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Short Communication
Fruit selection for better seedling production in *Sapindus emerginatus*

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ABSTRACT

The effect of grading of fruits on seedling production was investigated in soapnut tree (*Sapindus emerginatus*). Both size and density grading were effective. Sinkers in density grading, large and medium sized fruits in size grading should be chosen for maximising seed germination and better seedling characters. Between the grading techniques, size grading was better than density grading, as sinkers of density grading recorded 21 and 12% lesser germination than larger and medium sized fruits, respectively.

Key words: Density grading, germination, *Sapindus emerginatus*, seedlings, size grading.

Sapindus emerginatus, commonly known as soapnut tree belongs to the family Sapindaceae. The soapnut tree of South India occurs widespread in deciduous and drier evergreen forests. The fruit pulp is widely used in jewellary industry while fruit kernels have medicinal values (Venkatesh 1976). The tree is widely propagated through seeds, which are globular, black and hard. For better use of this tree in social forestry, knowledge on selection of fruits for elite seedling production in the nursery is required. Hence studies were taken up on selection of best fruits for production of elite seedling in the nursery.

The fruits of *Sapindus emerginatus* were collected from the bulk collection of Forest Genetics Division, Department of Forestry, Coimbatore during 1998. The fruits were graded based on size as large, medium and small and as sinkers and floaters through density grading using water as the medium. The graded fruits were recorded for their recovery in each grade based on total weight. The fruit was separated manually into pulp and seed and the percentage contribution of each category was calculated based on original weight and expressed as fruit to fruit pulp ratio and fruit to seed ratio respectively. Four replicates with 10 seeds in each category were separated into seed coat and embryo using light manual breaking with hammer and the seed coat and embryo weight seed^{-1} was obtained on weighing in a top pan balance. The seeds of each category were given 3 cycles wetting and drying treatment with water at 24 h interval to remove the dormant nature of seed due to hard seed coat. The seeds were tested for germination in sand media (ISTA 1993) with 100 seeds of 4 replicates. The experiment was conducted in a germination room maintaining 25±1^{0}C and 90±3% RH. On 21st day, counts were made on germination and expressed as the percentage of seeds which produced normal seedlings (ISTA 1993).

After the germination count, ten random seedlings were measured for their root and shoot length. The vigour index values were computed as per Abdul Baki and Anderson (1973). The experiment was laid out in a completely randomized design and replicated four times. The results were subjected to analysis of variance and tested (t-test) for significant (design) differences according to Panse and Sukhatme (1967). Percentage values were transformed to arcsine values prior to statistical analysis.

The grading of fruits based on density through water floatation recovered 40.5% as sinkers and 59.5% as floaters. The 100 fruit weight of sinkers and floaters were 215 g and 171 g respectively, while the ungraded bulk recorded 175 g fruit^{-1}. In sinkers, both the fruit to pulp ratio and fruit to seed ratio were more (69.4% and 37.6% respectively) indicating the bigger size of seeds that sink in water. The fruit to seed ratio of floaters were lower than ungraded bulk fruits highlighting the lower seed weight of floater fruits. The seed coat and embryo weight seed^{-1} were also in the same order where the sinkers recorded more embryo weight than floaters (170 mg) (Table 1). The germination percentage and related vigour observations on root, shoot length and vigour index values were more in sinker fruits and was followed by ungraded bulk fruits. The seed quality characters of floater fruits were in the lower order. This might be due to the higher amount of food material available in the sinker seed that is expressed through the higher contribution of embryo (170 mg seed^{-1}) compared to the floater fruit where the embryo growth was less as was evident from the lower weight recorded by the embryos of floater fruits. Similar positive association with sinkers of density grading to the seedling quality was also reported in several fruit

Table 1. Influence of density grading of fruits on seed quality of *Sapindus emerginatus*.

Grades	Fruit recovery (%)	100 fruit weight (g)	Fruit to fruit pulp raio (%)	Fruit to seed ratio (%)	Embryo weight seed^{-1} (mg)	Seed coat weight seed^{-1} (mg)	Germination (%)	Root length (cm)	Shoot length (cm)	Vigour index
Sinkers	40.5	215	69.41	37.6	170	550	60(50.77)	16.8	18.7	2141
Floaters	59.5	171	62.33	30.6	150	410	49(44.43)	11.1	13.1	1185
Bulk	-	175	62.94	35.6	150	420	54(47.29)	12.8	15.3	1504
CD (P=0.05)	-	25.74	5.52	5.8	(2.36)	0.129	NS	0.88	1.61	20.3

(Figures in parentheses indicate trancformed valus)

Table 2. Influence of size grading of fruits on seed quality of *Sapindus emerginatus*.

Grades	Fruit recovery (%)	100 fruit weight (g)	Fruit to fruit pulp raio (%)	Fruit to seed ratio (%)	Embryo weight seed^{-1} (mg)	Seed coat weight seed^{-1} (mg)	Germination (%)	Root length (cm)	Shoot length (cm)	Vigour index
Large	16.08	213	62.16	32.82	560	170	81(64.37)	15.8	18.8	2803
Medium	65.95	167	64.66	35.40	500	160	72(58.35)	14.4	14.6	2088
Small	17.98	127	66.58	34.02	420	120	55(47.76)	7.2	7.4	803
Bulk	-	152	64.16	35.82	470	150	64(52.92)	11.0	14.6	1638
CD (P=0.05)	-	18.74	1.20	2.30	NS	NS	(3.34)	1.60	1.61	41.3

(Figures in parentheses indicate trancformed valus)

trees viz., Amla, ber and jamun (Srimathi 1997), owing to the positive relationship between seed weight and seedling quality characteristics.

In size grading of fruits, the highest recovery of fruits (65.96%) was recorded with medium sized fruits (Table 2) followed by smaller (17.08%) and larger sized (16.08%) fruits respectively, indicating the large frequency of medium sized fruits at harvesting from mother trees. The 100 fruit weight also follows a similar pattern with fruit recovery but the fruit weight of bulk fruits was more (152 g) than in smaller fruits (127 g), which recorded the lowest weight. The fruit to fruit pulp ratio was in increasing order with large to small fruits while the fruit to seed ratio was in decreasing order, explaining the larger initial capital in seed with fruit size. But in the group ungraded fruit to seed ratio was on par with medium and small sized fruits (Ashby 1936).

These results were again supported by the higher embryo weight recorded by the larger seeds which was in decreasing order with reduction in size grades of fruits. The seed coat weight also followed the same pattern as the embryo weight. The seed quality characters measured through germination, root and shoot length and vigour index values were more in larger fruits and was in decreasing order with reduction in size grades. The larger fruits recorded 81 percent germination with adequate support of vigour attributes and was followed by medium sized fruits (72%). The smaller sized fruits recorded the lowest germination of 55% which was 9% less than ungraded bulk fruit.

The study clearly indicated that bigger sized fruits produce bigger sized seeds which are capable of producing elite seedling with good germination percentage. The smaller sized fruits should be rejected for seed collection since they are poorer to ungraded bulk seeds. Hence depending on the intensity of demand, large and medium fruits can be selected for seedling establishment in nursery. Dharmalingam (1995) in teak, Palaniswamy *et al.* (1994) in sapota, Dharmalingam and Vijayakumar (1987) in acid lime and Srimathi (1997) in amla (*Emblica officinalis*), ber (*Zizyphus mauritiana*) and jamun (*Syzygium cuminii*) also reported similar positive association between fruit size and seed quality characters, while Siddiqui and Islam (1985) alone reported a non linear relationship between seed size and seed quality in *Sonneratia aperala.*

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