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### RESEARCH ARTICLE

#### EFFECT OF SEED SIZE ON SEED GERMINATION OF *AEGLE MARMELLOS*, L. CORR., TAMILNADU INDIA.

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#### Abstract

The present study was undertaken to examine the effect of physical characters seeds on physiological characters like seed germination and seedling growth of *A. marmelos* L. Corr. Seeds were size graded in to large, medium and small based on seed size (length and breadth) and weight. The result revealed that the size-graded seeds influence the seed germination and seedling growth. The large seeds gave maximum germination followed by medium and small size seeds.

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#### Introduction:-

*Aegle marmelos* (L.) Corr., is an endangered medicinal tree generally known as Bael belonging to the family Rutaceae. It is a medium sized deciduous and aromatic tree about 12-15m height, leaves trifoliate, aromatic, alternate. Leaflets ovate or ovate-lanceolate; greenish white flowers, Large, globose fruits, woody berry (Mazumder et al 2006). It is a popular medicinal plant in Ayurveda and siddha medicines to treat a variety of ailments (Venudevan 2013). Bael fruits are popular due to its medicinal and nutritional properties. Fruits juice is used to cure of diarrhea and dysentery, jaundice, ulcer and eczema (Nadkani 1954). The roots are useful for treating diarrhea and dyspepsia (Pallab Maity 2009). The tree is normally propagated through seeds and seeds required specific quality for better performance with uniformity on seedling production in nursery. However, seeds are exhibit wide varieties such as seed morphological characters as per the influence of development and maturation (Abdul- Baki and Baker, 1973) therefore the present study was conducted to evaluate the effect of seed size and weight on germination and initial growth in the nursery

#### Materials and Method:-

##### Physical characters:-

Mature fruits of *Aegle marmelos*, were collected during November to April in Coimbatore district, Tamilnadu, India. The seeds were extracted by macerating the fruits and washed in running water and then air dried at room temperature ( $28 \pm 2^\circ\text{C}$ ). The seeds were graded into three size grades i.e., large, medium and small. Seed samples (100 seeds) were drawn from each grade and measured for length and breadth using vernier- scale. The length was measured from the base to the tip of the seed and recorded in cm. The breadth was measured at its broadest portion and expressed in cm. One hundred seeds were counted and its weight was recorded in grams using electronic top pan balance as per ISTA (1985) rules. Number of seeds per kilogram was also calculated.

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**Physiological Characters:-**

Hundred seeds of three different sizes (based seed size) were sown in 30/11 inch polythene bags with holes at the rate of one seed / bag. These bags were filled with sand + red soil (1:1). The weight of the medium was one kilogram in each bag for all cases. The optimum depth was 1.0 to 1.5 cm below the surface of the soil. There were four replications consisting of one hundred bags /replication. The bags were watered daily. Germination percentage was calculated using the following formula:

$$\text{Germination \%} = \frac{\text{No. of seed germinated}}{\text{Total no of seeds sown}} \times 100$$

The growth and biomass productions of seedlings were taken once in fifteen days from the date of germination up to 90 days. Ten seedlings in each replication at random were uprooted by cutting the polythene bags without damaging the roots were washed with water. The root and shoot lengths were measured and expressed in cm. The seedlings were dried in a hot-air oven at 60°C for 48 hours. After cooling, them in desiccators weighed in electronic top pan balance and expressed in grams.

**Result and Discussion:-****Physical Parameter :**

The physical characteristics of seeds viz., seed length, seed breath, 100 seeds weight, percentage of occurrence and No. of seeds / kg was observed and tabulated [Table-1].

The seeds of *A. marmelos* were oblong in shape and milky white in colour. They were size Graded into large, medium and small representing in the ratio of 2:4:1. Seed length, breadth and 100 seed weight were noticed to be more in larger seeds followed by medium and small. Number of seeds / Kg was lowest in larger seeds 5300 ( $\pm 237.1$ ) followed by higher number in medium 6437 ( $\pm 515.3$ ) and 8125 ( $\pm 772.9$ ) in small. Similar seed morphological studies were made by Athaya (1985) in certain tree species growing in tropical dry deciduous mixed forests of central India. Roy [1985] in *Albizia lebbeck*, Ponnammal *et al.* , [1993] in *Hardwickia binnata* ,Suresh *et al.*, [2003] in *Bassia longifolia* and Kathiravan( 2004) in *Jatropha*.

**Physiological characters:-**

Seed grading is a continuous process in seed cleaning in which the seeds are graded according to their size or weight. The purpose of grading is to improve the physiological quality of the seed lot by eliminating small, empty and underdeveloped seeds

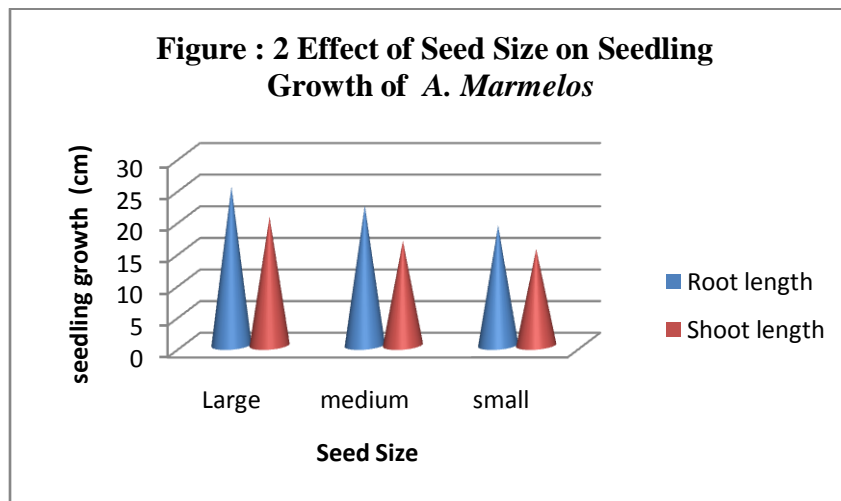
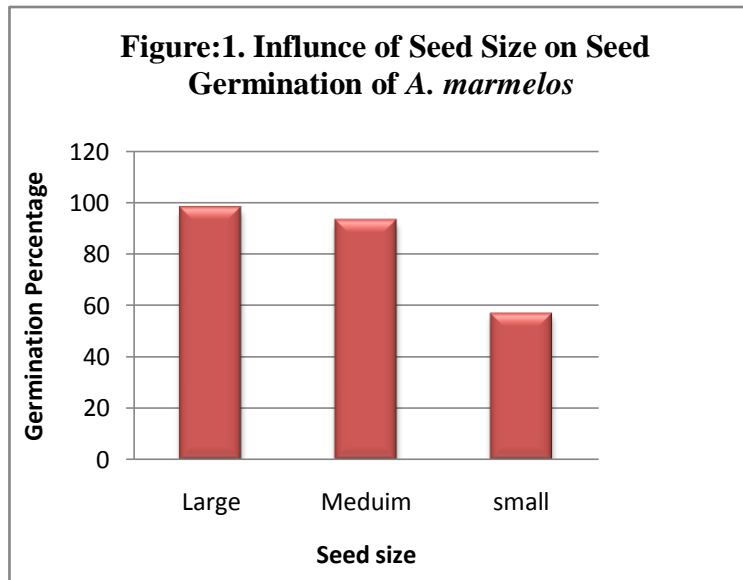
Among freshly collected seeds of *A. marmelos* germination was noticed 6- 10 days after sowing. The large sized seeds exhibited higher (98%) percentage of germination compared to that of medium and smaller sized seeds ( Fig: 1.) This may be due to large quantity of stored food materials in the larger seeds, which contributed for best germination. The better germination of larger seeds also noticed in, *Aholo sercia* by Hillum (1990), *Syzigium cumini* by Ponnammal *et al.*, (1992) and *Hardwickia binnata* by Ponnammal *et al.*,(1993). *Dalbergia sissoo* by Yadav *et al.*, (1998), *Bassia longifolia* by Suresh *et al.*, (2003) and *Pinus wallichiana* by Ghildiyal and Sharma (2005)

In the growth performance of the seedlings (90 day old), root and shoot length was higher in large sized seeds (25.1 cm and 20.3 cm) followed by medium (22.1 cm and 16.5 cm) and small (18.9cm and 15.2cm) respectively. This result conformed that the bigger seeds giving rise to larger seedlings. Due to bigger embryo, which had more nutrients to support more growth has been reported by Ponnusamy *et al.*, (1991) in *Neem*. Similar findings were also reported by Chauhan and Raina (1980) in *Pinus roxburghii.*, Ponnammal (1992) in *Syzigium cumini* Arjunan *et al.*, (1995) in *Pongamia pinnata* and Dar *et al.* , (2002) in *Albizia lebbeck*, *Acacia catechu* and *Pinus roxburghii*. In all these three sized seeds, the root growth was found to be faster than the shoot growth. After 90 days of seed germination, highest biomass production was noticed in seedlings from large seeds (0.186 g/plant) (Table.13).

**Table 1:-** Physical characters of *A. marmelos* seeds.

Seed size	100 Seed weight (g)	Seed length (cm)	Seed breadth (cm)	Occurrence (%)	No. of seeds / Kg	Seed Shape and Colour
Large	37.0 ± 1.85	0.81 ± 0.09	0.38 ± 0.05	20-25	5300 ± 237.1	Oblong Milky White
Medium	30.0 ± 3.29	0.65 ± 0.05	0.32 ± 0.04	55-60	6437 ± 515.3	
Small	22.0 ± 2.94	0.48 ± 0.06	0.25 ± 0.07	18-22	8125 ± 772.9	

± = Standard deviation



**Conclusion:-**

Seed is one of the most important inputs for forest nursery production. Based on the results of the present study, seed germination and seedling growth characters were higher in larger seeds. So this study concluded that the seed size and seed quality are positively related.

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