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Research Notes

Influence of potting mixture on elite seedling production *in bixa orellana*

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Bixa orellana commonly known as annatto or roucan is a multipurpose small evergreen tree, widely known for its dye, used for colouring food, dyeing cloth and painting skin. The pulp surrounding the seeds is widely used in herbal medicine to treat burns, dysentry, constipation and fever (Parrotta, 2001). Annatto seeds are the world's second most important natural colourant after caramel, yielding yellow to red colours (Mercandampe and Ptander, 1998). The colours may reach upto 7 per cent of the seeds dry mass (Kutzer, 1999). The success or failure of any forest plantation programme depends upon the quality planting stock which is to be planted to raise new crop under natural condition. It is therefore, imperative to raise healthy nursery stock before taking plantation work in which the most pragmatic step is to know the components of the potting media /mixture which enhances the growth and vigour of nursery stock. However such nursery studies are lacking in *B. orellana*, therefore the experiment was conducted with this crop to select a suitable potting mixture for germination and establishment of seedlings.

The freshly harvested seeds were collected from a five year plantation maintained at Avinashi of Coimbatore district, Tamilnadu, India. Since the seeds possess lesser germination (10%) due to physical dormancy, the seeds were scarified with sulphuric acid and washed adequately with water for removal of excess acid and shade dried for 48 hours and sown in polybags of size 22.5 x 15 cm. filled with three different pot mixtures *viz.*, Soil: FYM: Sand (2:1:1), Soil : Vermicompost: Sand (2:1:1) and Soil: Coirpith compost: Sand (2:1:1) in three replicates of 50 bags each. At nursery the growing seedlings were evaluated for seedling characters at 45 days intervals upto 6 months for nursery emergence, root length, shoot length, dry matter production 10 seedlings $^{-1}$ (mg), vigour index (Abdulbaki and Anderson, 1973), stem collar circumference and survival percentage. The data of the field observations were analysed using 'F' test of significance following the methods described by Panse and Sukhatme (1999).

In the present study, the potting mixture in three combinations (soil: sand: FYM; soil: sand: vermicompost; soil: sand: coir pith in the ratio 2:1:1) were evaluated for their efficacy in seedling production. Highly significant results were obtained for the evaluated seedling characters and for their survival percentage at various periods of nursery and to the type of potting mixtures .The interaction between them was also highly significant for the evaluated parameters except for root length, collar diameter and number of leaves (Table 1). During the nursery period, root length was observed at an increasing trend from 11.1 cm (45 days) to 29.3 cm (180 days). Potting mixture containing soil: sand: vermicompost in 2:1:1 ratio recorded the longest root (24.8 cm) while it was the shortest with potting mixture containing soil: sand: coir pith in 2:1:1 ratio (18.6 cm). The mixture containing soil: sand: vermicompost mixed in 2:1:1 ratio recorded the maximum shoot length (27.3 cm). In the interaction

Table 1. Influence of potting mixture on seedling characteristics of *Bixa oxellana.*

Potting mixture (P) (2:1:1)	Root length (cm)				Mean	Shoot length (cm)				Mean	Drymatter production 10 seedlings^{-1} (g)				Mean
	Nursery period in days (D)					Nursery period in days (D)					Nursery period in days (D)				
	45	90	135	180		45	90	135	180		45	90	135	180	
Soil:sand:FYM	11.5	20.0	25.5	29.5	21.6	10.2	21.5	28.0	35.5	23.8	1.625	2.235	3.830	5.930	3.405
Soil:sand :vermicompost	13.0	22.5	28.0	33.5	24.8	11.6	23.5	23.5	41.5	27.3	1.839	3.629	4.890	6.210	4.142
Soil:sand:coirpith	8.8	18.5	22.0	25.0	18.67	9.2	18.5	18.5	31.5	21.0	1.425	2.100	3.320	5.423	3.067
Mean	11.1	20.3	25.2	29.3		10.3	21.2	28.5	36.2		1.629	2.655	4.013	5.854	
	D	P	DXP			D	P	DXP			D	P	DXP		
SEd	0.516	0.447				0.423	0.366	0.733			0.025	0.021	0.043		
CD P=(0.05)	1.032	0.894	NS			0.846	0.733	1.466			0.050	0.043	0.088		

Table 1. Contd....

Potting mixture (P) (2:1:1)	Collar diameter (mm)				Mean	Number of leaves				Mean	Survival %				Mean
	Duration in days (D)					Duration in days (D)					Duration in days (D)				
	45	90	135	180		45	90	135	180		45	90	135	180	
Soil:sand:FYM	0.2	0.5	0.7	0.9	0.5	6	8	14	16	11.0	80	72	72	70	73
Soil:sand :vermicompost	0.3	0.7	0.9	1.1	1.0	7	8	16	19	12.5	82	78	78	78	78
Soil:sand:coirpith	0.2	0.5	0.6	0.8	0.7	6	7	12	14	9.7	75	70	70	68	70
Mean	0.2	0.6	0.7	0.7		6.4	7.6	14.0	16.3		79	72	73	72	
	D	P	DXP			D	P	DXP			D	P	DXP		
SEd	0.040	0.034	0.894			0.556	0.482	0.946			0.737	0.639	1.278		
CD P=(0.05)	0.080	0.069	NS			1.113	0.964	NS			1.475	1.278	2.556		

effect potting mixture containing soil: sand: vermicompost in 2:1:1 ratio recorded the maximum shoot length of 41.5 cm at 180 days of nursery period. Drymatter production was also maximum in the potting mixture containing soil: sand: vermicompost in the ratio of 2:1:1, with an increase from 1.629 to 4.013 g. Among the treatments, the survival per cent was the highest with pot mixture containing sand: soil: vermicompost in 2:1:1 proportions (78 %) and during the nursery period, it gradually decreased from 79 to 72 per cent. In the interaction effect, pot mixture containing soil: sand: vermicompost in 2:1:1 ratio recorded the maximum survival percentage of 78 at 180 days of nursery period.

Thus the study expressed that among the potting mixture combinations, the potting mixture included with vermicompost enhanced the seedling growth including the stem girth compared to other components of the potting mixture *viz*., FYM and coirpith which could be due to the fertility of the mixture that could be highly suitable for production of elite seedlings at nursery. Sreekrishnabhat (1999) also expressed that vermicompost contains N, P, K, Mg, Ca and vitamins that regulated the plant growth while Purakayastha and Bhatnagar (1997) expressed that it also had growth regulators like GA_3 which regulated plant growth. But according to Sivasubramanian (1999) vermicompost enhanced the macro and micronutrient uptake by the plants which might have enhanced the biological activities in the rhizosphere. The escalation observed in the plant characters of nursery in the present study also might be due to the above expressed reasons. The hike in plant height of seedling by vermicompost pot mixture was 18 and 27 per cent higher than pot mixtures with FYM and coirpith after six months of nursery period. Similarly the girth of the seedlings was also higher (1.0 mm) than pot mixtures containing FYM and coirpith. Gobi (2002) in *Simaruba glauca* also reported that inclusion of vermicompost in pot mixture enhanced the seedling growth in polypot nursery. However mortality of seedling was observed after 45 days of nursery period due to the infection by root rot and the infection by root rot was higher with soil: sand: coirpith combination followed by soil: sand: FYM combination and was the lowest with soil: sand: vermicompost mixture respectively.

Thus the study expressed that inclusion of vermicompost in nursery mixture in the ratio of 2:1:1 (soil: sand: vemicompost) promoted the elite seedling production at nursery and reduces the mortality of seedling due to root rot infection.

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