International Journal of Applied and Universal Research **E-ISSN No: 2395-0269**
Volume XI, Issue IV, July – August 2024 **Available online at: www.ijaur.com**
Impact Factor- 5.991

EFFECT OF PRETREATMENT ON SEED GERMINATION AND SEEDLING GROWTH OF *AILANTHUS EXCELSA* ROXB.

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ABSTRACT :- The present study was undertaken to examine the effect of pretreatments on seed germination of Ailanthus excelsa Roxb. Due to the hard seed coat with thick pericarp having high content of phenolic compounds, Ailanthus excelsa seeds germinate irregularly taking longer time for nursery establishment. Germination parameters were significantly influenced by the pre sowing treatments and the water soaking of the seed. The data revealed that the Highest germination percentage (77.5%), mean daily germination (0.486), peak value of germination (0.571), germination value (0.297) and seedling vigour index (2730) was observed in seeds soaking in water for 48 hrs (T_3).

KEYWORDS:- Pre-treatment, Germination, Seedling, Germination value, Vigour index and Ailanthus excelsa.

INTRODUCTION:-

Ailanthus excelsa Roxb. is a tree belonging to family Simaroubaceae, indigenous to Central and Southern India and commonly it is known as Tree of Heaven. It is a large deciduous tree and will be growing 18-25 m tall with straight trunk and 60 to 80 cm in diameter. It is mainly used to making plywood as well as match splint production (Orwa *et al*. 2009). Due to the demand of both plywood and match wood this study has conceived. Rapid socio-economic changes are having profound impacts on all sectors including forestry. Societal transformations are changing people's perceptions of forests, while growing and often conflicting demands for forest-derived goods and services have increased the complexity of forest management. Concerns over climate change, escalating energy prices and deepening water deficits have moved forestry into the spotlight of global and national development. Currently, the forest area in the country is around 23.81 per cent and in the state of Tamil Nadu it is around 17.59 per cent which is much low against the demanded requirement of 33.0 per cent. The productivity in terms of MAI is also one of the lowest comparing to the global average (FSI, 2011). The annual estimated production of wood from forest is estimated to be 3.173 million m3 and the annual potential production of wood from outside the forests is estimated to be 42.77 million m3 (FSI, 2011). The country's timber imports value I growing at 12 per cent per annum and is likely to increase in years ahead. The liberalization of imports has benefited the domestic timber market, otherwise faced paucity of the desired wood in the required quantity and quality. However, there is a potential to increase the domestic production of industrial wood through tree planting, afforestation and reforestation programmes (Manoharan, 2001). Hence shrinking forest area associated with low productivity established a total mismatch between the demand and supply of both domestic and industrial wood requirement besides creating environmental disequilibrium (Parthiban et al., 2011). The current supply of raw materials for industries like match wood, pulpwood, plywood, furniture and biomass energy in India particularly in Tamil Nadu is far behind the demand. Hence, to meet the growing raw material demand and also to meet the National Forest Policy (1988). Guidelines, the industries must expand sharply its plantation programme. There are over 400 small-scale sector Splints and Veneer Industry involved in the manufacturing of veneers and splints in southern India of which 75% are located in Kerala (Bansal et al., 2002). Per capita consumption of matches in India increased steadily from 2.45 sticks per capita in 1970 to 8.35 in 2013. There are wide fluctuations in the annual growth rate in the consumption of matches varying from as low as 3 percent (before 1970) to as high as 28 per cent. The rising levels of income, growing urbanization, swelling numbers of smokers and changes in fuel consumption patterns indicates that the future rate of growth could be higher than the 6 per cent as supported by past trends (FAO, 2015). The major raw materials used in the production of safety matches are

soft woods. Safety matches manufactured in India are of the standard type with wooden veneer or cardboard boxes and wooden splints. Historically the Indian match industry depended on imported wood including Aspen (*Populus tremula*) from Sweden, Canada, America, and Russia; Cotton Wood (*Populus deltoides*) from Canada; Balsam Poplar (*Populus balsamifera*) from Manchuria; and Linden (*Tilia japonica*) from Japan. But the government quickly moved to encourage the use of indigenous woods by restricting the import. Even though there are number of alternative match wood species are available to replace the imported wood, Ailanthus *excelsa* occupies predominant position because of its suitability for the production quality match splints. However there is no systematic evaluation or improvement programme in order to utilize the existing genetic variation among broader genetic base population which warrants a systematic tree improvement programme in *Ailanthus excelsa* which will also address the shortage of suitable raw material to the match industries.

MATERIALS AND METHODS:-

Experiment on effect of pretreatments on seed germination of *Ailanthus excelsa* was conducted at Indian Council of Forestry Research and Education-Skill Development Centre, Chhindwara, Madhya Pradesh, India in nursery during the year 2022-23. For this experiment fully ripen pods of *Ailanthus excelsa* were collected from selected tree around the campus during the April, 2022. The experiment was conducted in a completely randomized block design (CRBD) with five treatments and three replications, each replication contain hundred seeds, total three hundred seeds were sown in each treatment viz. T0 – Control, T1 - soaked in water for 12 hours, T2 - Fruits soaked in cold water for 24 hours, T3 - Seeds were soaked in cold water for 48 hours T4 - soaked in hot water for 24 hours and T5 - Seeds were just dip in boiling water and immediately washed in cold water (Table -1). Seed sowing was done in the last week of June, 2023 in polythene bags of 10”x5” size filled with a media which is mixture of Soil, Sand and FYM at a ratio of 1:1:2. Polybags were arranged in a shade house. Weeding, watering and loosening of soil were also done as per requirement and data were recorded on germination percentage and days taken for complete germination. Data on root length (cm) and shoot length (cm) of seedling was also recorded after 3 months of sowing. The data collected on various parameters during the course of investigation were statistically analyzed using computer software Microsoft Excel to explore the possible variations in seed germination. For analysis of variance (ANOVA), OPSTAT software was used as described by Sheoran Programmer, Computer Section, CCS HAU, Hisar.

Germination percent: Germination of seeds in each treatment was recorded daily up to 60 days. The seeds were considered as germinated when the cotyledonary leaves emerged out of the soil (Guneyliet *et al*., 1969). From the daily germination count, percent seed germination was recorded.

Germination percentage = (Number of seeds germinated × 100)/ (Number of seeds sown)

Mean daily germination (%) = (Cumulative percent germination)/ (Total number of days)

Peak value (PV) = Maximum mean daily germination reached at any stage of germination period

Germination value = Mean daily germination X peak value by Czabator (1962).

Seedling vigour index was calculated by adopting the method suggested by Abdulbaki and Anderson (1973) and expressed as number.

RESULTS AND DISCUSSION:-

Germination parameters of the *A. exelsa* seeds were significantly influenced by pre sowing treatments. Highest germination percentage (77.5%), mean daily germination (0.486), peak value of germination (0.571), germination value (0.297) and seedling vigour index (2730) were observed for the seeds with removed pulp and soaking in water for 48 hrs (T3). The next highest germination was recorded for the seeds were soaked in water for 24 hours. Although 55% seeds germination kept as control germinated (Table 1 &fig.1). Generally, the presowing treatments improve the germination (Kumar *et al*., 2015a).

Seedling Growth : Data of seedling growth were also recorded after three months of seed sowing, shoot length (cm) root length (cm) and collar diameter (mm) was

recorded (Table-2 &fig.2). Results indicated that maximum shoot length, root length and collar diameter was attaining by the T-3 with 18.40cm., 13.80 cm. and 8.00mm respectively followed by T-4, T-2, T-5 and T-1 while T-0 showed minimum growth performance in shoot length root length and collar diameter i. e 16.20cm. 8.60 cm. and 4.10 mm respectively.

Howard (1937) noticed that immersion of teak seed in hot water for 48 hours and placed in boiling water and allowing the whole thing to cool, induced higher germination in 24 hours. In a study on seed coat imposed dormancy in *Bauhinia racemosa* seeds, Prasad and Nautiyal (1996) reported that, soaking the seed in hot water and mechanical scarification gave better germination percentage. In a study to enhance germination Ma and Liu (1986) reported that seeds of different species of Pinus, Picea, Lrix, Conninghamia, Ptatychladus, Hippophae and Vitex germinated better when they were previously soaked in water for 15 to 24 hours. Soaking for more than 24 hours was found to be detrimental to the germination of all species. In *Tephrosiza perpurea* reported that concentrated sulphuric acid treatment for three and four minute gave the highest germination with less mechanical injury and seed damage (Dharmalingam *et al*., 1973).

TABLE 1: RESPONSE TO VARIOUS PRETREATMENTS OF *A. EXCELSA* SEEDS.

PRETREATMENTS	GERMINATION %	MEAN DAILY GERMINATION	PEAK VALUE	GERMINATIO N VALUE	VIGOUR INDEX
T0 (Control)	55	0.361	0.225	0.250	1815
T1 (12 hours soaking)	70	0.447	0.454	0.202	2233
T2: 24 hours soaking)	72.5	0.281	0.307	0.2860	2247.5
T3: 48 hours soaking)	77.5	0.486	0.571	0.297	2730
T4: hot water for 24 hours)	65	0.438	0.473	0.207	1690
T5: Just deep in boiling water)	62.5	0.410	0.461	0.189	1550
CD	8.523				
SE (m)	2.670				

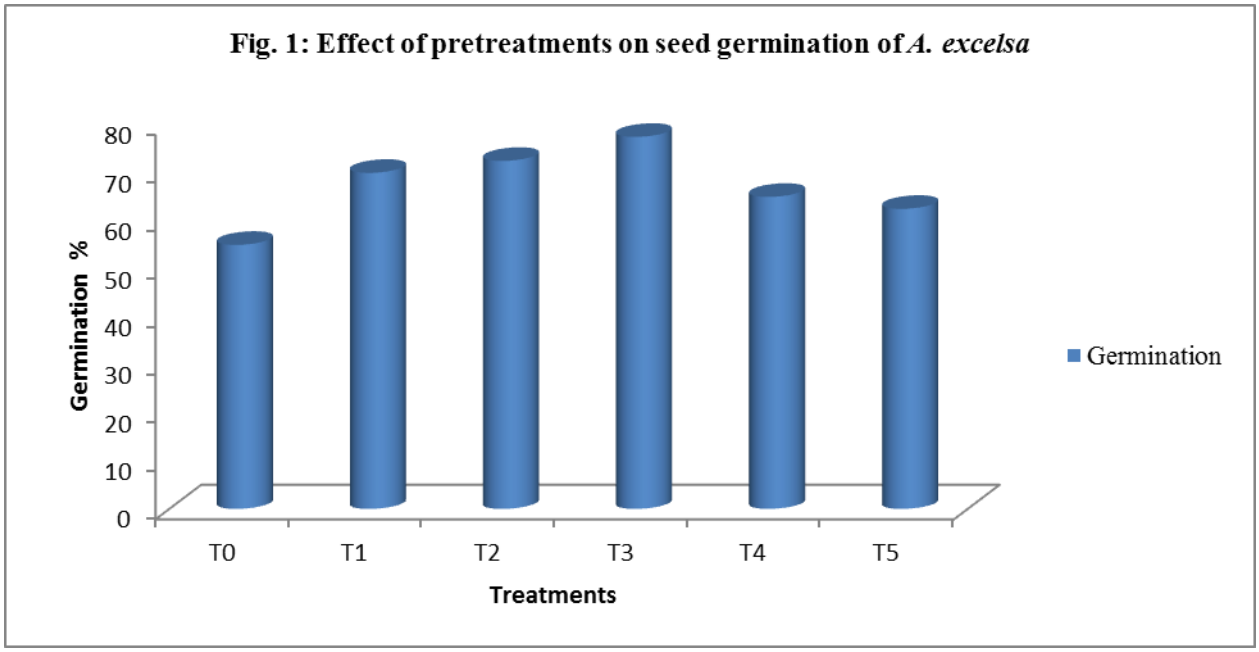
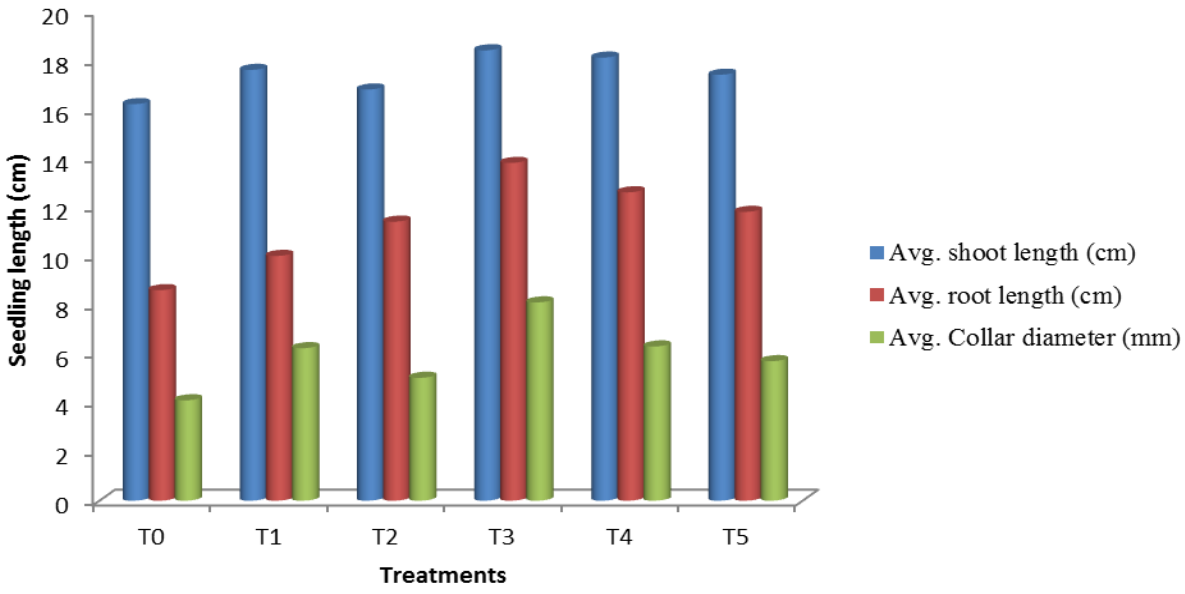


TABLE 2: AVERAGE SHOOT LENGTH, ROOT LENGTH AND COLLAR DIAMETER OF *A. EXCELSA* IN DIFFERENT TREATMENTS AFTER 3 MONTHS OF SEED SOWING.

Sr. No.	Treatments	Avg. shoot length (cm)	Avg. root length (cm)	Avg. collar diameter (mm)
	T0	16.20	08.60	4.10
	T1	17.60	10.00	6.23
	T2	16.80	11.40	5.02
	T3	18.40	13.80	8.10
	T4	18.10	12.60	6.30
	T5	17.40	11.80	5.70
	CD	N/A	2.991	1.192
	SE(m)	0.896	0.937	0.374
	SE(d)	1.267	1.325	0.528

Fig. 2 :Effect of pretreatment on seedling growth of *A. excelsa*



ACKNOWLEDGEMENT:-

Authors gratefully acknowledge to the Director, ICFRE - Tropical Forest Research Institute, Jabalpur and Director ICFRE-Skill Development Centre, Chhindwara for providing necessary facility and guidance from time to time.

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