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Effect of Different Pre-Treatments on Seed Germination and Dormancy Breaking of *Semecarpous anacardium* Linn.

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ABSTRACT

The seeds of *Semecarpous anacardium*, a medicinally important plant endemic to Saudi Arabia, become dormant and do not germinate easily. An attempt was made to improve seed germination and break the dormancy. The seeds were subjected to different mechanical, hormonal and scarification treatments. Germination of seed was recorded after 21 days of sowing the seed in different treatments. Maximum germination was obtained by Cow dung slurry treatment for 36hr. (90%). The germination of seeds was found to be improved upon storage for 6 and 12 months. In general, all treatments showed increased germination compared to control.

1. Introduction

Terminalia bellirica Roxb. belongs to family *Semecarpous anacardium* Linn. is small deciduous tree, belongs to family Anacardiaceae. It is found in deciduous forest of Marathwada region. Leaves oblong to oblanceolate, Flowers subsessile, clustered in pubesent panicles and fleshy, edible, orange coloured thalamus (Naik, 1998). The fruit has an acrid scent, and is hot and sweetish. Its active principles include anacardic acid, cardol, catechol, anacardoside, fixed oil, semecarpol, bhilawanol, biflavonoids, biflavones, etc. (Chopra et al., 1992; Kirtikar and Basu 2000; Majumder et al., 2008). *S. anacardium* fruit medicinally used in inflammations, (Misra and Ashwinikumar 2001), cardiac disease and fever (Joshi, 2000), diabetes, tumours, ulcers and general debility (Prajapati, et. al., 2003). It is a stimulant and a narcotic (Daniel, 2005). It is used in leprosy and nervous debility (Bose et.al, 1998). Hence, efforts have been taken to propagate it by seeds. Present paper deals with some pre-sowing treatments on germination of *Semecarpous Anacardium* Linn.

2. Materials and Methods

Mature seeds of *S. anacardium* were collected by the method described by Neergaard (1977). Seeds were collected from Maheshmal, (N -200 03.173'E-0750 11.390' 771m) Aurangabad (M.S.) India. Purity was tested by different methods (Agrawal, 1995). Seeds were plucked from the trees and sun dried. Seed purity percentage was calculated (Purohit, et, al., 1982). Seeds showed only 20% seed germination, without any treatment. Due to this, the seeds were treated with different mechanical as well as chemical and growth hormones as follows.

Presoaking treatment: Seeds were soaked in the tap water for 24 hr-48 hr. and sown. (Ghildiyal et. al., 2009).

Hot water treatment: Seeds were immersed in hot water (90^{o}C) for 15-45 min and sown. (Emongor,et al., 2004.,Thapliyal and Gupta, 1980).

Mechanical (scraping method): The seeds were subjected to slight scraping with the help of sharp blade. (Singh et. al., 2005).

Acid treatment: Seeds were treated with different acid such as Conc.H_2SO_4, Conc. HCl and HNO_3 for 5-15 min. All treated seeds were washed with running water and sown.

Alkali treatments: Seeds were treated with different alkali (NaOH & KOH) for 15-45 mines; washed with running water and sown. (Hou and Simpson, 1994).

Thiourea treatment: Seeds were kept in thiourea for 15-45 min, at 50 ppm concentration.

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Cow dung treatment: Seeds were immersed in slurry of cow dung for 24 hr-48 hr ((Rai et. al., 1986).

Growth hormones treatments: Seeds were treated with different growth hormones like, IAA, IBA, NAA, 2-4D, Cytokine and Gibberellic acid etc. (Liu et. al., 1998).

Chilling: The seeds were placed at 4 ^{o}C in refrigerator for 48 hours and removed, dried in air. (Maithani et. al., 1990).

Control: Seeds were sown in soil at a depth of 2 cm.

From each category 100 seeds in the five lots of 20 seeds each were used for the study on percent of seed germination (Prins and Maghembe, 1994.).

3. Results and Discussion

The result of different pre-treatments on seed germination is given in Table 1.

It is revealed from the data that, the untreated seeds of *S. anacardium* exhibited 20% germination. Maximum percentage of seed germination (90%) found in cow dung slurry treatment for 36hr. The pre-soaking treatment and mechanical treatment were observed to exhibit high seed germination i.e. 80%, 80% and 75% respectively. Conc. H_2SO_4, Conc. HCl and Conc. HNO_3 were found to be effective than control. All the Thiourea (50 ppm) treatments enhanced seed germination. The seed treatments with KOH (1%) NaOH (1%) only slightly increased seed germination percentage than control. However, NaOH at 15 min. treatment increased the germnation. Growth regulators (IAA, IBA, 2-4D, GA, NAA and Cytokinins) were used at 200 ppm and applied for 2, 4 and 6 hours; all the treatments enhanced the seed germination. Amongst these, treatment with IBA for 6 hours was more effective than the control as well as other treatments. Chilling at 4^{o}C also exhibited increase in the seed germination. Cow-dung slurry treatment for 36 hours was superior treatment in increasing the seed germination than the control, as well as other treatments used during present study of *S. anacardium.*

Similar observation were made in seeds of *Pinus roxburghii* (Ghildiyal et. al. 2009), and in *Ailanthus excelsa* (Prakash and Kavita, 2014). The purity percentage of *S. anacardium* seeds was 70%. Similar results were reported about seed germination percentage of *S. anacardium* (Meenakshi and Lingakumar**,** 2011) and in *Pongomia glabra* (Singh et.al., 2005).

4. Conclusion

In the present study, Cow-dung slurry proved to be very effective in improving seed germination for *S. anacardium* species. Also, seed germination was enhanced by treating with Mechanical scarification, Pre-soaking, Thiourea (50 ppm) and IBA (200 ppm). More time is needed to germinate the seeds, therefore, the type of seed dormancy in *S. anacardium* species is physical dormancy.

Table 1. Effect of different pre-treatments on seed germination of *Semecarpus anacardium*

Sr. No.	Treatments	Time	Seed germination (%) *
1	Pre-soaking	24 hr 36 48	60 80 70
2	Hot water (50^{o}C)	15 min 30 45	40 60 50
3	Mechanical (Scraping)	-	80
4	Conc. H_2SO_4	5 min 10 15	30 50 40
5	Conc. HCl	5 min 10 15	40 60 50
6	Conc. HNO_3	5 min 10 15	30 55 50
7	Thiourea (50 ppm)	2hr 4 6	50 70 80
8	Cow-dung slurry	24 hr 36 48	70 90 80
9	KOH (1%)	15 min 30 45	30 40 60
10	NaOH (1%)	15 min 30 45	25 35 50
11	IAA (200 ppm)	2hr 4 6	50 70 60
12	IBA (200 ppm)	2hr 4 6	40 60 80
13	2-4D (200 ppm)	2hr 4 6	30 65 60
14	GA (200 ppm)	2hr 4 6	45 75 55
15	NAA (200 ppm)	2hr 4 6	30 50 40
16	Cytokinins (200 ppm)	2hr 4 6	40 60 50
17	Chilling 4^{o}C	24 hr 36 48	35 50 45
	Control	-	20

*After 21 days

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