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Short communication

Effect of potting media on growth and quality in *Aglaonema*

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ABSTRACT

Effect of potting media on growth and quality of ornamental foliage plant, aglaonema cv. Ernesto's Favourite, was evaluated. Soil, cocopeat and sphagnum peat, in combination with sand, FYM and vermicompost in various proportions, were used as potting media. Maximum plant height (71.36cm), number of leaves (16.00), leaf length (60.39cm), leaf width (10.13cm), leaf area (208.36cm^2), plant growth index (63.37cm), fresh weight of root (45.00g), dry weight of root (8.53g), visual plant grade (4.50), colour grade (4.58), root grade (4.45), and, N (3.46 %), P (0.95 %) and K content in leaf (1.91%) were recorded with the medium containing cocopeat + sand + vermicompost in 2:1:1, (v/v) combination at 150 DAP. Medium containing cocopeat + sand + FYM + vermicompost in 2:1:1:0.5 ratio, (v/v) was found to be on par with cocopeat + sand + vermicompost in 2:1:1, (v/v) combination with respect to leaf width, dry weight of root, visual plant grade, colour grade, root grade and K content.

Key words: *Aglaonema*, sphagnum peat, cocopeat, vermicompost, plant grade, color grade, root grade, NPK content

Foliage plants are generally grown for their attractive foliage and can be kept for longer periods under indoor conditions. There is a great demand for foliage plants for both domestic and export markets. Among a large number of foliage plants available for interior decoration, *Aglaonema* is an important and popular herbaceous, evergreen ornamental with attractive foliar variegation and tolerance to low light. It belongs to the family Araceae and is native to South East Asia. Potting medium plays an important role in successful growth of foliage plants. Though most potted tropical foliage plants are grown in peat-based media, usually sphagnum peat, this is not readily available in the tropical regions. Hence, there is a need for new substrate-components which improve growth of foliage plants or reduce production costs compared to peat-based media. With this in view, an attempt was made to evaluate the effect of different potting media on growth performance and quality in *Aglaonema* cv. Ernesto's Favourite.

One-month old plants of *Aglaonema* cv. Ernesto's Favourite, obtained from a nursery located in Hyderabad, were used in the experiment. Nine treatments were laid out in Completely Randomized Design, and replicated thrice [(T_1 - Soil + Sand + FYM (2:1:1, v/v), T_2 - Soil + Sand + Vermicompost (2:1:1, v/v), T_3 - Soil + Sand + FYM + Vermicompost (2:1:1:0.5, v/v), T_4 - Cocopeat + Sand + FYM (2:1:1, v/v), T_5 - Cocopeat + Sand + Vermicompost (2:1:1, v/v), T_6 - Cocopeat + Sand + FYM + Vermicompost (2:1:1:0.5, v/v), T_7 - Sphagnum peat + Sand + FYM (2:1:1, v/v), T_8 - Sphagnum peat + Sand + Vermicompost (2:1:1, v/v), and T_9 - Sphagnum peat + Sand + FYM + Vermicompost (2:1:1:0.5, v/v)]. Each component of the mixture was added on the basis of volume while preparing the potting mixture which was added to earthen pots of 12" size stopping at 2cm from the top. One-month old plants of aglaonema cv. Ernesto's Favourite, were planted into the pots, and the pots were moved into partial shade. Observations on growth parameters, viz., plant height, leaf number/plant, leaf length, leaf width and leaf area were recorded at monthly intervals from 30 DAP to 150 DAP. Data recorded at 150 DAP is presented in Tables 1, 2 and 3. For calculating plant growth index, height (base to maximum point of canopy) and width (distance between widest two points in canopy) of plants were measured at inception, and again at the termination of the experiment (150DAP). Plant growth index (PGI) was calculated using the formula of net change in plant height plus net change in plant width (Merrow, 1995).

Various plant parameters, viz., visual plant grade, visual colour grade, fresh weight of roots, dry weight of roots, visual root grade and per cent N, P and K in leaf were recorded at 150 DAP. Visual plant grade was

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Table 1. Effect of potting media on growth performance in *Aglaonema* cv. Ernesto's Favourite at 150 days after planting

Treatment	Plant height (cm)	No.of leaves	Leaf length (cm)	Leaf width (cm)	Leaf area (cm^2)	Plant Growth Index	Fresh weight of root (g)	Dry weight of root (g)
T_1	51.20	9.00	41.67	7.26	146.86	44.42	30.07	3.26
T_2	57.50	10.22	48.48	8.95	161.40	47.39	33.00	4.08
T_3	58.23	12.71	50.70	8.83	174.00	49.17	36.66	4.45
T_4	59.63	11.71	47.36	8.64	180.46	52.42	40.83	7.45
T_5	71.36	16.00	60.39	10.13	208.36	63.37	45.00	8.53
T_6	63.53	14.75	55.15	9.61	192.13	56.72	42.04	8.08
T_7	55.80	11.38	49.28	8.11	167.20	50.08	37.12	6.81
T_8	60.63	13.26	50.34	8.95	183.20	52.25	40.16	7.65
T_9	60.76	12.24	50.44	8.62	173.50	52.71	38.68	6.61
S.Em.±	0.79	0.63	0.50	0.32	2.46	0.83	0.98	0.27
C D *(P=0.05)*	2.36	1.89	1.49	0.95	7.31	2.49	2.90	0.81

T_1 - Soil + Sand + FYM (2:1:1, v/v)
T_2 - Soil + Sand + Vermicompost (2:1:1, v/v)
T_3 - Soil + Sand + FYM + Vermicompost (2:1:1:0.5, v/v)
T_4 - Cocopeat + Sand + FYM (2:1:1, v/v)
T_5 - Cocopeat + Sand + Vermicompost (2:1:1, v/v)
T_6 - Cocopeat + Sand + FYM + Vermicompost (2:1:1:0.5, v/v)
T_7 - Sphagnum peat + Sand + FYM (2:1:1, v/v)
T_8 - Sphagnum peat + Sand + Vermicompost (2:1:1, v/v)
T_9 - Sphagnum peat + Sand + FYM + Vermicompost (2:1:1:0.5, v/v)

determined using 1-5 scale grade system, where 1 = dead, 2 = poor quality, 3 = fair quality, 4 = good quality and 5 = excellent quality. Visual colour grade of *Aglaonema* plants was rated according to colour and pigmentation by the grading system by Henny *et al* (2008) as, 1= poor colour, 3= good, light green and 5= excellent dark green & silver contrast. Visual root grade was determined using a grading system where 1= 20% soil ball covered with roots, 2= 20-40% soil ball covered, 3= 40-60% soil ball covered, 4= 60-80% soil ball covered and 5= ≥ 80% coverage. Leaf nitrogen per cent was determined by Kjeldhal method. Phosphorus content was determined as per Jackson (1973). Potassium per cent was estimated by a microprocessor-based flame photometer, using specific filter and LPG flame. Data were statistically analyzed as per Panse and Sukhatme (1985).

Observations on plant height, leaf number/plant, leaf length and width, leaf area, PGI and fresh and dry weight of roots recorded at 150 days after planting (DAP) under various potting media are presented in Table 1. Maximum plant height was recorded in T_5 - cocopeat + sand + vermicompost in 2:1:1 ratio (v/v) (71.36cm), followed by T_6 - cocopeat + sand + FYM + vermicompost in 2:1:1:0.5 ratio v(/v) (63.53cm). Minimum plant height (51.20cm) was recorded in T_1 - soil + sand + FYM in 2:1:1 ratio (v/v). High nitrogen content available to plants grown in cocopeat, sand and vermicompost medium (Table 3) could be the reason for greatest plant height. Maximum number of leaves (16.00) were recorded in treatment T_5 - cocopeat + sand + vermicompost in 2:1:1 ratio (v/v), followed by T_6 - cocopeat + sand + FYM + vermicompost in 2:1:1:0.5 ratio (v/v) (14.75) which was on par with T_8 - sphagnum peat + sand + vermicompost in 2:1:1 ratio v/v (13.26). Higher number of leaves in cocopeat + sand + vermicompost (2:1:1, v/v) medium is related to both cocopeat and vermicompost characteristics, where, cocopeat affords higher total pore space (TPS) and water holding capacity (WHC) and vermicompost is richer in humic compounds (Sahni *et al*, 2008). Maximumt leaf length was recorded in T_5 - cocopeat + sand + vermicompost (2:1:1 ratio, v/v) (60.39cm), followed by T_6 - cocopeat + sand + FYM + vermicompost (2:1:1:0.5 ratio, v/v) (55.15cm). Minimum leaf length was recorded in T_1 - soil + sand + FYM (2:1:1 ratio, v/v) (41.67cm). High water-holding capacity of cocopeat and high nutrient content of vermicompost may have been responsible for maximum leaf length. Tilt *et al* (1987) demonstrated positive correlation between water-holding capacity and increased top growth in several landscape species. Treatment T_5 - cocopeat + sand + vermicompost (2:1:1 ratio, v/v) showed maximum leaf width (10.13cm), and T_6 - cocopeat + sand + FYM + vermicompost (2:1:1:0.5 ratio, v/v) was on par (9.61cm) with it. Plants grown in cocopeat + sand + vermicompost (2:1:1 ratio, v/v) (T_5) produced leaves with maximum leaf area (208.36cm^2), followed by T_6 - cocopeat + sand + FYM + vermicompost (2:1:1:0.5 ratio, v/v) (192.13cm^2). Better performance in this medium can be attributed mainly to characteristics of cocopeat and vermicompost. Cocopeat has the ability to store and release nutrients to plants for an extended period of time. Vermicompost has considerable amounts of humic substances and improves plant nutrition (Sahni *et al*, 2008).

Maximum PGI (63.37cm) was observed in plants grown in a medium containing cocopeat + sand +

vermicompost (2:1:1 ratio, v/v) (T_5), followed by T_6 - cocopeat + sand + FYM + vermicompost (2:1:1:0.5 ratio, v/v) (56.72cm). Cocopeat allows air, nutrients and water to reach the root surface, which may be one of the reasons for the rapid and vigorous growth seen. Maximum root fresh weight (45g) was recorded in T_5 - cocopeat + sand + vermicompost in 2:1:1 ratio (v/v), followed by T_6 - cocopeat + sand + FYM + vermicompost in 2:1:1:0.5 ratio (v/v) (42.04 g). Minimum root fresh weight was observed in T_1 - soil + sand + FYM in 2:1:1 ratio (v/v) (30.07 g). Development of more number of leaves on the plant may reflect an earlier growth of root system. Thus, production of more leaves with maximum leaf area in this medium largely agrees with improved root development. Maximum dry weight of roots was obtained in treatment T_5 - cocopeat + sand + vermicompost in 2:1:1 ratio (v/v) (8.53g), which was on par with T_6 - cocopeat + sand + FYM + vermicompost in 2:1:1:0.5 ratio (v/v) (8.08g). Cocopeat is very slow to disintegrate compared to peat (Cresswell, 1992) which makes it resistant to bacterial and fungal growth. This could be one of the reasons for higher root growth.

Data on visual plant grade, colour grade and root grade at 150DAP *Aglaonema* cv. Ernesto's Favourite grown in different potting media are presented in Table 2. Significantly higher plant grade was recorded in T_5 - cocopeat + sand + vermicompost (2:1:1 ratio, v/v) (4.50), which was on par with T_6 - cocopeat + sand + FYM + vermicompost (2:1:1:0.5 ratio, v/v) (4.41). Cultivars growing in cocopeat-amended medium are shown to have higher production or accumulation of total protein and amino acids in their stem than plants growing in peat-amended media (Scagel, 2003). This could be a reason for high visual plant grade. Improved nutrition from vermicompost changes biochemical properties of a plant like chlorophyll, enzymes, and protein synthesis (Tomati *et al*, 1995) which could be one of the reasons for high visual plant grade. Significantly higher visual colour grade was recorded in T_5 - cocopeat + sand + vermicompost (2:1:1 ratio, v/v) (4.58), which was on par with T_6 - cocopeat + sand + FYM + vermicompost (2:1:1:0.5 ratio, v/v) (4.25). Higher nitrogen available to plants in this medium may be the reason for higher colour intensity. These results are in accordance with Scagel (2003) where leaf of the plant grown in cocopeat-amended media had higher chlorophyll content than in plants grown on peat-amended media. Higher visual root grade was registered in treatment T_5 - cocopeat + sand + vermicompost (2:1:1 ratio, v/v) (4.45), and was on par with T_6 - cocopeat + sand + FYM + vermicompost (2:1:1:0.5 ratio, v/v) (4.28). Phenolics in cocopeat may have either promoted root development or inhibited loss of roots to disease-causing pathogens (Evans and Stamps, 1996), resulting in high root grade.

Data on nitrogen, phosphorus and potassium in leaves at 150DAP in *Aglaonema* cv. Ernesto's Favourite treated with different potting media (Table 3) show that maximum percentage of nitrogen was recorded in treatment T_5 - cocopeat + sand + vermicompost (2:1:1 ratio, v/v) (3.46%), and was on par with T_6 - cocopeat + sand + FYM + vermicompost (2:1:1:0.5 ratio, v/v) (3.20%). High cation exchange capacity, low electrical conductivity and acceptable pH of cocopeat (Jeyaseeli and Samuel Paul Raj, 2010) could be the reason for high N uptake. Maximum phosphorus

Table 2. Effect of potting media on visual plant grade, colour grade and root grade in *Aglaonema* cv. Ernesto's Favourite at 150 days after planting

Treatment	Visual plant grade*	Visual colour grade**	Visual root grade***
T_1 - Soil + Sand + FYM (2:1:1, v/v)	3.28	3.00	3.53
T_2 - Soil + Sand + Vermicompost (2:1:1, v/v)	3.88	3.33	3.75
T_3 - Soil + Sand + FYM + Vermicompost (2:1:1:0.5, v/v)	4.15	3.58	3.91
T_4 - Cocopeat + Sand + FYM (2:1:1, v/v)	4.13	3.66	4.11
T_5 - Cocopeat + Sand + Vermicompost (2:1:1, v/v)	4.50	4.58	4.45
T_6 - Cocopeat + Sand + FYM + Vermicompost (2:1:1:0.5, v/v)	4.41	4.25	4.28
T_7 - Sphagnum peat + Sand + FYM (2:1:1, v/v)	4.16	3.66	4.03
T_8 - Sphagnum peat + Sand + Vermicompost (2:1:1, v/v)	4.20	4.00	4.20
T_9 - Sphagnum peat + Sand + FYM + Vermicompost (2:1:1:0.5, v/v)	4.08	4.00	4.13
S.Em.±	0.09	0.18	0.06
C D *(P=0.05)*	0.28	0.54	0.18

*Plant grade system where 1 = dead, 2 = poor quality, 3 = Fair quality, 4 = Good quality and 5=Excellent quality

**Colour grade system where 1= poor colour, 3 = good, light green, 5 = excellent, dark green & silver contrast

***Root grade system where 1= 20% soil ball covered with roots, 2 = 20-40% soil ball covered, 3 = 40-60% soil ball covered, 4 = 60-80% soil ball covered, 5 = ≥ 80% soil ball covered with roots

Table 3. Effect of potting media on leaf nitrogen, phosphorus and potassium content (%) in *Aglaonema* cv. Ernesto's Favourite at 150 days after planting

Treatment	Nitrogen content (%)	Phosphorus content (%)	Potassium content (%)
T_1 - Soil + Sand + FYM (2:1:1, v/v)	2.04	0.30	1.26
T_2 - Soil + Sand + Vermicompost (2:1:1, v/v)	2.33	0.39	1.40
T_3 - Soil + Sand + FYM + Vermicompost (2:1:1:0.5, v/v)	2.71	0.45	1.59
T_4 - Cocopeat + Sand + FYM (2:1:1, v/v)	2.74	0.52	1.69
T_5 - Cocopeat + Sand + Vermicompost (2:1:1, v/v)	3.46	0.95	1.91
T_6 - Cocopeat + Sand + FYM + Vermicompost (2:1:1:0.5, v/v)	3.20	0.84	1.88
T_7 - Sphagnum peat + Sand + FYM (2:1:1, v/v)	2.73	0.52	1.60
T_8 - Sphagnum peat + Sand + Vermicompost (2:1:1, v/v)	2.88	0.79	1.78
T_9 - Sphagnum peat + Sand + FYM + Vermicompost (2:1:1:0.5, v/v)	2.75	0.65	1.76
S.Em.±	0.07	0.02	0.03
C D *(P=0.05)*	0.21	0.08	0.10

content (0.95 %) was recorded in T_5 - cocopeat + sand + vermicompost (2:1:1 ratio, v/v), followed by T_6 - cocopeat + sand + FYM + vermicompost (2:1:1:0.5 ratio, v/v) (0.84%). Higher availability of P in coir-amended medium could be a result of greater P exchange sites or due to a higher activity of P-solubilizing and acid phosphatase producing organisms. Maximum potassium content (1.91%) was recorded in T_5 - cocopeat + sand + vermicompost (2:1:1 ratio, v/v), which was on par with T_6 - cocopeat + sand + FYM + vermicompost (2:1:1:0.5 ratio, v/v) (1.88%). This could be attributed to higher nutrient status provided by vermicompost, and, excellent physical (water retention and aeration) and chemical properties (acceptable pH, low electrical conductivity, high CEC) of cocopeat, which would have resulted in higher nutrient uptake.

These results reveal that potting media containing cocopeat + sand + vermicompost in 2:1:1 ratio result in best growth parameters and improved quality in *Aglaonema* cv. Ernesto's Favourite among the media studied.

REFERENCES

Cresswell, G.C. 1992. Coir dust – a viable alternative to peat? p. 1-5. In: Proc. Austral. Potting Mix Manufacturers Conf., Sydney

Evans, M.R. and Stamps, R.H. 1996. Growth of bedding plants in sphagnum peat and coir dust based substrates. *J. Environ. Hort.*, **14**:187-190

Henny, R.J., Chen, J. and Mellich, T.A. 2008. New Florida foliage plant cultivar: Aglaonema 'Stripes'. University of Florida, IFAS Extension, USA

Jackson, M.L. 1973. Soil chemical analysis, Prentice Hall of India Private Limited, New Delhi, p. 182

Jeyaseeli, M.D. and Samuel Paul Raj. 2010. Chemical characteristics of coir pith as a function of its particle size to be used as soilless medium. *The Ecoscan.*, **4**:163-169

Merrow, A.W. 1995. Growth of two tropical foliage plants using coir dust as a container medium amendment. *Hort. Technol.,* **5**:237-239

Panse, V.G. and Sukhatme, P.V. 1985. Statistical methods for agricultural workers, 2nd Edition ICAR, New Delhi

Sahni, S., Sarma, B.K., Singh, D.P., Singh, H.B. and Singh, K.P. 2008. Vermicompost enhances performance of plant growth-promoting rhizobacteria in *Cicer arietinum* rhizosphere against *Sclerotium rolfsii* and quality of strawberry (*Fragaria x ananassa* Duch.). *Crop Prot.,* **27**:369–376

Scagel, C.F. 2003. Growth and nutrient use of ericaceous plants grown in media amended with sphagnum moss peat or coir dust. *Hortl. Sci.,* **38**:46-54

Tilt, K.M., Bilderback, T.E. and Fonteno, W.C. 1987. Particle size and container size effects on growth of three ornamental species. *J. Amer. Soc. Hort. Sci.*, **112**:981-984

Tomati, U., Grappelli, A. and Galli, E. 1995. The hormone-like effect of earthworm casts on plant growth. *Biol. Fertil. Soils,* **5**:288–294

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