.27   | 2.83   | 1.84   | 0.78   |
| M <sub>3</sub> | 0.23   | 1.54   | 0.91   | 0.24   | 0.026  | 1.98   | 1.43 | 0.75   | 0.22   | 2.73   | 1.79   | 0.80   |
| M <sub>4</sub> | 0.30   | 0.98   | 0.80   | 0.29   | 0.027  | 2.54   | 1.62 | 0.65   | 0.25   | 2.83_  | 1:77   | 0.86   |
| SE             | 0.0026 | 0.17   | 0.0027 | 0.0020 | 0.0018 | 0.0018 | 0.02 | 0.0023 | 0.0020 | 0.0023 | 0.0046 | 0.0019 |
| CD ·           | 0.01   | 0.01   | 0.01   | 0.01   | 0.01   | 0.01   | 0.05 | 0.01   | 0.01   | 0.01   | 0.01   | 0.01   |
| Cowdung        |        |        |        |        | )<br>  |        |      |        |        |        |        |        |
| C <sub>1</sub> | 0.21   | 0.99   | 0.72   | 0.26   | 0.26   | 2.42   | 1.60 | 0.62   | 0.24   | 2.79   | 1.79   | 0.80   |
| C <sub>2</sub> | 0.24   | 1.00   | 0.74   | 0.24   | 0.24   | 2.28   | 1.48 | 0.64   | 0.27   | 2.76   | 1.78   | 0.82   |
| C <sub>3</sub> | 0.26   | 1.25   | 0.86_  | 0.26   | 0.26   | 2.31   | 1.44 | 0.68   | 0.27   | 2.85   | 1.81   | 0.81   |
| SE             | 0.0022 | 0.0015 | 0.0023 | 0.0016 | 0.0016 | 0.0061 | 0.01 | 0.0020 | 0.0018 | 0.0020 | 0.0040 | 0.0017 |
| CD             | 0.01   | 0.01   | 0.01   | 0.01   | 0.01   | 0.01   | 0.04 | 0.01   | 0.01   | 0.01   | 0.01   | 0.01   |
| Organic manure |        |        |        |        |        |        |      |        |        |        |        |        |
| Oı             |        | 0.86   | 0.70   | 0.23   | 0.23   | 2.15   | 1.44 | 0.64   | 0.24   | 2.66   | 1.77   | 0.79   |
| O <sub>2</sub> |        | 1.11   | 0.78   | 0.27   | 0.27   | 2.35   | 1.48 | 0.63   | 0.25   | 2.77   | 1.81   | 0.80   |
| O <sub>3</sub> |        | 1.28   | 0.84   | 0.25   | 0.25   | 2.52   | 1.89 | 0.66   | 0.27   | 2.97   | 1.80   | 0.82   |
| SE             |        | 0.0015 | 0.0023 | 0.0016 | 0.0016 | 0.0016 | 0.01 | 0.0020 | 0.0018 | 0.0020 | 0.0040 | 0.0017 |
| CD             |        | 0.01   | 0.01   | 0.01   | 0.01   | 0.01   | 0.04 | 0.01   | 0.01   | 0.01   | 0.01   | 0.01   |

<sup>\*</sup>Before organic manure application

Table 32. Interaction effect of media and cowdung treatments on EC (dSm<sup>-1</sup>) of the media (recorded at weekly intervals)

| Treatments                    | OM*    | 1      | 2      | 3      | OM*    | 1    | 2    | 3      | OM*    | 1      | 2    | 3      |
|-------------------------------|--------|--------|--------|--------|--------|------|------|--------|--------|--------|------|--------|
| $M_1C_1$                      | 0.14   | 0.63   | 0.55   | 0.24   | 0.24   | 2.49 | 1.51 | 0.57   | 0.25   | 2.78   | 1.68 | 0.78   |
| $M_1C_2$                      | 0.17   | 0.64   | 0.54   | 0.22   | 0.25   | 2.28 | 1.37 | 0.64   | 0.28   | 2.88   | 1.77 | 0.85   |
| $M_1C_3$                      | 0.21   | 0.81   | 0.71   | 0.21   | 0.25   | 2.53 | 1.43 | 0.56   | 0.27   | 2.78   | 1.85 | 0.78   |
| $M_2C_1$                      | 0.26   | 0.70   | 0.63   | 0.29   | 0.27   | 2.62 | 1.66 | 0.60   | 0.27   | 2.92   | 1.85 | 0.77   |
| $M_2C_2$                      | 0.27   | 1.15   | 0.77   | 0.33   | 0.25   | 2.43 | 1.52 | 0.57   | 0.27   | 2.64   | 1.88 | 0.76   |
| M <sub>2</sub> C <sub>3</sub> | 0.27   | 1.49   | 0.95   | 0.26   | 0.27   | 2.14 | 1.43 | 0.63   | 0.28   | 2.91   | 1.79 | 0.79   |
| M <sub>3</sub> C <sub>1</sub> | 0.23   | 1.60   | 0.91   | 0.24   | 0.24   | 2.04 | 1.59 | 0.79   | 0.24   | 2.76   | 1.79 | 0.81   |
| M <sub>3</sub> C <sub>2</sub> | 0.23   | 1.41   | 0.90   | 0.24   | 0.28   | 1.71 | 1.28 | 0.74   | 0.28   | 2.67   | 1.78 | 0.79   |
| M <sub>3</sub> C <sub>3</sub> | 0.22   | 1.60   | 0.91   | 0.25   | 0.25   | 2.21 | 1.41 | 0.71   | 0.25   | 2.76   | 1.81 | 0.79   |
| M <sub>4</sub> C <sub>1</sub> | 0.30   | 1.02   | 0.80   | 0.28   | 0.27   | 2.54 | 1.65 | 0.54   | 0.27   | 2.71   | 1.76 | 0.84   |
| M <sub>4</sub> C <sub>2</sub> | 0.30   | 0.81   | 0.74   | 0.3    | 0.23   | 2.71 | 1.74 | 0.61   | 0.25   | 2.85   | 1.80 | 0.87   |
| M <sub>4</sub> C <sub>3</sub> | 0.30   | 1.12   | 0.86   | 0.29   | 0.27   | 2.38 | 1.49 | 0.80   | 0.27   | 2.94   | 1.78 | 0.87   |
| SE                            | 0.0044 | 0.0030 | 0.0046 | 0.0034 | 0.0032 | 0.01 | 0.03 | 0.0040 | 0.0035 | 0.0040 | 0.01 | 0.0034 |
| CD                            | 0.01   | 0.01   | 0.01   | 0.01   | 0.01   | 0.02 | 0.08 | 0.01   | 0.01   | 0.01   | 0.02 | 0.01   |

<sup>\*</sup>Before organic manure application

Table 33. Interaction effect of media and organic manure treatments on EC (dSm<sup>-1</sup>) of the media (recorded at weekly intervals)

| Treatments                      | 1      | 2      | 3      | OM*    | 1    | 2    | 3      | OM*    | 1    | 2    | 3      |
|---------------------------------|--------|--------|--------|--------|------|------|--------|--------|------|------|--------|
| · M <sub>1</sub> O <sub>1</sub> | 0.58   | 0.50   | 0.22   | 0.25   | 2.23 | 1.51 | 0.57   | 0.26   | 2.81 | 1.68 | 0.82   |
| $M_1O_2$                        | 0.71   | 0.61   | 0.23   | 0.26   | 2.46 | 1.31 | 0.57   | 0.28   | 2.74 | 1.77 | 0.78   |
| $M_1O_3$                        | 0.79   | 0.68   | 0.22   | 0.23   | 2.61 | 1.49 | 0.63   | 0.26   | 2.89 | 1.85 | 0.79   |
| M <sub>2</sub> O <sub>1</sub>   | 0.88   | 0.64   | 0.28   | 0.27   | 2.34 | 1.35 | 0.64   | 0.28   | 2.52 | 1.85 | 0.75   |
| M <sub>2</sub> O <sub>2</sub>   | 1.04   | 0.83   | 0.33   | 0.26   | 2.41 | 1.51 | 0.55   | 0.27   | 2.85 | 1.88 | 0.76   |
| M <sub>2</sub> O <sub>3</sub>   | 1.43   | 0.88   | 0.28   | 0.26   | 2.44 | 1.75 | 0.61   | 0.28   | 3.11 | 1.79 | 0.82   |
| M <sub>3</sub> O <sub>1</sub>   | 1.15   | 0.94   | 0.26   | 0.24   | 1.60 | 1.28 | 0.72   | 0.25   | 2.66 | 1.79 | 0.79   |
| M <sub>3</sub> O <sub>2</sub>   | 1.73   | 0.87   | 0.24   | 0.27   | 1.97 | 1.48 | 0.78   | 0.27   | 2.71 | 1.78 | 0.79   |
| M <sub>3</sub> O <sub>3</sub>   | 1.74   | 0.91   | 0.23   | 0.26   | 2.38 | 1.52 | 0.74   | 0.26   | 2.83 | 1.81 | 0.81   |
| M <sub>4</sub> O <sub>1</sub>   | 0.83   | 0.72   | 0.27   | 0.26   | 2.44 | 1.61 | 0.64   | 026    | 2.68 | 1.76 | 0.82   |
| $M_4O_2$                        | 0.95   | 0.80   | 0.29   | 0.27   | 2.55 | 1.64 | 0.64   | 0.26   | 2:79 | 1.80 | 0.88   |
| M <sub>4</sub> O <sub>3</sub>   | 1.16   | 0.87   | 0.30   | 0.25   | 2.64 | 1.62 | 0.67   | 0.27   | 3.04 | 1.75 | 0.87   |
| SE                              | 0.0030 | 0.0046 | 0.0034 | 0.0032 | 0.01 | 0.03 | 0.0040 | 0.0035 | 0.01 | 0.01 | 0.0034 |
| CD                              | 0.01   | 0.01   | 0.01   | 0.01   | 0.02 | 80.0 | 0.01   | 0.01   | 0.02 | 0.02 | 0.01   |

<sup>\*</sup>Before organic manure application

Table 34. Interaction effect of cowdung extract and organic manure treatments on EC (dSm<sup>-1</sup>) of the media (recorded at weekly intervals)

| Treatments                    | 1      | 2      | 3      | OM*    | 1    | 2    | 3      | OM*    | 1    | 2    | 3      |
|-------------------------------|--------|--------|--------|--------|------|------|--------|--------|------|------|--------|
| $C_1O_1$                      | 0.75   | 0.64   | 0.24   | 0.25   | 2.20 | 1.35 | 0.63   | 0.25   | 2.71 | 1.74 | 0.78   |
| C <sub>1</sub> O <sub>2</sub> | 0.99   | 0.73   | 0.26   | 0.27   | 2.46 | 1.75 | 0.57   | 0.27   | 2.70 | 1.81 | 0.80   |
| $C_1O_3$                      | 1.23   | 0.80   | 0.27   | 0.25   | 2.61 | 1.70 | 0.67   | 0.25   | 2.96 | 1.82 | 0.81   |
| $C_2O_1$                      | 0.74   | 0.63   | 0.26   | 0.24   | 1.99 | 1.44 | 0.68   | 0.26   | 2.58 | 1.74 | 0.80   |
| $C_2O_2$                      | 1.04   | 0.74   | 0.29   | 0.26   | 2.28 | 1.41 | 0.64   | 0.27   | 2.80 | 1.80 | 0.82   |
| $C_2O_3$                      | 1.23   | 0.84   | 0.26   | 0.26   | 2.57 | 1.57 | 0.61   | 0.27   | 2.90 | 1.81 | 0.83   |
| C <sub>3</sub> O <sub>1</sub> | 1.09   | 0.83   | 0.26   | 0.26   | 2.27 | 1.52 | 0.62   | 0.26   | 2.71 | 1.84 | 0.08   |
| C <sub>3</sub> O <sub>2</sub> | 1.29   | 0.87   | 0.26   | 0.26   | 2.29 | 1.29 | 0.69   | 0.27   | 2.81 | 1.83 | 0.78   |
| C <sub>3</sub> O <sub>3</sub> | 1.38   | 0.87   | 0.24   | 0.25   | 2.37 | 1.51 | 0.71   | 0.27   | 3.03 | 1.77 | 0.83   |
| SE                            | 0.0026 | 0.0040 | 0.0029 | 0.0028 | 0.01 | 0.02 | 0.0034 | 0.0031 | 0.01 | 0.01 | 0.0029 |
| CD                            | 0.01   | 0.01   | 0.01   | 0.01   | 0.02 | 0.07 | 0.01   | 0.01   | 0.02 | 0.02 | 0.01   |

<sup>\*</sup>Before organic manure application



#### 4.2 FLORAL CHARACTERS (Tables 35 to 38 and Appendix VIII)

#### 4.2.1 Days to Flowering

#### 4.2.1.1 Effect of Media and Nutrient Treatments on Days to Flowering

The growing media treatments significantly influenced the days taken for flowering of the plants. The number of days to flowering was found to be the lowest for plants grown in sand + coir pith compost (434.67 days). It was followed by granite + leaf compost (440.28 days). The highest number of days to flowering was recorded by plants grown sand + leaf compost medium (470.11 days).

The number of days to flowering was significantly influenced by different concentrations of fresh cowdung extract. The number was the lowest for plants treated with 4 g l<sup>-1</sup> cowdung extract which was on par with plants treated 6 g l<sup>-1</sup> cowdung extract (450.71 days). The number of days to flowering was found to be the highest for 2 g l<sup>-1</sup> cowdung extract (454.7 days).

The different concentrations of organic manure mix also significantly influenced the number of days to flowering. The number was the lowest for treatment with 75 g organic manure mix. It was followed by treatment with 25 organic manure mix (449.71 days). The number of days to flowering was the highest in treatment with 50 g organic manure mix.

# 4.2.1.2 Interaction Effect of the Media and Nutrient Treatments on Number of Days to Flowering

Number of days to flowering was significantly influenced by the interaction between media and cowdung treatments. The number of days to flowering was found to be the lowest for the interaction  $M_2C_1$  (426.50) which was on par with  $M_3C_2$  (434.33 days) and  $M_3C_3$  (429.33 days). The maximum number was recorded for  $M_1C_2$  (474.83) which was on par with  $M_1C_1$  (469.67 days) and  $M_4C_3$  (470.33 days).

The interaction between growing media and organic manure treatments was also found to significantly influence the number of days to flowering. The number was found to be lowest for the interaction  $M_2O_3$  (422.17 days) which was on par with  $M_3O_1$  (428.83 days). The highest number of days to flowering was recorded for the interaction  $M_1O_2$  (487.33 days).

The number of days to flowering was significantly influenced by interaction between cowdung and organic manure treatments.  $C_2O_3$  interaction recorded the lowest number of days to flowering. The highest number of days to flowering was recorded by  $C_3O_2$  (466 days) which was on par with  $C_2O_2$  (460 days),  $C_2O_1$  (460.25 days) and  $C_1O_2$  (465.25 days).

#### 4.2.2 Number of Flowers per Plant

# 4.2.2.1 Effect of Media and Nutrient Treatments on Number of Flowers per Plant

The growing media significantly influenced the number of flowers. The highest number was obtained in sand + coir pith compost media (2.33). This was followed by granite + leaf compost media (1.5). The lowest number of flower was recorded in granite + coir pith compost (1.11) which was on par with sand + leaf compost media (1.17).

Cowdung extract treatments did not significantly influence the number of flowers.

Application of organic manure mix did not show significant effect on number of flowers.

# 4.2.2.2 Interaction Effect of Media and Nutrient Treatments on Number of Flowers per Plant

Number of flowers produced was significantly affected by the interaction of growing media and cowdung treatments. The number of

flowers was the highest for the interaction  $M_2C_2$  (2.5) which was on par with  $M_2C_1$  (2.33) and  $M_2C_3$  (2.17). The lowest number of flowers was recorded in the interaction  $M_1C_3$  (1.00) and  $M_4C_3$  (1.00).

Interaction between growing media and organic manure treatments significantly affected the number of flowers per plant. The highest number of flowers was recorded in the interaction  $M_2O_3$  (2.67). The lowest number of flowers was recorded in the interaction  $M_4O_2$  (1.00) and  $M_1O_2$  (1.00) which were on par with  $M_1O_1$  (1.17),  $M_3O_3$  (1.17),  $M_4O_1$  (1.17),  $M_4O_3$  (1.17),  $M_1O_3$  (1.33) and  $M_3O_2$  (1.33).

The number of flowers was significantly influenced by the interaction between cowdung and organic manure treatments. The number of flowers was found to be the highest in the interaction  $C_2O_3$  (1.88) and  $C_3O_1$  (1.88). The lowest number of flowers was recorded in  $C_3O_3$  (1.25) which was on par with  $C_2O_1$  (1.38),  $C_2O_2$  (1.38) and  $C_3O_2$  (1.38).

### 4.2.3 Spathe Size

### 4.2.3.1 Effect of Media and Nutrient Treatments on Spathe Size

Growing media significantly influenced the spathe size. The highest spathe size of 15.22 cm was recorded in sand + coir pith compost. The lowest spathe size was recorded in sand + leaf compost (7.85 cm) which was followed by granite + coir pith compost (8.93 cm).

Application of fresh cowdung extract significantly influenced spathe size. The highest value for spathe size was recorded for the treatment with 4 g l<sup>-1</sup> cowdung extract (11.59 cm). The lowest value for spathe size was recorded in 2 g l<sup>-1</sup> cowdung extract (10.52 cm).

Spathe size was significantly influenced by different doses of organic manure mix. The highest spathe size was recorded in 25 g organic manure mix (11.25 cm). The lowest value for spathe size was recorded in

50 g organic manure mix (10.79 cm) which was on par with 75 g organic manure mix (10.81 cm).

## 4.2.3.2 Interaction Effect of Media and Nutrient Treatments on Spathe Size

Interaction between growing media and cowdung treatments significantly influenced spathe size. Interaction  $M_2C_2$  recorded the highest spathe size (15.93 cm). This was followed by  $M_2C_1$  (15.37 cm). The lowest spathe size was recorded for the interaction  $M_1C_3$  (7.47 cm).

Interaction of growing media and organic manure treatments significantly influenced spathe size. The interaction  $M_2O_3$  recorded the highest spathe size of 15.32 cm which was on par with  $M_2O_2$  (15.22 cm) and  $M_2O_1$  (15.13 cm). Interaction  $M_1O_3$  recorded the lowest spathe size (7.58 cm).

Interaction of cowdung and organic manure treatments significantly influenced spathe size. The interaction  $C_2O_3$  recorded the highest spathe size (12.35 cm) which was on par with  $C_3O_1$  (12.31 cm). The lowest value was recorded for the interaction  $C_3O_3$  (9.71 cm).

### 4.2.4 Length of Spadix

### 4.2.4.1 Effects of Media and Nutrient Treatments on Length of Spadix

The length of spadix was significantly influenced by the different growing media. The length of spadix as found to be the highest in plants grown in sand + coir pith compost (3.66 cm). The lowest value was recorded by plants grown in granite + coir pith compost (2.71 cm) which was on par with sand + leaf compost (2.8 cm).

The length of spadix was not significantly influenced by different concentrations of fresh cowdung extract.

Different doses of organic manure mix significantly influenced the length of the spadix. The highest spadix length of 3.07 cm was recorded by plants receiving 75 g mix and 50 g mix. The lowest spadix length was recorded by plants receiving 25 g mix (2.93 cm).

# 4.2.4.2 Interaction Effect of Media and Nutrient Treatments on Length of Spadix

Interaction between media and cowdung treatments significantly influenced the length of spadix. The length of spadix was found to be the highest for the interaction  $M_2C_2$  (3.78 cm) which was on par with  $M_2C_1$  (3.72 cm). The lowest spadix length was recorded for the interaction  $M_1C_3$  (2.53 cm), which was on par with  $M_4C_2$  (2.68 cm) and  $M_4C_3$  (2.67 cm).

Length of spadix was also significantly influenced by the interaction between growing media and organic manure treatments. The highest spadix length (3.73 cm) was recorded for the interaction  $M_2C_2$  which were on par with  $M_2O_1$  (3.65) and  $M_2O_3$  (3.6 cm).

The lowest value for spadix length was recorded for the interaction  $M_4O_3$  (2.52 cm) which was on par with  $M_4O_1$  (2.64) and  $M_1O_1$  (2.62 cm).

Interaction effect of cowdung and organic manure treatments significantly influenced the spadix length. The highest spadix length of 3.25 cm was recorded for the interaction  $C_2O_3$  (3.25 cm) which was on par with  $C_3O_1$  (3.16 cm),  $C_1O_2$  (3.2 cm) and  $C_1O_3$  (3.14 cm). Length of spadix was found to be lowest for the interaction  $C_2O_1$  (2.76 cm) which were on par with  $C_1O_1$  (2.86 cm) and  $C_3O_3$  (2.82 cm).

### 4.2.5 Thickness of Spadix

### 4.2.5.1 Effect of Media and Nutrient Treatments on Thickness of Spadix

Growing media significantly influenced the thickness of spadix. The highest spadix thickness (2.46) was recorded in sand + coir pith

compost. The lowest thickness for spadix was recorded in granite + coir pith compost media (1.84 cm).

Thickness of spadix was significantly influenced by application of fresh cowdung extract. Cowdung extract applied at concentration of 2 g l<sup>-1</sup> was found to produce the highest spadix thickness (2.40 cm), which was on par with 6 g l<sup>-1</sup> application (2.06 cm). Thickness of spadix was lowest (2.00 cm) for plants treated with 4 g l<sup>-1</sup> extract.

Different concentration of organic manure mix significantly influenced the spadix thickness. The highest spadix thickness was recorded for plants treated with 75 g organic manure mix (2.18 cm). Treatment with 50 g organic manure mix recorded the lowest spadix thickness (2.01 cm).

## 4.2.5.2 Interaction Effect of Media and Nutrient Treatments on Spadix Thickness

Thickness of spadix was significantly influenced by the interaction between growing media and cowdung treatments. Interaction  $M_2C_2$  recorded the highest spadix thickness of 2.57 cm which was on par with  $M_2C_3$  (2.47 cm). The lowest spadix thickness was obtained in the interaction  $M_1C_3$  (1.72 cm) which was on par with  $M_4C_1$  (1.75 cm) and  $M_3C_1$  (1.83 cm).

Interaction between growing media and organic manure treatments significantly influenced the spadix thickness. The highest spadix thickness was obtained in the interaction  $M_2O_2$  (2.48 cm) and  $M_2O_3$  (2.48 cm), which were on par with  $M_2O_1$  (2.4 cm). Spadix thickness was observed to be lowest in  $M_4O_2$  (1.75 cm) which was on par with  $M_1O_1$  (1.87 cm),  $M_1O_2$  (1.83 cm),  $M_3O_2$  (1.8 cm) and  $M_4O_1$  (1.78 cm).

Thickness of spadix was significantly influenced by interaction between cowdung extract and organic manure mix. The highest value for spadix thickness was obtained for the interaction C<sub>2</sub>O<sub>3</sub> (2.4 cm). The lowest value was obtained for the interaction C<sub>2</sub>O<sub>1</sub> (1.91 cm).

### 4.2.6 Inclination of the Spadix

# 4.2.6.1 Effect of Media and Nutrient Treatments on the Inclination of Spadix

The inclination of spadix was significantly influenced by the growing media tried. The highest inclination of 37.11° was recorded in the media, sand + coir pith compost. The lowest value for inclination was recorded in sand + leaf compost (30.58°).

Application of fresh cowdung extract did not show significant effect on the inclination of spadix.

Different doses of organic manure mix significantly influenced the inclination of spadix. The inclination of spadix was found to be the highest for treatment with 75 g organic manure mix (36.02°). Treatment with 50 g organic manure mix recorded the lower inclination of 32.31°.

# 4.2.6.2 Interaction Effect of Media and Nutrient Treatments on Inclination of Spadix

Interaction of growing media and cowdung significantly influenced the inclination of spadix. The inclination of spadix was found to be the highest for the interaction  $M_4C_1$  (40.5°). The lowest inclination was observed for the interaction  $M_1C_1$  (28.83°).

Inclination of spadix was not significantly influenced by the interaction between growing media and cowdung treatments. Inclination of spadix was the highest for the interaction  $M_4O_3$  (38.25°).

There was significant influence on the inclination of spadix due to interaction of cowdung and organic manure treatments. The highest value was obtained for the interaction  $C_3O_3$  (38.58°) which was on par with

C<sub>2</sub>O<sub>3</sub> (35.81) and C<sub>1</sub>O<sub>1</sub> (37.5). Interaction C<sub>3</sub>O<sub>2</sub> recorded the lowest value of 30.63°.

### 4.2.7 Length of Flower Stalk

# 4.2.7.1 Effects of Media and Nutrient Treatments on Length of Flower Stalk

Length of flower stalk was significantly affected by different growing media. Sand + coir pith compost recorded the highest flower stalk length of 32.17 cm. This was followed by granite + leaf compost (24.5 cm). The lowest flower stalk length was recorded in granite + coir pith compost (17.81 cm) which was followed by sand + leaf compost (18.84 cm).

Application of cow dung extract significantly influenced the length of flower stalk. The highest flower stalk length was recorded in treatment 4 g l<sup>-1</sup> cow dung extract (23.85 cm) which was on par with 2 g l<sup>-</sup> cowdung extract (23.82 cm). Plants treated with 6 g l<sup>-1</sup> cowdung extract recorded the lowest value of 22.82 cm.

Different doses of organic manure mix significantly influenced the flower stalk length. The highest value for flower stalk length was recorded in treatment with 25 g organic manure mix (23.81 cm), which was on par with 75 g organic manure mix (23.43 cm). The lowest value was recorded in treatment with 50 g organic manure mix (22.76 cm).

# 4.2.7.2 Interaction Effect of Media and Nutrient Treatments on Flower Stalk Length

Interaction of growing media and cowdung treatments significantly affected the flower stalk length. The highest value for flower stalk length was recorded for  $M_2C_3$  (32.77 cm) which was on par with  $M_2C_2$  (32.28 cm). The lowest value was recorded for  $M_4C_2$  (15.73 cm) which was on par with  $M_1C_3$  (16.63 cm).

Interaction effect of growing media and organic manure treatments significantly influenced the flower and stalk length.  $M_2O_3$  interaction recorded the highest flower stalk length (32.77 cm) which was on par with  $M_2O_2$  (32.28 cm). The lowest value was recorded for  $M_4O_2$  (15.73 cm) which was on par with  $M_1O_3$  (16.63 cm).

Flower stalk length was significantly influenced by the interaction between cowdung and organic manure treatments. The highest flower stalk length of 25.19 was recorded for the interaction  $C_2O_3$  which was on par with  $C_3O_1$  (25.44 cm). The lowest value of 22.03 cm was recorded for the interaction  $C_3O_3$  (22.74 cm) and  $C_1O_3$  (22.35 cm).

#### 4.2.8 Thickness of Flower Stalk

## 4.2.8.1 Effect of Media and Nutrient Treatments on Thickness of Flower Stalk

Growing media significantly influenced the thickness of flower stalk. The highest flower stalk thickness was recorded in sand + coir pith compost (1.13 cm). The lowest flower stalk thickness was recorded in plants grown in granite + coir pith compost (0.96 cm) which was on par with sand + leaf compost (0.99 cm) and granite + leaf compost (0.99 cm).

Thickness of flower stalk was significantly influenced by application of fresh cowdung extract. Thickness was the highest for fresh cowdung extract applied at 2 g l<sup>-1</sup> (1.04 cm) and 4 g l<sup>-1</sup> (1.04 cm). The thickness was observed to be lowest in 6 g l<sup>-1</sup> cowdung extract (0.97 cm).

Thickness of flower stalk was not significantly influenced by different doses of organic manure mix.

# 4.2.8.2 Interaction Effect of Media and Nutrient Treatments on Thickness of Flower Stalk

Thickness of flower stalk was significantly influenced by the interaction between growing media and cowdung treatments. Thickness of

flower stalk was the highest for the interaction  $M_2C_1$  (1.22 cm). Thickness was lowest for the interaction  $M_1C_3$  (0.82 cm) which was on par with  $M_3C_1$  (0.9 cm).

The interaction of growing media and organic manure treatments significantly influenced the flower stalk thickness. The highest thickness of 1.18 cm was recorded for the interaction  $M_2O_3$  which was on par with  $M_2O_1$  (1.12 cm). The interaction  $M_1O_2$  recorded the lowest value of 0.92 cm.

Flower stalk thickness was significantly influenced by the interaction between cowdung extract and organic manure mix. The interaction  $C_2O_3$  recorded the highest flower stalk thickness of 1.13 cm which was on par with  $C_1O_2$  (1.06 cm). The lowest value was recorded for the interaction  $C_3O_2$  (0.94 cm).

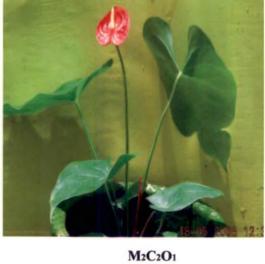
#### 4.2.9 Days to Harvestable Maturity of Flowers

## 4.2.9.1 Effect of Media and Nutrient Treatments on Days to Harvestable Maturity of Flowers

Number of days to harvestable maturity of flowers was significantly influenced by growing media. The number of days to harvestable maturity of flowers was lowest for granite + leaf compost (45.83 days). The highest number of days to harvestable maturity of flowers was observed in sand + leaf compost (47.06 days) which was on par with sand + coir pith compost (46.92 days) and granite + coir pith compost (46.39 days).

Fresh cowdung extract applied at different concentrations significantly influenced the number of days to harvestable maturity of flowers. The lowest value was recorded for the treatment 4 g l<sup>-1</sup> cowdung extract (45.71 days). The highest value was recorded for the treatment 2 g l<sup>-1</sup> cowdung extract (47.21 days).





M1C1O2





M<sub>3</sub>C<sub>2</sub>O<sub>3</sub> M<sub>4</sub>C<sub>2</sub>O<sub>2</sub>

Plate 3. Treatment effects on growth and flower production

The number of days to harvestable maturity of flowers was not significantly influenced by different doses of organic manure mix.

## 4.2.9.2 Interaction Effect of Media and Nutrient Treatments on Days to Harvestable Maturity of Flowers

Interaction between cowdung and organic manure treatments were found to influence the days to harvestable maturity of flowers. The lowest number of days was recorded in  $C_2O_3$  (45 days) which was on par with  $C_2O_1$  (45.88 days) and  $C_3O_2$  (45.19 days). The highest number of days was recorded in  $C_3O_3$  (48.3 days) which was on par with  $C_1O_2$  (48.13 days).

The interaction between growing media and cowdung treatments did not significantly influence the days to harvestable maturity of flowers.

Days to harvestable maturity of flowers was not significantly influenced by growing media and organic manure treatments.

### 4.2.10 Vase Life

## 4.2.10.1 Effect of Media and Nutrient Treatments on Vase Life of Flowers

The growing media had a significant influence on the vase life of flowers. The highest vase life of 13.06 days was observed in sand + coir pith compost. The lowest vase life was recorded in granite + coir pith compost (10.50 days) which was on par with sand + leaf compost (10.83 days).

Vase life was significantly influenced by application of fresh cowdung extract. The highest vase life was recorded in plants treated with 4 g l<sup>-1</sup> cowdung extract (11.71 days). The lowest value was recorded in treatment with 2 g l<sup>-1</sup> (11.17 days) which was on par with 6 g l<sup>-1</sup> extract (11.21 days).

Vase life was significantly influenced by different dose of organic manure mix. The treatment with 25 g organic manure mix recorded the

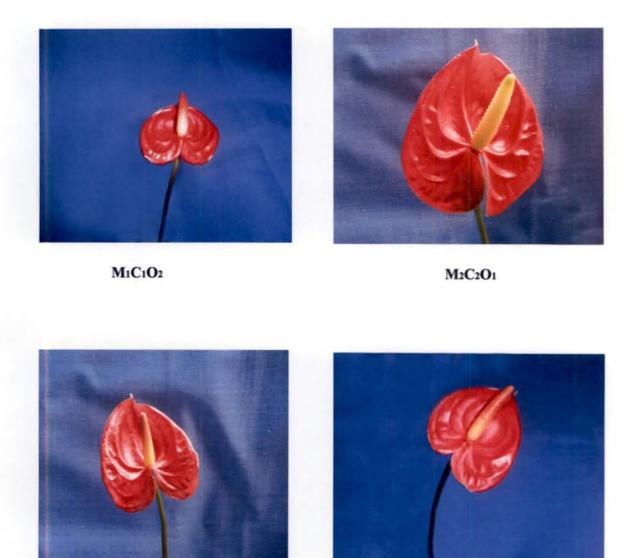


Plate 4. Variation in flower size between treatments

M<sub>4</sub>C<sub>2</sub>O<sub>2</sub>

M<sub>3</sub>C<sub>2</sub>O<sub>3</sub>

highest vase life of 11.67 days. The lowest vase life was recorded in the treatment with 50 g organic manure mix (10.96 days).

## 4.2.10.2 Interaction Effect of Media and Nutrient Treatments on Vase Life of Flowers

The vase life of flowers was significantly influenced by the interaction between growing media and organic manure treatments. The highest vase life was recorded in M<sub>2</sub>O<sub>1</sub> and M<sub>2</sub>O<sub>3</sub> (13.5 and 13.17 days respectively). The vase life was found to be the lowest for the interaction M<sub>4</sub>O<sub>1</sub>, M<sub>4</sub>O<sub>2</sub>, M<sub>4</sub>O<sub>3</sub>, M<sub>3</sub>O<sub>2</sub>, M<sub>3</sub>O<sub>3</sub> and M<sub>1</sub>O<sub>2</sub> recording 10.67, 10.17, 10.67, 10.83, 10.5 and 10.33 respectively.

Interaction of growing media and cowdung treatments did not significantly influence the vase life of flowers.

Interaction between cowdung and organic manure treatments also did not affect the vase life of flowers significantly.

Table 35. Effects of media and nutrient treatments on floral characteristics in Anthurium andreanum cv. Tropical

| Treatments     | Days to flowering | Number of flowers | Spathe size (cm) | Length of spadix (cm) | Thick spadix (cm) | Inclination<br>(Degree) | Length of flower stalk (cm) | Thickness<br>of flower<br>stalk (cm) | Days to maturity | Vase life<br>(Days) |
|----------------|-------------------|-------------------|------------------|-----------------------|-------------------|-------------------------|-----------------------------|--------------------------------------|------------------|---------------------|
| Growing media  |                   |                   |                  |                       |                   |                         |                             |                                      | <u> </u>         |                     |
| M <sub>1</sub> | 470.11            | 1.17              | 7.85             | 2.80                  | 1.97              | 30.58                   | 18.84                       | 0.99                                 | 47.06            | 10.83               |
| M <sub>2</sub> | 434.67            | 2.33              | 15.22            | 3.66                  | 2.46              | 37.11                   | 32.17                       | 1.13                                 | 46.92            | 13.06               |
| M <sub>3</sub> | 440.28            | 1.50              | 11.81            | 2.92                  | 1.95              | 32.89_                  | 24.50                       | 0.99                                 | 45.83            | 11.06               |
| M <sub>4</sub> | 462.00            | 1:11              | 8.93             | 2.7.1                 | 1.84              | - 35.53                 | 17.81                       | 0.96                                 | 46.39            | 10.50               |
| SE             | 1.64              | 0.09              | 0.05             | 0.04                  | 0.02              | 0.91                    | 0.20                        | 0.02_                                | 0.25             | 0.14_               |
| CD             | 4.69              | 0.25              | 0.15             | 0.11                  | 0.67              | 2.61                    | 0.57                        | 0.05                                 | 0.72             | 0.41                |
| Cowdung        |                   |                   | <u> </u>         |                       |                   |                         |                             |                                      |                  |                     |
| Cı             | 454.70            | 1.54              | 10.52            | 3.06                  | 2.00              | 34.71                   | 22.82                       | 1.04                                 | 47.21            | 11.17               |
| C <sub>2</sub> | 449.88            | 1.54              | 11.59            | 3.02                  | 2.10              | 33.71                   | 23.85                       | 1.04                                 | 45.71            | 11.71               |
| C <sub>3</sub> | 450.71            | 1.50              | 10.75            | 2.98                  | 2.06              | 33.67                   | 23.32                       | 0.97                                 | 46.73            | 11.21               |
| SE             | 1.42              |                   | 0.05             |                       | 0.02              | -                       | 0.17                        | 0.01                                 | 0.22             | 0.12                |
| CD             | 4.07              | NS                | 0.13             | NS                    | 0.06              | NS                      | 0.49                        | 0.04                                 | 0.63             | 0.35                |
| Organic manure |                   |                   |                  |                       |                   |                         |                             |                                      | -                |                     |
| Oı             | 449.71            | 1.63              | 11.25            | 2.93                  | 2.01              | 33.75                   | 23.81                       | 1.02                                 | 46.42            | 11.67               |
| O <sub>2</sub> | 463.75            | 1.38              | 10.79            | 3.07                  | 1.97              | 32.31                   | 22.76                       | 0.99                                 | 46.52            | 10.96               |
| O <sub>3</sub> | 441.83            | 1.52              | 10.81            | 3.07                  | 2.18              | 36.02                   | 23.43                       | 1.04                                 | 46.71            | 11.46               |
| SE             | 1.42              | -                 | 0.05             | 0.03                  | 0.02              | 0.79                    | 0.17                        | -                                    | -                | 0.12                |
| CD             | 4.07              | NS                | 0.13             | 0.10                  | 0.06              | 2.26                    | 0.49                        | NS                                   | NS               | 0.35                |

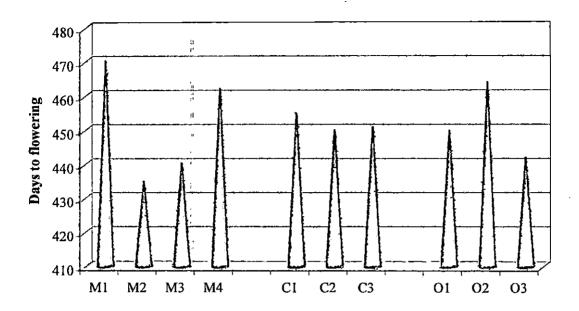


Fig. 4. Effect of media and nutrient treatments on days to flowering in Anthurium andreanum cv. Tropical

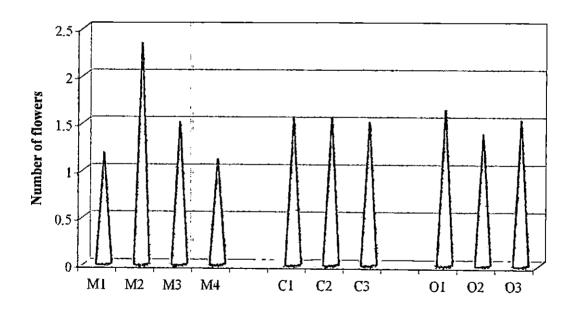


Fig. 5. Effect of media and nutrient treatments on number of flowers in Anthurium andreanum ev. Tropical

M1 - Sand + leaf compost

M2 - Sand + coir pith compost

M3 - Granite chips + leaf compost

M4 - Granite chips + coir pith compost

C1-2.0 g l<sup>-1</sup> cowdung extract

C2- 4.0 g I<sup>-1</sup> cowdung extract

C3-6.0 g l<sup>-1</sup> cowdung extract

O1-25 g organic manure mix

O2- 50 g organic manure mix

O3-75 g organic manure mix

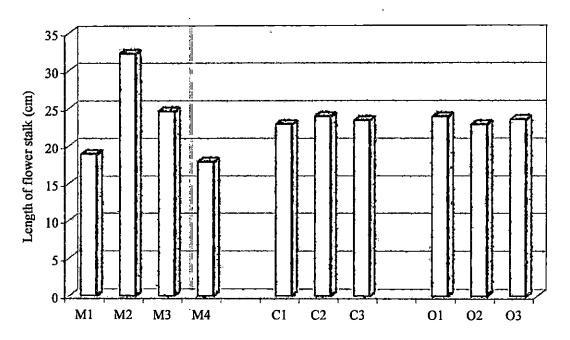


Fig. 6. Effect of media and nutrient treatments on length of flower stalk (cm) in Anthurium andreanum cv. Tropical

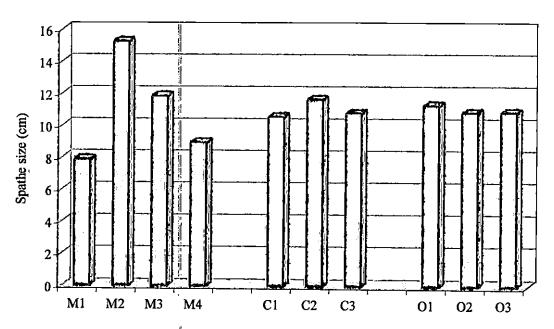


Fig. 7. Effect of media and nutrient treatments on spathe size (cm) in Anthurium andreanum cv. Tropical

M1 - Sand + leaf compost

M2 - Sand + coir pith compost

M3 - Granite chips + leaf compost

M4 - Granite chips + coir pith compost

C1-2.0 g l<sup>-1</sup> cowdung extract

C2-4.0 g l<sup>-1</sup> cowdung extract

C3-6.0 g l<sup>-1</sup> cowdung extract

O1-25 g organic manure mix

O2-50 g organic manure mix

O3-75 g organic manure mix

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Table 36. Interaction effect of media and cowdung treatments on floral characteristics in Anthurium andreanum cv. Tropical

| Treatments                    | Days to flowering | Number of flowers | Spathe size (cm) | Length of spadix (cm) | Thickness<br>of spadix<br>(cm) | Inclination<br>(Degree) | Length of<br>flower<br>stalk (cm) | Thickness<br>of flower<br>stalk (cm) | Days to<br>maturity | Vase life<br>(days) |
|-------------------------------|-------------------|-------------------|------------------|-----------------------|--------------------------------|-------------------------|-----------------------------------|--------------------------------------|---------------------|---------------------|
| $M_1C_1$                      | 469.67            | 1.17              | 8.00             | 3.00                  | 2.08                           | 28.83                   | 20.13                             | 1.07                                 | 47.17               | 10.89               |
| $M_1C_2$                      | 474.83            | 1.33              | 8.08             | 2.87                  | 2.10                           | 30.42                   | 19.77                             | 1.07                                 | 46.50               | 11.50               |
| M <sub>1</sub> C <sub>3</sub> | 465.83            | 1.00              | 7.47             | 2.53                  | 1.72                           | 32.50                   | 16.63                             | 0.82                                 | 47.50               | 10.17               |
| M <sub>2</sub> C <sub>1</sub> | 426.50            | 2.33              | 15.37            | 3.72                  | 2.33                           | 37.50                   | 31.47                             | 1.22                                 | 47.83               | 12.50               |
| M <sub>2</sub> C <sub>2</sub> | 440.17            | 2.50              | 15.93            | 3.78                  | 2.57                           | 38.33                   | 32.28                             | 1.13                                 | 46.33               | 13.50               |
| M <sub>2</sub> C <sub>3</sub> | 437.33            | 2.17              | 14.37            | 3.48                  | 2.47                           | 35.50                   | 32.77                             | 1.05                                 | 46.58               | 13.17               |
| M <sub>3</sub> C <sub>1</sub> | 457.17            | 1.50              | 9.98             | 2.75                  | 1.83                           | 32.00                   | 22.10                             | 0.90                                 | 46.50               | 10.83               |
| M <sub>3</sub> C <sub>2</sub> | 434.33            | 1.17              | 13.52            | 2.75                  | 1.87                           | 32.50                   | 27.63                             | 1.03                                 | 45.33               | 11.33               |
| M <sub>3</sub> C <sub>3</sub> | 429.33            | 1.83              | 11.93            | 3.25                  | 2,15                           | 34.10                   | 23.77                             | 1.04                                 | 45.67               | 11.00               |
| M <sub>4</sub> C <sub>1</sub> | 465.50            | 1.17              | 8.73             | 2.79                  | 1.75                           | 40.50                   | 17.58                             | 0.97                                 | 47.33               | 10.50               |
| M <sub>4</sub> C <sub>2</sub> | 450.17            | 1.17              | 8.83             | 2.68                  | 1.85                           | 33.58                   | 15.73                             | 0.92                                 | 44.67               | 10.50               |
| M <sub>4</sub> C <sub>3</sub> | 470.33            | 1.00              | 9.25             | 2.67                  | 1.91                           | 32.50                   | 20.12                             | 0.98                                 | 47.17               | 10.50               |
| SE                            | 2.83              | 0.15              | 0.09             | 0.07                  | 0.04                           | 1.57                    | 0.34                              | 0.03                                 | -                   |                     |
| CD                            | 8.13              | 0.44              | 0.26             | 0.19                  | 0.12                           | 1.52                    | 0.98                              | 0.08                                 | NS                  | ทร                  |

Table 37. Interaction effect of media and organic manure treatments on floral characteristics in Anthurium andreanum cv. Tropical

| Treatments                    | Days to flowering | Number of flowers | Spathe size (cm) | Length of spadix (cm) | Thick<br>spadix<br>(cm) | Inclination<br>(Degree) | Length of flower stalk (cm) | Thickness<br>of flower<br>stalk (cm) | Days to<br>maturity | Vase life<br>(days) |
|-------------------------------|-------------------|-------------------|------------------|-----------------------|-------------------------|-------------------------|-----------------------------|--------------------------------------|---------------------|---------------------|
| $M_1O_1$                      | 470.50            | 1.17              | 8.00             | 1.87                  | 2.62                    | 33.33                   | 20.13                       | 1.02                                 | 47.33               | 11.00               |
| $M_1O_2$                      | 487.33            | 1.00              | 7.97             | 1.83                  | 2.77                    | 27.58                   | 19.77                       | 0.92                                 | 47.00               | 10.33               |
| M <sub>1</sub> O <sub>3</sub> | 452.50            | 1.33              | 7.58             | 2.20                  | 3.02                    | 30.83                   | 16.63                       | 1.03                                 | 46.83               | 11.17               |
| M <sub>2</sub> O <sub>1</sub> | 435.17            | 2.17              | 15.13            | 2.40                  | 3.65                    | 36.67                   | 31.47                       | 1.12                                 | 47.00               | 13.17               |
| M <sub>2</sub> O <sub>2</sub> | 446.67            | 2.17              | 15.22            | 2.48                  | 3.73                    | 36.67                   | 32.28                       | 1.10                                 | 46.75               | 12.50               |
| M <sub>2</sub> O <sub>3</sub> | 422.17            | 2.67              | 15.32            | 2.48                  | 3.60                    | 38.00                   | 32.77                       | 1.18                                 | 47.00               | 13.50               |
| M <sub>3</sub> O <sub>1</sub> | 428.83            | 2.00              | 12.00            | 2.02                  | 2.80                    | 30.00                   | 22.10                       | 0.99                                 | 45.33               | 11.83               |
| M <sub>3</sub> O <sub>2</sub> | 442.67            | 1.33              | 11.89            | 1.80                  | 2.80                    | 31.67                   | 27.63                       | 1.01                                 | 45.83               | 10.83               |
| M <sub>3</sub> O <sub>3</sub> | 449.33            | 1.17              | 11.54            | 2.03                  | 3.15                    | 37.00                   | 23.77                       | 0.97                                 | 46.33               | 10.50               |
| M <sub>4</sub> O <sub>1</sub> | 464.33            | 1.17              | 9.88             | 1.78                  | 2.64                    | 35.00                   | 17.58                       | 0.95                                 | 46.00               | 10.67               |
| M <sub>4</sub> O <sub>2</sub> | 478.33            | 1.00              | 8.09             | 1.75                  | 2.98                    | 33.33                   | 15.73                       | 0.93                                 | 46.50               | 10.17               |
| M <sub>4</sub> O <sub>3</sub> | 443.33            | 1.17              | 8.82             | 1.98                  | 2.52                    | 38.25                   | 20.12                       | 0.98                                 | 46.67               | 10.67               |
| SE                            | 2.83              | 0.15              | 0.09             | 0.04                  | 0.07                    | -                       | 0.34                        | 0.03                                 | -                   | 0.25                |
| CD                            | 8.13              | 0.44              | 0.26             | 0.12                  | 0.19                    | NS                      | 0.98                        | 0.07                                 | NS                  | 0.70                |

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Table 38. Interaction effect of cowdung and organic manure treatments on floral characteristics in Anthurium andreanum cv. Tropical

| Treatments                    | Days to flowering | Number of flowers | Spathe size (cm) | Length of spadix (cm) | Thick<br>spadix<br>(cm) | Inclination<br>(Degree) | Length of<br>flower<br>stalk (cm) | Thickness<br>of flower<br>stalk (cm) | Days to<br>maturity | Vase life<br>(days) |
|-------------------------------|-------------------|-------------------|------------------|-----------------------|-------------------------|-------------------------|-----------------------------------|--------------------------------------|---------------------|---------------------|
| C <sub>1</sub> O <sub>1</sub> | 450.00            | 1.63              | 10.61            | 2.86                  | 1.94                    | 37.50                   | 23.08                             | 1.03                                 | 46.75               | 11,25               |
| C <sub>1</sub> O <sub>2</sub> | 465.25            | 1.38              | 10.56            | 3,20                  | 1.96                    | 32.88                   | 23.04                             | 1.06                                 | 48.13               | 10.63               |
| C <sub>1</sub> O <sub>3</sub> | 448.88            | 1.63              | 10.38            | 3.14                  | 2.10                    | 33.75                   | 22.35                             | 1.03                                 | 46.75               | 11.63               |
| C <sub>2</sub> O <sub>1</sub> | 460.25            | 1.38              | 10.84            | 2.76                  | 1.91                    | 31.88                   | 22.91                             | 1.01                                 | 45.88               | 12.00               |
| C <sub>2</sub> O <sub>2</sub> | 460.00            | 1.38              | 11.58            | 3.05                  | 1.97                    | 33.44                   | 22.74                             | 0.97                                 | 46.25               | 11.38               |
| C <sub>2</sub> O <sub>3</sub> | 429.38            | 1.88              | 12.35            | 3.25                  | 2.40                    | 35.81                   | 25.91                             | 1.13                                 | 45.00               | 11.75               |
| C <sub>3</sub> O <sub>1</sub> | 438.88            | 1.88              | 12.31            | 3.16                  | 2.19                    | 31.88                   | 25.44                             | 1.02                                 | 46.63               | 11.75               |
| C <sub>3</sub> O <sub>2</sub> | 466.00            | 1.38              | 10.24            | 2.96                  | 1.96                    | 30.63                   | 22.50                             | 0.94                                 | 45.19               | 10.88               |
| C <sub>3</sub> O <sub>3</sub> | 447.25            | 1.25              | 9.71             | 2.82                  | 2.03                    | 38.50                   | 22.03                             | 0.96                                 | 48.38               | 11.00               |
| SE                            | 2.45              | 0.13              | 0.08             | 0.06                  | 0.04                    | 1.36                    | 0.30                              | 0.03                                 | 0.38                | -                   |
| CD                            | 7.04              | 0.38              | 0.23             | 0.16                  | 0.10                    | 3.91                    | 0.85                              | 0.07                                 | 1.08                | NS                  |

Discussion

#### 5. DISCUSSION

The experiment was undertaken with the objective of standardizing growing media and organic nutrition for juvenile Anthurium andreanum plants. The growing media evaluated had consisted of sand or granite along with leaf compost or coir pith compost in the proportion of 3:1. The nutrients tried had consisted of fresh cowdung extract and organic manure mix at varying concentrations. The results obtained are discussed in this chapter.

Effect of growing media and applied nutrients on vegetative growth was studied at fortnightly intervals from 60 DAT to 225 DAT. The medium consisting of sand + coir pith compost was found to be the best for obtaining greater plant height (41.66 cm), leaf area (574.48 cm²), leaf duration (147.06 cm), petiole length at third and fourth week after emergence (15.28 and 16.29 cm respectively) and the shortest phyllachron (39.94 days). The fresh and dry weight of leaves (5.14 g and 1.2 g respectively) and their N and K content (1.61 and 2.23 per cent respectively) were also greater in this medium. The advantages of composted coir pith as an ideal media component for growing plants had been reported by several workers (Jawaharlal et al., 2001a; Meerow, 1995; Singh et al., 2003).

In Anthurium andreanum Lima white, Rajeevan et al. (2003) reported similar beneficial effects on vegetative growth in a sand based medium containing coir pith. Similar effects have also been reported in foliage aroids such as Aglaonema, Dieffenbachia and Philodendron with coir pith as a media component (George et al., 2003).

The beneficial effects on vegetative growth observed were found to be related to flowering and floral characteristics. Plants grown in this medium recorded earlier flowering (434.67 days), greater number of flowers per plant (2.33), increased spathe size (15.22 cm), greater length and thickness of flower stalk (32.17 and 1.13 cm respectively) and enhanced vase life (13.06 days). The inclination of spadix (37.11°) and its length and thickness were also found to be greater (3.66 and 2.46 cm respectively) tending towards those of mature plants in this medium. Similar effects on days to flowering, flower production and flower longevity were reported in A. andreanum cv. Temptation by Jawaharlal et al. (2001a) in cocopeat alone or cocopeat + leaf mould medium and in floral attributes of the cultivars Agnihotri, Cherry Red and Sunset Orange in sand + coconut husk medium by Hatibarua et al. (2003).

The beneficial media effects observed in the present study may be attributed to the better physico-chemical properties of the medium. The greater aeration obtained with the sand component and the enhanced nutrient composition of composted coir pith and its reported ability to convert nutrients into a readily available form to plants (Suharban, 2004) may be the causative factors.

Vegetative growth enhancement was also obtained with 4 g l<sup>-1</sup> and 6 g l<sup>-1</sup> fresh cowdung extract treatments at varying stages of growth. Greater plant height was recorded in plants receiving 4 g l<sup>-1</sup> cowdung extract at 60 and 180 to 225 DAT and with 6 g l<sup>-1</sup> cowdung extract from 105 to 135 DAT. Enhanced leaf area was also recorded in plants receiving 4 g l<sup>-1</sup> cowdung extract from 60 to 120 DAT, 150 to 225 DAT and with 6 g l<sup>-1</sup> cowdung extract at 135 DAT. Petiole length was also found to be greater for plants receiving 4 g l<sup>-1</sup> extract. However the shortest phyllachron interval was obtained with 2 g l<sup>-1</sup> cowdung extract.

Greater fresh weight and dry weight of leaves were recorded in plants receiving 4 g l<sup>-1</sup> cowdung extract at 165 and 225 DAT. These plants also recorded greater N and K content during the period while the P content was greater in plants receiving 6 g l<sup>-1</sup> at these periods.

Increased spathe size, lesser number of days to flowering, maximum length of flower stalk, maximum vase life and lesser number of days to harvestable maturity of flowers was obtained with 4 g l<sup>-1</sup> extract. However the thickness of flower stalk was greater with the 2 g l<sup>-1</sup> as well as the 4 g l<sup>-1</sup> treatment and spadix thickness was greater with the 2 g l<sup>-1</sup> treatment. Similar beneficial effects of farmyard manure applied in 2 : 1 : 1 proportion with soil and sand on the growth of *Anthurium andreanum* cv. Singapore Hybrid has been highlighted by Dhananjaya and Sulladmath (2003). Similarly, a combination of organic manure such as farmyard manure with 2 g of 17 : 17 : 17 : 2 NPK and Mg /plant once or twice a month was reported to be beneficial for Anthurium by Rajeevan and Valsalakumari (1998). The package of practices (KAU, 2002) also recommends the use of combination of cowdung, neem cake and cow's urine for Anthuriums.

Organic manure mix consisting of leaf compost, neem cake, bone meal, poultry manure and wood ash in the proportion 2:2:2:1:1 by volume applied to plants at bimonthly intervals at 25, 50 and 75 g plant<sup>-1</sup> were also found to give beneficial effects. Plants receiving 75 g OM mix at 60 and 75 DAT recorded greater plant heights. At 120 DAT and from 150 to 225 DAT, 25 g dosage was found to be more effective.

Greater leaf area was recorded at 60, 75 and 150 DAT by 50 g / plant. However at 105, 120, 135 DAT and from 105 to 225 DAT, 25 g OM mix resulted in greater leaf area. This dosage also resulted in greater leaf duration and greater petiole length during the first and second week after leaf emergence.

Petiole length was however greater during the third and fourth week after emergence in plants receiving 75 g OM mix. Fresh and dry weight of the leaves recorded at 165 and 225 DAT were greater in plants receiving 75 g mix. The shortest phyllachron was recorded with 50 g dosage and the longest was recorded with 75 g / plant

Spathe size, length of the flower stalk as well as the vase life of flowers was greater in plants receiving 25 g OM mix. However, lesser number of days to flowering, greater thickness and inclination of spadix were recorded in plants receiving 75 g mix and greater spadix length was recorded in plants receiving 50 g mix also.

Beneficial effects on vegetative growth and quality of plant produce were observed by organic manure application in other crops such as tomato (Thamburaj, 1994), turmeric (Rakhee, 2002) and ginger (Sreekala, 2004).

The N and K content of the leaves recorded at 165 and 225 DAT were greater in plants receiving 25 g mix while the P content was greater in plants receiving 50 g mix. In Anthuriums, raising the N levels was reported to increase the N levels of leaves and decrease the P levels (Poole and Greaves, 1969). The higher N levels of leaves recorded during the later stages of growth are supportive of this.

The pH and EC of the growing media was also influenced by the media and nutrient treatments. The pH of the growing media recorded before the application of nutrient treatments showed that the values were the highest in granite + coir pith compost (7.49) and the lowest in sand + leaf compost (4.53). The sand + leaf compost media recorded the lowest value in the acidic range before the first application of organic manure mix. However, this medium recorded the highest values during the first, second and third week after the first organic manure mix application. Similar effects were observed after subsequent application also. The sand + coir pith media was found to record only gradual changes in pH during the various stages compared to the other media. It was found to retain values such as 6.49, 6.41 and 6.64 respectively by the third week after three consecutive bimonthly application of organic manure mix. This may be attributed to the better vegetative growth and flowering observed in plants grown in sand + coir pith compost media.

A rise in pH and EC was observed in all the media treatments during the first week after the organic mix application and the pH and EC were found to decrease gradually during the subsequent period. The components of the manure mix and its organic nature may be the causative factors for these changes. Contrary to this lowering of the pH was observed by the application of nutrient solutions to Anthurium plants (Ozcelik et al., 2000) and in gerbera plants (Aswath and Pillai, 2004) which may be due to the inorganic nature and components of the applied solutions.

Among the cowdung treatments, plants receiving 4 g l<sup>-1</sup> extract were found to record relatively lower pH after the application of organic manure mix. An increasing in pH immediately after organic manure mix application and decrease in pH during subsequent stages was noticed tending towards the neutral. Among the organic manure treatments plants receiving higher doses of organic manure mix were found to record higher pH values from first week after first application onwards. Similar effects were observed after second and third application. By second and third application 50 g dosage also recorded higher pH.

In Anthurium andreanum supra normal concentrations of applied salts and rising EC levels has been reported to be detrimental to flower production (Spek et al., 1985). In this experiment the rising EC levels and associated beneficial effects on flowering observed showed that these applied nutrients levels are not supra normal and are indication of optimum levels.

Interaction effects between media treatments, cowdung and organic manure treatments were observed to influence the performance of plants. They generally support the main effects observed in the experiment. The dosage of 75 g organic manure mix was also found to be equally effective as the lower dose (25 g organic manure mix) as a result of interaction.

The main effects observed in the study have shown that significantly greater plant height, leaf area, leaf duration, N and K content of leaves and vase life could be obtained in plants grown in sand + coir pith compost (M<sub>2</sub>) receiving weekly application of 4 g l<sup>-1</sup> cowdung extract and bimonthly application of 25 g organic manure mix. The plants grown in this medium and cowdung treatment also recorded greater fresh weight and dry weight of leaves, lesser phyllachron, lesser number of days to flowering and lesser number of days to harvestable maturity of flowers.

Thus, this medium combination (sand + coir pith compost) and nutrient regime (4 g l<sup>-1</sup> cowdung extract and 25 g organic manure mix) can be recommended for juvenile anthurium plants.

Summary

#### 6. SUMMARY

An investigation was carried out at the Department of Pomology and Floriculture, College of Agriculture, Vellayani during 2003 – 2005 with a view to standardize the growing media and organic nutrient dosage for young anthurium plants. The anthurium cultivar chosen for study was Anthurium andreanum 'Tropical', a commercially important cultivar of Kerala. The treatment consisted of thirty six combinations of four media treatments namely sand + leaf compost (M<sub>1</sub>), sand + coir pith compost (M<sub>2</sub>), granite + leaf compost (M<sub>3</sub>) and granite + coir pith compost (M<sub>4</sub>) and nine nutrients treatments including three cowdung treatment (2, 4 and 6 g l<sup>-1</sup> extract) and three organic manure mix (25, 50 and 75 g) treatments. The results of the experiment are summarized below.

Growing media, nutrient treatments and their interactions influenced vegetative growth, flowering and floral characters, vase life, fresh weight and dry matter production and nutrient content of leaves.

Highest height was recorded in plants grown in sand + coir pith compost from 50 DAT (14.12 cm) to 225 DAT (41.66 cm).

Greater height was recorded for the treatment with 4 g l<sup>-1</sup> cowdung extract at 60 DAT (13.56 cm) and from 180 to 225 DAT (30.4 to 34.25 cm). From 105 to 135 DAT, plants receiving 6 g l<sup>-1</sup> extract recorded highest height (18.86 to 22.5 cm).

Plant height was highest for plants receiving 75 g organic manure mix at 60 and 75 DAT (13.56 and 14.72 cm respectively). At 120 DAT and from 150 to 225 DAT, plants receiving 25 g organic manure mix were found to record greater heights (20.77) at 120 DAT, 26.22 cm at 150 DAT to 34.55 cm at 225 DAT.

Interaction between growing media and cowdung treatments resulted in highest heights in M<sub>2</sub> plants (sand + coir pith media) receiving

 $C_2$  (4 g l<sup>-1</sup> extract) at 60, 75, 150 DAT and from 180 to 225 DAT. From 105 to 135 DAT, lowest height was recorded in  $M_2$  (sand + coir pith media) plants receiving  $C_3$  (6 g l<sup>-1</sup> extract).

Interaction between growing media and organic manure mix resulted in highest heights in  $M_2$  (sand + coir pith media) plants receiving  $O_3$  (75 g mix) at 60 DAT. From 75 to 135 DAT and from 165 to 225 DAT the highest heights were recorded in  $M_2$  (sand + coir pith media) plants receiving  $O_2$  (50 g mix). At 150 DAT the highest height was recorded in  $M_2$  (sand + coir pith media) plants receiving  $O_1$  (25 g mix).

The plant height was also significantly influenced by the interaction between fresh cowdung extract and organic manure mix.

From 60 to 90 DAT and from 195 to 225 DAT, the highest plant height was recorded in plants receiving  $C_2O_3$ . At 120 DAT and 165 DAT highest plant height was observed in plants receiving  $C_3O_2$  and  $C_2O_1$  respectively. At 105, 135, 150 and 180 DAT, the highest plant height was observed in plants receiving  $C_3O_1$ .

The highest leaf area was recorded for plants grown in sand + coir pith compost from 60 DAT to 225 DAT (66.15 cm<sup>2</sup> to 574.48 cm<sup>2</sup>).

The plants receiving 4 g l<sup>-1</sup> extract recorded highest leaf area from 60 DAT to 120 DAT (63.09 cm<sup>2</sup> to 140.16 cm<sup>2</sup>) and from 150 DAT to 225 DAT (223.13 cm<sup>2</sup> to 451.23 cm<sup>2</sup>). At 135 DAT, plants receiving 6 g l<sup>-1</sup> extract was found to record highest leaf area (156.13 cm<sup>2</sup>).

The highest leaf area was recorded in plants receiving 50 g OM mix at 60, 75 and 150 DAT (58.96, 62.74 and 208.74 cm<sup>2</sup> respectively). From 165 to 225 DAT, highest leaf area was recorded in plants receiving 25 g OM mix (266.34 to 446.46 cm<sup>2</sup>).

Interaction between media and cowdung treatments resulted in highest leaf area in  $M_2$  (sand + coir pith media) plants receiving  $C_2$  (4 g l<sup>-1</sup> extract) at 60 DAT and from 90 to 225 DAT.

Interaction between media and organic manure treatments resulted in highest leaf area in  $M_2$  (sand + coir pith media) plants receiving  $O_2$  (50 g mix) from 60 to 105 DAT and from 135 – 195 DAT. At 120, 210 and 225 DAT the highest leaf area was recorded in  $M_2$  (sand + coir pith media) plants receiving  $O_3$  (75 g mix).

Interaction between cowdung and organic manure treatments resulted in highest leaf area in plants receiving C<sub>2</sub>O<sub>3</sub> from 60 to 105 DAT and from 150 to 225 DAT. Plants grown in granite + coir pith compost recorded highest number of leaves at 60, 75 and 90 DAT.

Among the interaction, the highest number of leaves was recorded in  $M_2$  (sand + coir pith media) plant receiving  $C_2$  (4 g l<sup>-1</sup> extract) and  $M_4$  plants receiving  $C_1$  at 60 DAT.

The shortest phyllachron was recorded in plants grown in sand + coir pith compost (39.94 days) and the longest in granite + coir pith compost (45.33 days).

Plants receiving 2 g l<sup>-1</sup> extract recorded the shortest phyllachron (42.83 days) and those receiving 6 g l<sup>-1</sup> extract the longest phyllachron (43.71 days).

Among the organic manure treatments, the shortest phyllachron was recorded in plants receiving 50 g OM mix (42.33) and the longest in those receiving 75 g OM mix (43.79).

Interaction between media and cowdung treatments resulted in shortest phyllachron in  $M_2C_1$  and  $M_2C_2$ .

Interaction between media and organic manure treatments resulted in shortest phyllachron in  $M_2O_1$  and  $M_2O_2$ .

Interaction C<sub>2</sub>O<sub>2</sub> and C<sub>2</sub>O<sub>3</sub> recorded shortest phyllachron due to interaction between cowdung and organic manure treatments.

Leaf duration was the longest for plants grown in sand + coir pith compost (147.06 days) and the shortest for those grown in granite + leaf compost (146 days).

Among different organic manure treatments plants receiving 25 g OM mix recorded longest leaf duration (146.92 days) and the shortest was recorded in plants receiving 75 g OM mix (145.25 days).

Interaction between media and cowdung treatments resulted in longest leaf duration in  $M_2C_3$ .

Interaction between media and organic manure treatments resulted in longest leaf duration in  $M_2O_3$ .

Highest petiole length was recorded in plants grown in sand + coir pith compost during the second, third and fourth week after emergence.

Plant receiving 4 g 1<sup>-1</sup> cowdung extract recorded highest petiole length during the first, second, third and fourth week after emergence.

Plants receiving 25 g OM mix recorded highest petiole length during first and second week after emergence and those receiving 75 g OM mix during third and fourth week after emergence.

Interaction between media and cowdung treatments resulted in highest petiole length in  $M_2C_2$  during second, third and fourth week after emergence.

Interaction between media and organic manure mix resulted in highest petiole length in  $M_2O_2$  during third and fourth week after emergence.

Among the interaction between cowdung and nutrient treatments highest petiole length was recorded for C<sub>2</sub>O<sub>3</sub> during the third and fourth week after emergence.

The fresh weight and dry weight of the leaves and their N and K content were greater in sand + coir pith compost medium at 165 and 225

DAT while P content was greater in sand + leaf compost medium during the period.

11.1

Greater fresh and dry weight of leaves were recorded in plants receiving 4 g l<sup>-1</sup> cowdung extract. These plants recorded greater N and K content during the period. The P content was greater in plants receiving 6 g l<sup>-1</sup> extract.

Fresh and dry weight of the leaves recorded were greater at 165 and 225 DAT in 75 g OM mix. The N and K content of leaves during the period were greater in plants receiving 50 g mix, while the P content was greater in plants receiving 50 g mix.

Interaction between media and nutrients treatments also significantly influenced the fresh weight, dry weight, N, P and K content of the leaves.

The pH of the medium was found to be highest for granite + coir pith compost before the first application of organic manure mix. Thereafter sand + leaf compost media recorded higher pH.

Among the nutrient treatments, pH was found to be the highest for plants receiving 2 g l<sup>-1</sup> extract and the lowest for those receiving 4 g l<sup>-1</sup> extract. Plants receiving 75 g OM mix were found to record higher pH than those receiving 50 and 25 g OM mix.

The EC of the medium was highest for plants grown in granite + coir pith compost before the first application of organic manure mix and was found to show fluctuations thereafter. Plants receiving 6 g l<sup>-1</sup> extract recorded higher EC values than those receiving 2 g l<sup>-1</sup> and 4 g l<sup>-1</sup> extract after the first and third application of organic manure mix. Among the organic manure treatments those receiving 75 g organic manure mix were found to record higher EC values from the first week after application onwards.

The number of days to flowering was the lowest (434.67 days) and flower production was (2.33) for plants grown in sand + coir pith compost.

The highest spathe size (15.22 cm), length (3.66 cm), thickness (2.46 cm) and inclination of spadix (37.11°), length (32.17 cm) and thickness of flower stalk was obtained for plants grown in sand + coir pith compost.

The vase life of flowers was also the highest for plants grown in sand + coir pith compost (13.06 days). However the number of days to harvestable maturity of flowers was the lowest for plants grown in granite + leaf compost (45.83 days).

Among the different concentrations of fresh cowdung extract, plants receiving 4 g l<sup>-1</sup> cowdung extract recorded the lowest number of days to flowering (449.88 days). The largest spathe size (11.59 cm), length of flower stalk (23.85 cm), the lowest number of days to harvestable maturity of flowers (45.71 days). Thickness of flower stalk was the highest for plants receiving both 4 g l<sup>-1</sup> and 2 g l<sup>-1</sup> extract. Thickness of spadix was however highest for plants receiving 2 g l<sup>-1</sup> cowdung extract.

Among the different organic manure treatments, lesser number of days to flowering (441.83 days), highest thickness of spadix (2.18 cm) and inclination of spadix (36.02°) was obtained for plants receiving 75 g OM mix.

Plants receiving 25 g OM mix were found to record highest flower stalk length, spathe size (11.25 cm) and vase life (11.67 days). Length of spadix was highest for plants receiving 75 and 50 g OM mix.

Interaction between media and cowdung extract resulted in lesser number of days to flowering, highest thickness of flower stalk for  $M_2$  (sand + coir pith media) plants receiving  $C_1$ . The length and thickness of spadix, number of flowers per plant and spathe size was highest for  $M_2$ 

(sand + coir pith media) plants receiving  $C_2$ . The longest flower stalk was recorded for  $M_2$  (sand + coir pith media) plants receiving  $C_3$ . The inclination of spadix was highest in  $M_4$  plants receiving  $C_1$ .

Interaction between media and organic manure mix resulted in lesser number of days to flowering in  $M_2$  (sand + coir pith media) plants receiving  $O_3$  (75 g mix). The highest number of flowers per plant, spathe size, length and thickness of flower stalk was obtained in  $M_2$  (sand + coir pith media) plants receiving  $O_3$  (75 g mix). The length of spadix was greater in  $M_2$  (sand + coir pith media) plants receiving  $O_2$  (50 g mix). Thickness of spadix was greater both in  $M_2$  (sand + coir pith media) plants receiving  $O_2$  (50 g mix) or  $O_3$  (75 g mix).

The interaction between cowdung and organic manure treatments resulted in lesser number of days to flowering, highest number of flowers, highest spathe size, highest length and thickness of flower stalk and highest length and thickness of spadix in plants receiving  $C_2O_3$  (4 g l<sup>-1</sup> cowdung extract  $\pm$  75 g mix )

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<sup>\*</sup>Original not seen

Appendices

Effect of interaction between media, cowdung and organic manure treatments on plant height (cm) in Anthurium andreanum cv. Tropical

APPENDIX - I

|  |        |           |         |         |       |       |       |       |       |       | _     |        |
|--|--------|-----------|---------|---------|-------|-------|-------|-------|-------|-------|-------|--------|
| Treatments                                   | 60     | 75        | 90      | 105     | 120   | 135   | 150   | 165   | 180   | 195   | 210   | 225    |
| 1 Teamletics                                 | DAT    | DAT       | DAT     | DAT     | DAT   | DAT   | DAT   | DAT   | DAT   | DAT   | DAT   | DAT    |
| $M_iC_iO_i$                                  | 11.90  | 15.65     | 17.40   | 20.85   | 20.85 | 20.85 | 22.50 | 22.50 | 23.60 | 23.55 | 27.90 | 27.90  |
| $M_1C_1O_2$                                  | 13.50  | 14.40     | 14.40   | 17.40   | 17.40 | 17.40 | 19.60 | 19.60 | 22.75 | 22.75 | 24.40 | 24.55  |
| $M_1C_1O_3$                                  | 12.75  | 14.15     | 14.50   | 18.35   | 18.35 | 18.35 | 20.40 | 20.40 | 23.30 | 23.30 | 25.85 | 25.85  |
| $M_1C_2O_1$                                  | 11.10  | 12.35     | 13.30   | 14.65   | 14.65 | 14.65 | 20.65 | 20.65 | 23.95 | 23.95 | 25.25 | 25.25  |
| $M_1C_2O_2$                                  | 11.50  | 11.85     | 13.35   | 15.20   | 15.20 | 15.70 | 18.10 | 18.10 | 21.00 | 21.00 | 23.00 | 23.00  |
| $M_1C_2O_3$                                  | 14.60  | 14.60     | 16.35   | 17.25   | 17.25 | 17.40 | 19.90 | 19.90 | 22.75 | 22.75 | 24.65 | 24.65  |
| $M_1C_3O_1$                                  | 15.45  | 15.45     | 16.65   | 18.35   | 18.35 | 18.35 | 20.55 | 20.55 | 23.60 | 23.60 | 25.30 | 25.30  |
| $M_1C_3O_2$                                  | 12.90  | 14.10     | 14.55   | 21.20   | 21.20 | 21.70 | 23.45 | 23.45 | 24.95 | 24.95 | 26.15 | 26.15  |
| $M_1C_3O_3$                                  | 13.50  | 15.90     | 16.00   | 18.50   | 18.50 | 19.30 | 19.30 | 21.25 | 21.40 | 25.40 | 26.30 | .26.35 |
| $M_2C_1O_1$                                  | 15.45  | 15.90     | 17.25   | 23.75   | 23.75 | 23.75 | 27.90 | 27.90 | 32.70 | 32.70 | 37.10 | 37.10  |
| $M_2C_1O_2$                                  | 15.00  | 17.25     | 21.50   | 24.10   | 24,10 | 25.40 | 29.90 | 29.90 | 33.80 | 34.25 | 40.55 | 40.60  |
| $M_2C_1O_3$                                  | 13.25  | 13.25     | 15.20   | 18.00   | 18.00 | 22.75 | 22.75 | 28.55 | 34.45 | 40.25 | 40.25 | 46.05  |
| $M_2C_2O_1$                                  | 14.40  | 14.40     | 19.35   | 24.25   | 24.25 | 24.25 | 32.50 | 32.50 | 39.40 | 39.40 | 43.10 | 43.10  |
| $M_2C_2O_2$                                  | 14.60  | 16.85     | 18.95   | 22.00   | 22.00 | 28.95 | 30.25 | 30.25 | 37.25 | 37.85 | 42.65 | 42.65  |
| $M_2C_2O_3$                                  | 15.15  | 16.60     | 16.60   | 23.05   | 23.05 | 23.05 | 27.40 | 27.40 | 36.75 | 36.75 | 42.35 | 42.35  |
| $M_2C_3O_1$                                  | 11.45  | 11.90     | 14.15   | 21.35   | 21.35 | 24.20 | 29.55 | 29.55 | 36.30 | 36.90 | 44.30 | 44.30  |
| $M_2C_3O_2$                                  | 12.60  | 13.60     | 18.65   | 27.40   | 27.40 | 28.30 | 28.15 | 37.45 | 37.45 | 41.85 | 41.85 | 41.85  |
| M <sub>2</sub> C <sub>3</sub> O <sub>3</sub> | 15.15  | 16.75     | 17.60   | 24.10   | 24.10 | 24.10 | 27.90 | 27.90 | 28.50 | 34.50 | 34.50 | 36.95  |
| $M_3C_1O_1$                                  | 12.35  | 13.75     | 14.75   | 21.85   | 21.85 | 24.00 | 27.45 | 30.80 | 34.40 | 36.75 | 36.75 | 38.20  |
| M <sub>3</sub> C <sub>1</sub> O <sub>2</sub> | 9.15   | 9.65      | 11.55   | 13.90   | 13.90 | 17.40 | 23.60 | 25.70 | 27.30 | 31.05 | 31.05 | 32.45  |
| M <sub>3</sub> C <sub>1</sub> O <sub>3</sub> | 13.15  | 14.25     | 14.60   | 18.10   | 18.10 | 21.45 | 21.90 | 22.20 | 26.10 | 26.10 | 28.85 | 30.00  |
| M <sub>3</sub> C <sub>2</sub> O <sub>1</sub> | 14.50  | 15.70     | 15.70   | 18.55   | 18.55 | 19.80 | 26.35 | 26.35 | 34.65 | 34.65 | 38.45 | 38.45  |
| M <sub>3</sub> C <sub>2</sub> O <sub>2</sub> | 11.75  | 11.75     | 13.25   | 18.45   | 18.45 | 23.95 | 23.95 | 25.75 | 33.70 | 33.95 | 38.75 | 38.75  |
| M <sub>3</sub> C <sub>2</sub> O <sub>3</sub> | 17.55  | 17.55     | 20.05   | 23.35   | 23.35 | 28.85 | 28.85 | 36.55 | 36.55 | 39.40 | 39.40 | 41.45  |
| M <sub>3</sub> C <sub>3</sub> O <sub>1</sub> | 14.80  | 16.15     | 18.30   | 24.35   | 24.35 | 30.35 | 34.20 | 34.20 | 38.65 | 38.65 | 38.65 | 39.95  |
| M <sub>3</sub> C <sub>3</sub> O <sub>2</sub> | 10.90  | 12.50     | 16.10   | 21.50   | 21.50 | 25.30 | 27.15 | 28.75 | 31.70 | 32.70 | 32.70 | 32.70  |
| M <sub>3</sub> C <sub>3</sub> O <sub>3</sub> | 11.10  | 13.40     | 14.15   | 15.15   | 15.15 | 17.15 | 17.30 | 20.70 | 20.70 | 23.20 | 23.20 | 25.20  |
| M <sub>4</sub> C <sub>1</sub> O <sub>1</sub> | 12.00  | 12.00     | 14.20   | 18.80   | 18.80 | 19.30 | 26.75 | 28.25 | 29.35 | 32.60 | 32.60 | 32.60  |
| M <sub>4</sub> C <sub>1</sub> O <sub>2</sub> | 11.65  | 11.65     | 13.25   | 20.00   | 20.00 | 20.00 | 24.95 | 24.95 | 28.10 | 28.10 | 30.35 | 30.35  |
| M <sub>4</sub> C <sub>1</sub> O <sub>3</sub> | 10.25  | 11.40     | 12.60   | 14.80   | 14.80 | 20.40 | 20.25 | 24.90 | 24.90 | 26.60 | 26.60 | 26.60  |
| M <sub>4</sub> C <sub>2</sub> O <sub>1</sub> | 10.50  | 12.10     | 13.90   | 21.85   | 21.85 | 20.85 | 21.95 | 23.25 | 29.50 | 29.50 | 31.95 | 31.95  |
| M <sub>4</sub> C <sub>2</sub> O <sub>2</sub> | 13.30  | 13.80     | 16.00   | 18.20   | 18.20 | 18.55 | 18.95 | 20.55 | 22.80 | 22.80 | 24.45 | 25.90  |
| M <sub>4</sub> C <sub>2</sub> O <sub>3</sub> | 13.75  | 15.70     | 15.50   | 19.85   | 19.85 | 19.90 | 23.25 | 23.60 | 26.50 | 31.15 | 33.55 | 33.55  |
| M <sub>4</sub> C <sub>3</sub> O <sub>1</sub> | 11.50  | 13.00     | 14.70   | 20.60   | 20.60 | 21.45 | 24.25 | 24.25 | 29.30 | 29.30 | 30.15 | 30.50  |
| M <sub>4</sub> C <sub>3</sub> O <sub>2</sub> | 12.50  | 14.10     | 14.90   | 17.90   | 17.90 | 17.90 | 19.15 | 19.15 | 21.20 | 21.20 | 25.30 | 25.30  |
| M <sub>4</sub> C <sub>3</sub> O <sub>3</sub> | 12.50  | 13.10     | 7.05    | 17.85   | 17.85 | 22.65 | 22.65 | 26.75 | 30.10 | 30.10 | 31.05 | 31.05  |
| SE   | 0.51   | -         | -       | 0.74    | 0.76  | 0.86  | 0.93  | 0.85  | 0.86  | 0.8   | 0.65  | 0.57   |
| CD   | 1.46   | NS        | NS      | 2.11    | 2.19  | 2.48  | 2.67  | 2.43  | 2.48  | 2.31  | 1.87  | 1.65   |
| DAT -  | Days a | fter tran | splanti | <u></u> |       |       |       |       |       |       | -     |        |

APPENDIX – II

Effect of interaction between media, cowdung and organic manure treatments on number of leaves in *Anthurium andreanum* cv. Tropical

|  | 60 75 90 105 120 135 150 165 190 105 210 |          |         |      |      |      |       |       |                |       |          |       |  |  |
|--|--|----------|---------|------|------|------|-------|-------|----------------|-------|----------|-------|--|--|
| Treatments                                   | 60                                       | 75       | 90      | 105  | 120  | 135  | 150   | 165   | 180            | 195   | 210      | 225   |  |  |
|  | DAT                                      | DAT      | DAT     | DAT  | DAT  | DAT  | DAT   | DAT   | DAT            | DAT   | DAT      | DAT   |  |  |
| $M_1C_1O_1$                                  | 6.50                                     | 5.50     | 5.00    | 5.50 | 5.50 | 6.50 | 7.00  | 7.00  | <b>7.</b> 00 . | 7.50  | 7.50     | 7.50  |  |  |
| $M_1C_1O_2$                                  | 6.00                                     | 6.00     | 5.00    | 5.50 | 5.50 | 6.00 | 6.50  | 6.50  | 7.00           | 9.00  | 7.50     | 8.00  |  |  |
| $M_1C_1O_3$                                  | 5.50                                     | 6.50     | 7.00    | 8.00 | 8.00 | 8.50 | 8.50  | 9.00  | 8.50           | 9.00  | 9.00     | 9.00  |  |  |
| $M_1C_2O_1$                                  | 5.50                                     | 6.00     | 6.50    | 7.00 | 7.00 | 8.00 | 8.00  | 8.50  | 8.50           | 7.00  | 9.00     | 10.00 |  |  |
| $M_1C_2O_2$                                  | 5.00                                     | 5.00     | 5.50    | 5.50 | 6.00 | 6.00 | 6.00  | 6.00  | 7.00           | 7.00  | 7.50     | 7.50  |  |  |
| $M_1C_2O_3$                                  | 4.00                                     | 5.00     | 5.00    | 6.00 | 5.00 | 6.00 | 6.00  | 6.00  | 7.00           | 6.50  | 8.00     | 9.00  |  |  |
| $M_1C_3O_1$                                  | 5.00                                     | 5.50     | 6.50    | 7.00 | 7.50 | 7.50 | 6.00  | 6.00  | 6.50           | 7.50  | 7.00     | 7.50  |  |  |
| $M_1C_3O_2$                                  | 5.00                                     | 5.50     | 6.00    | 6.50 | 7.00 | 7.50 | 7.50  | 7.00  | 7.00           | 7.00  | 8.00     | 8.50  |  |  |
| $M_1C_3O_3$                                  | 4.00                                     | 5.00     | 5.00    | 6.00 | 6.00 | 6.00 | 5.50  | 6.00  | 6.50           | 9.50  | 7.00     | 7.50  |  |  |
| $M_2C_1O_1$                                  | 6.50                                     | 6.50     | 7.50    | 7.00 | 8.00 | 8.50 | 8.00  | 8.50  | 8.50           | 8.50  | 9.50     | 10.00 |  |  |
| $M_2C_1O_2$                                  | 8.00                                     | 8.00     | 8.50    | 9.00 | 7.50 | 7.50 | 9.00  | 9.00  | 9.00           | 7.00  | 8.00 -   | 8.50  |  |  |
| $M_2C_1O_3$                                  | 5.50                                     | 5.50     | 6.00    | 6.00 | 5.50 | 5.50 | 6.00  | 6.00  | 7.00           | 8.00  | 7.50     | 8.00  |  |  |
| $M_2C_2O_1$                                  | 7.00                                     | 7.00     | 6.00    | 6.50 | 6.50 | 7.00 | 7.00  | 7.00  | 7.50           | 8.00  | 8.50     | 8.50  |  |  |
| $M_2C_2O_2$                                  | 6.50                                     | 7.00     | 7.50    | 8.00 | 7.00 | 7.00 | 7.50  | 7.00  | 7.00           | 8.00  | 8.50     | 8.00  |  |  |
| $M_2C_2O_3$                                  | 7.00                                     | 8.00     | 8.00    | 8.00 | 8.50 | 9.00 | 7.00  | 7.00  | 8.00           | 8.50  | 8.50     | 8.00  |  |  |
| $M_2C_3O_1$                                  | 5.50                                     | 6.00     | 6.50    | 7.00 | 7.00 | 8.00 | 8.00  | 8.00  | 8.00           | 8.00  | 8.00     | 8.50  |  |  |
| $M_2C_3O_2$                                  | 6.00                                     | 7.00     | 6.00    | 6.00 | 6.50 | 6.50 | 7.50  | 7.50  | 8.00           | 7.00  | 8.50     | 9.00  |  |  |
| $M_2C_3O_3$                                  | 5.50                                     | 5.50     | 6.50    | 7.00 | 7.50 | 6.50 | 7.00  | 7.00  | 7.00           | 7.50  | 7.50     | 8.00  |  |  |
| $M_3C_1O_1$                                  | 4.00                                     | 4.50     | 5.50    | 6.00 | 6.00 | 6.00 | 6.50  | 7.00  | 7.00           | 8.50  | 8.00     | 8.50  |  |  |
| $M_3C_1O_2$                                  | 5.50                                     | 5.50     | 5.50    | 6.00 | 6.50 | 6.50 | 6.50  | 7.50  | 8.00           | 7.50  | 8.50     | 9.00  |  |  |
| $M_3C_1O_3$                                  | 4.00                                     | 4.00     | 4.00    | 5.00 | 5.00 | 5.50 | 6.50  | 7.00  | 7.50           | 8.50  | 8.50     | 8.50  |  |  |
| $M_3C_2O_1$                                  | 5.00                                     | 6.00     | 6.50    | 7.00 | 7.00 | 7.50 | 7.50  | 8.00  | 8.00           | 8.00  | 8.50     | 9.00  |  |  |
| $M_3C_2O_2$                                  | 6.00                                     | 6.00     | 5.50    | 6.00 | 6.50 | 7.00 | 7.00  | 7.50  | 7.50           | 9.50  | 8.50     | 8.50  |  |  |
| $M_3C_2O_3$                                  | 7.00                                     | 7.00     | 8.00    | 8.00 | 8.50 | 8.50 | 9.00  | 9.00  | 8.50           | 11.00 | 8.50     | 8.50  |  |  |
| $M_3C_3O_1$                                  | 6.50                                     | 7.00     | 7.50    | 8.00 | 8.50 | 9.00 | 10.00 | 11.00 | 11.00          | 8.50  | 11.00    | 11.50 |  |  |
| $M_3C_3O_2$                                  | 7.00                                     | 7.00     | 8.00    | 8.00 | 9.00 | 9.00 | 10.00 | 9.00  | 9.00           | 8.00  | 8.50     | 8.50  |  |  |
| $M_3C_3O_3$                                  | 6.00                                     | 7.00     | 7.00    | 7.50 | 7.50 | 8.00 | 7.50  | 8.00  | 8.00           | 8.00  | 8.50     | 9.00  |  |  |
| $M_4C_1O_1$                                  | 6.50                                     | 7.00     | 6.50    | 6.00 | 6.50 | 6.50 | 7.00  | 7.00  | 8.00           | 9.50  | 8.50     | 8.50  |  |  |
| $M_4C_1O_2$                                  | 7.50                                     | 8.50     | 8.50    | 9.00 | 8.00 | 8.00 | 9.00  | 9.00  | 8.00           | 7.00  | 9.50     | 10.00 |  |  |
| $M_4C_1O_3$                                  | 6.50                                     | 6.50     | 6.50    | 5.50 | 5.50 | 6.00 | 6.00  | 6.50  | 6.50           | 8.00  | 7.50     | 7.50  |  |  |
| $M_4C_2O_1$                                  | 6.00                                     | 7.00     | 7.00    | 8.00 | 8.00 | 8.50 | 8.00  | 7.50  | 7.50           | 8.50  | 8.00     | 8.50  |  |  |
| $M_4C_2O_2$                                  | 5.50                                     | 6.50     | 6.50    | 6.50 | 7.00 | 7.00 | 7.50  | 7.50  | 8.00           | 8.00  | 8.50     | 9.00  |  |  |
| $M_4C_2O_3$                                  | 6.00                                     | 6.50     | 7.00    | 7.00 | 7.00 | 7.50 | 7.00  | 7.00  | 8.00           | 7.00  | 8.50     | 8.50  |  |  |
| $M_4C_3O_1$                                  | 6.50                                     | 7.00     | 7.50    | 7.50 | 7.50 | 7.00 | 7.50  | 7.50  | 8.00           | 7.00  | 7.00     | 8.00  |  |  |
| $M_4C_3O_2$                                  | 5.00                                     | 5.50     | 6.00    | 6.50 | 7.00 | 7.00 | .7.50 | 7.50  | 7.50           | 7.50  | 7.00     | 7.00  |  |  |
| M <sub>4</sub> C <sub>3</sub> O <sub>3</sub> | 8.50                                     | 9.00     | 9.50    | 9.50 | 9.50 | 9.00 | 6.50  | 6.50  | 7.00           | 7.50  | 8.00     | 8.00  |  |  |
| SE   | -  | -        | -       | -    | -    | -    | -     | -     | _              | -     |          | -     |  |  |
| CD   | NS                                       | NS       | NS      | NS   | NS   | NS   | NS    | NS    | NS             | NS    | NS       | NS    |  |  |
| DAT –  | Days al                                  | ter tran | splanti | ng   |      |      |       |       |                |       | <u>\</u> |       |  |  |

APPENDIX - III Effect of interaction between media, cowdung and organic manure treatments on leaf area (cm²) in Anthurium andreanum cv. Tropical

| Internation   DAT   D   | Tractmo                                      | 60    | 75       | 90     | 105      | 120    | 135    | 150    | 165  | 180          | 195    | 210    | 225    |
|---|--|-------|----------|--------|----------|--------|--------|--------|--|--------------|--------|--------|--------|
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $   | Treatme                                      |       |          |        | i        |        |        |        |  |              |        |        |        |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   |  |       | _        |        | _        |        |        | _      |  |              |        |        |        |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $   |  |       |          |        | i        |        |        |        |  |              |        |        |        |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | •  |       |          |        |          |        |        |        |  |              |        |        |        |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | [ ·  |       | l        |        |          |        |        |        |  |              |        |        |        |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | 1  |       |          |        |          |        |        |        |  |              |        |        |        |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   |  | 1     |          | l      |          |        | 1      |        |  |              |        |        |        |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   |  |       |          |        |          |        |        |        |  |              |        |        |        |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | -  |       |          |        |          |        |        |        | l  |              |        |        |        |
| $\begin{array}{l} M_{\rm C} C_{\rm O} \\ M_{\rm C} C_{\rm O} \\ N_{\rm $ |  | 1     | Į.       |        |          |        |        |        |  |              | ,      |        |        |
| $\begin{array}{llllllllllllllllllllllllllllllllllll$  |  |       |          |        |          |        |        |        |  | •            |        | ł      |        |
| $\begin{array}{l} M_{1}C_{1}O_{3} \\ N_{2}C_{3}O_{1} \\ R7.08 \\ R7.09 \\ R7.$  |  |       | ]        |        |          |        |        |        |  |              |        |        |        |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | 1  |       |          | l l    |          |        |        |        | 308.17   |              |        |        | l .    |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | _  |       | l        |        | 156.66   | l '    | 250.45 | 344.10 | 344.10   |              | 1      | ľ      |        |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   |  | 1     |          | 176.98 | 176.98   |        | l .    | 374.75 | 455.45   |              | ŀ      |        |        |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | 1  | 1     |          |        | 151.20   | ŀ      | 243.45 | 241.04 | 385.80   | 385.80       |        |        | 613.10 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   |  |       | 51.91    | 123.25 | 123.25   | 175.20 | 175.20 | 193.14 | 258.48   | 378.70       | 458.25 | 458.25 |        |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | İ  | 49.83 | 80.81    | 125.61 | 154.94   | 154.94 | 257.80 | 265.85 | 352.14   | 422.80       | 523.79 | 588.25 | 588.25 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   |  | 61.40 | 96.50    | 144.15 | 144.15   | 243.70 | 243.70 | 317.93 | 359.45   | 360.60       | 471.32 | 568.14 | 568.14 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>3</sub> C <sub>1</sub> O <sub>1</sub> | 57.16 | 57.16    | 79.85  | 79.85    | 116.85 | 116.85 | 167.90 | 167.90   | 248.50       | 358.17 | 358.17 | 358.17 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>3</sub> C <sub>1</sub> O <sub>2</sub> | 51.38 | 50.43    | 64.35  | 66.12    | 104.75 | 104.75 | 126.65 | 154.65   | 231.93       | 288.20 | 288.20 | 365.70 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>3</sub> C <sub>1</sub> O <sub>3</sub> | 53.65 | 53.65    | 60.45  | 60.45    | 87.80  | 87.80  | 158.05 | 158.05   | 282.45       | 282.45 | 391.65 | 391.65 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>3</sub> C <sub>2</sub> O <sub>1</sub> | 44.35 | 44.35    | 74.49  | 104.96   | 96.10  | 96.10  | 166.90 | 213.87   | 324.48       | 324.48 | 357.05 | 357.05 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>3</sub> C <sub>2</sub> O <sub>2</sub> | 74.10 | 74.10    | 93.60  | 93.60    | 133.05 | 133.05 | 189.85 | 243.69   | 328.97       | 328.97 | 477.00 | 477.00 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>3</sub> C <sub>2</sub> O <sub>3</sub> | 85,25 | 85,25    | 138.71 | 111.88   | 186.76 | 186.75 | 292.49 | 428.88   | 566.50       | 566.50 | 566.50 | 566.50 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>3</sub> C <sub>3</sub> O <sub>1</sub> | 85.02 | 85.02    | 135.80 | 135.80   | 199.27 | 313.00 | 384.94 | 384.90   | 478.17       | 526.15 | 526.15 | 635.70 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>3</sub> C <sub>3</sub> O <sub>2</sub> | 65.07 | 65.07    | 114.94 | 114.94   | 193.55 | 199.10 | 291.14 | 291.17   | 436.78       | 436.78 | 436.78 | 436.78 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>3</sub> C <sub>3</sub> O <sub>3</sub> | 41.10 | 41.10    | 61.35  | 102.57   | 102.57 | 110.94 | 198.45 | 276.72   | 310.85       | 310.85 | 448.85 | 448.85 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>4</sub> C <sub>1</sub> O <sub>1</sub> | 44.75 | 44.75    | 62.70  | 92.85    | 134.65 | 134.65 | 178.18 | 219.25   | 258.11       | 327.80 | 327.80 | 458.30 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>4</sub> C <sub>1</sub> O <sub>2</sub> | 52.20 | 60.93    | 72.90  | 72.90·   | 94.25  | 126.45 | 203.79 | 203.79   | 256.90       | 256.90 | 307.80 | 307.80 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>4</sub> C <sub>1</sub> O <sub>3</sub> | 49.70 | 49.70    | 81.77  | 82.34    | 82.34  | 128.70 | 133.61 | 220.05   | 219.83       | 255.75 | 255.75 | 347.20 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>4</sub> C <sub>2</sub> O <sub>1</sub> | 50,45 | 57.52    | 57.52  | 82.90    | 1      | 122.30 | 133.98 | 182.82   | 225.20       | 278.30 | 278.30 | 330.95 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | M <sub>4</sub> C <sub>2</sub> O <sub>2</sub> | 47.80 | 47.80    | 1      |          |        | 1      | }      | i  | 302.05       | 302.05 | 343.57 | 343.57 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   | 1  |       |          | I -    |          |        | I      |        |  | l            | Į.     | ŀ      |        |
| M <sub>4</sub> C <sub>3</sub> O <sub>3</sub> 41.49         41.49         58.64         58.64         87.85         91.70         130.00         205.54         205.50         258.85         258.85         308.75           SE         3.00         2.4         2.02         2.36         3.18         3.19         1.71         1.27         0.84         0.92         0.94         1.01           CD         8.61         6.88         5.8         6.78         9.12         9.17         4.91         3.65         2.42         2.64         2.71         2.89  |  |       |          |        | Ĭ        |        | 1      |        |  |              |        |        |        |
| SE     3.00     2.4     2.02     2.36     3.18     3.19     1.71     1.27     0.84     0.92     0.94     1.01       CD     8.61     6.88     5.8     6.78     9.12     9.17     4.91     3.65     2.42     2.64     2.71     2.89   | 1  |       |          | l l    |          | 1      |        | 1      | 1  |              | l      |        | ľ      |
| CD 8.61 6.88 5.8 6.78 9.12 9.17 4.91 3.65 2.42 2.64 2.71 2.89   |  |       | <b>†</b> |        | <b>-</b> |        |        | _      | <del>                                     </del> | <del> </del> |        | i —    | 308.75 |
|   |  | 1     |          |        |          | 1      | 1      |        |  |              | ]      |        | l .    |
|   |  |       |          |        |          | 9.12   | 9.17   | 4.91   | 3.65   | 2.42         | 2.64   | 2.71   | 2.89   |

APPENDIX - IV

## Effect of interaction between media, cowdung and organic manure treatments on petiole length, phyllachron, leaf duration, fresh weight and dry weight in Anthurium andreanum cv. Tropical

|  |      | Petiole le | ngth (cm)          |       | Phyll- | Leaf     | Fresh w | eight (g) | Dry we | eight (g) |
|--|------|------------|--------------------|-------|--------|----------|---------|-----------|--------|-----------|
| Treatments                                   | I    | 2          | 3,                 | 4     | achron | duration | 165     | 225       | 165    | 225       |
|  | WAE  | WAE        | <u>W</u> AE        | WAE   | acidon | (days)   | DAT     | _DAT_     | DAT    | DAT       |
| $M_1C_1O_1$                                  | 5.40 | 8.77       | 12.50              | 15.00 | 45.50  | 144.50   | 3.47    | 3.65      | 0.88   | 0.89      |
| $M_1C_1O_2$                                  | 5.70 | 9.70       | 12.53              | 13.43 | 44.50  | 143.00   | 4.23    | 4.30      | 0.75   | 0.83      |
| M <sub>1</sub> C <sub>1</sub> O <sub>3</sub> | 5.33 | 13.30      | 13.70              | 16.27 | 44.00  | 146.50   | 4,21    | 4.12      | 0.79   | 0.84      |
| $M_1C_2O_1$                                  | 6.10 | 14.33      | 15.17              | 15.43 | 47.50  | 148.00   | 4.71    | 4.65      | 1.18   | 0.93      |
| $M_1C_2O_2$                                  | 5.23 | 10.73      | 12.53              | 13.07 | 40.50  | 148.50   | 5.71    | 5.75      | 1.60   | 1.57      |
| M <sub>1</sub> C <sub>2</sub> O <sub>3</sub> | 7.10 | 13.23      | 13.83              | 16.37 | 42.50  | 145.00   | 5.74    | 5.96      | 1.71   | 1.64      |
| M <sub>1</sub> C <sub>3</sub> O <sub>1</sub> | 7.33 | 13.67      | 14.37              | 15.67 | 46.00  | 146.00   | 4.96    | 5.21      | 1.13   | 0.94      |
| M <sub>1</sub> C <sub>3</sub> O <sub>2</sub> | 5.50 | 11.40      | 12.33              | 12.67 | 45.50  | 147.50   | 5.94    | 5.72      | 1.61   | 1.63      |
| M <sub>1</sub> C <sub>3</sub> O <sub>3</sub> | 5.30 | 10.50      | 13.20              | 14.50 | 47.50  | 139.00   | 5.54    | 5.35      | 1.32   | 1.28      |
| $M_2C_1O_1$                                  | 5.60 | 10.30      | 14.40              | 16.37 | 40.50  | 149.00   | 4.55    | 4.75      | 0.82   | 0.76      |
| M <sub>2</sub> C <sub>1</sub> O <sub>2</sub> | 4.97 | 7.70       | 15.33              | 16.57 | 40.50  | 144.00   | 4.31    | 4.18      | 0.73   | 0.82      |
| $M_2C_1O_3$                                  | 5.07 | 11.43      | 16.47              | 16.13 | 38.50  | 146.50   | 6.41    | 6.54      | 1.64   | 1.57      |
| $M_2C_2O_1$                                  | 6.63 | 14.73      | 16.60              | 16.80 | 40.50  | 148.50   | 5.41    | 5.55      | 1.38   | 1.30      |
| $M_2C_2O_2$                                  | 6.07 | 15.50      | 16.40              | 16.77 | 39.50  | 144.50   | 4.72    | 4.78      | 0.83   | 0.78      |
| $M_2C_2O_3$                                  | 7.30 | 13.40      | 14.57              | 16.60 | 39.50  | 148.50   | 5.51    | 5.54      | 1.22   | 1.18      |
| $M_2C_3O_1$                                  | 7.33 | 13.67      | 14.57              | 16.50 | 38.50  | 146.00   | 4.29    | 4.60      | 0.80   | 0.84      |
| $M_2C_3O_2$                                  | 7.47 | 12.70      | 14.77              | 16.53 | 39.50  | 146.00   | 4.81    | 4.90      | 0.95   | 0.86      |
| M <sub>2</sub> C <sub>3</sub> O <sub>3</sub> | 5.40 | 12.57      | 14.40              | 14.30 | 42.50  | 150.50   | 5.48    | 5.44      | 1.25   | 1.24      |
| $M_3C_1O_1$                                  | 5.90 | 8.30       | 12.43              | 15.57 | 40.50  | 147.50   | 3.51    | 3.31      | 0.83   | 0.83      |
| M <sub>3</sub> C <sub>1</sub> O <sub>2</sub> | 5.93 | 9.70       | 13.33              | 13.37 | 43.50  | 148.50   | 5.23    | 5.38      | 1.22   | 1.23      |
| $M_3C_1O_3$                                  | 4.93 | 9.30       | 12.40 <sup>1</sup> | 15.30 | 45.50  | 142.50   | 5.08    | 5.22      | 1.28   | 1.23      |
| $M_3C_2O_1$                                  | 6.30 | 13.60      | 13.97              | 13.53 | 45.50  | 144.50   | 4.54    | 4.55      | 0.86   | 0.84      |
| M <sub>3</sub> C <sub>2</sub> O <sub>2</sub> | 6.80 | 13.40      | 12.80 <sup>-</sup> | 15.53 | 42.50  | 146.50   | 5.21    | 5.37      | 1.21   | 1.18      |
| $M_3C_2O_3$                                  | 7.93 | 13.37      | 14.30              | 15.23 | 41.00  | 142.00   | 5.30    | 5.22      | 1.37   | 1.38      |
| M <sub>3</sub> C <sub>3</sub> O <sub>1</sub> | 5.40 | 12.47      | 16.47              | 14.87 | 43.50  | 147.50   | 4.22    | 4.39      | 0.80   | 0.84      |
| $M_3C_3O_2$                                  | 8.10 | 11.13      | 12.67              | 15.37 | 39.50  | 142.50   | 5.28    | 5.22      | 1.33   | 1.33      |
| $M_3C_3O_3$                                  | 5.57 | 11.40      | 15.40              | 16.53 | 42.50  | 143.00   | 5.20    | 5.31      | 1.27   | 1.28      |
| M <sub>4</sub> C <sub>1</sub> O <sub>1</sub> | 5.77 | 9.53       | 11.73              | 13.37 | 41.50  | 146.50   | 4.65    | 4.77      | 1.18   | 1.18      |
| M <sub>4</sub> C <sub>1</sub> O <sub>2</sub> | 5.67 | 12.83      | 13.43              | 14.60 | 42.50  | 143.50   | 4.22    | 4.31      | 0.94   | 0.95      |
| $M_4C_1O_3$                                  | 5.48 | 9.37       | 13.40              | 14.37 | 47.00  | 147.50   | 4.71    | 4.65      | 1.18   | 1.16      |
| $M_4C_2O_1$                                  | 5.87 | 10.03      | 13.30              | 14.33 | 48.00  | 145.50   | 4.28    | 4.30      | 0.82   | 0.83      |
| $M_4C_2O_2$                                  | 5.87 | 8.43       | 11.47              | 12.87 | 45.00  | 144.50   | 5.63    | 5.53      | 1.60   | 1.63      |
| M <sub>4</sub> C <sub>2</sub> O <sub>3</sub> | 7.90 | 10.33      | 16.40              | 18.23 | 44.50  | 145.50   | 4.15    | 4.24      | 1.12   | 1.16      |
| M₄C₃O₁                                       | 8.43 | 12.50      | 11.80              | 15.07 | 44.00  | 149.50   | 4.55    | 4.59      | 0.94   | 0.97      |
| M <sub>4</sub> C <sub>3</sub> O <sub>2</sub> | 5.30 | 12.33      | 12.33              | 13.30 | 45.00  | 145.00   | 4.22    | 4.40      | 0.81   | 0.88      |
| M <sub>4</sub> C <sub>3</sub> O <sub>3</sub> | 7.33 | 10.23      | 13.43              | 14.40 | 50.50  | 146.50   | 4.28    | 4.18      | 0.92   | 0.97      |
| SE   | 0.17 | 0.2        | 0.17               | 0.22  | 0.5    | -        | 0.11    | 0.1       | 0.01   | 0.02      |
| CD   | 0.47 | 0.56       | 0.47               | 0.62  | 1.44   | NS       | 0.3     | 0.29      | 0.03   | 0.06      |

### APPENDIX - V

# Effect of interaction between media, cowdung and organic manure treatments on N, P and K content (%) of leaves in Anthurium andreanum cv. Tropical

|  |         |         | <u> </u> | p       |         |         |
|--|---------|---------|----------|---------|---------|---------|
| Treatments                                   | 165 DAT | 225 DAT | 165 DAT  | 225 DAT | 165 DAT | 225 DAT |
| $M_1C_1O_1$                                  | 1.16    | 1.23    | 0.11     | 0.14    | 1.77    | 1.82    |
| $M_1C_1O_2$                                  | 1.19    | 1.24    | 0.21     | 0.23    | 1.60    | 1.64    |
| $M_1C_1O_3$                                  | 1.15    | 1.24    | 0.16     | 0.19    | 1.70    | 1.72    |
| $M_1C_2O_1$                                  | 1.19    | 1.23    | 0.14     | 0.17    | 1.79    | 1.83    |
| $M_1C_2O_2$                                  | 1.16    | 1.22    | 0.23     | 0.25    | 1.89    | 1.93    |
| $M_1C_2O_3$                                  | 1.17    | 1.24    | 0.12     | 0.15    | 1.60    | 1.64    |
| $M_1C_3O_1$                                  | 1.17    | 1.21    | 0.21     | 0.23    | 1.68    | 1.77    |
| $M_1C_3O_2$                                  | 1.19    | 1.24    | 0.12     | 0.16    | 1.88    | 1.93    |
| $M_1C_3O_3$                                  | 1.19    | 1.21    | 0.21     | 0.23    | 1.73    | 1.73    |
| $M_2C_1O_1$                                  | 1.46    | 1.55    | 0.11     | 0.13    | 2.03    | 2.05    |
| $M_2C_1O_2$                                  | 1.47    | 1.51    | 0.20     | 0.22    | 2.03    | 2.05    |
| $M_2C_1O_3$                                  | 1.57    | 1.73    | 0.11     | 0.13    | 2.30    | 2.33    |
| $M_2C_2O_1$                                  | 1.50    | 1.62    | 0.15     | 0.18    | 2.20    | 2,23    |
| $M_2C_2O_2$                                  | 1.46    | 1.55    | 0.14     | 0.15    | 2.30    | 2.34    |
| $M_2C_2O_3$                                  | 1.56    | 1.80    | 0.20     | 0.23    | 2.40    | 2.44    |
| $M_2C_3O_1$                                  | 1.54    | 1.63    | 0.16     | 0.18    | 2.20    | 2.23    |
| M <sub>2</sub> C <sub>3</sub> O <sub>2</sub> | 1.55    | 1.57    | 0.22     | 0.24    | 2.10    | 2.14    |
| $M_2C_3O_3$                                  | 1.49    | 1.52    | 0.15     | 0.17    | 2.20    | 2.23    |
| $M_3C_1O_1$                                  | 1.32    | 1.37    | 0.16     | 0.18    | 1.87    | 1.91    |
| $M_3C_1O_2$                                  | 1.43    | 1.46    | 0.15     | 0.16    | 1.87 .  | 1.90    |
| $M_3C_1O_3$                                  | 1.29    | 1.35    | 0.16     | 0.19    | 1.82    | 1.89    |
| M <sub>3</sub> C <sub>2</sub> O <sub>1</sub> | 1.30    | 1.38    | 0.16     | 0.18    | 1.70    | 1.78    |
| M <sub>3</sub> C <sub>2</sub> O <sub>2</sub> | 1.48    | 1.53    | 0.16     | 0.17    | 1.88    | 1.91    |
| $M_3C_2O_3$                                  | 1.52    | 1.58    | 0.11     | 0.13    | 2.12    | 2.22    |
| M <sub>3</sub> C <sub>3</sub> O <sub>1</sub> | 1.54    | 1.58    | 0.12     | 0.15    | 2.30    | 1.92    |
| $M_3C_3O_2$                                  | 1.53    | 1.55    | 0.14     | 0.15    | 2.12    | 2.22    |
| $M_3C_3O_3$                                  | 1.31    | 1.34    | 0.15     | 0.17    | 1.70    | 1.78    |
| M <sub>4</sub> C <sub>1</sub> O <sub>1</sub> | 1.50    | 1.58    | 0.12     | 0.13    | 2.07    | 2.22    |
| $M_4C_1O_2$                                  | 1.21    | 1.23    | 0.12     | 0.14    | 1.70    | 1.73    |
| M <sub>4</sub> C <sub>1</sub> O <sub>3</sub> | 1.22    | 1.25    | 0.12     | 0.14    | 1.79    | 1.83    |
| $M_4C_2O_1$                                  | 1.29    | 1.32    | 0.14     | 0.16    | 1.90    | 1.94    |
| $M_4C_2O_2$                                  | 1.31    | 1.34    | 0.17     | 0.19    | - 1.80  | 1.92    |
| M <sub>4</sub> C <sub>2</sub> O <sub>3</sub> | 1.37    | 1.45    | 0.13     | 0.14    | 1.80    | 1.93    |
| $M_4C_3O_1$                                  | 1.34    | 1.38    | 0.15     | 0.18    | 1.80    | 1.83    |
| M <sub>4</sub> C <sub>3</sub> O <sub>2</sub> | 1.22    | 1.25    | 0.12     | 0.14    | 1.60    | 1.71    |
| M <sub>4</sub> C <sub>3</sub> O <sub>3</sub> | 1.21    | 1.30    | 0.14     | 0.17    | 1.69    | 1.73    |
| SE   | 0.01    | 0.01    | 0.01     | 0.01    | 0.01    | 0.06    |
| CD.0.03                                      | 0.03    | 0.03    | 0.02     | 0.03    | 0.04    | 0.16    |

DAT - Days after transplanting

APPENDIX - VI

Effect of interaction between media, cowdung and organic manure treatments on pH of the media recorded at weekly intervals

| M <sub>1</sub> C <sub>1</sub> O <sub>1</sub> 8.61         6.86         6.35         6.17         8.32         7.10         6.36         6.25         8.51         7.35         6.           M <sub>1</sub> C <sub>1</sub> O <sub>2</sub> 8.38         7.52         6.49         6.27         8.71         7.51         6.56         6.20         8.42         7.52         6.3           M <sub>1</sub> C <sub>1</sub> O <sub>3</sub> 8.62         7.49         7.35         7.10         8.47         7.53         7.31         7.23         8.35         7.78         7.7           M <sub>1</sub> C <sub>2</sub> O <sub>3</sub> 7.38         7.34         7.25         7.30         7.39         7.37         7.64         7.50         7.47         7.41         7.51         7.14         6.65         6.52         8.25         7.21         6.67         6.51         8.35         7.60         7.60         6.64         7.41         7.33         7.43         7.23         7.64         7.50         7.47         7.41         7.63         7.40         7.77         7.47         7.41         7.63         7.81         7.64         7.55         6.69         8.25         7.52         6.53         6.47         8.26         7.71         7.72         7.23         7.10         7.77         7.72         7  |  |      |        |  |      |             |      |      |      |      |      |      |
|--|--|------|--------|--|------|-------------|------|------|------|------|------|------|
| M <sub>1</sub> C <sub>1</sub> O <sub>2</sub> 8.38         7.52         6.49         6.27         8.71         7.51         6.56         6.20         8.42         7.52         6.49           M <sub>1</sub> C <sub>1</sub> O <sub>3</sub> 8.62         7.49         7.35         7.10         8.47         7.53         7.31         7.23         8.35         7.78         7.8           M <sub>1</sub> C <sub>2</sub> O <sub>1</sub> 7.38         7.34         7.25         7.30         7.39         7.35         7.30         7.07         7.47         7.41         7.51           M <sub>1</sub> C <sub>2</sub> O <sub>1</sub> 7.31         7.38         6.64         7.41         7.33         7.43         7.23         7.64         7.50         7.70         7.47         7.41         7.51         6.65         6.52         6.52         7.52         6.53         6.47         8.25         7.52         6.53         6.47         8.25         7.52         6.53         6.47         8.25         7.52         6.53         6.47         8.25         7.51         6.53         6.47         8.25         7.52         6.53         6.33         8.25         7.77         7.72         7.7         7.72         7.73         M.70         7.77         7.72         7.73         M.70         7.77 <th< td=""><td>Treatments</td><td>1</td><td>2</td><td>3</td><td>OM*</td><td>1</td><td>2</td><td>3</td><td>OM*</td><td>1</td><td>2</td><td>3</td></th<> | Treatments                                   | 1    | 2      | 3  | OM*  | 1           | 2    | 3    | OM*  | 1    | 2    | 3    |
| M <sub>1</sub> C <sub>1</sub> O <sub>3</sub> 8.62         7.49         7.35         7.10         8.47         7.53         7.31         7.23         8.35         7.78         7.28         M <sub>1</sub> C <sub>2</sub> O <sub>1</sub> 7.38         7.34         7.25         7.30         7.39         7.35         7.30         7.07         7.47         7.41         7.21         M <sub>1</sub> C <sub>2</sub> O <sub>2</sub> 6.62         7.27         7.38         6.64         7.41         7.33         7.43         7.23         7.64         7.50         7.4         7.51         7.14         6.65         6.52         8.25         7.21         6.67         6.51         8.35         7.67         6.61           M <sub>1</sub> C <sub>1</sub> O <sub>2</sub> 7.53         7.53         6.69         8.25         7.52         6.53         6.47         8.26         7.71         7.67         6.64           M <sub>1</sub> C <sub>2</sub> O <sub>2</sub> 7.58         7.53         7.63         7.42         7.62         7.53         7.53         7.40         7.77         7.72         7.72         7.72         7.72         7.72         7.72         7.72         7.72         7.72         7.72         7.73         M.72         7.93         8.55         7.54         7.23         8.53         7.67         7.67         7.62  | $M_1C_1O_1$                                  | 8.61 | 6.86   | 6.35   | 6.17 | 8.32        | 7.10 | 6.36 | 6.25 | 8.51 | 7.35 | 6.31 |
| M <sub>1</sub> C <sub>2</sub> O <sub>1</sub> 7.38         7.34         7.25         7.30         7.39         7.35         7.30         7.07         7.47         7.41         7.21         M <sub>1</sub> C <sub>2</sub> O <sub>2</sub> 6.62         7.27         7.38         6.64         7.41         7.33         7.43         7.23         7.64         7.50         7.4           M <sub>1</sub> C <sub>2</sub> O <sub>3</sub> 7.51         7.14         6.65         6.52         8.25         7.21         6.67         6.51         8.35         7.67         6.1           M <sub>1</sub> C <sub>2</sub> O <sub>2</sub> 7.58         7.54         7.63         7.42         7.62         7.53         7.53         7.40         7.77         7.72   | $M_1C_1O_2$                                  | 8.38 | 7.52   | 6.49   | 6.27 | 8.71        | 7.51 | 6.56 | 6.20 | 8.42 | 7.52 | 6.41 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_1C_1O_3$                                  | 8.62 | 7.49   | 7.35   | 7.10 | 8.47        | 7.53 | 7.31 | 7.23 | 8.35 | 7.78 | 7.48 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |  | 7.38 | 7.34   | 7.25   | 7.30 | 7.39        | 7.35 | 7.30 | 7.07 | 7.47 | 7.41 | 7.33 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_1C_2O_2$                                  | 6.62 | 7.27   | 7.38   | 6.64 | 7.41        | 7.33 | 7.43 | 7.23 | 7.64 | 7.50 | 7.41 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_1C_2O_3$                                  | 7.51 | 7.14   | 6.65   | 6.52 | 8.25        | 7.21 | 6.67 | 6.51 | 8.35 | 7.67 | 6.62 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_1C_3O_1$                                  | 8.52 | 7.35   | 6.57   | 6.69 | 8.25        | 7:52 | 6.53 | 6.47 | 8.26 | 7.71 | 6.71 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_1C_3O_2$                                  | 7.58 | 7.54   | 7.63   | 7.42 | 7.62        | 7.53 | 7.53 | 7.40 | 7.77 | 7.72 | 7.29 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_1C_3O_3$                                  | 8.57 | 8.18   | 7.47   | 7.19 | 8.48        | 8.55 | 7.54 | 7.24 | 8.51 | 7.76 | 7.52 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_2C_1O_1$                                  | 8.56 | 7.31   | 6.28   | 6.18 | 8.29        | 7.40 | 6.25 | 6.33 | 8.25 | 7.38 | 6.41 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_2C_1O_2$                                  | 7.26 | 6.76   | 6.52   | 6.30 | 8.24        | 6.82 | 6.50 | 6.28 | 8.31 | 7.40 | 6.40 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_2C_1O_3$                                  | 8.41 | 7.50   | 6.31   | 6.24 | 8.68        | 7.40 | 6.39 | 6.25 | 8.37 | 7.43 | 6.22 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_2C_2O_1$                                  | 6.71 | 6.45   | 6.35   | 6.22 | 7.67        | 6.71 | 6.33 | 6.38 | 7.55 | 7.39 | 6.19 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |  | 7.82 | 7.15   | 6.16   | 6.18 | 7:24        | 7.21 | 6.36 | 6.30 | 7.41 | 7.34 | 6.33 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_2C_2O_3$                                  | 6.69 | 6.55   | 6.37   | 6.24 | 7.82        | 6.70 | 6.32 | 6.27 | 7.66 | 7.54 | 6.67 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_2C_3O_1$                                  | 8.32 | 7.25 . | 6.82   | 6.70 | 8.40        | 7.40 | 6.79 | 6.71 | 8.40 | 7.64 | 6.74 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |  | 7.59 | 6.76   | 6.30   | 6.21 | 7.62        | 6.71 | 6.33 | 6.35 | 7.60 | 7.45 | 7.38 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |  | 7.76 | 7.43   | 7.34   | 7.21 | 7.43        | 7.21 | 6.43 | 6.50 | 7.54 | 7.57 | 7.36 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_3C_1O_1$                                  | 8.80 | 7.59   | 6.56   | 6.43 | 8.32        | 7.60 | 6.61 | 6.52 | 8.31 | 8.28 | 6.12 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_3C_1O_2$                                  | 8.82 | 7.58   | 7.35   | 7.11 | 7.68        | 7.41 | 7.61 | 6.82 | 7.60 | 7.61 | 6.72 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_3C_1O_3$                                  | 8.72 | 8.13   | 7.36   | 7.23 | 8.82        | 8.22 | 7.21 | 7.30 | 8.61 | 7.79 | 6.75 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_3C_2O_1$                                  | 8.25 | 7.17   | 5.52   | 5.50 | 7.77        | 7.25 | 6.70 | 6.21 | 7.52 | 7.25 | 6.57 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | M <sub>3</sub> C <sub>2</sub> O <sub>2</sub> | 7.53 | 6.82   | 6.32   | 6.12 | 7.45        | 6.70 | 6.29 | 6.10 | 7.42 | 7.35 | 6.41 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_3C_2O_3$                                  | 7.52 | 7.61   | 7.59   | 7.42 | 7.73        | 7.37 | 7.51 | 7.50 | 7.82 | 7.56 | 5.90 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |  | 5.73 | 5.79   | 5.52   | 5.72 | 7.32        | 6.64 | 5.63 | 6.29 | 7.54 | 7.18 | 5.91 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | $M_3C_3O_2$                                  |      |        | 6.72   | 6.31 | 7.76        | 6.56 | 6.30 | 6.40 | 7.72 | 7.52 | 6.31 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |  | li . |        |  | 6.24 | 8.72        | 7.67 | 7.28 | 7.19 | 8.15 | 7.69 | 6.35 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |  |      | 1      |  |      | 7.35        | 7.25 | 6.25 | 6.26 | 7.40 | 7.16 | 6.35 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | 1  | 1    |        |  |      |             | 7.18 | 6.55 | 6.55 | 7.31 | 7.25 | 6.53 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |  |      |        |  | j .  | 7.86        | 6.70 | 6.21 | 6.35 | 7.41 | 7.29 | 6.29 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  |  |      |        |  | ł    | 1           | L    | 6.28 | 6.19 | 7.31 | 7.25 | 6.57 |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$  | i i  | ŀ    |        |  |      |             |      | 6.36 | 6.35 | 7.78 | 6.61 | 5.78 |
| $M_4C_3O_2$ 7.33 6.39 5.82 5.77 7.74 6.49 6.45 6.18 7.39 7.35 6.7 $M_4C_3O_3$ 8.61 7.78 6.62 6.55 8.74 7.70 7.28 6.52 7.63 7.40 6.7  |  |      |        | í  | ſ    |             | 6.64 | 6.47 | 6.54 | 7.63 | 6.46 | 5.81 |
| $M_4C_3O_3$ 8.61 7.78 6.62 6.55 8.74 7.70 7.28 6.52 7.63 7.40 6.7  |  |      |        |  | ĺ    |             |      |      | 6.53 | 8.23 | 7.73 | 6.79 |
|  |  |      | í      |  |      |             |      |      |      | 7.39 | 7.35 | 6.74 |
| SE   0.07   0.08   0.09   0.07   0.06   0.08   0.09   0.08   0.07   0.07   0.0   |  |      |        | <del>                                     </del> | 1    | <del></del> |      | _    | 6.52 | 7.63 | 7.40 | 6.70 |
|  | 1  | 1    |        | i  |      | ľ           |      | 0.09 | 0.08 | 0.07 | 0.07 | 0.07 |
| CD 0.21 0.21 0.24 0.19 0.18 0.21 0.27 .22 0.21 0.21 0.1  | CD   | 0.21 | 0.21   | 0.24   | 0.19 | 0.18        | 0.21 | 0.27 | .22  | 0.21 | 0.21 | 81.0 |

<sup>\*</sup>Before organic manure application

APPENDIX – VII

Effect of interaction between media, cowdung and organic manure treatments on EC (dSm<sup>-1</sup>) of the media recorded at weekly intervals

|  | 1    | 2    | 3    | OM*  | 1    | 2    | 3     | OM*  | 1    | 2    | 3    |
|--|------|------|------|------|------|------|-------|------|------|------|------|
| M <sub>1</sub> C <sub>1</sub> O <sub>1</sub> | 0.52 | 0.49 | 0.24 | 0.23 | 2.52 | 1.35 | 0.54  | 0.25 | 2.75 | 1.75 | 0.73 |
| $M_1C_1O_2$                                  | 0.63 | 0.52 | 0.24 | 0.25 | 2.41 | 1.55 | 0.52  | 0.26 | 2.55 | 1.82 | 0.73 |
| $M_1C_1O_3$                                  | 0.73 | 0.63 | 0.23 | 0.23 | 2.54 | 1.65 | 0.64  | 0.24 | 3.03 | 1.85 | 0.81 |
| M <sub>1</sub> C <sub>2</sub> O <sub>1</sub> | 0.51 | 0.41 | 0.21 | 0.24 | 2.15 | 1.54 | 0.63  | 0.26 | 2.85 | 1.65 | 0.85 |
| $M_1C_2O_2$                                  | 0.67 | 0.57 | 0.25 | 0.28 | 2.25 | 1.22 | 0.67  | 0.29 | 2.93 | 1.63 | 0.86 |
| $M_1C_2O_3$                                  | 0.73 | 0.62 | 0.22 | 0.24 | 2.44 | 1.33 | 0.63  | 0.28 | 2.85 | 1.78 | 0.83 |
| M <sub>I</sub> C <sub>3</sub> O <sub>1</sub> | 0.70 | 0.60 | 0.21 | 0.27 | 2.02 | 1.64 | 0.55  | 0.27 | 2.82 | 1.63 | 0.88 |
| $M_1C_3O_2$                                  | 0.82 | 0.75 | 0.22 | 0.25 | 2.72 | 1.17 | 0.53  | 0.28 | 2.73 | 1.87 | 0.73 |
| $M_1C_3O_3$                                  | 0.90 | 0.79 | 0.22 | 0.24 | 2.84 | 1.48 | 0.61  | 0.25 | 2.78 | 1.93 | 0.73 |
| $M_2C_1O_1$                                  | 0.57 | 0.46 | 0.29 | 0.26 | 2.45 | 1.17 | 0.62  | 0.26 | 2.56 | 1.77 | 0.72 |
| $M_2C_1O_2$                                  | 0.72 | 0.74 | 0.29 | 0.27 | 2.67 | 1.96 | 0.55  | 0.28 | 2.96 | 1.94 | 0.78 |
| $M_2C_1O_3$                                  | 0.82 | 0.70 | 0.29 | 0.29 | 2.74 | 1.84 | 0.63  | 0.28 | 3.24 | 1.83 | 0.82 |
| $M_2C_2O_1$                                  | 0.60 | 0.56 | 0.28 | 0.24 | 1.83 | 1.34 | 0.72  | 0.28 | 2.25 | 1.84 | 0.75 |
| $M_2C_2O_2$                                  | 0.92 | 0.77 | 0.39 | 0.24 | 2.72 | 1.43 | 0.53  | 0.26 | 2.73 | 1.86 | 0.72 |
| M <sub>2</sub> C <sub>2</sub> O <sub>3</sub> | 1.95 | 0.99 | 0.33 | 0.27 | 2.74 | 1.78 | 0.47  | 0.29 | 2.95 | 1.78 | 0.82 |
| $M_2C_3O_1$                                  | 1.49 | 0.89 | 0.27 | 0.30 | 2.74 | 1.53 | 0.58  | 0.30 | 2.74 | 1.93 | 0.76 |
| $M_2C_3O_2$                                  | 1.50 | 0.98 | 0.30 | 0.27 | 1.83 | 1.13 | 0.57  | 0.29 | 2.86 | 1.86 | 0.78 |
| M <sub>2</sub> C <sub>3</sub> O <sub>3</sub> | 1.52 | 0.96 | 0.23 | 0.24 | 1.85 | 1.64 | 0.73  | 0.26 | 3.14 | 1.76 | 0.82 |
| $M_3C_1O_1$                                  | 1.17 | 0.96 | 0.24 | 0.21 | 1.36 | 1.34 | 0.82  | 0.21 | 2.78 | 1.85 | 0.82 |
| $M_3C_1O_2$                                  | 1.71 | 0.90 | 0.25 | 0.29 | 2.33 | 1.75 | 0.72  | 0.27 | 2.64 | 1.75 | 0.82 |
| $M_3C_1O_3$                                  | 1.92 | 0.87 | 0.24 | 0.23 | 2.43 | 1.67 | 0.82  | 0.23 | 2.85 | 1.85 | 0.78 |
| $M_3C_2O_1$                                  | 1.11 | 0.86 | 0.25 | 0.26 | 1.45 | 1.24 | 0.71  | 0.28 | 2.62 | 1.68 | 0.76 |
| $M_3C_2O_2$                                  | 1.72 | 0.85 | 0.23 | 0.29 | 1.33 | 1.16 | 0.83  | 0.29 | 2.72 | 1.87 | 0.83 |
| $M_3C_2O_3$                                  | 1.37 | 0.97 | 0.24 | 0.28 | 2.34 | 1.44 | 0.68  | 0.29 | 2.66 | 1.94 | 0.78 |
| $M_3C_3O_1$                                  | 1.13 | 0.99 | 0.30 | 0.24 | 1.99 | 1.25 | 0.64  | 0.25 | 2.57 | 1.84 | 0.78 |
| $M_3C_3O_2$                                  | 1.72 | 0.87 | 0.23 | 0.24 | 2.25 | 1.53 | 0.78  | 0.25 | 2.75 | 1.73 | 0.71 |
| $M_3C_3O_3$                                  | 1.90 | 0.88 | 0.22 | 0.26 | 2.37 | 1.44 | 0.71  | 0.26 | 2.97 | 1.64 | 0.88 |
| $M_4C_1O_1$                                  | 0.72 | 0.66 | 0.22 | 0.30 | 2.47 | 1.55 | 0.53  | 0.29 | 2.76 | 1.57 | 0.83 |
| $M_4C_1O_2$                                  | 0.89 | 0.75 | 0.28 | 0.27 | 2.43 | 1.74 | 0.52  | 0.28 | 2.64 | 1.73 | 0.85 |
| $M_4C_1O_3$                                  | 1.41 | 0.99 | 0.35 | 0.25 | 2.73 | 1.66 | 0.57  | 0.26 | 2.73 | 1.78 | 0.84 |
| $M_4C_2O_1$                                  | 0.73 | 0.66 | 0.31 | 0.22 | 2.53 | 1.64 | 0.67  | 0.24 | 2.58 | 1.77 | 0.83 |
| $M_4C_2O_2$                                  | 0.84 | 0.79 | 0.30 | 0.23 | 2.84 | 1.84 | 0.51  | 0.25 | 2.83 | 1.83 | 0.89 |
| $M_4C_2O_3$                                  | 0.88 | 0.79 | 0.28 | 0.25 | 2.76 | 1.73 | 0.66  | 0.25 | 3.15 | 1.73 | 0.87 |
| $M_4C_3O_1$                                  | 1.06 | 0.86 | 0.29 | 0.25 | 2.33 | 1.65 | 0.73  | 0.23 | 2.68 | 1.94 | 0.79 |
| $M_4C_3O_2$                                  | 1.13 | 0.88 | 0.30 | 0.30 | 2.37 | 1.33 | 0.88  | 0.26 | 2.88 | 1.85 | 0.89 |
| M <sub>4</sub> C <sub>3</sub> O <sub>3</sub> | 1.16 | 0.84 | 0.29 | 0.25 | 2.43 | 1.48 | 0.79  | 0.30 | 3.25 | 1.74 | 0.91 |
| SE   | 0.01 | 0.01 | 10.0 | 0.01 | 0.01 | 0.05 | 0.032 | 0.01 | 0.01 | 0.01 | 0.01 |
| CD   | 0.04 | 0.02 | 0.02 | 0.02 | 0.04 | 0.14 | 0.01  | 0.02 | 0.04 | 0.04 | 0.02 |

<sup>\*</sup>Before organic manure application

APPENDIX - VIII

### Effect of interaction between media, cowdung and organic manure treatments on floral characters in Anthurium andreanum cv. Tropical

|                | Treatments                                 | Days to flowering | Number of<br>flowers | Spathe size (cm) | Length of spadix (cm) | Thick ness of spadix (cm) | Inclination<br>(Degree) | Length of flower<br>stalk (cm) | Thickness of flower stalk (cm) | Days to maturity | Vase life (days) |
|----------------|--|-------------------|----------------------|------------------|-----------------------|---------------------------|-------------------------|--------------------------------|--------------------------------|------------------|------------------|
| Mı             | $C_lO_1$                                   | 483.50            | 1.00                 | 7:75             | 2.45                  | 1.70                      | 37.50                   | 18.50                          | 0.95                           | 48.00            | 10.50            |
| M <sub>1</sub> | $C_1O_2$ .                                 | 475.00            | 1.00                 | 8.10             | 3.20                  | 2.10                      | 26.50                   | 20.55                          | 1.10                           | 47.50            | 10.00            |
| M <sub>1</sub> | $C_1O_3$                                   | 450.50            | 1.50                 | 8,15             | 3.35                  | 2.45                      | 22.50                   | 21.35                          | 1.18                           | 46.00            | 12.00            |
|                | $C_2O_1$                                   | 469.50            | 1,50                 | 8.10             | 2.85                  | 2.15                      | 25.00                   | 21.75                          | 1.25                           | 45.00            | 12.00            |
|                | $C_2O_2$                                   | 496.50            | 1.00                 | 8,35             | 2.50                  | 1.65                      | 31.25                   | 18.80                          | 0.80                           | 48.50            | 10.50            |
|                | $C_2O_3$                                   | 458.50            | 1.50                 | 7,80             | 3.25                  | 2.51                      | 35.00                   | 18.75                          | 1.15                           | 46.00            | 12.00            |
| I              | $C_3O_1$                                   | 458.50            | 1.00                 | 8.15             | 2.55                  | 1.75                      | 37.50                   | 14.90                          | 0.85                           | 49.00            | 10.50            |
|                | $C_3O_2$                                   | 490.50            | 1.00                 | 7.45             | 2.60                  | 1.75                      | 25.00                   | 17.50                          | 0.85                           | 45.00            | 10.50            |
| , i            | $C_3O_3$                                   | 448.50            | 1.00                 | 6.80             | 2.45                  | 1.65                      | 35.00                   | 17.50                          | 0.75                           | 48.50            | 9.50             |
| I .            | $_{2}C_{1}O_{1}$                           | 437.50            | 2.00                 | 14.85            | 3.55                  | 2.30                      | 42.50                   | 29.95                          | 1.20                           | 48.00            | 12.00            |
| I .            | $_{2}C_{1}O_{2}$                           | 437.00            | 2.00                 | 14.80            | 20.30                 | 2.15                      | 30.00                   | 30.55                          | 1.10                           | 49.50            | 12.00            |
| I .            | C <sub>1</sub> O <sub>3</sub>              | 405.00            | 3.00                 | 16.45            | 3.95                  | 2.55                      | 40.00                   | 33.90                          | 1.35                           | 46.00            | 13.50            |
| I .            | $_{2}C_{2}O_{1}$                           | 436.50            | 2.00                 | 15.25            | 3.70                  | 2.30                      | 40.00                   | 31.15                          | 1.00                           | 46.50            | 14.00            |
| I .            | $C_2O_2$                                   | 454.00            | 2.50                 | 16:20            | 3.85                  | 2.65                      | 40.00                   | 31.60                          | 1.15                           | 47.00            | 13.00            |
| I .            | $_{2}C_{2}O_{3}$                           | 430.00            | 3.00                 | 16.35            | 3.80                  | 2.75                      | 35.00                   | 34.10                          | 1.25                           | 45.50            | 13.50            |
| ,              | <sub>2</sub> C <sub>3</sub> O <sub>1</sub> | 431.50            | 2.50                 | 15.30            | 3.70                  | 2.60                      | 27.50                   | 33.30                          | 1.15                           | 46.50            | 13.50            |
|                | $_{2}C_{3}O_{2}$                           | 449.00            | 2.00                 | 14.65            | 3.70                  | 2.65                      | 40.00                   | 33.65                          | 1.05                           | 43.75            | 12.50            |
|                | $_{2}C_{3}O_{3}$                           | 431.50            | 2.00                 | 13.15            | 3.05                  | 2.15                      | 39.00                   | 31.35                          | 0.95                           | 49.50            | 13.50            |
|                | 3C <sub>1</sub> O <sub>1</sub>             | 437.50            | 2.00                 | 10.20            | 2.90                  | 2.00                      | 30.00                   | 26.00                          | 0.95                           | 45.50            | 11.50            |
|                | $_{3}C_{1}O_{2}$                           | 475.50            | 1.50                 | 9.98             | 2.55                  | 1.85                      | 32.50                   | 21.75                          | 1.00                           | 48.00            | 10.50            |
| 1              | $_3C_1O_3$                                 | 458.50            | 1.00                 | 9.77             | 2.80                  | 1.65                      | 33.50                   | 18.55                          | 0.75                           | 46.00            | 10.50            |
|                | $_{3}C_{2}O_{1}$                           | 447.50            | 1.00                 | 9.95             | 1.90                  | 1.45                      | 30.00                   | 21.50                          | 0.85                           | 46.00            | 11.50            |
| 1              | $_3C_2O_2$                                 | 416.00            | 1.00                 | 15.35            | 3.15                  | 1.85                      | 32.50                   | 30.25                          | 1.18                           | 44.00            | 11.50            |
| - 1            | $_{3}C_{2}O_{3}$                           | 439.50            | 1.50                 | 15.25            | 3.20                  | 2.30                      | 35.00                   | 31.15                          | 1.05                           | 46.00            | 11.00            |
| - 1            | <sub>3</sub> C <sub>3</sub> O <sub>1</sub> | 401.50            | 3.00                 | 15.85            | 3.60                  | 2.60                      | 30.00                   | 33.70                          | 1.18                           | 44.50            | 12.50            |
|                | <sub>3</sub> C <sub>3</sub> O <sub>2</sub> | 436.50            | 1.50                 | 10.35            | 2.70                  | 1.70                      | 30.00                   | 18.10                          | 0.85                           | 45.50            | 10.50            |
| - 1            | <sub>3</sub> C <sub>3</sub> O <sub>3</sub> | 450.00            | 1.00                 | 9.60             | 3.45                  | 2.15                      | 42.50                   | 19.50                          | 1.10                           | 47.00            | 10.00            |
| 1              | <sub>4</sub> C <sub>1</sub> O <sub>1</sub> | 441.50            | 1.50                 | 9.65             | 2.53                  | 1.75                      | 40.00                   | 17.85                          | 1.00                           | 45.50            | 11.00            |
|                | ${}_{4}C_{1}O_{2}$                         | 473.50            | 1.00                 | 9.35             | 3.40                  | 1.75                      | 42.50                   | 19.30                          | 1.05                           | 47.50            | 10.00            |
|                | ${}_{4}C_{1}O_{3}$                         | 481.50            | 1.00                 | 7.15             | 2.45                  | 1.75                      | 39.00                   | 15.60                          | 0.85                           | 49.00            | 10.50            |
|                | <sub>4</sub> C <sub>2</sub> O <sub>1</sub> | 487.50            | 1.00                 | 10.05            | 2.60                  | 1.75                      | 32.50                   | 17.25                          | 0.95                           | 46.00            | 10.50            |
|                | $_4C_2O_2$                                 | 473.50            | 1.00                 | 6.43             | 2.70                  | 1.75                      | 30.00                   | 10.30                          | 0.75                           | 45.50            | 10.50            |
|                | 4C2O3                                      | 389.50            | 1.50                 | 10.00            | 2.75                  | 2.05                      | 38.25                   | 19.65                          | 1.05                           | 42.50            | 10.50            |
|                | <sub>4</sub> C <sub>3</sub> O <sub>1</sub> | 464.00            | 1.00                 | 9.95             | 2.80                  | 1.83                      | 32.50                   | 19.85                          | 0.90                           | 46.50            | 10.50            |
| L              | ₄C₃O₂                                      | 488.00            | 1.00                 | 8.50             | 2.85                  | 1.75                      | 27.50                   | 20.75                          | 1.00                           | 46.50            | 10.00            |
| _              | 4C3O3                                      | 459.00            | 1.00                 | 9.30             | 2.35                  | 2.15                      | 37.50                   | 19.75                          | 1.05                           | 48.50            | 11.00            |
| i i            | SE   | 4.91              | -                    | 0.16             | 0.11                  | 0.17                      | -                       | 0.59                           | 0.05                           | 0.76             | -                |
| (              | CD   | 14.08             | NS                   | 0.46             | 0.33                  | 0.2                       | NS                      | 1.7_                           | 0.15                           | 2.17             | NS               |
|                |  |                   |                      |                  |                       |                           |                         |                                |                                |                  |                  |

### STANDARDIZATION OF GROWING MEDIA AND ORGANIC NUTRITION FOR JUVENILE ANTHURIUM PLANTS

(Anthurium andreanum Lind.)

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#### **ABSTRACT**

Anthuriums are herbaceous perennials belonging to the largest genus of the family Araceae. Anthurium andreanum Lind. called the 'Painter's palette' flower is the most important species grown in the tropics. Anthurium cultivation on a commercial basis is gaining popularity in Kerala because of its high demand in the foreign market. The lack of proper management practices has increased the total period taken for the production of marketable flowers to nearly 2-2½ years. The present work was thus taken up with a view to standardize growing media and organic nutrient dosage for young anthurium plants, for enhancing their early vegetative growth and for earlier production of flowers having desirable floral attributes of size and quality.

The experiment was carried out at the Department of Pomology and Floriculture, College of Agriculture, Vellayani during 2003–2005 with a view to standardize the growing media and organic nutrient dosage for young anthurium plants. The anthurium cultivar chosen for this study was *Anthurium andreanum* 'Tropical', a commercially important cultivar of Kerala. The treatments consisted of thirty six combinations of four media treatments namely sand + leaf compost (M<sub>1</sub>), sand + coir pith compost (M<sub>2</sub>), granite + leaf compost (M<sub>3</sub>) and granite + coir pith compost (M<sub>4</sub>) and nine nutrient treatments including weekly application of three cowdung treatments (2, 4 and 6 g l<sup>-1</sup> extract) and bimonthly application of three organic manure mix (25, 50 and 75 g) treatments.

Growing media, nutrient treatments and their interactions influenced vegetative growth, flower characters, vase life, fresh weight and dry matter production and nutrient content of leaves.

Among the media, sand + coir pith compost was found to be the best for obtaining greater plant height, leaf area, leaf duration, petiole length at third and fourth week after emergence, shortest phyllachron, the highest fresh and dry weight of leaves and their N and K content. Plants grown in this medium also recorded earlier flowering, greater number of flowers per plant, increased spathe size, greater length and thickness of flower stalk and enhanced vase life. The inclination of spadix and its length and thickness were also found to be greater tending towards those of mature plants in this medium.

Vegetative growth enhancement was also obtained with 4 g l<sup>-1</sup> and 6 g l<sup>-1</sup> fresh cowdung extract treatments at varying stages of growth. Greater fresh weight and dry weight of leaves were recorded in plants receiving 4 g l<sup>-1</sup> cowdung extract at 165 and 225 DAT. These plants also recorded greater N and K content during the period while the P content was greater in plants receiving 6 g l<sup>-1</sup> at these periods. Increased spathe size, lesser number of days to flowering, maximum length of flower stalk, maximum vase life and lesser number of days to harvestable maturity of flowers was obtained with 4 g l<sup>-1</sup> extract.

Application of organic manure mix were also found to give beneficial effects. Plants receiving 25 g organic manure mix recorded greater plant heights and leaf area during the latter stages of growth. This dosage also resulted in greater leaf duration and greater petiole length during the first and second week after leaf emergence. Fresh and dry weight of the leaves recorded were greater in plants receiving 75 g mix. The shortest phyllachron was recorded with 50 g dosage and the longest was recorded with 75 g / plant. The N and K content of the leaves were greater in plants receiving 25 g mix while the P content was greater in plants receiving 50 g mix. Spathe size, length of the flower stalk as well as the vase life of flowers was greater in plants receiving 25 g OM mix.

The interaction between media treatment, cowdung and organic manure treatments were also found to influence the performance of plants.