

Government of Union of Myanmar
Ministry of Forestry
Forest Department



Nursery Practice of Padauk for Plantation

by
Dr. Nyan Htun
Forest Research Division
December, 1979

Contents

	Page
1. Introduction	1
2. Seed Production and Collection	1
2.1 Methods of Extraction of seeds	2
2.2 Method of Pretreatment	3
3. Seed Sowing	3
3.1 Transplanting	5
4. Planting out in the field	5
5. Analysis and Conclusions	5
6. References	

Nursery Practice of Padauk for Plantation

by
Dr. Nyan Htun
Forest Research Division

1. Introduction

Padauk (Pterocarpus macrocarpus, Kurz) is becoming increasingly important to Burma. It is an excellent cabinet wood, has good figure and color, makes fine floors, and its market value has increased considerably in recent years. As a result of the rising commercial interest, the Forest Department has included this species in its large scale planting program.

There are no fewer than three separate species of tree popularly known as Padauk. They are as follows:

- (1) Pterocarpus dalbergioides, Roxb.
- (2) P. indicus, willd. And
- (3) P. macrocarpus, Kurz.

The first of the three is Andaman Padauk (Andaman Red Wood) also known as Kapali Padauk. It is found in the Andaman islands only. The second species, as far as present evidence goes, is not indigenous to Burma but has been introduced from Malay-Archipelago (also known as Pashu Padauk). The trees are grown in Rangoon and other towns. The third species is the only indigenous Padauk of Burma.

The people of Burma have planted Padauk for generations because of its beauty and utility. They propagated vegetatively, using branch cuttings, and rarely sowed seed. But high volume production in forest nurseries requires production from seeds. This publication outlines the sequence of events normally encountered in raising padauk in the nursery from seed. It sets forth, on the basis of limited experimental data, what to expect in the way of viable seed per pound of fruit, germination percent, and seedling growth rates. And it suggests ways of keeping nursery costs low while meeting production requirements.

2. Seed Production and Collection

Padauk flowers during April and May and sometimes as late as June. The pods are usually first seen in June. The trees normally produce abundant fruits, but natural regeneration is low in comparison with the number of fruits produced. The fruits are round and winged (See figure 2). Although the fruit is normally two seeded, it is found to have only one sound seed generally. Troup suggests that they should be collected earlier in the season. Depending on the locality, collection usually can be started when the pods have turned light brown in color. The pods start ripening towards the end of monsoon season. Fruits with viable seeds may be collected beginning from November.

Number of fruits per pound is variable. In a sample of 50 pounds selected at random (See table 1), number of fresh, mature, winged fruits per pound ranged from 503 to 919. The average was 674. The data in table 1 were obtained from fruits collected from five different

places during the month of November, 1979. (viz. Yaw, Shwebo, Meiktila, Yamethin and North Toungoo Forest Divisions.)

Table 1. Number of Padauk fruits per pound

No	Districts	Pound	Fruit		
			Max.	Min.	Average
1.	Yaw	1	919	804	962
2.	Shwebo	1	757	551	644
3.	Meiktila	1	918	672	614
4.	Yamethin	1	879	503	581
5.	Toungoo	1	802	564	670

Average number of fruit/ pound = 674.2

2.1 Methods of Extraction of Seeds

A first step in preparing seed for planting is extraction. This makes for more rapid germination, space saving in the nursery beds and permits easier, quicker transplanting. The result of several trials of extraction are shown in table 2. Some labourers are more dextrous than others and can produce more seed per day, but on the average, the sample shows that a single skilled labour can extract about 600 seeds per working day by using a pair of scissors.

Table 2. Number of seeds extracted per labourer per working day.

No	No. of fruits cut	No. of seed obtained			Remarks
		Labourer A	Labourer B*	Labourer C	
1	100	55	57	53	* Had finished Only 800 fruits
2	100	100	53	54	
3	100	72	83	50	
4	100	51	63	39	
5	100	85	84	44	
6	100	67	63	43	
7	100	98	77	52	
8	100	87	42	54	
9	100	90		53	
10	100	100		50	
	Total	805	522	592	

Total number of seeds extracted by 3 labourers = 1919

Average = 639.6

The results of the above trial also shows that 68 seeds on the average can be obtained from 100 fruits.

2.2 Method of Pretreatment

The second step is pretreatment as a means of hastening the germination of seeds. In this initial investigation, eight methods of pretreatment were compared.

- (1) Seeds were sown without any treatment.
- (2) Seeds were soaked in boiling water for one minute.
- (3) Seeds were cut on the opposite side of Hilum.
- (4) Seeds were pierced with a needle and sown.
- (5) Seeds were pierced with a needle and soaked in water for one day before sowing.
- (6) Seeds were soaked in water for one day before sowing.
- (7) Seeds were cut just below the micropyle and sown.
- (8) Seeds were soaked in water for two days before sowing.

In the above mentioned tests the number of days of first germination for each lot was note and recorded. Test numbers 7 & 8 seemed to indicate faster germination out of little value. It was also found that first germination generally takes place within 7-8 days and continues for about 35 to 40 days with little or no more thereafter.

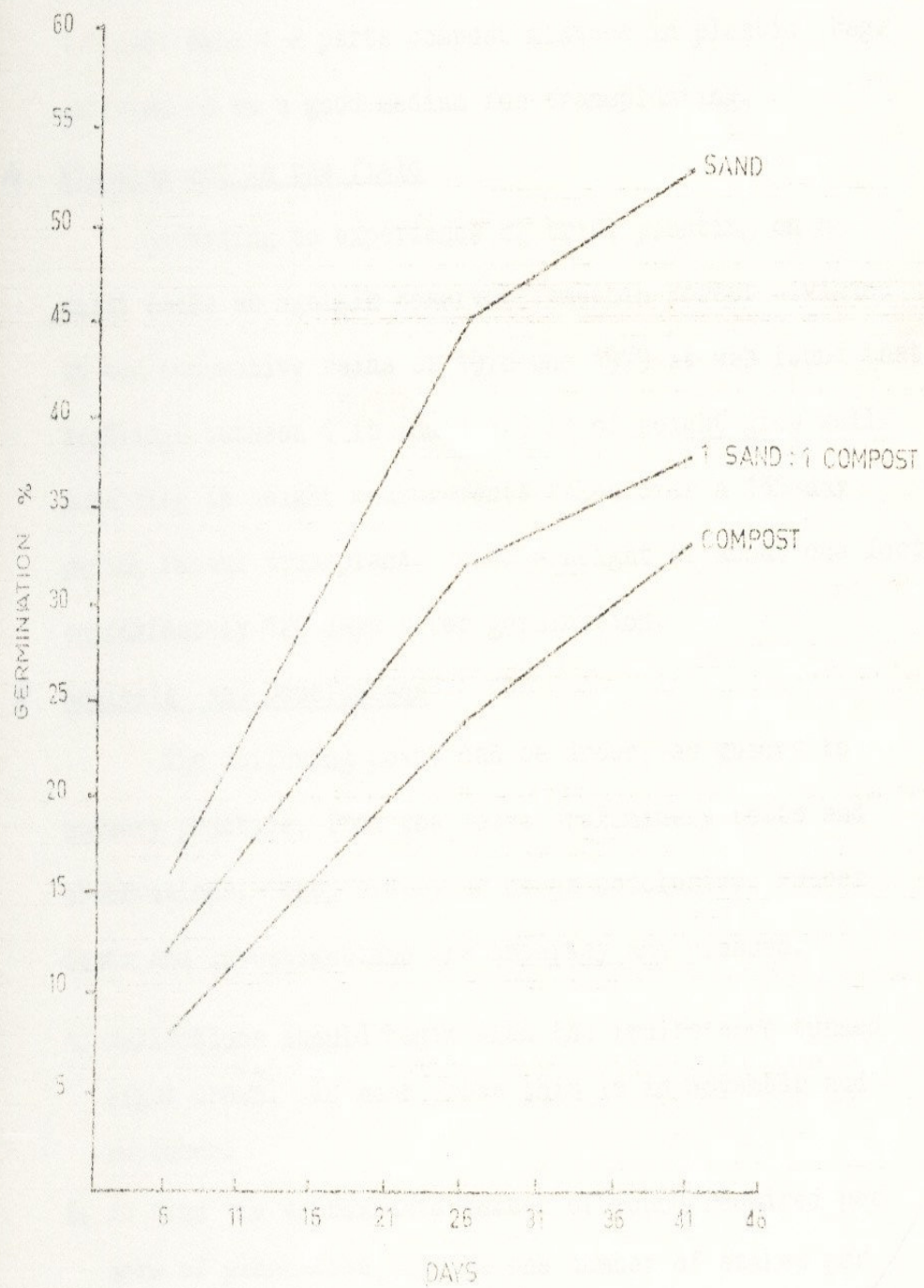
3. Seed Sowing

The next test made was of the germination response of padauk seeds to sowing in various mixtures of soil in plastic bags. The number of seeds tested was small and the results are considered to be highly preliminary. Additional tests are underway. Table 3 and figure 1 show that germination percent in pure sand is significantly higher than in any other medium. Moreover, initial germination is more rapid.

Table 3. Germination response of Padauk seeds when sown in selected soil mixtures in plastic bags.

No.	Soil Mixtures (Treatment)	No. of Seed Sown	No. Germinated 6 days after sowing	Total (Cumulative) germination							Total Germinatio n Percent
				Days							
				5	10	15	20	25	30	35	
1	Sand	100	16	22	34	39	45	45	49	53	53
2	3 Parts Sand + 1 Part Compost	100	9	20	27	27	31	31	31	31	31
3	2 Parts Sand + 1 Part Compost	100	9	21	27	29	38	38	39	39	39
4	1 Part Sand + 1 Part Compost	100	12	18	27	32	32	38	38	38	38
5	1 Part Sand + 2 Parts compost	100	7	15	29	31	36	42	42	42	42
6	1 Part Sand + 3 Parts compost	100	8	19	23	34	36	36	41	41	41
7	Compost	100	8	14	21	20	24	33	33	33	33

(FIG.1) GERMINATION RESPONSE OF PADAUK SEEDS WHEN SOWN
IN SELECTED SOIL MIXTURES IN PLASTIC BAGS.



3.1 Transplanting

To reduce shock to the seedlings, it is advisable to transplant seedlings individually soon after they germinate. Transplanting practice was tested and found that two-leaf-stage and first-matured-leaf-stage are favourable for transplanting (See Figure 2). 1 part manure : 1 part sand : 2 parts compost mixture in plastic bags is found to be a good medium for transplanting.

4. Planting out in the Field

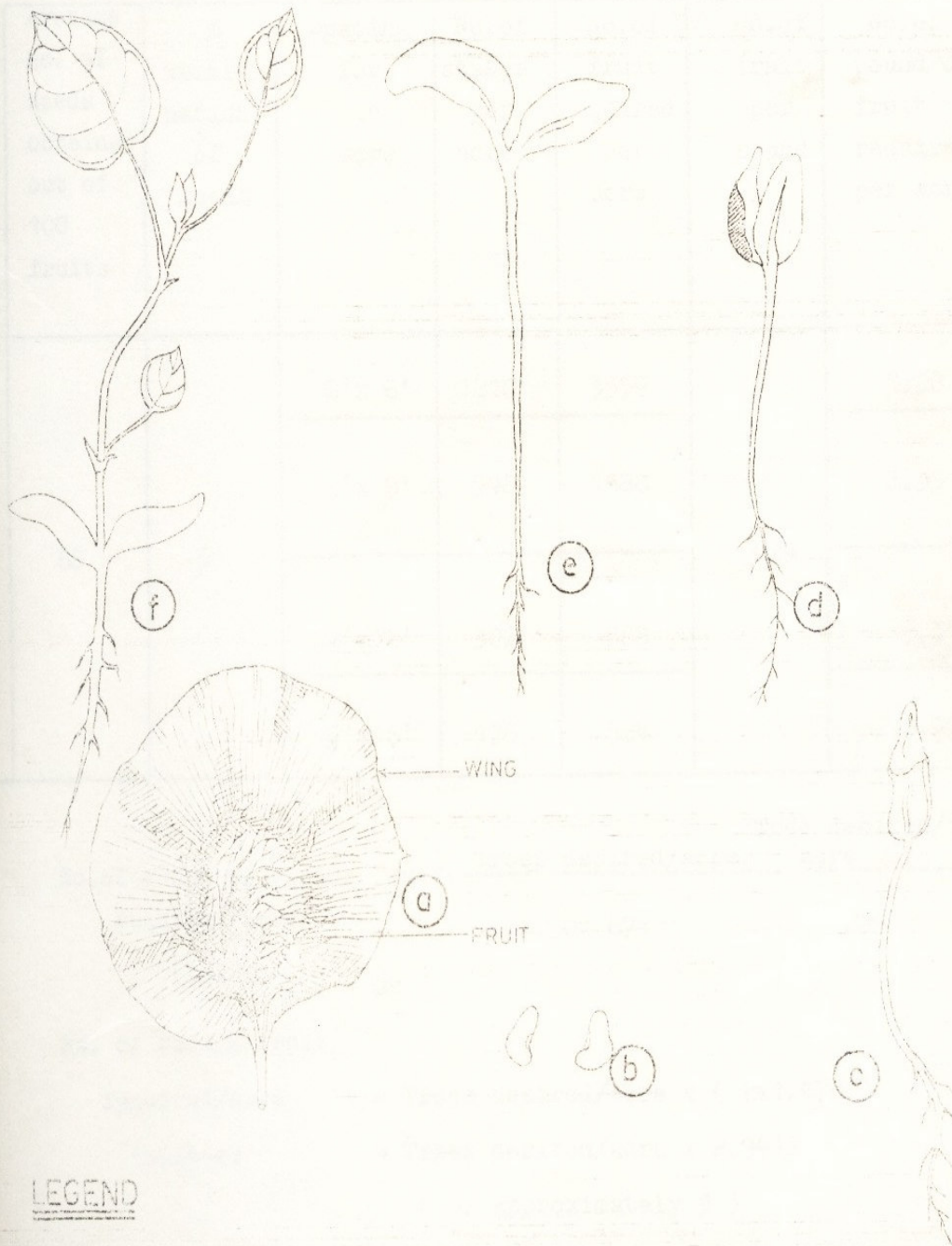
According to experience of trial planting on a small scale at Ngalaik Reserve, Yamethin Forest Division in two successive rains of 1978 and 1979 it was found that seedlings between 1 ft and 1 1/3 ft of height grow well. According to height measurements taken over a 135-day period Padauk transplants reach a height of about one foot approximately 120 days after germination.

5. Analysis and Conclusions

The following point can be drawn, as guides to nursery practice, from the above preliminary tests and observations. They are by no means conclusive. Further tests and investigations are underway and planned.

1. Collections should begin when the fruits have turned light brown. In most areas this is in November and December.
2. To find the approximate number of pound required per acre of plantation, divide the number of stakes per acre by 229. In terms of number of fruit required, the number of stakes per acre may be multiplied by 2.9412 or roughly 3. A safety factor may be added to account for transplanting losses and curling in the nursery depending on the local conditions. (See table 4).

(FIG.2) PADAUK FRUIT, SEEDS AND GERMINATION STAGES
 (NORMAL SIZE)



LEGEND

- a WINGED FRUIT
- b EXTRACTED SEEDS
- c-d GERMINATION STAGES
- e GERMINATION COMPLETED (TWO SEED-LEAF STAGE)
- f YOUNG SEEDLING

Table 4. Number of pound of Padauk fruit required per acre of plantation.

Average no. of seeds obtained out of 100 fruits	% Germination of seeds	Spacing for an acre	No. of stakes per acre	No. of fruit required per acre	No. of fruit per pound	No. of pound of fruit required per acre
68	50	6' x 6'	1210	3559	674	5.28
		9' x 9'	540	1588		2.35
		12' x 12'	302	888		1.31
		16' x 16'	178	524		0.77

$$\text{No. of Pound of Padauk fruit required/ acre (lb)} = \frac{\text{Trees desired/acre} \times \text{tree desired acre}}{.68 \times 50 \times 674} = \frac{229}{229}$$

$$\text{No. of Padauk fruit required/acre (number)} = \frac{\text{Trees desired/acre} \times (2 \times 1.4706)}{\text{Trees desired/acre} \times 2.9412} \text{ (or approximately 3)}$$

3. Seed extraction demonstrates advantages over unextracted seed and can be carried out at a rate of about 600 seeds per man-day, approximate cost being kyat one per hundred seeds at Yezin.
4. Little or no germination may be expected to occur after 35 days. There was no significance between pretreated and untreated seeds. Hence untreated seed could be used in the nursery.
5. Sowing is best done in sand followed by transplanting into plastic bags. This reduces waste of plastic bags and increases rate of germination.
6. Medium in the plastic bags should be mixed according to the type of soil available. 1 part manure: 1 part sand: 2 parts compost mixture, according to Yezin conditions, is a good mixture.
7. Transplanting of individual plants should be carried out early, soon after the leaves begin to separate. This reduces shock.
8. Sowing in the nursery should begin in early February in preparation for planting out in June/July. Transplants are normally ready for planting out about 4 months after germination.

References

- (1) Burma Forest Research & Training Circle:-
Some Commercial Hardwoods of Burma.
Zeya Thein Press, Rangoo.
- (2) Dastur, J.F. - Useful Plants of India and Pakistan.
- (3) FAO Publication, Forest Tree Seed Directory
1975. UNO Rome.
- (4) Gamble, J.S. 1922. A Manual of Indian Timber.
P. 259 London, Sampson Low, Marston &
Co., Ltd.
- (5) Htun, N. 1979. Departmental Report on Nursery
practice at Yezin. (unpublished)
- (6) Rodger, A. 1963. A Handbook of the Forest
Products of Burma. P. 30 Govt.
printing and stationery, Rangoo.
- (7) Shirley, G.S - An Elementary Manual of
Silviculture.
- (8) Singh, B. 1972. Symposium on Man-Made Forest in
India.
- (9) Troup, R.S. 1909. Burma Padauk.
(Pterocarpus macrocarpus, Kurz)
Superintendent, Government Printing
Press, India.
- (10) Troup, R.S. 1921. The Silviculture of Indian
Trees Vol.I. pp 287-292, oxford
University Press.