SEED ATTRIBUTES IN RELATION TO THEIR POSITION IN THE POD AND ITS INFLUENCE ON SEEDLING ESTABLISHMENT OF FOUR ORNAMENTAL TREE SPECIES

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SRIMATHI, P., SWAMINATHAN, C., SIVAGNANAM, K. & SURENDRAN, C. 1992. Seed attributes in relation to their position in the pod and its influence on seedling establishment of four ornamental tree species. Studies were conducted on the physical attributes of seeds in relation to their position in the pod and its influence on germination, seedling establishment and vigour of four ornamental species, *viz Albizia saman, Cassia fistula, Cassia hybrida* and *Delonix regia.* Results revealed that seeds extracted from the distal end of the pod in *D. regia* and middle portion for the other three species produced better vigour and seedling establishment.

Key words: *Albizia saman - Cassia fistula - Cassia hybrida - Delonix regia* - germination - vigour index - seedling establishment

Introduction

Increase in forestry planting activities is often restricted by adequate supply of quality seeds. Tree species characterised by long protracted pods possess greater variation in seed physical characteristics. The position of the seed in the pod influences its germination and the quality of the seedling produced. Hence, a study was undertaken on four ornamental tree species to investigate the physical attributes of the seeds in relation to their position in the pod and its impact on germination and growth of the seedlings.

Materials and methods

The study was conducted at the Forest College and Research Institute, Mettupalayam, India (lat. 11°19'N, longtd. 76°56'E), which receives an annual average rainfall of 895 *mm.* Matured, brown coloured pods were collected from four tree species, *viz Albizia saman, Cassia fistula, Cassia hybrida* and *Delonix regia.* Observations on pod and seed physical characteristics were made and recorded. Each pod was divided into three equidistant, proximal, middle and distal portions. Seeds extracted from each position of the pod for each species were counted and weighed separately. For each position in each species, a total of 100 seeds were weighed and the same number of seeds were sown in polypots of size 20 × 10 *cm* filled with a mixture of soil and farm yard manure (FYM) in 3:1 proportion, after giving acid scarification with concentrated sulphuric acid for 20 *min* (FAO 1985). Each tree

species represents an experiment and the experiment was conducted in Randomised Block Design (RBD) with seven replications.

Germination, as emergence of cotyledons (Bahuguna *et al.* 1987), counts and seedling attributes were recorded on the 21st day after sowing (ISTA 1985). Vigour Index was calculated by multiplying germination percentage and seedling length (Abdul Baki & Anderson 1973). The data recorded were subjected to analysis of variance (ANOVA) for their statistical significance (Panse & Sukhatme 1967).

Results and discussion

Pod and seed attributes recorded are presented in Table 1. It reveals that pod weight and seed weight and number of seeds of *A. saman, C. fistula* and *C. hybrida* were highest in seeds collected from the middle portion of the pod. The reduced size and weight of the seeds in both proximal and distal ends in a pod may be ascribed to time lag between fertilisation and consequent changes in the supply of nutrients. Difference in fertilisation also leads to difference in developmental stages thereby causing variation in seed size and weight of a pod. However, *D. regia* presented a different trend in respect of seed weight in that seeds farther from the stalk were heavier. This may also be attributed to the differential development of seeds due to the difference in fertilisation. Guppy (1912) reported that formation of heavier seeds in the distal end of the pod may be attributed to the ovule abortion in one locule changing the shape of the seed developed in the next locule.

Table 1. Pod and seed attributes of the four ornamental tree species

Species	Position	Pod weight* (*g*)	Weight of 100 seeds (*g*) per position	Number of seeds per position
Albizia saman	P	6.8	17.2	10.1
	M	7.0	18.5	12.2
	D	5.9	16.8	9.2
Cassia fistula	P	13.0	26.8	11.8
	M	13.8	27.9	12.9
	D	12.1	25.2	10.9
Cassia hybrida	P	7.8	18.9	11.6
	M	8.1	20.1	12.1
	D	6.2	17.3	10.7
Delonix regia	P	30.3	93.5	7.7
	M	34.9	119.6	10.1
	D	29.3	135.6	8.7

P: Proximal; M: Middle; D: Distal; * mean of 100 pods

Highly significant differences are observed in germination percent, root length, shoot length and vigour index (Tables 2 & 3). In the case of *A. saman, C. fistula* and *C. hybrida*, seeds extracted from the middle portions of the pod showed maximum germination percent, maximum root and shoot length and also vigour index. In *D. regia*, seeds extracted from the distal end showed maximum germination and seedling establishment. It was attributed to the heavier seed size, since a close

association exists between seed size and seedling vigour. A similar parallel relationship has been already established in teak (*Tectona grandis*) (Edimann 1934), kapok (*Ceiba pentandra*) (Gawande 1985) and *Gmelina arborea* (Woessner & Mc Nabb 1979).

Table 2. Impact of seed position in the pod on germination percent

Position	*Albizia saman*	*Cassia fistula*	*Cassia hybrida*	*Delonix regia*
Proximal	47(43.28)	31(23.21)	67(56.17)	69(56.17)
Middle	81(64.16)	76(60.67)	78(62.03)	76(60.67)
Distal	39(38.65)	39(38.65)	42(38.23)	80(63.43)
CD(P≤ 0.05)	1.75	1.05	1.012	1.81

(Figures in the parentheses indicate transformed values)

Table 3. Impact of seed position in the pod on seedling vigour and establishment

	Albizia saman			*Cassia fistula*			*Cassia hybrida*			*Delonix regia*		
	RL(*cm*)	SL(*cm*)	VI	RL(*cm*)	SL(*cm*)	VI	RL(*cm*)	SL(*cm*)	VI	RL(*cm*)	SL(*cm*)	VI
Proximal	6.4	16.1	1058	4.2	13.3	543	8.1	9.9	1176	5.2	8.5	945
Middle	8.5	17.1	2073	7.9	17.1	1900	10.6	11.0	1638	6.8	9.2	1216
Distal	6.4	15.9	870	2.1	13.3	601	6.7	9.6	685	7.9	12.4	1624
CD(P ≤ 0.05)												
	0.6	0.2	9.5	0.2	0.3	5.8	0.3	0.4	5.0	0.26	0.3	10.5

RL : Root length; SL : Shoot length; VI : Vigour index

Since the juvenile vigour bears a positive influence on adult growth, it may be concluded that use of seeds from the middle portion of the pod in *A. saman, C. fistula* and *C. hybrida*, and the distal end in *D. regia* is recommended for quality seedling production.

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