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Studies on the influence of growing media consortia for the production of quality flowering annuals in pots

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ABSTRACT: *Investigation was carried out to study the influence of growing media consortia for the production of quality flowering annuals in pots. The effect of various growing media consortia was evaluated in three flowering annuals* viz., *balsam, celosia and french marigold based on morphological and physiological parameters. Different growing media consortia were used to study the growth, floral and physiological characters of flowering annuals. Among the treatments, T_2 media (red soil + sand + FYM + vermicompost @ 2:1:1:1) recorded its superiority for plant height (50.11; 10.93 and 30.50 cm respectively), number of branches per plant (6.44; 4.33 and 7.60 nos. respectively) and internodal length (3.66; 1.70 and 3.26 cm respectively) during rainy season in all three flowering annuals. The same treatment also recorded increased number of flowers per pot and flower diameter in all three flowering annuals. Among the various media consortia, T_2 media (red soil + sand + FYM + vermicompost @ 2:1:1:1) was found to be the best which showed high efficiency in the physiological parameter observed* viz., *total dry matter production (8.17; 5.85 and 14.32 g plant^{-1} respectively) in all three flowering annuals.*

Key words: *growing media consortia, flowering annuals, growth, flowering*

INTRODUCTION

Flowering annuals provide much diverse colour in landscaping in many of residential and commercial plantings. Landscaping is both science and art, which requires good observation and design skills. Such designed environments are not just "pretty" they add functionality by modulating temperature, abating noise, reducing glare, and increasing privacy and security. Nowadays the concept of gardening and landscaping is becoming more personal, interactive and relaxed. A more diverse group of plants, both native and introduced, will be used in a way that is more resource-efficient and lower in maintenance to create beautiful, functional landscapes that cherish both nature and people. Therefore a massive number of flowering annuals are being introduced and some are bred to produce many improved and new varieties. Albeit flowering annuals plays a magnificent binding with the planter box and other landscaping factors in this corporate era, growing and maintaining them is still a challenging task for the growers and landscapists to their prefer needs, modernize growing with ideal media usage, optimization of water requirement, aesthetic canopy management *etc.*, are still to be studied and standardized as flowering annuals are getting more commercial value in the modern day landscaping.

Considering the importance of flowering annuals in landscaping, the present study was taken up to examine the effect of different growing media consortia growth, flowering and quality in containers.

MATERIALS AND METHODS

The present study was carried out at the Department of Floriculture and Landscaping, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore. The treatments consisted of different combinations of growing media consortia *viz.*, T_1 - Pot mixture 1 (1:2:1 sand, red earth, FYM), T_2 - Pot mixture 2 (1:2:1:1 sand, red earth, FYM, vermicompost), T_3 - Cocopeat only, T_4 - Cocopeat + pot mixture 1 (25:75), T_5 - Cocopeat + pot mixture 2 (25:75), T_6 - T_5 + microbial consortia (Azophos 15g + VAM 15g), T_7 - T_6 + microbial consortia (Azophos 15g + VAM 15g) and T_8 - Control (2:1 red earth, sand).

Among the flowering annuals, those which have wide adaptation at Coimbatore conditions are selected with respect to the flowering season. The

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flowering annuals *viz*., Balsam, Celosia and French marigold were selected for the study. The seeds were sown in protrays with cocopeat as medium. Watering was done at weekly intervals and drenching of polyfeed @ 1g/lit at 15 days intervals was given. Nine pots per treatment were maintained. Seedlings were allowed to grow in the nursery for 30 days and transplanting was done in the pots and each pot was planted with four seedlings. Half size mud pots were used for the trial. Irrigation was given immediately after transplanting and life irrigation was given on the third day of transplanting. Manual weeding was done at 15, 30 and 45 DAT. Pinching was done at 20 DAT in order to promote laterals.

The observations on the morphological characters *viz*., height of the plant, the number of branches per plant and internodal length were recorded and the floral characters like number of flowers per pot recorded at peak flowering stage were observed and the diameter of the flower was measured by a scale across the middle portion at two directions after maximum opening of the flower. The physiological parameter *viz*., total dry matter production have been recorded.

STATISTICAL ANALYSIS

The data generated from various experiments were subjected to statistical analysis in a Completely Randomized Design (CRD) as given by Panse and Sukhatme (1967). The critical difference was worked for 0.05 % probability and the results were interpreted.

RESULTS AND DISCUSSION

The data on plant height influenced by different media consortia at various growth stages were recorded (Table 1). The plant height for balsam, celosia and french marigold increased continuously from 30 DAT and the increase in height was more in 45 DAT as compared to other stages. At 45 DAT in balsam, celosia and french marigold the plant height ranged from 29.55 cm to 50.11 cm; 5.60 cm to 10.93 cm; 15.30 cm to 30.50 cm respectively and the maximum plant height recorded in T_2 (red soil + sand + FYM + vermicompost) followed by T_7 (cocopeat + red soil + sand + FYM + vermicompost + microbial consortia). The minimum plant height (29.55, 5.60, 15.30cm respectively) was recorded with T_3 (cocopeat only) on 45 DAT in these flowering annuals. The reason for continuous growth could be attributed to the fact that the medium pot mixture 2 (red soil + sand + FYM + vermicompost) has got the good physical properties and desirable chemical properties of a good medium. The inclusion of vermicompost to the growing medium had positive effect on the growth of flowering annuals. Research conducted by Buckerfield *et al.*(1999) inferred that using 100 per cent mixture of vermicompost and sand increased plant growth of ornamental shrubs.

In case of number of branches the maximum was observed in balsam (6.44 nos.), celosia (4.30 nos.) and french marigold (7.60 nos.) in T_2 (red soil + sand + FYM + vermicompost) and the minimum number of branches (4.22; 1.00; 5.33 nos. respectively) were recorded in T_3 (cocopeat only) which is on par with T_8 (control - Red Soil + Sand) (Table 2). Kale *et al.* (1992) observed that the sufficient quantity of nutrient flow in China aster treated with vermicompost leading to increase in number of branches. Significant differences on internodal length of balsam, celosia and french marigold were observed among the different media. Whereas T_2 (red soil + sand + FYM + vermicompost) showed an increased internodal length (3.66; 1.70; 3.26 cm respectively) for three crops (Table 3). Sharan (2011) observed a raising trend of growth and development with respect to length of internodes in *Zinnia elegans.*

The number of flowers was more in balsam 36.25 nos., in celosia 5.00 nos., and in french marigold 53.00 nos. in the media consortia T_2 (red soil + sand + FYM + vermicompost) while the minimum number of flowers (23.00; 3.00; 28.00 nos. respectively) for the three flowering annuals (Figure 1). Vermicompost, an organic source of plant nutrients contains a higher per cent of nutrients necessary for plant growth in available forms (Nagavallema *et al.,* 2004). As a result, Vermicompost has a potential for improving growth including flowers when added to the soil (Atiyeh *et al.,* 2000; Zaller, 2007). Nethra *et al.* (1999) reported that application of different levels of vermicompost to chrysanthemum resulted in increased number of flowers and flower diameter.

Plant dry matter production showed an increasing trend from vegetative to flowering stage (Figure 2). The maximum dry matter accumulation was found to be 8.17 g plant^{-1} in balsam (T_2), 7.47 g plant^{-1} in celosia (T_2) and 14.32 g plant^{-1} in french marigold (T_2). This was followed by treatments T_7 (7.33 g plant^{-1}); T_6 (6.33 g plant^{-1}); T_5 (12.61 g plant^{-1}) respectively for balsam, celosia and french marigold. The treatment T_2 (red soil + sand + FYM + vermicompost) recorded significantly higher values.

The high nitrate content of the mature vermicompost (Atiyeh, 2001) and presence of available forms of minerals led to enhanced

Table 1
Influence of different growing media consortia on plant height in three flowering annuals

	Treatments	*Balsam*	*Celosia*	*French marigold*
T1	Pot mixture 1*	39.88	8.57	23.50
T2	Pot mixture 2*	50.11	10.93	30.50
T3	Cocopeat only	29.55	5.60	15.30
T4	Pot mixture 1 + Cocopeat	43.00	8.00	22.70
T5	Pot mixture 2 + Cocopeat	50.00	9.97	30.00
T6	Pot mixture 1 + Cocopeat +Microbial consortia*	43.11	7.80	27.90
T7	Pot mixture 2 + Cocopeat +Microbial consortia*	49.55	10.37	30.20
T8	Control*	35.44	8.47	19.80
	Mean	**42.58**	**8.71**	**24.98**
	SE(d)	0.35	0.21	0.208
	CD @ 0.05%	**0.75**	**0.45**	**0.442**

Table 2
Influence of different growing media consortia on number of branches in three flowering annuals

	Treatments	*Balsam*	*Celosia*	*French marigold*
T1	Pot mixture 1*	5.33	3.00	6.00
T2	Pot mixture 2*	6.44	4.33	7.60
T3	Cocopeat only	4.22	1.00	5.33
T4	Pot mixture 1 + Cocopeat	4.28	2.67	5.60
T5	Pot mixture 2 + Cocopeat	5.11	3.33	6.60
T6	Pot mixture 1 + Cocopeat +Microbial consortia*	5.88	2.00	6.33
T7	Pot mixture 2 + Cocopeat +Microbial consortia*	4.88	3.36	7.00
T8	Control*	4.77	1.00	5.60
	Mean	**5.11**	**2.59**	**6.25**
	SE(d)	0.041	0.45	0.052
	CD @ 0.05%	**0.087**	**0.62**	**0.111**

Table 3
Influence of different growing media consortia on internodal length in three flowering annuals

	Treatments	*Balsam*	*Celosia*	*French marigold*
T1	Pot mixture 1*	3.33	1.50	2.60
T2	Pot mixture 2*	3.66	1.70	3.26
T3	Cocopeat only	2.22	0.47	2.16
T4	Pot mixture 1 + Cocopeat	3.34	0.90	3.13
T5	Pot mixture 2 + Cocopeat	3.61	1.17	3.00
T6	Pot mixture 1 + Cocopeat +Microbial consortia*	3.27	1.13	2.83
T7	Pot mixture 2 + Cocopeat +Microbial consortia*	3.63	1.56	3.16
T8	Control*	3.00	1.67	2.50
	Mean	**3.26**	**1.26**	**2.83**
	SE(d)	0.027	0.013	0.023
	CD @ 0.05%	3.66	1.70	3.26

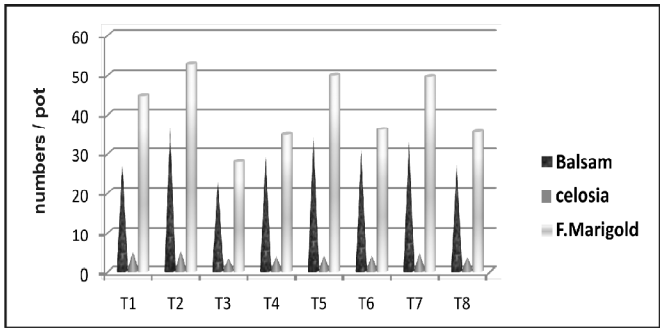

Figure 1: Effect of growing media consortia on number of flowers per pot in flowering annuals during season I (Aug- Oct)

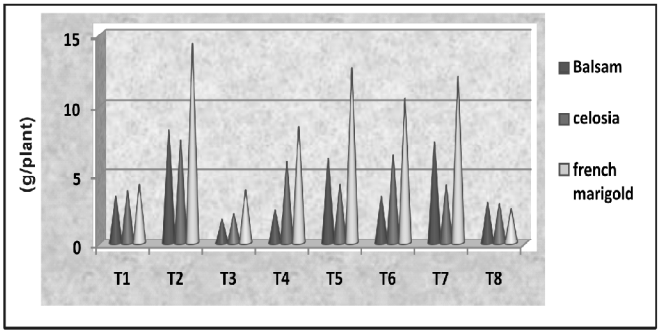

Figure 2: Effect of growing media consortia on total dry matter production of flowering annuals during rainy season (Aug- Oct)

photosynthetic activity of tomato plants in vermicompost resulting in the production and accumulation of total dry matters (Atiyeh *et al.*, 1999). Vadiraj *et al.* (1993) reported enhanced growth and dry matter production in cardamom due to the nutrient status of the vermicompost.

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