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B Sivakumar
Assistant Professor (Forestry)
Forest College and Research Institute,
Tamil Nadu Agricultural University,
Coimbatore, Tamil Nadu, India

PS Devanand
Associate Professor (PB&G)
Forest College and Research Institute
Tamil Nadu Agricultural University
Coimbatore, Tamil Nadu, India

R Vijayan
Associate Professor (Seed Technology),
Forest College and Research Institute,
Tamil Nadu Agricultural University
Coimbatore, Tamil Nadu, India

K Hemaprabha
Associate Professor (Plant Biotechnology), Forest College and Research Institute, Tamil Nadu Agricultural University
Coimbatore, Tamil Nadu, India

P Radha
Assistant Professor (Biochemistry)
Forest College and Research Institute
Tamil Nadu Agricultural University
Coimbatore

M Tilak
Associate Professor (Microbiology)
Forest College and Research Institute
Tamil Nadu Agricultural University
Coimbatore, Tamil Nadu, India

S Utharasu
Assistant Professor (PB&G)
Agriculture Research Institute
Bavani Sagar, Tamil Nadu, India

M Kiruba
Assistant Professor (Forestry)
Forest College and Research Institute
Tamil Nadu Agricultural University
Coimbatore, Tamil Nadu, India

Dr. K Nelson Navamani Raj
Assistant Professor (Seed Technology)
Tamil Nadu Agricultural University
Coimbatore, Tamil Nadu, India

K Sivakumar
Associate Professor (Soil Science)
Tamil Nadu Agricultural University
Coimbatore, Tamil Nadu, India

M Mathivanan
Doctoral Student (Research Scholar)
Forest College and Research Institute
Tamil Nadu Agricultural University
Coimbatore, Tamil Nadu, India

Corresponding Author:
PS Devanand
Associate Professor (PB&G)
Forest College and Research Institute
Tamil Nadu Agricultural University
Coimbatore, Tamil Nadu, India

Performance of seed and seedling quality of *Dendrocalamus strictus* (Roxb.) Ness based on the size polymorphism

B Sivakumar, PS Devanand, R Vijayan, K Hemaprabha, P Radha, M Tilak, S Utharasu, M Kiruba, Dr. K Nelson Navamani Raj, K Sivakumar and M Mathivanan

Abstract
In the current research work, the influence of size polymorphism on seed and seedling quality characteristics of *Dendrocalamus strictus* were analyzed. The results revealed that *Dendrocalamus strictus* seeds (caryopsis) were separated based on size using physiological parameters (Length and Width) as big, medium and small seeds. Medium sized seeds performed well with all the characters *viz.*, seed recovery, seed to hull ratio, 100 seed weight, seed length, seed breadth and also in seedling quality like shoot length, root length dry matter production and vigour index were observed. The various classes of seed revealed that the seedling vigour parameters were superior with medium sized seeds over the small seeds. The results might be due to differential rate of filling that was observed with bamboo seeds. The association between the seedling growth and seed size is normally explained as positive due to the quantum of accumulated reserve and their higher order chemical composition. The study revealed that on size grading of *Dendrocalamus strictus* seeds, selection of medium sized seed should be practiced for improving the quality characteristics of seed both at laboratory and at nursery. The study also quantified that selection of medium sized seed improved the germination of the seed by 30 percent at laboratory and by 57 percent at nursery when compare to small seeds.

Keywords: Performance, seedling, polymorphism, *Dendrocalamus strictus*

Introduction
Several studies on tree species (Sivasamy, 1991; Masilamani, 1996; Manonmani *et al.*, 1996) [12, 10, 8, 9] identified grading as an integral part of post harvest operations to enhance the planting value of the seed lots. Grading, that entitled to remove the empty, immatured, broken and insect damaged seeds (Bonner and Switzer, 1971) [2] is done mainly based on size, weight and colour of the seed. Among them size grading is widely accepted as the basic processing technique for maximizing quality characters of the seed (Gupta *et al.*, 1983) [4]. *Dendrocalamus strictus* is one of emerging pulp wood crop. Studies on basic grading are much limited in this species. Hence studies were made in healthy seeds of *Dendrocalamus strictus* collected from identified elite culms from Dharmapuri district of Tamil Nadu were used for the study.

Materials and Methods
Bulk seeds collected from the seed source Dharmapuri district of Tamil Nadu, were extracted for seeds manually and graded as big, medium and small based on visual appearance and were evaluated for the seed recovery on weight basis based on total weight to the seed recovered in each of the grade and the results were expressed as percentage**.** The seeds of each grade were evaluated for the physical seed quality characters *viz.*, seed length (cm) and seed breadth (cm), under the germination room conditions as per ISTA, (1999) [5] each of seed grades along with ungraded seeds were evaluated for the seed quality characters *viz.*, 100 seed weight (g) and germination (%) as per ISTA, (1999) [5] and for the seedling quality characters *viz.*, root length (cm) shoot length (cm), and dry matter production 10 seedlings^{-1} (g). Vigour index values were also computed adopting the following formulae, as these values are the totality expressions seed quality characters.

Vigour index 1 = Germination (%) x Total seedling length (cm)
(Abdul –Baki and Anderson, 1973) [1]

Influence of size polymorphism on seed and seedling quality characters of *D. strictus.* The experiment was laid out in Completely Randomized Design (CRD) Snedecor and Cochran (1967) [13]. with four treatments and five replications at Forest College and Research Institute, Tamil Nadu Agricultural University Coimbatore, Tamil Nadu. Graded seeds were also evaluated for their performance at nursery in terms of nursery establishment (%), root length (cm), shoot length (cm), dry matter production 10 seedlings $^{-1}$ (g), vigour index (Abdul –Baki and Anderson, 1973) [1].

Results and Discussion

Size grading of *Dendrocalamus strictus* seeds with different sizes based on visual appearance revealed that the separated based on size using length measurements as big, medium and small seeds. Medium sized seeds performed well with all the seeds and seedling quality characters *viz.,* seed recovery, seed to hull ratio, 100 seed weight, seed length, seed breadth, shoot length, root length dry matter production and vigour index were observed with the various classes of seed revealed that the seedling vigour parameters were superior with medium sized seeds over the small seeds. The results might be due to differential rate of filling that was observed with bamboo seeds. The association between the seedling growth and seed size is normally explained as positive due to the quantum of accumulated reserve and their higher order chemical composition. (Table 1) and (Table 2).

The study reported that on size grading of *Dendrocalamus strictus* seeds, selection of medium sized seed should be practiced for improving the quality characteristics of seed both at laboratory and at nursery. The study also quantified that selection of medium sized seed improved the germination of the seed by 30 percent at laboratory and by 57 percent at nursery when compare to small seeds (Table 3).

Similar results were also reported by Srimathi *et al*. (2002) [15] reported the positive relationship between the seed size and seed weight in *Cassia fistula*. Srimathi *et al*. (2000) [14] in *Emblica officinalis* opined that translocation of reserve from endosperm to embryo proceeds differently in large and small seeds, the better-filled, larger seeds transformed more nitrogen from the endosperm to the embryo after sowing than the small seeds. Similar results were also found out by Kathiravan (2004) [7] Kumar (2003) [7] in *Jatropha curcas.* Geethanjali (2003) [3] and Parameshwari (2001) in *Tamarindus indica*, Srimathi (2000) [14] in ber (*Zyzipus mauritiana*) and Manonmani (1996) [8] in *Pongamia pinnata*.

Table 1: Effects of Seed size on seed physical characteristics of *D. strictus*

Size grades	Seed recovery (%)	Seed length (cm)	Seed breadth (cm)	100 seed weight (g)	Seed to hull ratio
Big	30.2	0.111	0.041	4.185	1.167
Medium	50.0	0.077	0.046	4.348	1.194
Small	19.8	0.057	0.026	4.039	1.101
Bulk	-	0.067	0.037	4.123	1.137
S.Ed.	-	0.003	0.001	0.042	0.011
CD (P=0.05)	-	0.007	0.003	0.094	0.023

Table 2: Effects of size grading on physiological characteristics of *D. strictus* at laboratory

Size grades	Germination (%)	Root length (cm)	Shoot length (cm)	Dry matter production 10 seedling-1 (g)	Vigour index
Big	32 (34.19)	6.61	6.40	0.052	445
Medium	76 (60.95)	6.93	6.79	0.058	836
Small	19 (25.83)	3.25	4.80	0.046	208
Bulk	55 (46.48)	6.33	5.78	0.047	563
S.Ed.	(0.830)	0.110	0.110	0.002	2.364
CD (P=0.05)	(1.762)	0.226	0.240	0.004	4.701

Table 3: Effect of size categorizing on seedling characteristics of *D. strictus* at nursery

Size grades	After 21 days	After three months			
	Nursery establishment (%)	Root length (cm)	Shoot length (cm)	Dry matter production seedling^{-1} (g)	Vigour index
Big	27 (31.43)	21.46	20.15	3.874	1306
Medium	66 (54.46)	26.59	23.27	4.689	2712
Small	10 (22.73)	16.44	17.57	2.717	773
Bulk	40 (26.54)	18.69	19.10	3.350	1003
S.Ed.	(1.013)	0.817	0.952	0.003	3.143
CD (P=0.05)	(2.147)	1.783	2.041	0.006	6.348

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