PERFORMANCE OF ORNAMENTAL PLANTS IN DIFFERENT MEDIA COMPOSITION FOR OUTDOOR VERTICAL GARDENING

ABSTRACT

The present experiment was carried out during August 2022 to November 2022 in Research Field ,Department of Horticulture SHUATS ,Prayagraj .The experiment was conducted in Factorial Plot Design (FPD) with five media composition i.e (Soil,Perlite,Sand ,Cocopeat,)in different proportion viz. .M0-Soil,M1- Perlite +Cocopeat+Sand 1:1:1,M2- Perlite +Cocopeat+Sand 1:1:2,M3- Perlite+Cocopeat+Sand 1:2:1,M4- Perlite+Cocopeat+Sand 2:1:1 in plastic pot for outdoor vertical gardening.Total number of plants are 150 ,there are two factors .Five variety and each varieties have five plants with three replication. Second factor is the different types of plant such as Begonia semperflorens, Crassula ovata,Syngonium podophyllum,Coleus scutellarioide ,Iresine herbstii. From the present experimental growth parameter and ornamental morphological characters observed. Among the five ornamentals plants used Coleus scutellarioide and Jade performed better as ornamentals plants used in vertical garden system with growing media.And the media composition M4 (Perlite+Cocopeat+Sand 2:1:1) is the best media composition for the plant growth.

Keywords: Coleus scutellarioide; Syngonium podophyllum; Begonia semperflorens;Crassula ovata; Iresine herbstii ; Vertical gardens.

1. INTRODUCTION

A vertical garden also known as green wall or living wall or bio-wall is self sufficient vertical garden attached to exterior or interior walls of a building. The plants receive water and nutrients from within the vertical support instead of from the ground.

The Vertical Garden conceived and realized by the botanist Patrick Blanc (he was awarded an Honorary Fellow of the Royal Institute of British Architects. He is a French botanist, he is the modern innovator of the green wall, or the vertical garden). Vertical garden was invented by Stanley Hart White who patented a green wall system in the late 1930s. Green walls provide an attractive design feature, but also add to building insulation by direct shading of the wall surface. They create cooler microclimates and improve local air quality, and provide the possibility of growing plants in locations that would not normally support vegetation. A wide range of plants is used on green walls, usually herbaceous, some small shrubs can also be suitable.

In vertical gardens, various types of modular panels can be used along with plastic pot ,growing media, irrigation systems, and plants. Living wall are particularly suitable for cities as they allow good use of available vertical surface area.The living wall could also function for urban agriculture,urban gardening ,or for its beauty as art.Green walls may be indoor or outside ,freestanding or attached to an existing wall,and come in great variety of sizes. Vertical gardens are newly getting populating and pervading in urban areas. They enhance urban biodiversity and thus the urban environment by allowing spontaneous vegetation to colonize these systems.

A well- designed green wall system will fulfill both design and functional aims by providing growing condition suitable for the selected species , have a long lifespan,require minimal component replacement and have achievable demands for maintenance.The wall greenery improves visual and aesthetic aspects of indoor spaces .The vegetation plants helps to ameliorate the effects of air pollution , trap dust, absorb noise and recycle carbon dioxide by photosynthesis.Vertical garden is solution to implement beautiful plant in any location where there are no horizontal places lefts for plants. It has been proved that visual and physical contacts with plants can result in direct health benefits. Green wall can generate restorative effects leading to decreased stress improve patient recovery rate and higher resistance to illness.Vertical garden act as natural air filter and help in absorbing harmful toxins and releasing oxygen in the air .They help in improving the air quality and creating a clean and breathable environment and thus reducing the risk of stroke, depression, heart and respiratory ailments.Vertical garden enables to maximize limited space and reclaim disregarded space .Potting media for these type of structures should be weightless,high water holding capacity,high nutrient holding capacity,good porosity.

2.MATERIAL AND METHOD

EXPERIMENTAL SITE AND CLIMATE

The research will be carried out at the Department building and at the Horticulture research farm, Department of Horticulture, Sam Higginbottom University Agriculture, Technology and Sciences (SHUATS), Prayagraj situated in the semi-arid agro climatic zone of Uttar Pradesh. Geographically, Prayagraj is located at 25^0 45’ North latitude, 81^0 85’ East longitude and

at an altitude of 98m (322ft) above mean sea level (MSL).The research is done using Factorial Plot Design with three replications. In this experiment living wall system of vertical garden was established with fabricated iron frame to hold the planter boxes.The plastic pots was fabricated with two slits in the front side to aaccomodate two rows of plants to cover the side of wall.The vertical garden system made of plastic pot container(11cm x 11cm x 11cm) of square shape ,black in colour.

3.RESULT AND DISCUSSION

The present investigation entitled PERFORMANCE OF ORNAMENTAL PLANTS IN DIFFERENT MEDIA COMPOSITION FOR OUTDOOR VERTICAL GARDENING was carried out at the department of horticulture ,Sam Higginbottom University of agriculture technology and sciences,Prayagraj during the August 2022.The objective is to find out the best media composition and the best plant in these potting media which have been presented in table .The media compositions are(Soil,Perlite,Sand ,Cocopeat,)in different proportion .M0-Soil, M1- Perlite +Cocopeat+Sand 1:1:1, M2- Perlite +Cocopeat+Sand 1:1:2, M3- Perlite+Cocopeat+Sand 1:2:1, M4- Perlite+Cocopeat+Sand 2:1:1 and the plants are Begonia semperflorens, Crassula ovata,Syngonium podophyllum,Coleus scutellarioide ,Iresine herbstii can be used to establish the above ornamentals plants in plastic pot container of vertical gardening fabricated in iron frames .In present experiment data was recorded for various character Plant Height (cm) ,Plant Spread(cm),Leaf area,Number of branches,Root spread,Relative humidity.By considering the mean performance of all the five ornamentals plants (Table 1) it is concluded that Coleus and Jade plants can be used as ornamentals plants for the establishment of vertical garden.The result of the present work are presented under following table.

TABLE 1-EFFECT OF POTTING MEDIA ON PLANT HEIGHT OF ORNAMENTAL PLANTS IN VERTICAL GRDENING

MEDIA	PLANTS	TREATMENTS	30DAP	60DAP	90DAP
SOIL (M0)	BEGONIA	M0P1	15	18	20.66667
SOIL (M0)	JADE	MOP2	15.66667	16.83333	18.5
SOIL (M0)	SYNGONIUM	M0P3	12.33333	14.5	14.66
SOIL (M0)	COLEUS	MOP4	15.83333	17.33333	18.33333
SOIL (M0)	BLOOD LEAF	M0P5	13.16667	13.16667	16.5
PERLITE+COCOPEAT+SAND 1:1:1(M1)	BEGONIA	M1P1	18.16667	18.66667	20.16667
PERLITE+COCOPEAT+SAND 1:1:1(M1)	JADE	M1P2	17.83333	18.16667	18.66667
PERLITE+COCOPEAT+SAND 1:1:1(M1)	SYNGONIUM	M1P3	15.33333	14.5	14.66667
PERLITE+COCOPEAT+SAND 1:1:1(M1)	COLEUS	M1P4	12.66667	15	19
PERLITE+COCOPEAT+SAND 1:1:1(M1)	BLOOD LEAF	M1P5	11.16667	12.66667	14.83333
PERLITE+COCOPEAT+SAND 1:1:2(M2)	BEGONIA	M2P1	14.66667	18.5	19.16667
PERLITE+COCOPEAT+SAND 1:1:2(M2)	JADE	M2P2	16.83333	18.5	17.83333
PERLITE+COCOPEAT+SAND 1:1:2(M2)	SYNGONIUM	M2P3	12.83333	15.5	13.5
PERLITE+COCOPEAT+SAND 1:1:2(M2)	COLEUS	M2P4	12.83333	13.33333	16.66667
PERLITE+COCOPEAT+SAND 1:1:2(M2)	BLOOD LEAF	M2P5	12.33333	11.33333	15
PERLITE+COCOPEAT+SAND 1:2:1(M3)	BEGONIA	M3P1	14	15.33333	17.66667
PERLITE+COCOPEAT+SAND 1:2:1(M3)	JADE	M3P2	18.33333	17.16667	17.66667
PERLITE+COCOPEAT+SAND 1:2:1(M3)	SYNGONIUM	M3P3	14.16667	15.5	14.66667
PERLITE+COCOPEAT+SAND 1:2:1(M3)	COLEUS	M3P4	14.66667	20.33333	22.66667
PERLITE+COCOPEAT+SAND 1:2:1(M3)	BLOOD LEAF	M3P5	11	11.16667	13.83333
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	BEGONIA	M4P1	18.33333	17.16667	21
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	JADE	M4P2	18.83333	18.66667	18.66667
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	SYNGONIUM	M4P3	12	14.16667	13.33333
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	COLEUS	M4P4	14.83333	21.5	26
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	BLOOD LEAF	M4P5	10.66667	12.66667	15.5
		F Test	S	S	S
		C.D(5%)	4.86	4.01	1.82
		CV	30.9	30.9	20.8
		SE(d)	2.41	2.41	1.99

TABLE 2- EFFECT OF POTTING MEDIA ON PLANT SPREAD OF ORNAMENTAL PLANTS IN VERTICAL GARDENING

MEDIA	PLANTS	TREATMENTS	30DAP	60DAP	90DAP
SOIL (M0)	BEGONIA	M0P1	11.43333	15.5	14.33333
SOIL (M0)	JADE	MOP2	11.16667	12.16667	13.16667
SOIL (M0)	SYNGONIUM	M0P3	7.5	6.583333	7.5
SOIL (M0)	COLEUS	MOP4	5	7	11.33333
SOIL (M0)	BLOOD LEAF	M0P5	9.833333	10.83333	11.33333
PERLITE+COCOPEAT+SAND 1:1:1(M1)	BEGONIA	M1P1	11.5	15.5	17.5
PERLITE+COCOPEAT+SAND 1:1:1(M1)	JADE	M1P2	8.5	10.16667	9.333333
PERLITE+COCOPEAT+SAND 1:1:1(M1)	SYNGONIUM	M1P3	6.166667	7.166667	11.83333
PERLITE+COCOPEAT+SAND 1:1:1(M1)	COLEUS	M1P4	5.5	8.333333	11
PERLITE+COCOPEAT+SAND 1:1:1(M1)	BLOOD LEAF	M1P5	7.166667	9.333333	9.5
PERLITE+COCOPEAT+SAND 1:1:2(M2)	BEGONIA	M2P1	15.66667	14.16667	16.66667
PERLITE+COCOPEAT+SAND 1:1:2(M2)	JADE	M2P2	10.33333	8.666667	10.16667
PERLITE+COCOPEAT+SAND 1:1:2(M2)	SYNGONIUM	M2P3	6.833333	5.166667	14.66667
PERLITE+COCOPEAT+SAND 1:1:2(M2)	COLEUS	M2P4	6.5	7.166667	11.66667
PERLITE+COCOPEAT+SAND 1:1:2(M2)	BLOOD LEAF	M2P5	7	10	13
PERLITE+COCOPEAT+SAND 1:2:1(M3)	BEGONIA	M3P1	12.33333	13.5	12.83333
PERLITE+COCOPEAT+SAND 1:2:1(M3)	JADE	M3P2	12.66667	8.666667	10.83333
PERLITE+COCOPEAT+SAND 1:2:1(M3)	SYNGONIUM	M3P3	6.333333	7.333333	10.16667
PERLITE+COCOPEAT+SAND 1:2:1(M3)	COLEUS	M3P4	6.833333	8	10
PERLITE+COCOPEAT+SAND 1:2:1(M3)	BLOOD LEAF	M3P5	6.5	8.5	9.5
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	BEGONIA	M4P1	9.333333	11.83333	13.16667
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	JADE	M4P2	10	10	13.33333
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	SYNGONIUM	M4P3	7.5	8.166667	8.833333
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	COLEUS	M4P4	7	6.833333	11.33333
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	BLOOD LEAF	M4P5	7.833333	10.5	9.833333
		F Test	S	S	S
		C.D(5%)	4.86	4.01	1.82
		CV	30.9	30.9	20.8
		SE(d)	2.41	2.41	1.99

TABLE 3- EFFECT OF POTTING MEDIA ON NUMBER OF BRANCHES OF ORNAMENTAL PLANTS IN VERTICAL GRDENING

MEDIA	PLANTS	TREATMENTS	30DAP	60DAP	90DAP
SOIL (M0)	BEGONIA	M0P1	3.833333	8	8.333333
SOIL (M0)	JADE	MOP2	4.5	10.33333	27
SOIL (M0)	SYNGONIUM	M0P3	4.5	7.333333	8.166667
SOIL (M0)	COLEUS	MOP4	4.166667	8.833333	13.66667
SOIL (M0)	BLOOD LEAF	M0P5	6	12.66667	18.5
PERLITE+COCOPEAT+SAND 1:1:1(M1)	BEGONIA	M1P1	5	13.16667	14.66667
PERLITE+COCOPEAT+SAND 1:1:1(M1)	JADE	M1P2	4.333333	11	19
PERLITE+COCOPEAT+SAND 1:1:1(M1)	SYNGONIUM	M1P3	5.333333	6.166667	10.16667
PERLITE+COCOPEAT+SAND 1:1:1(M1)	COLEUS	M1P4	4.333333	7.833333	17.16667
PERLITE+COCOPEAT+SAND 1:1:1(M1)	BLOOD LEAF	M1P5	4.833333	13.16667	20.5
PERLITE+COCOPEAT+SAND 1:1:2(M2)	BEGONIA	M2P1	3.166667	8.333333	10
PERLITE+COCOPEAT+SAND 1:1:2(M2)	JADE	M2P2	4.166667	11.33333	24.66667
PERLITE+COCOPEAT+SAND 1:1:2(M2)	SYNGONIUM	M2P3	4.5	5.5	7.833333
PERLITE+COCOPEAT+SAND 1:1:2(M2)	COLEUS	M2P4	3.333333	8	18.83333
PERLITE+COCOPEAT+SAND 1:1:2(M2)	BLOOD LEAF	M2P5	4.833333	12.16667	19.16667
PERLITE+COCOPEAT+SAND 1:2:1(M3)	BEGONIA	M3P1	3.166667	6.833333	9.5
PERLITE+COCOPEAT+SAND 1:2:1(M3)	JADE	M3P2	3.333333	8.166667	16.66667
PERLITE+COCOPEAT+SAND 1:2:1(M3)	SYNGONIUM	M3P3	4.333333	4	4.833333
PERLITE+COCOPEAT+SAND 1:2:1(M3)	COLEUS	M3P4	2.333333	8	14.83333
PERLITE+COCOPEAT+SAND 1:2:1(M3)	BLOOD LEAF	M3P5	4	10.5	14.33333
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	BEGONIA	M4P1	3	9	12.83333
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	JADE	M4P2	4.166667	8.166667	22
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	SYNGONIUM	M4P3	4.666667	6	8.166667
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	COLEUS	M4P4	4	9.333333	13.5
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	BLOOD LEAF	M4P5	5.333333	12.33333	20.5
		F Test	S	S	S
		C.D(5%)	1.82	5.42	7.35
		CV	26.4	34.8	29.1
		SE(d)	0.91	2.69	3.65

TABLE 4 - EFFECT OF POTTING MEDIA ON DIFFERENT ORNAMENTAL PLANT SPECIES GROWN IN VERTICAL GARDENING

MEDIA	PLANTS	TREATMENTS	ROOT SPREAD	RH	LAI
SOIL (M0)	BEGONIA	M0P1	6.98	59.33	16.00
SOIL (M0)	JADE	MOP2	8.30	62.00	17.17
SOIL (M0)	SYNGONIUM	M0P3	8.00	64.33	18.83
SOIL (M0)	COLEUS	MOP4	9.83	65.33	19.33
SOIL (M0)	BLOOD LEAF	M0P5	11.00	64.33	18.33
PERLITE+COCOPEAT+SAND 1:1:1(M1)	BEGONIA	M1P1	8.33	66.33	17.33
PERLITE+COCOPEAT+SAND 1:1:1(M1)	JADE	M1P2	9.50	60.67	16.67
PERLITE+COCOPEAT+SAND 1:1:1(M1)	SYNGONIUM	M1P3	9.33	65.67	16.83
PERLITE+COCOPEAT+SAND 1:1:1(M1)	COLEUS	M1P4	10.33	65.00	18.17
PERLITE+COCOPEAT+SAND 1:1:1(M1)	BLOOD LEAF	M1P5	8.47	65.00	15.83
PERLITE+COCOPEAT+SAND 1:1:2(M2)	BEGONIA	M2P1	9.83	64.67	17.33
PERLITE+COCOPEAT+SAND 1:1:2(M2)	JADE	M2P2	9.50	62.00	18.67
PERLITE+COCOPEAT+SAND 1:1:2(M2)	SYNGONIUM	M2P3	9.83	63.00	19.33
PERLITE+COCOPEAT+SAND 1:1:2(M2)	COLEUS	M2P4	10.50	68.33	17.50
PERLITE+COCOPEAT+SAND 1:1:2(M2)	BLOOD LEAF	M2P5	9.17	63.67	16.50
PERLITE+COCOPEAT+SAND 1:2:1(M3)	BEGONIA	M3P1	10.00	64.67	20.50
PERLITE+COCOPEAT+SAND 1:2:1(M3)	JADE	M3P2	9.33	62.00	21.33
PERLITE+COCOPEAT+SAND 1:2:1(M3)	SYNGONIUM	M3P3	9.67	63.00	16.33
PERLITE+COCOPEAT+SAND 1:2:1(M3)	COLEUS	M3P4	10.00	67.33	19.00
PERLITE+COCOPEAT+SAND 1:2:1(M3)	BLOOD LEAF	M3P5	9.33	63.67	15.67
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	BEGONIA	M4P1	9.83	58.67	20.83
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	JADE	M4P2	9.83	65.67	20.17
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	SYNGONIUM	M4P3	10.17	65.33	19.17
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	COLEUS	M4P4	8.97	65.67	17.83
PERLITE+COCOPEAT+SAND 2:1:1 (M4)	BLOOD LEAF	M4P5	8.15	62.67	16.67
		F Test	S	S	S
		C.D(5%)	1.80	5.35	2.99
		CV	11.60	5.12	10.12
		SE(d)	0.89	2.66	1.49

4.CONCLUSION

- From the above experimental it may be concluded that the media composition M4P4 was found to be best in term of growth viz, plant height at 30 DAP (18.33) at 60 DAP (19.66) at 90 DAP (24), and in term of plant spread Begonia was found to be best for vertical gardening at 30 DAP (15.66),at 60 DAP (16.66),at 90 DAP (16.96), In term of number of branches Jade was found to be best at 30 DAP(4),at 60 DAP (11) ,at 90DAP (24)

- The plant which is most suitable in the media composition is Coleus scutellarioides.

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