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Research Paper

EXAMINING THE EFFECT OF SEED SIZE AND WEIGHT ON SEED GERMINATION OF *SEMECARPUS ANACARDIUM* L. - A CASE STUDY OF WANWADI GERMPLASM, DIST. NANDED, MAHARASHTRA

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Abstract

Semecarpus anacardium L. is a dry deciduous tree belonging to family Anacardiaceae and is growing in tropical and temperate region. It is widely used in Indian traditional medicine. This study is based on seed germination of this species, and was undertaken to examine the effect of seed size and weight on seed germination. The size (≥ 21 mm length and ≥ 17 mm breadth) and weight (≥ 2.352 gm) of large seed followed by size (18-20mm length and 13-16mm breadth) and weight (2.131- 2.351gm) of medium seed and size (≤ 17 mm length and ≤ 12 mm breadth) and weight (≤ 2.130 gm) of small seed. We observed highest germination percentage (68 ± 3.74) for large size seeds, which was followed by (63 ± 2.55) for medium size seeds and the lowest germination percentage was observed (54 ± 2.92) for small size seeds when seeds are treated with conc. sulphuric acid for 20 minutes. The average germination percentage of non-scarified (control) seeds was found to be 34%. So while selecting the seed for good progeny it is necessary to analyse the weight and size of seed for plantation.

Key words: Seed size and weight, seed germination, *Semecarpus anacardium* L.

INTRODUCTION

Semecarpus anacardium L. is a dry deciduous tree belonging to family Anacardiaceae and is growing in tropical and temperate region (forest areas and cultivated areas) having grey bark, Leaves simple, alternate, obvate-oblong, rounded at the apex. The flower is greenish white and nut long ovoid and smooth shining colour. It is reported from India in Maharashtra; Konkan, Deccan, In Kolhapur; Alate, Babu Jamul, Batkanangale, Gadhinglas. In Sindhadurg; Malwan, Kuperighati, Sawantwadi, Akeri, Mangaon, Bhedshi. In Rajasthan; Mount Abu. In Tamilnadu; Chengalpattu, Coimbatore, kanniyakumari, Nilgiri, North Arcot, Sadem, Dharmapuri, and South Arcot. In Karnataka; Belgaum, Bellary, Bidar, Chitradurg, Coorg, Gulbarga, Hassan, Kolar, Mysore, N. Kanara, Shimoga, Tumkur [5, 28, 9, 23, 15 and 22]. The fruits were collected by Bhoi community mostly by woman for extraction of Godambi and oil. Nuts are used for extraction of Godambi and oil, further it can be use for the purpose of medicine. *Semecarpus anacardium* L. is highly medicinal valued for being caustic, astringent, ant rheumatic, vesicant and used in anorexia, cough, asthma, indigestion, ulcer, piles and various nervous diseases [4]. The Godambi has high value in local and city market so is called 'Kal-dhan'. The seed size is a considerable and significant factor in the extraction of Godambi, oil, germination and early stage of plant

growth. Extensive work with reference to seed germination has been carried out in this laboratory on different plants like *Cleome viscosa* L., *Phyllanthus fraternus* and *Solanum nigrum* L. [11, 13 and 25]. Different sized seeds have different level of Godambi size, germination percentage and seedlings growth of this plant. The nut is called “Bhallataka” or Bibba traditionally used in medicine. The oil of Bibba seeds is used as mark on the cloth hence is known as “Marking nut”. The main purpose of seed grading is to understand the better physiological quality of the seed lot. Large size seeds are useful to get healthy seedling of plant species and for purpose of transplantation in the field. The Larger seeds are higher germination percentage than the medium seeds and small size seeds [2, 27]. Germination percentage and growth of seedlings are influenced largely by the food reserve in seeds, and it increases with the seed weight as reported by [26, 7]. Conflicting report exist on the interspecific variation in seed weight and germination behaviour. For instance, large seed may germinate at higher rate than the smaller seeds [26, 3, 7]. The small seeds may germinate at higher percentages than large seeds [10]. The heavier seeds may take less time for germination than lighter seeds [14, 8]. The germination time may be dependent on seed weight [16].

MATERIALS AND METHODS

Fruits of *Semecarpus anacardium* L. were collected from Shri. Nandu Ganesh Kachale's farm at Wanwadi village which is located in Tq. Hadgaon having GPS co-ordinate as 19°17' 59 N latitude 077° 32 ' 30 E longitudes and 386 m altitude.

Seed weights were taken by using the electronic balance and seed size were measured by using vernier calliper. Further, it has been grouped in to three categories consisting of (a) Large (b) Medium and (c) Small size and weight. These seeds have been treated with concentrated Sulphuric acid for 20 minutes and control seeds were taken as it is. The treated seeds were washed thoroughly under running tap water for removal of acid stress. The seeds were then kept in sterilized petriplate wetted with distilled water. The petriplate were kept in sun light and observed for initiation of germination up to 30 days. The effect of seed size and weight on seed germination is presented in Table-1.

Germination percentage was calculated by [12] using following formula.

$$\text{Germination \%} = \frac{\text{Number of seeds germinated}}{\text{Number of seeds kept in petriplate}} \times 100$$

The statistical analysis was carried out using methods suggested by [17] and the data obtained for seed germination percentage were statistically analysed for Mean, Standard deviation, standard error and one way analysis of variance (ANOVA) using MINITAB 14 software.

RESULTS

Seed weight is very much influenced not only by the climatic and edaphic factors but also by the density of the plant and genetic variation within different populations of a species. The large weight of the seeds is the better seed quality and small weight indicates immaturity, insect damage, drought effects, frost damage and sterility [1]. The statistical analysis for germination percentage is shown in the table -1, 2 and 3. The average germination percentage of untreated (control) seeds was found to be 34%. These treated seeds have been treated with concentrated Sulphuric acid for 20 minutes. The average germination percentage of seeds for the different seed sizes i.e. large, medium and small size and weight of seed were 68%, 63% and 54% respectively. The seed germination started on 13th days for large, 14th days for medium and 16th days for small size and weight of seeds and 19th days for control seeds. In present investigation treated seeds showed highest and early germination as compared to control seeds. The ANOVA showed a very high significant difference ($p < 0.05$) in the germination percentage of scarified and non-scarified seeds. Figure-1 shows the cumulative percentage germination of seeds.

DISCUSSION

The seed size and weight affect the seed germination variable. In present investigation highest final germination percentage in larger seeds than medium and small seeds of *Semecarpus anacardium* L. The treated seeds showed highest germination as compared to control but opposite in *Solanum nigrum* L. [25]. The seed germination started on 13th days for large, 14th days for medium and 16th days for small size and weight of seeds after sowing. The maximum germination was 68% for large size and weight of seeds and germination started on 13th days after sowing. The germination observed in medium, small size and weight of seeds were 63%, 54%, respectively and germination started on 14th, 16th days respectively after sowing. Similar results were reported in *Acacia nilotica* Sub sp. *indica* (Benth.) [21] and *Prunus jenkinsii* Hook. F. and Thoms also reported germination percentage [27]. Similar observation were made in *Alangium lamarckii* were maximum germination is 76% for large size and weight of seeds, followed by 74% for medium size and weight of seed and 59% for small size and weight of seed [2]. In *Prunus jenkinsii* Hook. F. and Thoms were maximum germination is 42% for large size and weight of seed, followed by 41% for medium size and weight of seed and 28% for small size and weight of seed [27].

CONCLUSION

In the present study, the seed effect of size and weight on seed germination was investigated and maximum germination percentage was obtained in larger seeds as compared to medium and smaller seeds. The treated seeds showed highest and early germination as compared to control seeds. In actual the size and weight of seeds may be helpful to improve the seed germination of *Semecarpus anacardium* L. as the larger seeds resulted in high germination percentage and it contains more food reserves to support germination.

Table - 1: Seed size, weight and seed germination of *Semecarpus anacardium* L.

Sr. no.	Size group	Weight of/seed (gm)	Length (mm.)	Breadth (mm.)	Initiation germination (Days)	Completion germination (Days)	Germination %
01	Control	*	*	*	19	26	34±2.92
02	Small	≤ 2.130	≤ 17	≤12	16	26	54 ±2.92
03	Medium	2.131-2.351	18-20	13-16	14	24	63±2.55
04	Large	≥ 2.352	≥ 21	≥ 17	13	24	68±3.74

* Indicates no weight, size and no treatment of seeds have been considered.

Table - 2: Mean standard deviation and Standard error for seeds size, weight and germination percentage of *Semecarpus anacardium* L.

Treatment	Mean (%)	Std. Dev	SE Mean
Control	34	6.52	2.92
Small seeds	54	6.52	2.92
Medium size seeds	63	5.70	2.55
Large seeds	68	8.37	3.74

Table – 03: Analysis of variance (ANOVA) for seeds size, weight and germination percentage of *Semecarpus anacardium* L.

Source of Variation (SOV)	Degrees of freedom (DF)	Sum of squares (SS)	Mean squares (MSS)	F - Cal	P-Value
Treatment	3	3373.8	1124.6	23.99	0.000
Error	16	750.0	46.9		
Total	19	412			

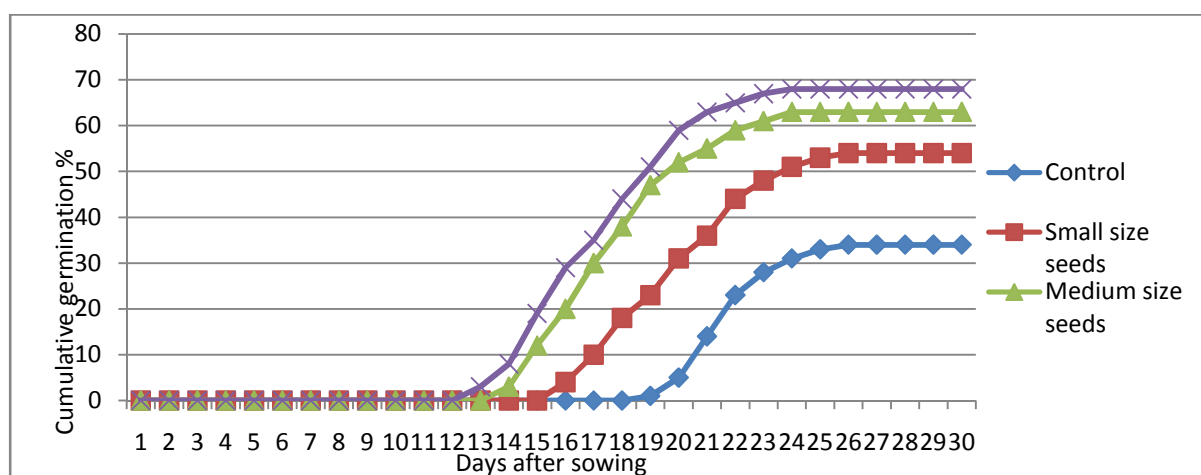


Fig-1: Effect of seed size and weight on germination of *S. anacardium* L.

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