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Effect of Green Waste Compost on Growth and Root Morphology of Ornamental Shrubs

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***Abstract*:** The present investigations on effect of green waste compost on growth and root morphology of the present investigations on ornamental shrubs were undertaken at, Punjab Agricultural University, Ludhiana, during March 2021-February 2022. One year old three ornamental shrubs (*Murraya paniculata, Hibiscus rosa-sinensis* and *Tabernaemontana coronaria*) were transplanted in polybags of size 9×7 inches, filled with green waste compost (GWC) and soil in different proportions during second week of March 2021. The maximum plant height (57.33 cm), root collar diameter (10.00 mm), number of primary branches per plant (3.30), shoot dry weight (23.70 g), primary root diameter (12.55 mm) and plant nitrogen percentage (3.73%) were observed in *Hibiscus rosa-sinensis* in GWC 50% + soil 50%. Maximum root dry weight (13.95 g) and primary root length (11.61 cm) were observed in *Murraya paniculata* in GWC 50% + soil 50%. Plants growing in media (GWC 100%) were somewhat stunted and chlorotic for several weeks after transplanting probably due to higher levels of EC (4.15 dS/m) and pH (7.62). The growing media composition was observed to be an ideal in GWC 50% + Soil 50% i.e. pH (7.22), EC (1.64 dS/m), OC (2.39%), available nitrogen (0.55%), available phosphorus (0.22%), available K (0.47%), total porosity (38.50%) and water holding capacity (123.67%) for nursery raising of ornamental shrubs. Based on growth performance evaluated, the sequence for growth parameters is *Hibiscus rosa-sinensis*>*Murraya paniculata*>*Tabernaemontana coronaria*. GWC 50% + soil 50% proved superior growing medium for growth of three ornamental shrubs.

With the growth of environmental concern in the world, nurserymen are also looking for sustainable substitutes of media for growing plants. The green waste compost being easily available and economical is one substitute that can be used. The green waste compost mainly consist of compost made from garden litter, fresh leaves, dead leaves, pruned parts of young shrubs and trees, bark, wood etc. It contains low level of micro pollutants due to its origin from plant source, therefore hold better environmental feasibility and further can be used in organic farming (Bustamante et al 2016). Where chemical fertilizer release nutrient immediately and get depleted, green waste releases nutrients slowly in the media hence preferred as long-term nutrient source. The reason is presence of high number of lignocellulosic compounds (75%) which take more time to decompose by aerobic microbes (Gabhane et al 2012). A considerable amount of phosphorus and potassium in green waste compost stimulate better plant and root growth. Manipulation of highly degraded urban soils by green waste compost is beneficial as it improves physicochemical properties of soil together with enhancing microbial processes. Green waste compost maintains pH by improving buffering capacity of soil, enhance nutrient retention as well as decrease fertilizer requirements. Presence of humic acid and micronutrients also act as growth promoting factors for the plants. Well decomposed green waste reduce soil borne pathogen.

The present study is centralized on effect of green waste compost on the growth habit of three shrubs namely *Murraya paniculata* (Kamini), *Hibiscus rosa-sinensis* (China rose) and *Tabernaemontana coronaria* (Double chandni). These shrubs are highly used in large landscape gardening and backyard gardens in India in various forms as to line streets, for shade purpose, in topiary, as a specimen plant, as natural screen as hedge or along a pillar or wall and as a pot plant. *Hibiscus rosa-sinensis* (China rose) has white to pink, red colour flowers belonging to Malvaceae family. *Murraya paniculata* (Kamini) is an evergreen fragrant white flowering shrub belonging to Rutaceae family. It produces flower from April to August and grown in tropical as well as subtropical countries. Similarly, *Tabernaemontana coronaria*is an evergreen shrub of Apocynaceae family. It produces double white flowers throughout the year. This shrub has thick foliage and is used as a specimen shrub or also as a shrubbery border. It is branched and bush shrub with origin from India, China and Thailand. Its leaves are oval with wavy margins. The objective was to standardize the optimum proportions of green waste compost for nursery raising of

flowering shrubs and to evaluate the growth performance of nursery of flowering shrubs raised in green waste compost.

MATERIAL AND METHODS

The present experiment was carried out during period of March 2021-February 2022 at Punjab Agricultural University, Ludhiana. In experiment treatments combination were used three shrubs species (*Hibiscus rosa-sinensis, Murraya paniculate* and *Tabernaemontana coronaria*) and five different media compositions (green waste compost 100%, green waste compost 75% + soil 25%, green waste compost 50% + soil 50%, green waste compost 25% + soil 75% and FYM 50% + soil 50% as control). The experiment was conducted by following factorial completely randomized design. The height of plant was recorded at bi-monthly intervals. Root collar diameter was measured at soil level with the help of digital Vernier caliper at bi-monthly intervals. The number of primary branches per plant was manually counted at bi-monthly intervals. Shoot and root dry weight was recorded after uprooting the plant, shoot was separated from the roots and then sun dried for 2-3 days before being dried in the oven. After sun drying samples were placed in oven at 60°C for 48 hours for drying to achieve a constant weight. The length of primary root was recorded after uprooting the plants at the end of experiment. Diameter of primary root collar was measured after uprooting the plants at the end of experiment. All the media were analyzed for their chemical characteristics. Different physical and chemical properties of growing media were determined to identify the factors that affect the growth of ornamental shrubs. The air-dried media samples were used for specific determination of maximum water holding capacity, bulk density (g cm^{-3}), nitrogen (Subbiah and Asija1956), phosphorus was measured using Olsen method and potassium was measured using flame photometer given by Jackson (1967). The maximum water holding capacity (WHC) was determined with the help of Keen's box (steel box of 5.0 cm I.D.) and 4 cm height with perforated bottom and a filter paper disc fixed with a steel ring at the bottom end) for the soil samples.

RESULTS AND DISCUSSION

Plant height (cm): The plant height varied statistically significantly in 3 shrub species (Table 2). The interaction between GWC treatments × months × species was also significant. With respect to the treatments maximum plant height was in T_3 (GWC 50% + Soil 50%) in *H. rosa-sinensis* (65.49 cm), *T. coronaria* (56.38 cm) and *M. paniculata* (54.30 cm) as compared to other treatments. The three different shrub species were statistically significant irrespective of treatments and months. The height maximum was in *H. rosa-sinensis* (57.33 cm), whereas minimum in *M. paniculata* (47.90 cm)which was at par with *T. coronaria* (50.28 cm). Among the three shrub species, maximum increment in plant height was observed in *H. rosa-sinensis* (92.58%) followed by *T. coronaria* and *M. paniculate* in T_3 (GWC 50% + Soil 50%) as compared to other treatments from period of April to February. Irrespective of GWC treatments maximum increment in plant height was in *T. coronaria* (24.34%) followed by *H. rosa-sinensis*, *M. paniculate* from June to August i.e. rainy season as compared to other months, irrespective of GWC treatments. Prasad et al (2011) reported that the growth rate of plants was poor with the use of 100% composted green waste. Better aggregate stability of the media amended with compost also enhanced flower quality in Chrysanthemum (Singh et al 2016). Additionally, there was reduction of vegetative development when more than 50 percent green waste compost amendment as in *Gloxinia sylvatica*, *Justicia carnea*, *Lysmachia congestiflora, Pelargonium*, *Petunia* and *Salvia* due to higher pH of growing media leading to immobilization of various plant nutrients and higher heat generated via compost decomposition in the media mixture (Wilson et al 2002, Thangam et al 2009, Dubey et al 2013).

Number of primary branches per plant: The interaction between number of primary branches, months and shrub species was statistically significant. The mean maximum number of primary branches was in *H. rosa-sinensis* (3.30) whereas minimum in *M. paniculata* (1.45) which was at par with the *T. coronaria* (1.85). Different treatments were statistically significant, maximum number of primary

Table 1. Characteristics of different growing media

Treatments	pH	EC	N (%)	P (%)	K (%)	Bulk density (g/cm^3)	Maximum water holding capacity (%)
T1-GWC 100%	7.62	4.15	0.64	0.27	0.55	0.97	166.70
T2-GWC 75% + Soil 25%	7.32	3.86	0.58	0.23	0.50	1.05	151.38
T3-GWC 50% + Soil 50%	7.22	1.64	0.55	0.22	0.47	1.13	123.67
T4-GWC 25% + Soil 75%	7.13	1.35	0.29	0.15	0.39	1.27	112.78
T5-FYM 50% + Soil 50% (Control)	7.76	2.76	0.38	0.16	0.41	1.19	92.42

branches in *H. rosa-sinensis* (3.63) and *M. paniculata* (2.16) in T_3 (GWC 50% + soil 50%) as compared to other treatments. In *M. paniculata* number of primary branches was maximum in T_3 i.e., 2.16 which was at par with the T_4 (GWC 25% + soil 75%) and T_1 (GWC 100%). In *T. coronaria* T_3 showed maximum number of primary branches (1.96) which was at par with T_2 (GWC 75% + soil 25%), T_5 (control) and T_4whereas minimum number of primary branches (1.57) was observed in T_1. *H. rosa-sinensis* showed mean maximum number of primary branches (3.63) in T_3which was at par with T_2 (GWC 75% + soil 25%) and T_5 (FYM 50% + soil 50%) and significantly different from other treatments and minimum number of primary branches (2.79) was in T_1. Early flowering and a greater number of flowers with longer blooming period observed in Kalanchoe (*Kalanchoe blossfeldiana*) when treated with paddy straw compost with burnt rice husk (Kaur et al 2015). Mugnai et al (2007) observed that the plant height was reduced with increased CGW concentration treatments, resulting in lesser and thinner branches. The plants cultivated in T 75 and T 100 exhibited low quality and growth.

Shoot dry weight (g): The interaction between different levels of green waste compost treatments and shrub species was significant. Among the shrub species with respect to treatments mean maximum shoot dry weight was in *H. rosa-sinensis* (23.70 g) in T_3 and mean minimum shoot dry weight was in *T. coronaria* (12.00 g) in T_1which was at par with *T. coronaria* in T_5 (12.69 g), T_4 (12.83 g) and T_2 (13.00 g). Irrespective of different treatments shoot dry weight was statistically significant, mean maximum shoot dry weight was in *H. rosa-sinensis* (19.88 g) followed by *M. paniculate* (17.39 g) and *T. coronaria* (13.30 g). Among the different treatments results was also statistically significant. Mean maximum (20.43g) and mean minimum (14.61g) shoot dry weight irrespective of three different shrub species was in T_3 and T_1respectively. Similar results were reported by Gong et al (2018) in calendula and geranium where shoots dry weight was significantly greater in medium amended with green waste vermicompost as compared to unamended media. Papafotiou et al (2005) reported that when peat was substituted organic waste compost (OWC) by 50% led to increase in fresh weight of leaves in *Codiaeum variegatum*.

Root collar diameter (mm): Root collar diameter increases with the increase in growth of the shrubs. It has positive correlation with the growth of the plant. The interaction between GWC treatments × months × species was statistically significant (Table 3). The different treatments were statistically significant. The mean maximum root collar diameter was in *H. rosa-sinensis* (11.55 mm) followed by *T. coronaria* (9.81 mm) and *M. paniculata* (7.12 mm) in T_3 as compared to other

Table 2. Effect of green waste compost based growing media on plant height (cm) of different shrub species

Species	Treatment/ Month	April	June	August	October	December	February	Mean	Mean (species)
Hibiscus rosa-sinensis	T_1	34.89	40.77	47.41	52.78	57.28	60.89	49.00^{C}	57.33^{A}
	T_2	41.22	47.83	58.33	65.15	71.00	74.11	59.61^{AB}	
	T_3	43.44	50.99	63.77	72.22	78.88	83.66	65.49^{A}	
	T_4	39.00	45.70	55.11	62.33	66.11	67.33	55.93^{B}	
	T_5 (Control)	40.33	46.50	56.11	61.11	66.44	69.22	56.62^{B}	
Mean		39.78^{D}	46.36^{D}	56.15^{C}	62.72^{BC}	67.94^{AB}	71.04^{A}		
Murraya paniculata	T_1	32.78	36.66	43.88	47.66	51.22	53.77	44.33^{C}	47.90^{B}
	T_2	34.78	38.44	46.33	49.89	54.11	57.55	46.85^{BC}	
	T_3	36.67	43.15	54.26	59.56	64.11	68.04	54.30^{A}	
	T_4	35.11	39.11	45.00	48.77	51.44	55.66	45.85^{BC}	
	T_5 (Control)	34.89	40.11	48.41	52.31	55.55	57.89	48.19^{B}	
Mean		34.85^{F}	39.49^{E}	47.58^{D}	51.64^{C}	55.29^{B}	58.58^{A}		
Tabernaemontana coronaria	T_1	29.77	35.44	40.77	46.78	49.00	52.77	42.42^{D}	50.28^{B}
	T_2	38.89	44.89	55.16	59.77	61.33	64.66	54.12^{AB}	
	T_3	36.67	44.61	57.83	62.66	66.18	70.33	56.38^{A}	
	T_4	34.00	40.72	49.11	51.40	52.22	55.22	47.11^{CD}	
	T_5 (Control)	37.55	45.11	53.00	55.77	57.00	59.66	51.35^{BC}	
Mean		35.38^{D}	41.15^{C}	51.17^{B}	55.27^{AB}	57.14^{A}	60.52^{A}		

See Table 1 for details

Table 3. Effect of green waste compost based growing media on root collar diameter (mm) of different shrub species

Species	Treatment/ Month	April	June	August	October	December	February	Mean	Mean (species)
Hibiscus rosa-sinensis	T_1	7.73	8.50	9.21	10.10	10.56	11.33	9.57^{BC}	10.00^{A}
	T_2	7.68	8.76	9.76	10.57	11.17	12.60	10.09^{B}	
	T_3	8.67	10.32	10.84	11.96	13.14	14.35	11.55^{A}	
	T_4	7.33	8.14	9.19	9.30	9.66	10.07	8.95^{C}	
	T_5 (Control)	7.85	8.75	9.84	10.35	10.43	11.89	9.85^{B}	
Mean		7.85^{E}	8.89^{D}	9.77^{CD}	10.46^{BC}	10.99^{B}	12.05^{A}		
Murraya paniculata	T_1	2.94	3.99	4.93	5.79	6.66	7.13	5.24^{D}	5.95^{B}
	T_2	3.43	4.13	5.09	5.95	6.60	7.59	5.46^{CD}	
	T_3	3.70	4.92	6.75	8.34	8.84	10.18	7.12^{A}	
	T_4	3.39	4.69	5.94	7.07	7.56	7.97	6.10^{B}	
	T_5 (Control)	3.00	4.04	5.67	6.34	7.24	8.71	5.83^{BC}	
Mean		3.29^{F}	4.36^{E}	5.68^{D}	6.70^{C}	7.38^{B}	8.32^{A}		
Tabernaemontana coronaria	T_1	5.37	6.07	6.80	7.33	7.48	8.41	6.91^{D}	8.32^{C}
	T_2	6.63	7.68	8.47	9.39	9.90	10.25	8.72^{B}	
	T_3	7.50	8.65	9.55	10.29	10.80	12.07	9.81^{A}	
	T_4	6.47	7.61	7.98	8.59	8.92	9.52	8.18^{BC}	
	T_5 (Control)	5.94	7.21	7.84	8.22	8.66	9.98	7.98^{C}	
Mean		6.38^{E}	7.44^{D}	8.13^{CD}	8.76^{BC}	9.15^{B}	10.05^{A}		

See Table 1 for details

Table 4. Effect of green waste compost based growing media on number of primary branches per plant of different shrub species

Species	Treatment/ Month	April	June	August	October	December	February	Mean	Mean (species)
Hibiscus rosa-sinensis	T_1	1.77	2.00	2.44	2.99	3.55	4.00	2.79^{C}	3.30^{A}
	T_2	2.00	2.33	3.77	3.66	4.22	5.11	3.52^{AB}	
	T_3	1.66	2.22	3.77	4.00	4.77	5.33	3.63^{A}	
	T_4	1.99	2.55	2.99	2.99	3.78	4.00	3.05^{BC}	
	T_5 (Control)	2.44	2.55	3.44	3.66	4.33	4.77	3.53^{AB}	
Mean		1.97^{C}	2.33^{C}	3.28^{B}	3.46^{B}	4.13^{A}	4.64^{A}		
Murraya paniculata	T_1	0.89	1.11	1.77	1.77	1.89	2.33	1.63^{AB}	1.45^{B}
	T_2	0.22	0.77	0.88	0.88	1.11	1.22	0.85^{C}	
	T_3	0.11	0.11	2.89	3.11	3.33	3.44	2.16^{A}	
	T_4	0.55	0.44	2.11	2.11	2.11	2.66	1.66^{A}	
	T_5 (Control)	0.22	0.22	1.00	1.11	1.55	1.66	0.96^{BC}	
Mean		0.40^{B}	0.53^{B}	1.73^{A}	1.80^{A}	2.00^{A}	2.26^{A}		
Tabernaemontana coronaria	T_1	1.33	1.33	1.33	1.55	1.78	2.11	1.57^{B}	1.85^{B}
	T_2	1.66	1.77	2.00	2.00	2.00	2.33	1.96^{A}	
	T_3	1.66	1.77	1.66	1.88	2.00	2.11	1.85^{AB}	
	T_4	1.77	1.77	1.89	1.89	2.00	2.11	1.90^{A}	
	T_5 (Control)	1.77	1.89	2.00	2.00	2.00	2.11	1.96^{A}	
Mean		1.64^{B}	1.71^{B}	1.78^{B}	1.86^{AB}	1.95^{AB}	2.15^{A}		

See Table 1 for details

treatments. Among the 3 shrub species, mean root collar diameter was maximum in *H. rosa-sinensis* (10.00 mm) which was at par with *T. coronaria* (8.32 mm) and minimum in *M. paniculata* (5.95 mm) irrespective of different treatments. Gong et al (2018) also reported significantly higher stem diameter of calendula and geranium amended with green waste vermicompost as compared to unamended media. Beldaet al (2013) reported increase in growth parameters in viola and calendula seedlings grown in media amended with 25 or 50% vermicompost as compared to control.

Root dry weight (g): The interaction between different levels of green waste compost treatments and shrub species was significant. Among the shrub species with respect to treatments mean maximum root dry weight was in *M. paniculata* (13.95 g) which was at par with the *H. rosa-sinensis* (13.89 g) in T_3 and minimum root dry weight was observed in *T. coronaria* (9.50 g) in T_1 which was at par with *M. paniculata* (9.67 g) in T_1 and *T. coronaria* (10.00 g) in T_4. Among the different treatments results were statistically significant. Mean maximum (13.48 g) and mean minimum (10.12 g) root dry weight irrespective of three different shrub species was in T_3 and T_1, respectively. Irrespective of different treatments, root dry weight of three shrub species statistically significant, mean maximum root dry weight was observed in *H. rosa-sinensis* (11.89 g) followed by *M. paniculata* (11.69 g) and *T. coronaria* (10.87 g). Gong et al (2018) reported

Table 5. Effect of Green waste compost based growing media on shoot dry weight (g) of different shrub species

Treatments	Species			
	Hibiscus rosa-sinensis	*Murraya paniculata*	*Tabernaemontana coronaria*	Mean
T_1	17.67^{f}	14.17^{h}	12.00^{i}	14.61^{D}
T_2	19.67^{cd}	15.00^{gh}	13.00^{i}	15.89^{C}
T_3	23.70^{a}	21.59^{b}	16.00^{g}	20.43^{A}
T_4	20.07^{c}	17.43^{f}	12.83^{i}	16.77^{B}
T_5 (Control)	18.32^{ef}	18.78^{de}	12.69^{i}	16.59^{B}
Mean	19.88^{A}	17.39^{B}	13.30^{C}	

See Table 1 for details

Table 6. Effect of green waste compost based growing media on root dry weight (g) of different shrub species

Treatments	Species			
	Hibiscus rosa-sinensis	*Murraya paniculata*	*Tabernaemontana coronaria*	Mean
T_1	11.19^{d}	9.67^{fg}	9.50^{g}	10.12^{D}
T_2	12.17^{bc}	12.33^{b}	11.00^{de}	11.83^{B}
T_3	13.89^{a}	13.95^{a}	12.61^{b}	13.48^{A}
T_4	10.33^{ef}	11.08^{de}	10.00^{fg}	10.47^{D}
T_5 (Control)	11.50^{cd}	11.44^{cd}	11.24^{d}	11.39^{C}
Mean	11.89^{A}	11.69^{A}	10.87^{B}	

See Table 1 for details

Table 7. Effect of green waste compost based growing media on primary root length (cm) of different shrub species

Treatments	Species			
	Hibiscus rosa-sinensis	*Murraya paniculata*	*Tabernaemontana coronaria*	Mean
T_1	8.77^{ef}	9.22^{de}	9.22^{de}	9.07^{D}
T_2	10.27^{bc}	9.61^{cd}	9.22^{de}	9.70^{B}
T_3	11.55^{a}	11.61^{a}	10.94^{ab}	11.36^{A}
T_4	9.44^{de}	9.94^{cd}	8.38^{f}	9.25^{CD}
T_5 (Control)	9.33^{de}	9.88^{cd}	9.33^{de}	9.51^{BC}
Mean	9.87^{A}	10.05^{A}	9.42^{B}	

See Table 1 for details

significantly greater root dry weight of calendula and geranium amended with green waste vermicompost as compared to unamended media.

Primary root length (cm): Among the different shrub species with respect to treatments mean maximum primary root length was in *M. paniculata*(11.61cm) which was at par with *H. rosa-sinensis* and *T. coronaria* in T_3 (GWC 50% + soil 50%), whereas mean minimum was in *T. coronaria* in T_4. which was at par with *H. rosa-sinensis* in T_1. Shrub species irrespective of different green waste compost media treatments were statistically significant, mean maximum primary root length was in *M. paniculata* (10.05 cm) which was at par with *H. rosa-sinensis* and mean minimum primary root length was in *T. coronaria* (9.42cm). The treatments were also statistically significant, irrespective of three ornamental shrub species, mean maximum (11.36 cm) and mean minimum (9.07 cm) primary root length was observed in T_3 and T_1 respectively. De Falco et al (2021) reported that with the addition of green compost at the lowest dosages (C50-C25) to the growth substrate showed significantly increase in main root length in chard, sorrel and radish. The beneficial impact on the roots may be suitable at the nursery level to prepare seedlings for transplanting with established root systems that can effectively recover from transplant shock.

Primary root diameter (mm): The interaction between different levels of green waste compost treatments and shrub species shows significant results. Among the different shrub species mean maximum primary root diameter was in *H. rosa-sinensis* (12.55 mm), whereas mean minimum was in *M. paniculate* (8.15mm) which was at par with *M. paniculate* (8.31 mm and 8.72 mmi in T_5 and T_4 respectively.) Irrespective of three ornamental shrub species results were statistically significant, mean maximum (10.75 mm) and mean minimum (9.25 mm) primary root diameter in T_3 and T_1respectively. Amongst the shrub species irrespective of different green waste compost media treatments, mean maximum (11.35 mm) and mean minimum (8.76 mm) primary root diameter was in *H. rosa-sinensis* and *M. paniculate* , respectively.

Survival percentage: The interaction of different GWC treatments × shrubs species was non-significant (Table 9). Among the different shrub species irrespective of treatments, *H. rosa-sinensis* showed mean highest survival percentage of. 88.00 % which was at par with *T. coronaria* and *M. paniculata.* Survival percentage showed significant results among different GWC treatments irrespective of shrub species. Plants treated with T_3 showed highest survival percentage which was at par with T_2, T_4 and T_5. Prasad et al (2001) also reported the rate of plants was poor with the use of 100% composted green waste.

Table 8. Effect of green waste compost based growing media on primary root diameter (mm) of different shrub species

Treatments	Species			
	Hibiscus rosa-sinensis	*Murraya paniculata*	*Tabernaemontana coronaria*	Mean
T_1	10.38^{c}	8.15^{f}	9.24^{de}	9.25^{C}
T_2	10.49^{c}	9.40^{de}	9.33^{de}	9.74^{B}
T_3	12.55^{a}	9.24^{de}	10.48^{c}	10.75^{A}
T_4	11.52^{b}	8.72^{ef}	9.86^{cd}	10.03^{B}
T_5 (Control)	11.82^{b}	8.31^{f}	9.22^{de}	9.78^{B}
Mean	11.35^{A}	8.76^{C}	9.63^{B}	

See Table 1 for details

Table 9. Effect of green waste compost based growing media on survival percentage of different shrub species

Treatments	Species			
	Hibiscus rosa-sinensis	*Murraya paniculata*	*Tabernaemontana coronaria*	Mean
T_1	73.33^{a}	73.33^{a}	73.33^{a}	73.33^{B}
T_2	93.33^{a}	86.67^{a}	80.00^{a}	86.67^{AB}
T_3	93.33^{a}	93.00^{a}	93.33^{a}	93.77^{A}
T_4	86.67^{a}	93.33^{a}	93.33^{a}	91.11^{A}
T_5 (Control)	93.33^{a}	86.67^{a}	86.67^{a}	88.89^{A}
Mean	88.00^{A}	86.67^{A}	85.33^{A}	

See Table 1 for details

CONCLUSION

Among various green waste compost based growing media used for nursery raising of flowering shrubs, GWC 50% + soil 50% proved superior growing medium for growth of three ornamental shrubs than other media. Based on growth performance evaluated, the sequence for growth parameters is *Hibiscus rosa-sinensis>Murraya paniculata>Tabernaemontana coronaria*. The present study concluded that green waste compost up to level of 50% in combination with soil can be used for nursery growing of ornamental shrubs.

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