



## STUDIES ON SEED DORMANCY AND GERMINATION OF KHAYA SENEGLENSIS (DERS) A. JUSS. IMPORTANT MULTIPURPOSE TREE.



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### ABSTRACT:

Khaya seneglesis(Desr) A. Juss is economically and medicinally important forest tree species. The bark extract of the tree is useful to treat several human and animal diseases. Rapid increase in population and decrease in forest cover, low sustainable yield and increasing demand lead to shortage of timber and wood in the unregulated and unsustainable extraction of forest moderation, growth and expansion of wood and herbal medicine based industries hence suffered for demand for sustainable supply Khaya senegalesis(Ders) A. Juss is medicinally useful plant species and its leaves stem bark extract is used conventional medicines. The plant has revealed its bioactive properties the extract of

plant leaves, stem bark is useful for efficient treatment of some bacterial infections and amylase activity inhibition decreasing in bowl mobility and some blood and serum enzyme justify the indication against diarrhea, diabetes and hiver disorder anthelmintic properties are attributed to these medicines. This plant may have a high risk of toxicity in chronic treatment.

The treatment with water 12 hrs, 24 hrs& 36 hrs shows better germination and seed treatment with growth regulators GA3& 1AA 250, 500 & 750 ppm helpful in breaking the dormancy and to enhance the germination percentage of seeds. Treatment with Thiourea 1% & 2%, KNO3 1% & 2% and Mechanical scarification of seeds by sand paper technique also found satisfactory and over all germination percentage increased significantly.



**KEYWORDS:** *Khaya seneglesis (Ders) A. Juss, seed dormancy, GA3, 1AA and KNO3 Bioactive compounds, imbibition, Mechanical scarification.*

### INTRODUCTION:

Khaya seneglesis (Desr) A. Juss is large and shady tree belong to family meliaceae plant has

perinate leaves, glabrous with 6 to 12 alternate or opposite elliptical oblong leaflet. At the flowering, *Khaya seneglesis* (Desr) A. Juss twig carry at their end panicles of small white flowers. The fruit and capsule with woody thick seed coat. The bark of the tree is very thick scaly and dark brownish gray colour. *Khaya seneglesis* (Desr) A. Juss grows in wet soil, deep alluvial, the non-flooded lowlands. It also grows in the areas of dry or lateritic with rainfall between 650 – 1300 mm during April to June.

The intensity of dormancy in a given species exhibit high degrees of variation with in population (Anderson and Milberg, 1998. Meyer and Pendelton, 2000) seed dormancy is influenced by environment of factors and interactions (Foley and Fennimore, 1998, Koornneef et al 2002). Seed dormancy is classified to their main types depending on the location of dormancy. Dormancy is nature broken by external environmental factors. Several germination stimulation have been used to improve the seed germination e.g. GA<sub>3</sub>, 1AA, (Vijaya et al., 1996, Soyler & Khawar, 2007).

*Khaya seneglesis* (Desr) A. Jussis only limited incorporated in forest action programmers because of most tropical tree species. Studies on silviculture of the species are incomplete. The information on quality control standard, seed dormancy pattern and germination behavior are scanty therefore it was decided to investigate the germination potential of this species. *Khaya seneglesis* (Desr) A. Juss shows polymorphism the large seed are non-dormant and small is dormant. The seed polymorphism is an obstacle in uniform germination of the seed and the establishment of the species.

The various extract obtained from the leaves and bark or seeds of *Khaya seneglesis* (Desr) A. Juss were reported to have cure properties against several diseases the limonoid extracted form *Khaya grandifoliola* is effective against causative agent of malaria plasmodium falciparum also. The extracted oil from the seeds of this plant is rich in bioactive compounds that induce therapeutic and prophylactic effect. (Andesogan, 1968, yum et al 2010, Bickii et al, 2000, Nwosu 2012. Konate 2010, Sule et al 2008)

The main aim of the study is to investigate the effect of pre seed treatment techniques on breaking seed dormancy and uniform germination potential. Therefore the main objective of the study is to determine feasible and practical seed dormancy breaking methods as reflected uniform germination of seed. (Li, B and foley. 1997, Nowag 1998, Rahman et al 2006, Hillhorst 1995)

#### Materials and Methods:

The seed of *Khaya seneglesis* (Desr) A. Juss used in the experimental work collected with the help of forest research garden pure, forest dept. Govt. of Maharashtra. Research wing Pune. The small size seeds shows dormancy and small seeds were separated and selected for different treatment. The seed were washed with running tap water and rinsed in sterile water and disinfected with 0.1.0 HgCl<sub>2</sub> for 5 min and washed with sterile water. The seeds were then sown in the Petri dishes lined with cotton and a circle of what man no 42 filter paper. The Petri dishes were kept at room temperature 25.0 c ± 2.0 c emergence of 2 mm radical is treated as index for germination. In case of water treatment seed were immersed in normal water for 12, 24 & 36 hrs followed by washing several time with distilled water and 100 seeds were distributed twenty seeds in each Petri dishes five replicates were kept for germination. (Anonymous, 1962). In case of pretreatment with growth hormone GA<sub>3</sub> and 1AA at concentration 250, 500 & 750 ppm seed were pre incubated with test solution of growth hormones Thiourea and KNO<sub>3</sub> 1 and 2% for 120 seconds each. Treatment with H<sub>2</sub>O<sub>2</sub> 1% for 10 seconds in case of each treatment the number of seeds germinated out of hundred was counted at 7 days intervals for a period of 6 weeks. The germinated seeds removed after each count to avoid transfer of microbial diseases by crowded seedling. Results obtained analyzed statistically.

#### Results and Discussion:

The results were given in table-I show germination response of different pretreatments as reflected by final germination percentage the germination percentage is increased by the treatment

with water 12, 24 & 36 hrs. The scarification by sand paper technique also quickest and cheapest method to enhance the germination and to make the seed coat permeable and releasing the seed coat dormancy and about 82% seed were germinated against 34% in control. The significant result were also obtained with KNO<sub>3</sub> 2% and Thiourea 2% treated seeds. The percentage of germination enhance significantly as compared to control. (Chauhan, 1998. Patil, et al 1994). The treatment with HO<sub>2</sub> 1% for 10 seeds also gave significant result and germination percentage increased significantly 76%. Seeds were germinated to 34% in control (Chawhan, 1988).

Seed germination response over all treatment levels showed high significant difference. Seeds soaked with 750ppm GA<sub>3</sub>& 1AA gave better result as compared to control. This was probably due to stimulating effect of imbibition on subsequent seed germination caused by increased absorption capacity resulting increased enzyme activity (Nanda et al 1959). The lower germination was possibly due to reduced permeability of seed coat to water and dissolve gasses of inhibitory substances (Croker 1953, Bedell, 1998, Bewley and Block, 1982 and 1994, Biradar et al, 1988).

It is evident from the table – I that soaking in water for 36 hrs and soaking GA<sub>3</sub>& 1AA at concentration 750 ppm for 24 hrs resulted significant increase in overall germination percentage (Table – I) (Randhava and Negi, 1964). GA<sub>3</sub> and 1AA treatment is often attributed to the mobilization of stored reserves (Bewley & Black 1994) the finding indicate the presence of a combined dormancy (chemical + endogenous) (Bakshi and Chadha, 1968, Shyamsingh and Soni, 1974, Richard, 1943 et al, 1998)

Table – I Effect of different pre-treatment on Seed germination of *Khaya senegalensis*(Ders) A. Juss  
A multipurpose tree

Sr No	Treatment	Days after treatment and percentage germination				
		7	14	21	28	34
1	Control		14 ± 0.2	21 ± 0.8	28 ± 0.6	34 ± 0.47
	Soaking water 12 hrs	7 ± 0.47	25 ± 0.0	36 ± 0.0	48 ± 0.0	60 ± 0.0
		15 ± 0.2	30 ± 0.2	43 ± 0.2	53 ± 0.6	70 ± 0.8
	Soaking water 24 hrs	20 ± 0.6	35 ± 0.6	49 ± 0.8	56 ± 0.2	72 ± 0.74
	Soaking water 36 hrs	26 ± 0.2	37 ± 0.2	41 ± 0.6	58 ± 0.8	75 ± 0.2
2	Soaking KNO <sub>3</sub> 1% 120 second	30 ± 0.2	40 ± 0.6	53 ± 0.2	60 ± 0.2	80 ± 0.47
	Soaking KNO <sub>3</sub> 2% 120 second	32 ± 0.6	42 ± 0.2	55 ± 0.6	62 ± 0.6	82 ± 0.8
3	Soaking Thiourea 1% 120 second	28 ± 0.6	39 ± 0.2	52 ± 0.47	56 ± 0.6	75 ± 0.2
	Soaking Thiourea 2% 120 second	29 ± 0.47	41 ± 0.12	54 ± 0.6	58 ± 0.2	79 ± 0.8
4	H <sub>2</sub> O <sub>2</sub> 1% 10 seconds	28 ± 0.12	36 ± 1.6	42 ± 4.47	59 ± 0.8	76 ± 0.2
5	Soaking GA <sub>3</sub> 250ppm	35 ± 0.2	45 ± 0.6	59 ± 0.47	65 ± 0.6	83 ± 0.6
	Soaking GA <sub>3</sub> 500ppm	36 ± 0.6	47 ± 0.8	50 ± 0.2	66 ± 0.6	85 ± 0.2
	Soaking GA <sub>3</sub> 750ppm	39 ± 0.8	49 ± 0.6	63 ± 0.6	68 ± 0.6	90 ± 0.8
6	1AA 250 ppm	35 ± 0.6	46 ± 0.6	60 ± 0.47	65 ± 0.6	83 ± 0.2
	1AA 500 ppm	36 ± 0.2	43 ± 0.8	58 ± 0.2	64 ± 0.12	84 ± 0.2
	1AA 750 ppm	37 ± 0.2	45 ± 0.8	59 ± 0.6	65 ± 0.2	85 ± 0.2
7	Mechanical Scarification by sand paper for 5 min	34 ± 0.2	45 ± 0.6	56 ± 0.47	60 ± 0.2	82 ± 0.0

NB:- 1) Each value is mean of five replicates  
2)(±) indicate for standard deviation

Gibberellins are group of plant hormones which occurs naturally in plants GA3 treatment can overcome dormancy in different seeds that have hard seed coat or dormant embryo. In *Khaya seneglesis* (Desr) A. Juss survival percentage increased after pretreatment with GA3& 1AA 500 & 750ppm. The result of the influence of gibberellic acid on seed germination has been presented in Table – I. The finding with pretreatment of seeds are similar to observation of their investigation (Singh et al, 1984) who have reported that GA3 enhances the seed germination in forest trees species. (Krishnamoorthy, 1975, Nanda and Purohit, 1964, Seth and Mathawada, 1959, Shedecor and Cochran, 1967)

#### CONCLUSION:

The present study was undertaken to assess the effect of different concentrations of gibberellic acid treatment on germination of *Khaya seneglesis* (Desr) A. Juss. The results of the study clearly indicates that the seed germination rate hastened to maximum by the application of GA3& 1AA 750 ppm for 24 hrs. The study clearly indicates that the seeds of *Khaya seneglesis* (Desr) A. Juss should be treated with H<sub>2</sub>SO<sub>4</sub>, Thiourea and KNO<sub>3</sub>. 120 seconds gave significant results Mechanical scarification by sand paper techniques and water treatment also enhances the germination percentage significantly as compared to control. These results shows that soaking in H<sub>2</sub>O, GA3 for a forestation program may be useful with reduced effort and cost of planting of this economically and medicinally important species.

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