Original Research Article

Effect of cowdung slurry and Termite mount as seed treatment on germination and seedling characteristicsofRed sanders (*Pterocarpus santalinus* L.f)

Abstract

Aims:-*Pterocarpus santalinus* L.fis a highly valued timber species, because of its "heavy, dark claret-red heartwood," especially that possessing a 'wavy' grain. **Propagated through mainseeds; theproblem in seed germination because of thehard seed coat so limitspoor seed germination production.The current study was carried out to find out best germination for enhancement treatment.**

Study design: - The data were then analyzed by the 'f' test for significance at 0.05 levels by using statistical software agrees with thecompletely randomized block design.

Place and Duration of Study: - Forest College and ResearchInstituteMettupalayam,Tamil Nadu AgriculturalUniversity, one year study.

Methodology:- Mature pods collected, were subjected to 4 treatments in 4 replications and the experimentwas conducted ina completely randomized block design.

Results:-The results showed that Cow dung slurry 24h and 72h resulted in more synchronized germination of 51 percent, followed by Cow dung slurry 48h (44 %) as against 33% in control.

Conclusion:- Among all the treatment Cow dung slurry 24hresulted in more synchronized germination of 51 percent.

Keywords:- *Cow dung slurry, Termite mounts, Speed of germination,microbe.*

1. Introduction

Red sandersdistribution is largely confined to the southern portion of the Eastern Ghats, Andhra Pradesh, India(Shilpa*et al*.,2012). The reddish and fragrant heartwood has arange of medicinal, pharmaceutical industrial and timber value and thus economically placed in the same range as tusk and amber. The natural habitats of red sanders in India (the major supplier) are extensively exploited to the point of near extinction thus placing it on the red list of endangered

species under IUCN guidelines. This species is propagation by seeds (Dayanand and Lohidas,1988); however, the seed propagation encountered with number of problems such as owing to low fruit set, hard pod, and seed coat, dormancy of the seed; extended germination period up to 90 days; low, poor germination of 20% and conversion of 34% restricted the area expansion.

Failure in seed propagation may adversely affect the important regeneration mechanism through quality seed, leaving only the coppicing mode for the survival of the species.Seed possessed with dormancy upto six months to one year, type of dormancy has not yet been elucidated (Rao and Raju, 2002). The presence of dormancy causes prolonged germination. The seedlinggrowth of the also not to the expectedrate and vigour, due to some reasons, resulting in poor crop establishment after transplanting (Kalimuthu and Lakshmanan, 1995).

Conventional vegetative propagation techniques such as grafting and air-layering have limitations in thelarge-scale multiplication of this species and rooting of cutting was also found to be poor (Kesava Reddy *et al.,* 1990). Tissue culture has proved to be a promising technique for conservation and large-scale multiplication of several woody species. However the members of Fabaceae have been difficult to culture *in vitro* owing to their rebellious nature, roots were robust and vigorous in air layers compared to stem cuttings, but the rate of manipulation is comparatively low and not enough to transplant in the nursery and main field (Rao and Raju, 2002). Based on the above reasons, the multiplication of the species largely depends on seed (Dayanand and Lohidas, 1988).

2.Materials and method:-

The study was carried out during 2015-16 at Forest College and Research Institute, Mettupalayam, Tamil Nadu, India.

2.1.Seed source

Seeds of *Pterocarpus santalinus*were collected during June 2015 from the Chittoor, Andhra Pradesh sources.

2.2.Treatment details

2.2.1.Cow dung slurry

About 500 g of cow dung slurry was mixed with 500 ml of water and mixed well to make aslurry.

Four hundred pods from thesource were separately mixed with cow dung slurry (1:2 ratio of water and cow dung) and kept for different duration *viz*., 24, 48, and 72 h.

2.2.2.Effect of Termite digestion on seed germination and seedling germination

About 400 pods were exposed to live termite mound for ten days; after ten days pods were collected.

2.3.The observations made are described as follows:

2.3.1.Days to initial germination

The nursery bed was observed daily, for seedling emergence. The day on which the first seedling emerged was expressed as days to initial germination.

2.3.2.Days to final germination (Mauromicale and Cavallaro, 1995)

The number of days on which the last seedling emerged was recorded and expressed as days to final germination.

2.3.3.Speed of germination

Speed of germination was calculated by the following formula,

Speed of germination= n1/d1+n2/d2+n3/d3+----------

Where, n = number of germinated seeds; d= number of days

2.3.4. Germination percent

The number of normal seedlings produced in each replication was counted, and theaveragewas expressed in percent.

$$\text{Germination percentage} = \frac{\text{Number of normal seedlings}}{\text{Total number of seed sown}} \times 100$$

2.3.5.Seedling length

All normal seedlings of each treatment were measured for length from root tip to shoot tip, and the average was expressed in cm.

2.3.6. Dry weight

All normal seedlings were dried under shade for 24 h and then dried in ahot air oven maintained at 85 ± 1°C for 48 h. It was cooled in a desiccator for 30 minutes and weighed. The values were expressed as 'g seedlings^{-1}'.

2.3.7.Vigour Index (Abdul-Baki and Anderson, 1973)

Vigour index (VI) was computed using the following formula and expressed as thewhole number.

VI = Germination percentage x dry weight (g/seedling)

2.3.8.Survival percentage

One-month-old seedlings were transplanted to polyethylene bags (23× 15 cm) containing nursery mixture.The survival rate was counted and expressed in percentage after one month.

2.4. Statistical analysis

Result data (in percent) were transformed to arcsine values before statistical analysis to unify the variance of the data (Ansari *et al*., 2012). The data were analyzed by the 'F' test for significance at 0.05 level by using statistical software AGRESS.

3. Result and Discussion

All the observed parameters were significant. Exposure of the pod to termite mound from 1 to 10 days did not show any remarkable increase either for germination percentage and speed of germination (Table 1).

Among the observed parameters for the influence of cow dung slurry on seed germination and seedling characters, days to initial germination, final germination, thespeed of germination, germination percentage, seedling length, vigour index and survival percentage showed asignificant difference for treatmenteffect(Table 2).

The pods exposed to termite mound did not have any influence on all the recorded parameters and evidenced through statistical analysis. Even exposure of pod for a duration of 10 days did not have any positive effect, and this might be due to hard veins on the surface of pod, shiny shell or due to thepresence of high quantity of phenols which might have prevented the termite activity. Such a non-productive effort due to termite was reported by Sivaprakash (2003) in *Terminalia chebula* and *T. bellerica*; but in many cases, termites have an influence of increasing the germination through theweakening of the coat and make tiny holes which facilitated the entry of water. The absence of such positive mechanism in *P. santalinus* is yet to be studied.

The use of bio-regulators in enhancing seed germination and seedling vigour is well known (Tendolkar, 1978; Singh *et al*., 1989 and Pampanna and Sulikeri, 2001). The presence of biologically active substances, microbes, week acids of some bioregulators like cow dung resulted in enhanced germination in *Calophyllum inophyllum* (Rajesh *et al.,* 2011).

4.Conclusion

The pods mixed with cow dung slurry during 24 h, was improved the germination rate. Moreover, enhancementin uniform germination with higher seedling vigour and survival percentage was observed. This might be due to the corrosion of pod coat by the week acids, digestion of thin and strong veins by the microbes present in cow dung; both together might have resulted in the opening of pores. The entry of growth stimulants of cow dung and adequate water through the opened pores might have resulted in a positive performance.

Table 1. Effect of treatment on seed germination characteristics

Treatment	Days to initiate germination	Days to final germination	Speed of germination	Germination %
T_0	14.00	53.00	00.22	34(35.66)
T_1	12.00	32.75	00.87	51(45.57)
T_2	10.00	28.75	00.78	50(45.00)
T_3	10.25	31.75	00.86	51(45.57)
T_4	13.00	50.75	00.21	36(36.86)
Mean	11.85	39.40	00.58	44(41.73)
SE.D	0.23	1.67	**0.01**	**1.59**
CD (P ≤0.05)	**0.46**	**3.40**	**0.01**	**3.23**

Table 2. Effect of treatment on seedling characteristics

Treatment	Seedling length (cm)	Dry weight (g)	Vigour Index	Survival (%)
T_0	11.22	0.10	07.41	91.00
T_1	17.57	0.16	08.36	92.50
T_2	17.27	0.17	08.40	89.25
T_3	17.55	0.15	08.33	89.50
T_4	10.85	0.21	06.99	89.25
Mean	14.89	0.16	7.90	90.30
SE.D	**0.61**	**0.01**	**1.58**	**0.4**
CD (P ≤0.05)	**1.25**	**0.02**	**2.60**	**0.8**

T0- Control, T1 - Cow dung slurry 24h, T2 - Cow dung slurry 48h, T3- Cow dung slurry 72h, T4 - Effect of Termite digestion

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