The Pharma Innovation Journal 2022; 11(7): 472-474

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(7): 472-474

www.thepharmajournal.com
Received: 08-05-2022
Accepted: 30-06-2022

Ramesh Rathod
Ph.D., Scholar, Department of Silviculture and Agroforestry, College of Forestry, Sirsi, Karnataka, India

SJ Patil
Retd. Professor and Head, Department of Silviculture and Agroforestry, College of Forestry, Sirsi, Karnataka, India

Raju Chavan
Principle Scientist-AICRP Agroforestry, Department of Farm Forestry & Agroforestry, UAS, Dharwad, Karnataka, India

Corresponding Author:
Ramesh Rathod
Ph.D., Scholar, Department of Silviculture and Agroforestry, College of Forestry, Sirsi, Karnataka, India

Effect of seed scarification on pod germination and seedling growth of *Pterocarpus santalinus* (Linn F.)

Ramesh Rathod, SJ Patil and Raju Chavan

Abstract
Pterocarpus santalinus is an important timber species, belongs to family Fabaceae. It is a good source of timber and has medicinal value. The present study summarizes the effect of scarification on pod and seed germination on pods and seedling of *Pterocarpus santalinus*. Fermented cow dung slurry treatment for 3 days recorded highest pod germination (56.67%) followed by soaking of pods in water for 72 hours while Maximum shoot length (11.71 cm) was recorded in cow dung slurry followed by concentrated H_2SO_4 (11.22 cm). Control recorded least among all the treatment and least in control which could be due to digestion of thin and strong veins of the pod by microbes present in cow dung.

Keywords: *Pterocarpus santalinus*, germination, scarification, cow dung slurry

Introduction
Pterocarpus santalinus (Linn F.) also known as Red Sander, is an endemic and endangered species largely confined to the southern portion of Eastern Ghats and Andhra Pradesh, India (Dayanand and Lohidas, 1998) [1]. The reddish and fragrant heartwood of red sander has a range of medicinal, pharmaceutical, industrial and timber value which fetches its economical place in same range as tusk and amber. The natural habitat of red sander in India (the major supplier) are extensively exploited to the point of near extinction, thus placing it in the red list of endangered species under IUCN guidelines (Kalimuthu and Lakshmanan, 1995) [3]. The species is propagated through seeds. The seed propagation encountered with number of problems owing to low fruit set, hard pod and seed coat, dormancy of seed; extended germination period up to 90 days; low poor germination of 20 per cent and conversion of 34 per cent 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 (Gunaga and Vasudeva, 2011) [4]. Seed possessed with dormancy from six month up to one year, type of dormancy has not yet been elucidated. Presence of dormancy causes prolonged germination. The growth of the seedling also not to the expected speed and vigour, due to number of reasons, resulting in poor crop establishment after transplanting.

Conventional vegetative propagation techniques such as grafting and air layering have limitations in large scale multiplication of this species and rooting of cuttings was also found to be poor (Rao *et al*., 2002) [2]. Tissue culture has proved to be 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 recalcitrant nature, robust roots and vigorous in air layers compared to stem cuttings. But, the rate of manipulation is comparatively low and not enough to stem cuttings, yet the rate of manipulation is comparatively low and not enough to transplant in the nursery and main field. Based on the above reasons, the multiplication of the species largely depends on seed.

Materials and Methods
The study was carried out on seed scarification in *Pterocarpus santalinus* pod germination and seedling growth during 2016-18 at nursey of College of Forestry Sirsi. The seeds of *Pterocarpus santalinus* were collected from during 2016.

Treatment details
T_1 - Control
T_2 - Cow dung slurry

T_3 - Mechanical scarification
T_4 - CONC.H_2S0_4 for 1 min
T_5 - KNO_3 1% for 12 hours
T_6 - KNO_3 5% for 12 hours
T_7 - 40% HCL for 24 hours
T_8 - Cow urine (1:10) for 30 min
T_9 - Water soaking for 48 hours
T_{10} - Water soaking for 72 hours

A total of 10 treatments in which pods were treated in the experiment. The pod germination and seedling growth parameters were recorded *viz.*, germination per cent, mean daily germination (%), peak value, germination value, germination rate, root weight, shoot weight, seedling fresh weight, seedling dry weight and seedling vigour index was calculated.

Statistical Analysis

The experiment was conducted in randomized block design. Data was analysed by analysis of variance (ANOVA) to detect significant variance between means. Significant results of scarification was tested and analyzed at 0.05 probability level by using OPSTAT software.

Results and Discussion

Table 1: Effect of various seed scarification treatments on pod Germination parameters of *Pterocarpus santalinus*

Treatments	Germination Percent (%)	Mean Daily Germination (%)	Peak value	Germination value	Germination rate
T1 (Control)	30.00	0.627	0.23	0.15	1.41
T2 (Cow dung slurry)	56.67	1.603	1.62	2.60	5.78
T3 (Mechanical scarification)	34.89	0.813	0.36	0.29	2.22
T4 (CONC.H_2S0_4 for 1 min)	41.33	0.960	0.58	0.55	3.71
T5 (KNO_3 1% for 12 hours)	33.11	0.753	0.33	0.25	1.89
T6 (KNO_3 5% for 12 hours)	31.33	0.680	0.31	0.21	1.70
T7 (40% HCL for 24 hours)	50.66	1.270	0.89	1.13	4.66
T8 (Cow urine (1:10) for 30 min)	36.00	0.840	0.50	0.42	2.31
T9 (Water soaking for 48 hours)	49.55	1.190	0.73	0.87	4.44
T10 (Water soaking for 72 hours)	52.00	1.367	1.23	1.68	5.15
S.E (m) (±)	1.229	0.038	0.035	0.043	0.081
C.D @ 5%	3.651	0.112	0.104	0.128	0.240

Effect of different seed scarification treatments on pod/seed germination of *Pterocarpus santalinus* were evaluated and results were presented in the Table 1. The various scarification treatments exhibited significant differences for pod germination. Fermented cow dung slurry treated (T_2) for 3 days recorded highest pod germination (56.67%) followed by T_{10} *i.e* soaking of pods in water for 72 hours (52.00%) and lowest was recorded in control (30.00%). These results were in line with Shinde and Malshe, (2015) [5]; Vijayalakshmi and Renganayaki (2017) [7]; where they reported higher germination per cent of 51.00 in cow dung slurry treatment in *Pterocarpus santalinus* and reported that the reasons for higher germination may be due to digestion of thin and strong veins of the pod by microbes present in cow dung.

Similar trend was recorded for Mean daily germination (MDG), where highest MDG was recorded in T_2 (1.603) followed by T_{10} (1.367) and least in control (0.627). Peak value of germination, germination value and germination trend significantly differed among different treatments with values recording highest in T_2 (1.62, 2.60 and 5.78) followed by T_{10} (1.23, 1.68 and 5.15) and least in control (0.23, 0.15 and 1.41), respectively. These results are in conformity with findings of Vijayalakshmi and Renganayaki (2017) [7] who reported greater speed of germination in seeds treated with cow dung slurry treatment and least in control.

Table 2: Effect of scarification treatments on seedling parameters of *Pterocarpus santalinus*

Treatment	Shoot length (cm)	Root length (cm)	Seedling fresh weight (g)	Seedling Dry weight (g)	Seedling Vigour Index
T1 (Control)	6.75	18.46	1.67	0.47	756.68
T2 (Cow dung slurry)	11.71	24.20	3.02	0.84	2035.07
T3 (Mechanical scarification)	7.27	20.04	1.82	0.50	952
T4(CONC.H_2S0_4 for 1 min)	11.22	23.76	2.87	0.80	1446
T5 (KNO_3 1% for 12 hours)	10.71	22.98	2.72	0.76	1115
T6 (KNO_3 5% for 12 hours)	10.21	22.50	2.57	0.72	1025
T7 (40% HCL for 24 hours)	9.71	22.00	2.42	0.68	1606
T8 (Cow urine (1:10) for 30 min)	9.21	21.56	2.27	0.63	1107
T9 (Water soaking for 48 hours)	8.26	20.56	1.97	0.55	1428
T10 (Water soaking for 72 hours)	8.68	21.06	2.12	0.59	1546
S.E (m) (±)	0.068	0.471	0.037	0.011	37.080
C.D @ 5%	0.201	1.398	0.110	0.032	110.157

Effect of scarification treatments on seedling parameters *Pterocarpus santalinus* were depicted in the Table 2. Significant variation for seedling parameters such as shoot length, root length, SVI, SFW and SDW was noticed among different scarification treatments. Maximum shoot length (11.71cm) was recorded in T_2 (cow dung slurry) followed by T_4 (11.22 cm) and least was recorded in control (6.72 cm).

Similar trend was noticed for root length where the recordings were recorded highest in T_2 (24.20 cm) followed by T_4 (23.76 cm) and least in control (18.46 cm). Highest Seedling Vigour

Index (SVI) was recorded in T_2 (2035.07) followed by T_7 (1606) and least in control (756.68). Significant variation for Seedling Fresh Weight (SFW) and Seedling Dry Weight (SDW) were recorded among different treatments; highest SFW (3.02 g) and highest SDW (0.84 g) were noticed in T_2 followed by T_4 (2.87 g and 0.80 g respectively) and least SFW (1.67 g) & SDW (0.47 g) was recorded in control.

The results were found in conformity with findings of Thanuja *et al.* (2018); where they reported higher seedling length (32.20 cm and 35. 30 cm) in GA_3 200 ppm followed by cow urine (1:1) treatments in Red sanders. They also reported SFW of 4.45 g and SDW of 1.56 in GA_3 200 ppm and SFW 4.7 g and 1.54 g in cow urine (1:1) treatments. Thanuja *et al.* (2019) reported higher SVI in cow dung slurry treatment (1135.85) followed by cow urine (1:1) and GA_3 200 ppm (785.59).

Conclusion

Pterocarpus santalinus is an important medicinal tree suitable for agroforestry and farm forestry initiatives. It can also grow in wide range of soil and climatic conditions. Among all the treatments, pod germination and seedling growth exhibited highest germination and growth rate when treated with cow dung slurry treatment for 3 days. Therefore, it is suggested to use this a scarification method for large scale production of P. santalinus, conserving this endangered species.

References

1. Dayanand T, Lohidas T. Effect of different treatments on pod germination of red sanders (*Pterocarpus santalinus* Linn F). Ind. J For. 1998;11:87-88.
2. Rao S, Purnachandra, Soloman SJ. Pollination ecology of *Pterocarpus santalinus*: an endemic and endangered species. Curr. Sci. 2002;83(9):10-13.
3. Kalimuthu K, Lakshmanan KK. Effecgt of different treatments on pod germination of Pterocarpus species. Ind. J For. 1995;18:104-113.
4. Gunaga RP, Vasudeva R. Influence of seed size on germination and seedling growth in Mammea suriga. Kar. J Agric. Sci. 20112;4(3):415-416.
5. Shinde VV, Malshe KV. Effect of cattle urine and cowdung slurry as seed treatment on germination and growth of Manikara hexandra. J Ecofri. Agric. 20151;0(2):128-130.
6. Thanuja PC, Sadashiv N, Shashikala SK. Enhancement of seed germination rate and seedling vigour index in red sanders: an endangered medicinal plant. Pharma Innov, 8(5), 523-525.
7. Vijayalaxmi KP, Renganayaki PR. Effect of cow dung slurry and termite mount as seed treatment on germination and seedling characteristics of Red Sanders. Adv. Res. 2017;11(4):1-4.