

EFFECT OF DIFFERENT ENVIRONMENTAL CONDITIONS ON SEED GERMINATION AND SEEDLING GROWTH OF *BUCHNANIA LANZAN* SPRENG

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ABSTRACT: - The effects of different environmental conditions on seed germination and initial growth were investigated. It was observed that seeds in the polyhouse under shade took 20 days to complete germination. The percentage of germination was highest (85%) as compared to seeds kept under shade house, mist chamber and open condition. Initial growth observation was recorded after three months. It was indicated that *B. lanzan* seedlings recorded highest plant height (10.19 cm), collar diameter (2.079mm) and number of leaves (6.867). Highest growth rate in plant kept at polyhouse may be due to built up of high temperature and humidity in combination with CO₂ enrichment triggers the growth.

KEYWORDS:- Seed germination, Initial growth, Polyhouse, Shade, *Buchnanian lanzan*.

INTRODUCTION:-

Buchnanian lanzan Spreng. Commonly known as achar, char or chironji is an important multipurpose tree species belonging to the family Anacardiaceae. It is a moderate sized tree with a straight trunk, and useful for clothing dry hills (Troup, 1921). It is commonly found growing in association with *Shorea robusta*, *Anogeissus latifolia* and other deciduous trees in mixed deciduous forests. The tree grows on a variety of soil and attains a height up to 15m to 20m and girth up to 1.25m. The pulp of the fruit is edible. The seed after drying is used commonly in the preparation of sweets. It is also suitable as an agroforestry tree species and plays important role in the rural and tribal economy (Choubey, et, al.,1997). Rural people, particularly the indigenous collect the fruits to earn their livelihood and the species is recognized as a major income earning species of Eastern and Central India. The dried seeds are sold at Rs. 1000/- to 1500/- per kilogram. However, due to heavy biotic pressure, poor germination, slow growth of the species and lack of

knowledge of its nursery and propagation techniques, plantations are not commonly raised either by forest department or by private tree growers. Therefore, the species is getting depleted fast from forest and non-forest areas. In nursery practice, it is important to obtain the suitable light conditions to produce well balanced and hardened seedlings suitable for out planting. (Jahn et al., 1986) reported that germination and growth of *M. oleifera* seedlings is affected by light condition and recommended half shade for germination. (Mohamad ,1986) mentioned that seedlings grown at 30% and 50% light intensity have tall and slim shoots with large dark green leaves and relatively poor root system. Ahmed et al. showed that *M. oleifera* seedling under high shade produces succulent stem, but in the same time it needs some shade in early stage. (Muhlet et. al 2011). Indicated the importance of temperature and showed that seed germination and seedling growth of *M. oleifera* increased exponentially with an increase in temperature. The objective of this study was to investigate effect of different environmental conditions i.e. shadehouse, polyhouse under shade, mist chamber and open condition, on seed germination percent and rate, seedling growth (accumulation and partitioning into root and shoot), and stem development of *B.lanzan*.

MATERIALS AND METHODS:-

The present study was under taken during the year 20013-14 at Forest Research Centre, Chhindwara, Madhya Pradesh which is situated at 22° 3' N and 78° 56' E and an altitude of 675 m above MSL. The normal annual rainfall of Chhindwara district is 1139.3 mm. The district receives maximum rainfall during south-west monsoon period i.e. June to September. About 85.7 % of the annual rainfall falls during monsoon season. Only 14.3 % of the annual rainfall takes place between

October to May period. The normal maximum temperature noticed during the month of May is 39.40° C and minimum during the month of December 9.80 C. Mature fruits of *Buchnanian lanzan* were collected during second week of May 2013 from Amarwada, and Tamia blocks of Chhindwara district of Madhya Pradesh. The fruits were rubbed and washed to remove the outer pulp and then dried in the shade for seven days. The seeds were sown in polybags filled with soil: sand: FYM (1:1:2) in different environment conditions viz, shade house, polyhouse under shade, mist chamber and open condition, to study the effect of environmental condition on seed germination and health of seedlings. Completely randomized design with four replications was followed for experimentation. In each replication 100 seeds were used. After starting the seed germination, the seed germination data was recorded the date of first emergence up to final germination. The following observations on seedling growth parameters viz., Shoot length, collar diameter and number of leaves were recorded after three months of sowing on five randomly selected seedlings. The results were subjected to analysis of variance and tested for significant differences (Panse and Sukhatme, 1978).

RESULT AND DISCUSSION:-

Table 1 indicated that seeds in the polyhouse under shade took 20 days to complete germination. The percentage of germination was highest (85%) as compared to seeds kept under shade house, mist chamber and open condition. Initial growth observation was recorded after two months indicates that *B. lanzan* seedlings recorded (10.19 cm) plant height, collar diameter (2.079mm) and only (6.867) number of leaves. Highest growth rate in plant kept at polyhouse may be due to built up of high temperature and humidity in combination with Co₂ enrichment triggers the growth. It is observed that from the above experiment that *B. lanzan* seeds need to germinate in polyhouse to hasten the germination. Similarly to enhance the early growth

of the seedlings/ plants they should be kept in polyhouse or any other modified structure so that we can minimize the time, labour and other production cost to obtain sturdy plants for early planting. Competition for light is size-asymmetric due to the unidirectional nature of sunlight. Slightly faster growth and larger body size confers a disproportionate advantage to a competing plant by simultaneously increasing its own light capture and its shading of smaller competitors (Schwinning and Weiner, 1998). The importance of facilitation by shade has frequently been demonstrated in arid and alpine study systems but has not been as commonly described in temperate grasslands (Brooker et al. 2008). Facilitative effects of shade from neighbors may not be detected in many studies because facilitation above ground can be masked in the field by intense root competition (Callaway, et. al,1991) or may be absent in greenhouse or growth-chamber experiments where a lack of shade may not impose the same level of abiotic stress as under field conditions. Callaway, 2007 reported that plants were grown under ambient atmospheric conditions, and the shading cloths modified not only irradiance levels but also wind speed, air temperature and humidity, which are all known to be modified by vegetation shade. Such an experimental set-up probably allowed us to detect the type of facilitative effect provided by shade in natural conditions. Despite possible difficulties in detecting positive effects of shade, examples of shading treatments having neutral or positive effects on plant growth can be readily found in many studies as incidental results that were largely overlooked (Grubb, Ford & Rochefort 1997; McConnaughay and Coleman 1999; Monaco and Briske 2000; Ryser and Eek 2000; Wahl, Ryser & Edwards 2001; Valladares, Sanchez-Gomez & Zavala 2006). Neutral or positive effects of neighbour shade have also been demonstrated in studies that separated the effects of shoot and root competition (Peltzer et. al., 1998; Cahill 1999; Lamb et. al., 2009).

Table 1 : Effect of different environmental condition on seedling growth of *B. lanzan*

Sl. No.	Environmental condition	Germination (%)	Seedling height (cm)	Seedling collar diameter (mm)	No. of leaves
1	Shade house	62	8.067	1.713	6.00
2	Poly house under shade	85	10.19	2.079	6.867
3	Mist chamber	71	8.227	1.817	5.933
4	Open condition	32	7.060	1.579	5.467
	CD	8.432	0.626	0.133	0.709
	SE (5%)	3.866	0.31	0.066	0.352

CONCLUSION :-

This study indicated that poly house under shade levels had significant effect on seed germination and seedlings growth of *B. lanzan*. The growth rate of *B. lanzan* seedling under four different conditions indicated that plants kept at polyhouse under shade recorded highest plant height and collar diameter (10.19 cm and 2.079 mm) as compared to open condition , shade house condition and control. To enhance the early growth of the seedlings/ plants they should be kept in polyhouse or any other modified structure so that we can minimize the time, labour and other production cost to obtain sturdy plants for early planting. Further examine the influence of seed size on germination ability under different conditions and the effect of GA3 on seed germination of this species was not examined in this study. Therefore we recommend this be investigated also.

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