

On The Propagation of (*Dalbergia melanoxyton*) (Guill. & Perr.)

Kamal F. Al-Khalifa

Faculty of Forestry, University of Khartoum, Sudan

Abstract

The present study is devoted to the artificial regeneration of Abanus trees (*Dalbergia melanoxyton*), a member of the *Fabaceae* family, as one of the endangered species which exhibits poor natural regeneration. Seeds were subjected to different pre-germination treatments. To find optimum storage conditions, seeds were stored under different conditions. In addition, vegetative propagation by shoot cuttings was investigated using Indole Buteric acid (IBA) and Naphthaline acetic acid (NAA). The results showed that sulphuric acid was lethal to the embryo. Seed germination was highest for seeds treated with hot water, cold water for one day or without treatment, where no significant differences found among them. There were no significant differences among germinated seeds after six and nine months of storage under the different conditions, but coverage with cloth at room temperature was always superior to the other methods especially after three months. Stem cuttings did not root well under the conditions of the experiment.

Keywords: *Dalbergia melanoxyton*, Seed germination, Storage, cuttings.

Introduction

Dalbergia melanoxyton is a leguminous spiny tree, of impari-pinnate leaves, sweet scented flowers and flat papery indehiscent pods. It grows well in clay soils near valleys and water courses. In Sudan, it grows at the foothills of Jebel Marra and Nuba mountains in western regions, Upper Nile and Equatoria in southern regions, Blue Nile in central Sudan, and Kassala in the east. The tree is of high economic value. The wood is sold in the international market under the commercial name «Grenadille» (Foget, 1995). It has an excellent timber and various medicinal uses in Africa (Thirakul, 1984 and Gundidz and Gaza, 1993).

The tree faces many problems in regeneration, It loses seed viability rapidly, while the tree is constantly removed for different purposes. Except for Harris (2000), no literature is found concerning its artificial regeneration. Hence, the present study aims at overcoming the difficulties encountered in the establishment of the tree, with specific objectives of determining the best means of seed regeneration, optimum conditions for storing seeds, and testing the possibility of rooting of shoot cuttings.

Materials and Methods

Seeds and stem cuttings were collected from abanus trees growing in Azaza forest, Blue Nile, central Sudan where the tree grows very well.

For the seed germination experiment, Abanus seeds were subjected to six pre-germination treatments, namely concentrated sulphuric acid (98%) for three minutes, and dilute acid (49%) for half an hour, soaking in hot water (60°) for half an hour, and for full hour, soaking in tap water at room temperature for a day and for two days, in addition to the control. The experiment was designed in a completely randomized layout with four replicates and carried out in the laboratory of Horticulture, faculty of Agriculture, university of Khartoum, where 100 seeds were sown per treatment, 25 for each replicate. The number of germinated seeds were recorded at interval of four days for 24 days.

For the seed storage experiment, 4000 seeds were stored under four different conditions. These were plastic pots under room temperature (27°C) and in cold store (14°C), and cloth bags under room temperature and in cold store (14°C). Seeds were stored under

Table 1. Effect of pregermination treatments on seed germination of *Delbergia melanoxylon*.

Reading (days)	Mean	Treatment
8	10.667a	COLW1
	10.000a	HOTW1
	10.000a	HOTW5
	9.667a	COLW2
	9.66a	CONTR
12	14.000a	COLW1
	13.333a	HOTW1
	13.000a	HOTW2
	11.667a	CONTR
	11.667a	COLW2
16	14.667a	HOTW1
	14.333a	COLW1
	14.33a	HOTW5
	14.000a	CONTR
	10.000b	COLW2
20	14.667a	HOTW1
	14.333a	COLW1
	14.333a	CONTR
	14.333a	HOTW5
	10.000b	COLW2
24	14.667a	HOTW1
	14.333a	COLW1
	14.333a	CONTR
	14.333a	HOTW5
	10.000b	COLW2
30	14.667a	HOTW1
	14.333a	COLW1
	14.333a	CONTR
	14.333a	HOTW5
	10.000b	COLW2

Means with the same small letter are not significantly different; at P=0.05

COLW1: water at room temperature for one day.

COLW2: water at room temperature for two days

CONTR: control

HOTW1: hot water for an hour

HOTW5: hot water for half an hour

each condition for nine months. The experiment was designed in a completely randomized layout of four replications at Soba, about 30 km south of Khartoum, where 1000 seeds were allocated for each treatment, 250 seeds for each replicate. At interval of three months, seeds from each sample were taken and germinated in either sand, clay or mixture of sand

Table 2. Effect of storing conditions on seeds germination of *Dalbergia melanoxylon*.

Reading (months)	Ratio	Treatment (storage)
3	33.30a	L2
	23.10b	P2
	14.30c	L1
	08.30c	P1
6	58.30a	L2
	54.20a	L1
	53.30a	P2
	51.70a	P1
9	33.30a	P1
	28.60a	P2
	28.60a	L2
	28.00a	L1

In the same column means with the same letter are not significantly different (at P=0.05).

P1: plastic container at 14 °C

L1: cloth bag at 14 °C

P2: plastic container at 27 °C

L2: cloth bag at 27 °C

Ratio: mean ratio of seed germination.

and clay (1:1 by volume). The number of germinated seeds was counted for a month at an interval of two days.

As far as cutting's experiment is concerned, trees were taken randomly, and cuttings of 2530- cm length and 915-mm diameter were prepared. Cuttings were treated with either IBA, NAA (of 1000 p. p. m. each) or planted without treatment. Cuttings were then planted in sand, clay or a mixture of sand and clay (1:1 by volume) in a randomized block design. Readings were taken after sixty days by counting the number of rooted cuttings in relation to the soils and treatment used.

Data of the germination and storage experiments were analyzed statistically where means were separated using Duncan's Multiple Range Test.

Results and Discussion

The germination experiment showed that sulphuric acid at its different concentrations was lethal to the embryo, and therefore, should be avoided. This might be attributed to the nature of the seeds of the tree under study, which are light and delicate seeds.

Table 3. Effect of soil on seeds germination of *Dalbergia melanoxylon* after storage under different conditions.

Reading (months)	Ratio	Soil
3	27.58a	S3
	26.59a	S1
	25.11a	S2
6	59.40a	S3
	59.00a	S2
	55.60a	S1
9	37.10a	S2
	36.40a	S1
	34.30a	S3

In the same column means with the same letter are not significantly different at P=0.05

S1: sand S3: mixture of sand and clay 1:1)

S2: clay, Ratio: mean ratio of seed germination

Means > separation showed that after sixteen days onward, seed treatment with hot water (for the two periods used), soaking in cold water for one day, and control were not significantly different from each other, but they were all significantly better than soaking the seeds in cold water for two days (Table 1). This result is in agreement with Harris (2000) and ElKhalifa *et al* (1993) and El-Matari (1995).

The results of the seed storage experiment revealed that there were no significant differences among types of soils or containers used, after six and nine months of storage (Tables 2 and 3). However, after three months storage, cloth bags at room temperature was the best storage condition (Table 2). Although not significant, this same method of storage was superior to the other methods after six and nine months of storage (Table 2). This might be attributed to the better aeration condition under clothing compared to the plastic. It was also noticed that seed germination

of the tree species under study declined with time of storage proportionally, a matter that might be related to seed viability.

Stem cuttings of *Aban* did not root well under the conditions of the present study. This result is in agreement with some works e.g. Abuelgasim (2000) and Hussein (1994). The former was carried on many tropical trees, seven of which were legumes. However, it is recommended to stimulate rooting by using higher concentrations of IBA and NAA (>2000 p. p. m.)

References

- Abuelgasim, Z.H., 2000. Investigation of seventeen tropical trees for stem cutting propagation. *Social Forestry and Environment*. Vol. 2, No. 6
- Elkhalifa, K.F.; El Nour, M.; Elmatari, Y. 1995. Juvenile Development of *Tamarindus indica* L. seedlings. *U.K..J. Agric. Sci.* 3: 28-32
- E-Imatari, A.M., 1991. Seed germination prerequisites and juvenile development of *Tamarindus indica*. M. sc. thesis, Faculty of Agriculture, university of Khartoum (Not published).
- Foget, K., 1995. Field advisor for trees and shrubs in arid zones in Sudan and their regeneration and uses. S.O.S Sahel International, London N10XT.
- Gundidz, M. and Gaza, N., 1993. Anti-microbial activity of *Dalbergia melanoxylon* extracts. *Ethnopharmacology*, 40: 127-130
- Harris, J.E., 2000. Some information about the mpingo tree. African Blackwood Conservation Project.
- Hussein. N.M., 1994. Natural and artificial regeneration of *Ziziphus spina-christi* L. M. sc.thesis, Faculty of Agriculture, university of Khartoum (Not published)
- Thirakul, S., 1984. Manual of Dendrology. Forest Inventory and Market Demand Survey Project. Quebec, Canada.

حول إكثار أشجار الأبنوس

كمال فضل السيد الخليفة
كلية الغابات ، جامعة الخرطوم ، الخرطوم ، السودان

الملخص

كُرسَت الدراسة الحالية على الإكثار الاصطناعي لشجرة الأبنوس من العائلة البقولية (تحت العائلة الفراشية) لأنها من الأنواع المهددة بالانقراض و لضعف تكاثرها الطبيعي. تمّت معاملة البذور بعدّة طرق قبل زراعتها كما تمّ خزنها بطرق مختلفة بهدف إيجاد أفضل الطرق لخزنها. كذلك تمّ اختبار الإكثار الخضري عن طريق العقل الساقية باستخدام منظّمي النمو حمض إندول البيوترك (IBA) وحمض نفتلين الخليك (NAA) أظهرت النتائج أنّ معاملة البذور بحمض الكبريت المركز كانت قاتلة لجنين البذرة و أنّ نسبة الإنبات كانت متقاربة في بقية المعاملات عدا الغمر بالماء البارد لمدة يومين حيث انخفضت النسبة كثيراً. لم تكن هناك فروق معنوية في إنبات البذور بعد طرق التخزين المختلفة لكن أعطت التغطية بالقماش تحت درجة حرارة الغرفة أعلى النتائج خاصّة بعد ثلاثة شهور من التخزين. لم تظهر جذور في العقل إلا نادراً.

كلمات دليلة: إكثار، أشجار الأبنوس