EFFECT OF PRE-SOWING TREATMENT ON SEED GERMINATION AND SEEDLINGS GROWTH CHARACTERSTICS OF *ALBIZIA PROCERA*

SUNIL KUMAR TIWARI[1*] and S S DHURIA[1]

Department of Forestry, Wildlife and Environmental Sciences School of Natural Resources

Guru Ghasidas Vishwavidhyalaya, Bilaspur, Chhattisgarh, India, 495009

ABSTRACT

Aims- The objective of this study was to identify the most suitable pre-treatment method that will increase germination of *Albizia procera*.

Study area- The present study examined the characteristics of *Albizia procera* after pre-sowing treatment on seed germination and seedling growth characteristics in the Departmental nursery.

Methodology- The seeds were collected from five provenances namely Bilaspur, Bastar, Korba, Raigarh and Sarguja of Chhattisgarh, India. The seeds were tested with four pre-sowing treatment in department nursery and growth performance of seedlings were determined in nursery condition. The germination test was conducted in nursery, polybags filled with mixture of soil, sand and Farm yard manure at a ratio of 3:2:2.

Results-The result show Significant differences ($P>0.05$) in Germination percentage by pre-sowing treatments and highest germination percentage (90.5) was obtained in hormonal treatment and lowest (80.2) was in coldwater. The shoot length and root length (27.8 &11.6) was highest in **in** hormonal treatment .

Conclusion- Pre-sowing treatment of *Albizia procera* seed in Harmonal treatment (IAA 25%) is suggested for nursery raising and successful plantation.

Keywords- Albizia procera, provenance, germination percentage, seedling growth, pre-sowing treatments.

INTRODUCTION

Albizia procera commonly called (white siris) is one of the important species belongs to family Fabaceae. It is a large, fast-growing medium to large sized deciduous tree; it is distributed throughout moist and dry deciduous forests of India. In Chhattisgarh, it is found on alluvial grounds along streams and moist swampy places. This species provides wood for a variety of purposes, nutritious fodder for livestock. It is extensively planted in farm lands, agricultural

boundary, wasteland and roadside avenues, it is an important reforestation and agro forestry species, Due to its multipurpose use and nitrogen fixing ability it is considered as one of the priority species in plantation programs. To ensure successful plantation of *Albizia* species it is important to provide better planting stock this can be achieve by seed treatments which can enhance seed germination rate, germination process and seedling growth characteristics because the seeds of the species are exogenously dormant due to impermeable seed coat or pericarp to water which impedes proper and complete germination resulting in to low quality uneven stock. So seed treatments can influence seed germination rate and seedling characteristic. The effect of pre-sowing treatments on seed germination of some tropical forest tree species have been reported by various authors for *Albizia* species [1], *Albizia procera* [2,4,6], *Melia azedarach* [3], *Albizia lebbeck* [8]. Different pre-sowing treatment have been used by different Researchers to enhance seed germination of different species including *Faidherbia albida* [9,10],*Acacia spp*[11], *Grewia oppostifolia*[12], *Terminalia chebula*[13], *Tetrapleura tetrapetra*[14] and *Adonsania digitatadigitate* [15]. The objective of this study was to identify the most suitable pre-treatment method that will increase seed germination and enhance seedling growth of *Albizia procera* .

MATERIAL AND METHODS

The present study is carried out in the Departmental nursery ,Department of Forestry, Guru Ghasidas vishwavidyala, Bilaspur, Chhattisgarh, Bilaspur is a major city of Chhattisgarh State and positioned in north western part of State, GGV is a central university (area around 700 acres). The area is positioned between 21°47' and 23°8' north latitudes and 81°14' and 83°15' east latitudes. It has an average altitude of 264 m (866 ft) near the banks of the rain-fed Arpa River with black-sandy soil The weather of the area is tropical. It is hot and humid, because of its nearness to the Tropic of Cancer and depending on the monsoon for rain. There are average rain fall in the monsoon season. Its summer is very warm with temperature between 30 and 47°C and between 5 and 25°C in winter. The flora of the area has been classified as tropical deciduous forest.

The seeds were collected from five provenances *viz*., Bilaspur, Bastar, Korba, Raigarh and Sarguja. From each provenance pods/seeds were collected from five phenotypicaly superior trees located about 1000 m apart from each other in order to avoid narrowing down of the

genetic base due to relatedness or inbreeding. Seeds from all the trees of a provenance were mixed and a composite seed lot was made for each provenance.

An extensive survey was carried out for the selection of superior/plus trees for the collection of pod/seeds , The Selection of plus tree was made on visual observations , The individuals trees with defective bole, bi- forked , diseased, dead branches, or attacked by any pathogen and pests were rejected in the initial stage of selection. The main characteristic considered for the plus tree selection, tree should be middle age, having cylindrical bole, with well developed crown, straightness ,non-forking, non-twisting bole, free from buttresses and flutes and minimum form characteristics. The preferred best phenotypically trees were dominating in height and girth compared to its surrounding trees of the same species and age.

The germination tests were examined in Departmental nursery (Department of Forestry, GGV, Bilaspur). In nursery, the experiment was laid out in randomized block design (RBD) using 25 bags each in four replications for each provenance. Three pre-treatment methods were employed, namely, soaking in cold water for 24 hrs, in hot water ($50^{°}$C) for 24 hrs, and Hormonal treatment IAA (25%). These all pre-treatments were undertaken separately and compared with control i.e. after each pre-treatment, the seeds **Seeds** were sown in polythene bags of 30 x 45 cm size filled with soil, sand and FYM (Farm Yard manure) in 3:2:2 ratios. Seeds were considered germinated when sprouted plumules just emerged from the soil surface. The bags were regularly watered and weeded in the nursery. Observations were recorded every day. Germination Percentage, Germination Energy Index, Germination Value, Germination Speed **were calculated according to ....** The experiment was conducted in the first week of May-2015.

.... days after beginnig of experiment, **The** the observations on morphological growth parameters were recorded *viz*., plant height, , number of leaves and dry weights of root, stem, branch and leaf were made on ten randomly selected seedlings .

Three pre-treatment methods were employed, namely, soaking in cold water for 24 hrs, in hot water (50^{0}c) for 24 hrs, and Hormonal treatment IAA (25%). These all pre-treatments were undertaken separately and compared with control i.e. after each pre-treatment, the seeds were subjected to germination in nursery and the following parameters were recorded. Germination percentage, Germination Energy Index, Germination Value, Germination Speed,

Seedling height, Number of leaves. Data collected on seed morphology, germination and early seedling growth parameters were subjected to Analysis of Variance (ANOVA**). This was done to determine the variation among provenances at a 0.05 significant level.** The Duncan multiple range test was used to compare means among provenances.

Comment [T9]: I can't see this parameters in text.

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Comment [T11]: Only compare provenaces ?? Why compare means among pretreatment? The difference between the mean statistically important or not. I can't see duncan test in tables. What about the result of analysis of variance???

RESULTS AND DISCUSSION

Various pre-treatments were employed to record their effects on seed germination and seedling growth response in the seeds collected from various provenances of *A. procera*. After each treatment seeds of each provenance were tested for their germination and the data has been depicted in Table (1). On an average germination was (71.6, 71.44, 75.82, 80.02) respectively, when seeds were pre-treated with coldwater, hot water and hormonal treatment for 24 hours, irrespective of provenances. In almost all the provenances, seeds pre-treated with cold water had optimum germination as compared to those pre-treated with hot water and hormonal treatment. Seeds pre-treated with hormone IAA had average highest germination among all the provenances. Maximum (90.5%) germination was recorded in Bilaspur provenance followed by (84.3%) Bastar provenance while the minimum (67.2%) was observed in Korba provenance.

Comment [T12]: You cant say this, hormonal treatment better than other treatments

The **Effect** effect of various pre-treatment on germination value and germination energy index (Table 1). The highest enhancement in germination energy index and germination value recorded for Bastar provenance after hormonal treatment and these values were lowest for Korba provenance when exposed to coldwater treatment. The speed of germination across all the provenances was enhanced significantly when the seeds were exposed to hot water and hormonal treatment, the cold water treatment had no effect in germination speed over control. It observed that pre-seed treatment with hormones at different concentration can stimulate the germination behaviour of *Albizia procera* .

The influence of different pre-seed treatments was also observed for different seedling growth attributes of *Albizia procera* Table (2) among different provenances. Across all the pre-seed treatment the hormonal treatment also proved effective in enhancing different seedling growth attributes for each provenance , it was observed that the coldwater treatment did not significantly changed the shoot length, root length, number of leaves and leaf area, than the

control of each provenances. While as hot water treatment and hormonal treatment enhanced these growth parameters significantly and successively for each provenance.
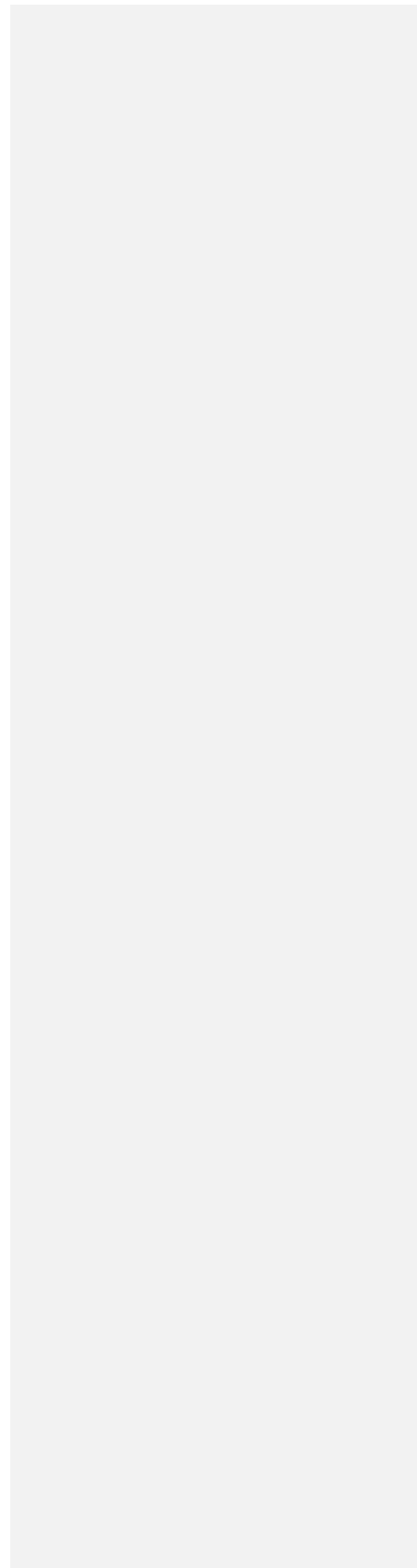
Table 1 Effect of various treatments on Germination Percentage (GP%), Germination Value (GV), Germination Energy Index (GEI) and Germination Speed (GS) of various provenances of *Albizzia procera*.

PROVENENCE	CONTROL				COLD WATER				HOT WATER(50^0 C)				HARMONAL			
	GP	GV	GEI	GS	GP	GV	GEI	GS	GP	GV	GEI	GS	GP	GV	GEI	GS
BILASPUR	84.0	46.2	44.9	15.2	80.2	40.6	34.6	12.2	86.2	46.6	42.6	16.2	90.5	49.8	44.5	16
BASTER	78.5	49.6	38.3	12.3	76.2	44.6	38.2	13.3	80.5	50.4	46.2	14.5	84.3	54.4	46.8	15.2
KORBA	60.0	18.8	29.8	7.1	62.3	21.2	30.5	8.8	65.4	26.9	32.5	12.7	67.2	29.5	34.6	12.5
RAIGARH	64.0	26.4	34.7	10.2	66.5	29.4	36.5	10.5	72.4	33.2	40.5	13.6	79.6	35.2	42.5	12.9
SARGUJA	71.5	34.3	33.8	10.7	72	37.6	32.7	9.4	74.6	38.9	36.4	14	78.5	40.6	39.9	13.7
MEAN	71.6	35.0	36.3	11.1	71.44	34.68	34.5	10.84	75.82	39.2	39.64	14.2	80.02	41.9	41.66	14.06
SD(±)	9.92	12.99	5.68	2.97	7.21	9.38	3.04	1.89	7.93	9.59	5.34	1.30	8.59	10.23	4.69	1.50

Table 2 : Effect of various treatments on growth parameters , Shoot Length (SL), Root Length (RL), Number of Leaves (NL), Leaf area (LA) of various provenances of *Albizia procera*.

PROVENENCE	CONTROL				COLD WATER				HOT WATER (50^0 C)				HORMONAL			
	SL(cm)	RL(cm)	NL	LA(cm)	SL(cm)	RL(cm)	NL	LA(cm)	SL(cm)	RL(cm)	NL	LA(cm)	SL(cm)	RL(cm)	NL	LA(cm)
BILASPUR	22.7	08.3	8	12.2	21.4	8.3	8	13.5	25.6	10.5	10	14.7	27.8	11.6	12	14.0
BASTER	21.3	11.4	8	10.0	22.7	9.2	8	11.4	23.2	10.0	10	11.6	25.0	10.5	10	12.5
KORBA	15.7	07.0	4	06.8	16.2	8.5	6	08.7	18.4	09.5	6	08.9	20.5	09.0	8	09.5
RAIGARH	17.8	08.8	6	08.4	17.2	7.9	8	08.7	21.5	10.9	8	10.3	23.6	10.0	8	10.6
SARGUJA	17.0	08.0	6	07.9	16.4	8.0	8	08.9	22.6	11.5	8	09.5	23.8	10.7	8	10.0
MEAN	**18.9**	**8.7**	**6.4**	**9.06**	**18.78**	**8.38**	**7.6**	**10.24**	**22.26**	**10.48**	**8.4**	**11**	**24.14**	**10.36**	**9.2**	**11.32**
SD (±)	**2.97**	**1.65**	**1.67**	**2.10**	**3.04**	**0.52**	**0.89**	**2.15**	**2.63**	**0.78**	**1.67**	**2.30**	**2.64**	**0.96**	**1.79**	**1.88**

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The pre-sowing treatments influence the germination percentage of *A.procera* seeds. The seed dormancy affect the use of dormant species in nurseries for the production of seedlings, it is known that seed dormancy vary from species to species, so the pretreatments should be given to that particular species [16,17]. Several authors [17,18,19 ,20,21,22,23,24,25,26] have discussed different methods of pre-sowing treatments for seed germination in order to break dormancy and enhance the rate of germination and speed up the germination process. The findings of the present study shows that seed germination of *A._procera* under different pre-treatment methods significantly increased ($P>0.05$) over the control. Among the three pre-treatments, seeds pre-treated with coldwater had optimum germination than those pretreated with hotwater and hormonal treatment. Similar studies have been done by [27] carried out an experiment on seed dormancy and germination of *Albizia falcataria* and *Albizia procera* and found that hot water treatments of $40^o, 60^o, 70^o, 80^0c$ significantly increased germination in both species.IAA and riboflavin [28] was found to enhance germination of *A.procera and A.lebbeck* . In *Albizia lebbeck* the highest germination was found when the seeds were pretreated with hot water [8]. The pre-treatment methods by affecting germination also influenced the seedling growth the highest root and shoot length (27.8 cm&11.6cm) were recorded with seeds treated with hormone and followed by hot water, coldwater.

Conclusion

The present studies revealed that there were difference in seed germination and seedling growth among the different seed source, so in order to produce large number of quality seedlings it is necessary for pre-sowing treatments because it plays a vital role to enhance the

Comment [T14]: In control ant cold water pretreatment germination percentage %71, İn hot water prtreatment %75 anh hormone pretreatment %80???????? so

seed germination and seedling growth. According to our studies the best treatments for *A. procera* is hormonal treatment and hot water treatments.

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