

## Standardization of growing media and seed size for germination and seedling growth of *Melocanna baccifera* (Roxb.) Kurz in Terai Zone of West Bengal

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**Abstract:** An experiment consisting six growing media (*viz.* soil, 1soil:1sand:2FYM, 1soil:1sand:1FYM, 1soil:1FYM, 1soil:1 sand and 2soil:1sand) and three seed weight (25, 25-50 and above 50 gm) were analyzed to study the effect on germination and seedling growth of *Melocanna baccifera* (Roxb.) Kurz at Pundibari, West Bengal, India during Feb. to April, 2008. Seeds of above 50 g weight sown in equal proportion of soil, sand and FYM gave significantly better germination and seedling growth than other media used.

**Keywords:** Growing media, seed weight, germination, seedling growth, *Melocanna baccifera*.

### INTRODUCTION

*Melocanna baccifera* (Roxb.) Kurz locally known as 'Muli Bas' is abundant in the terai region of West Bengal where local people used it for various purposes. This species is used for building houses, for making woven ware and as an important source of superior paper pulp. The species is highly suitable for kraft paper making. The culms are strong, durable with inconspicuous nodes. 'Tabasheer' an ancient elixir of Manipur can be isolated from the culms and branches. The fruits are edible. The culms are used for making floats to transport wooden logs. Enormous logs can be transported by these floats.

It is not exceptional to find reports of bamboo propagation by using seeds and macro-proliferation of seedlings to increase numbers in *Bambusa tulda* (Banik, 1987), *Dendrocalamus strictus* (Kumar, 1991; Chand and Sood, 2008) and *D. hamiltonii* (Kumar *et al.*, 1991). By these method a large number of plantlets are produced either through micro-proliferation or somatic embryogenesis but all these techniques are

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very expensive and require scientific skill. *M. baccifera* is growing very densely in and around the terai zone of West Bengal and recently very huge flowering has occurred. It is therefore, worthwhile to determine the optimum growing media and seed size for germination and initial growth of this species. Keeping this in mind the present study was undertaken to standardize the appropriate growing media and seed size for *M. baccifera* for its successful propagation after the flowering of this species in terai zone of West Bengal.

## MATERIALS AND METHODS

The experiment was carried out in the central nursery, Department of Forestry, Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar. Seeds were collected in the month of February, 2008. The experimental site was located at 26°19'86" N latitude and 89°23'53" E longitude at an elevation of 43 m a.s.l. with sub-tropical climate and lies in the terai region of West Bengal receiving average annual rainfall of 250-300 cm from South-West monsoon of which 80 per cent is received from June to August. 100 seeds for each treatment were sown in perforated poly bags and the germination was noted daily till the completion of the germination or up to twenty-one days whichever was earlier to obtain total number of germination for calculating the per cent germination following the methods prescribed by ISTA (Anon., 1976). The seeds having 5 mm or longer radicles were counted as germinated. Initial seedling growth parameters were also recorded. The experiment replicated thrice was laid out in factorial randomized block design having six growing media each with having three seed weights (25, 25-50 and above 50 g). The growing media were soil (T<sub>1</sub>), 1soil:1sand:2FYM (T<sub>2</sub>), 1soil:1sand:1FYM (T<sub>3</sub>), 1soil:1FYM (T<sub>4</sub>), 1soil:1sand (T<sub>5</sub>) and 2soil:1sand (T<sub>6</sub>). The growing media were prepared using nursery soil, river sand and well rotten FYM. The data were subjected to analysis of variance (Gomez and Gomez, 1984).

## RESULTS AND DISCUSSION

### Effect growing media on germination and seedling growth

Maximum germination of 84.38 per cent was recorded in growing media having equal proportion of sand, soil and FYM (T<sub>3</sub>) followed by 78.96 per cent in T<sub>4</sub>, whereas significantly lower germination of 49.36 per cent was observed in T<sub>6</sub> (control) (Table 1). This is because equal proportion of soil, sand and FYM may have improved the soil texture and structure making the media more friable and porous which increased aeration and water holding capacity but decreased compactness that supported better germination by providing adequate water and oxygen for germinating seed and also offering minimum resistance to the emerging plumule out of the media surface. Germination capacity, germination energy, germination value and germination speed were also significantly influenced by the growing media (Table 2). Similar results were also reported by Maithani *et al.* (1988) for some tree species.

**Table 1.** Effect of growing media and seed size on germination

Growing media	Seed size (g)			Mean
	25	25-50	Above 50	
1soil : 1sand	65.46 (54.01)*	70.11 (56.85)	76.20 (60.81)	70.59 (57.22)
2 soil : 1sand	65.20 (53.85)	69.17 (56.27)	74.93 (59.96)	69.77 (56.69)
1soil:1sand:1FYM	82.09 (64.96)	84.40 (66.74)	86.65 (68.57)	84.38 (66.75)
1 Soil:1Sand:2 FYM	76.30 (60.87)	79.48 (63.07)	81.09 (64.22)	78.96 (62.73)
1Soil:1FYM	70.71 (57.23)	73.48 (59.01)	77.35 (61.58)	73.84 (59.27)
Soil (Control)	55.48 (48.14)	57.33 (49.23)	59.93 (50.73)	57.58 (49.36)
Mean	69.21 (56.51)	72.33 (58.53)	76.03 (60.97)	

\*Figures in parenthesis are ARC SIN values.

CD (p = 0.05) Growing media (GM) = 0.27; Seed size (SS) = 0.19; GM x SS = 0.47

**Table 2.** Effect of growing media and seed size on various germination parameters

Treatments	GC	GE	GV	GS
Growing media				
1soil : 1sand	75.61 (60.42)*	22.06 (27.98)	8.58	12.42
2soil : 1sand	75.86 (60.59)	21.27 (27.42)	8.35	11.47
1soil:1sand:1FYM	88.03 (69.87)	23.86 (29.18)	9.33	13.77
1 soil:1sand:2 FYM	84.87 (67.13)	21.80 (27.78)	8.96	13.21
1soil:1FYM	80.25 (63.62)	20.29 (26.71)	8.64	11.86
Soil (Control)	75.57 (60.42)	16.56 (23.94)	7.25	9.28
C D (p = 0.05)	1.16	0.66	0.27	0.71
Seed size (g)				
25	79.00 (64.94)	17.09 (24.35)	7.51	9.57
25-50	79.38 (63.25)	21.58 (27.63)	8.55	12.74
Above 50	81.71 (62.84)	24.25 (29.47)	9.49	13.82
C D (p = 0.05)	0.92	0.62	0.19	0.91

\*Figures in parenthesis are ARC SIN values.

Significantly better seedling growth was obtained in the media having equal proportion of sand, soil and FYM than when compared with other media mixtures (Table 3) because of improved soil texture and structure of this medium as discussed earlier. Maximum and minimum root diameter, root length, shoot length, shoot diameter, number of leaves and number of clumps were recorded as 16.26 and 8.07 mm and 23.80 and 14.24 cm; 103.53 and 55.82 cm; 21.60 and 10.91 mm; 15.33 and 7.89 and 6.45 and 2.65 in  $T_3$  and  $T_1$ , respectively. Maithani *et al.* (1988) also reported significantly better seedling growth of some tree species when grown in a media having equal proportion of sand, soil and FYM.

### Effect of seed size on germination and seedling growth

Seed weight also significantly influenced the germination (Table 1) and germination capacity, germination energy, germination value and germination speed (Table 2) of *M. baccifera*. Highest germination of 60.97 per cent was recorded when seeds of above 50 g were sown followed by 25-50 g and 25 g which respectively had 2.44 and 4.46 per cent lower germination than what was recorded with 50 g seed. All these parameters gave the highest value with the heaviest seeds followed by the medium seeds and the least with the lightest seeds. This is because healthy and bolder seeds support higher germination due to good nutrient reservoir available in its larger cotyledons for the developing embryo. Shukla (2006) also reported that the germination of *Albizia procera* was influenced by the weight of its seed.

Seedling growth of *M. baccifera* was significantly influenced by the weight of its seeds (Table 3). All the growth parameters were significantly better when the seeds of above 50 g were sown. The results also revealed that a combination of the best growing

**Table 3.** Effect of size of pods on growth

Treatments	Root length (cm)	Root dia. (mm)	Shoot length (cm)	Shoot dia. (mm)	No of leaf	No of clumps
Growing media						
1soil : 1sand	19.73	11.06	84.50	17.04	9.78	3.33
2 soil : 1sand	20.33	12.08	88.40	18.70	12.56	4.56
1soil:1sand:1FYM	23.80	16.26	103.53	21.60	15.33	6.45
1 soil:1sand:2 FYM	22.09	12.37	93.67	19.31	12.11	4.78
1soil:1FYM	20.86	12.20	91.39	18.85	11.33	3.76
Soil (Control)	14.24	8.07	55.82	10.91	7.89	2.65
C D ( $p = 0.05$ )	0.53	0.92	1.31	0.36	1.31	1.20
Seed size (g)						
25	15.78	9.13	76.78	14.06	1.99	3.56
25-50	19.61	11.72	86.63	17.15	2.39	4.06
Above 50	25.14	15.17	95.25	21.95	2.35	5.17
C D ( $p = 0.05$ )	0.38	0.65	0.93	0.25	0.13	0.83

media and heaviest seed gave significantly better interaction effect than with all other treatment combinations as far as the seedling growth is concerned. Bolder seeds supported higher germination due to enough nutrient reservoir and thereby subsequently supporting the growth of the seedlings.

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