



Government of the Union of Myanmar
Ministry of Forestry
Forest Department



Testing the Methods of Vegetative Propagation of Padauk
(*Pterocarpus Macrocarpus kurz.*)

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**ခန္ဓာပိုင်းမျိုးပွားနည်း အမျိုးမျိုးကို ပိတောက်မျိုးသန့်ဥယျာဉ်
တည်ထောင်မှုတွင် အသုံးချနိုင်ရန် စမ်းသပ်ခြင်း**

ဦးသက်ထွန်း၊ B.Sc. (Bot.) (Mdy.) ဒု-သုတေသနမှူး
နှင့်

ဒေါက်တာဉာဏ်ထွန်း၊ B.Sc. (Hons.) (Rgn.), M.Sc. (MLU), Ph.D. (TUD)
ဌာနမှူး၊ သစ်တောသုတေသနဌာန

စာတမ်းအကျဉ်းချုပ်

ဤစာတမ်းတွင် ခန္ဓာပိုင်းမျိုးပွားနည်းများဖြစ်သည့် အဖူးဆက်နည်း၊ ကိုင်းဆက်နည်းများနှင့် ကိုင်းထိုးနည်းများကို အသုံးပြုခြင်းအားဖြင့် ပိတောက်ပင်ကို မျိုးပွားစမ်းသပ် ထားခြင်းဖြစ်သည်။ ၎င်း ခန္ဓာပိုင်းမျိုးပွားနည်းများမှ အသင့်တော်ဆုံး နည်းများကို အသုံးပြု၍ ပိတောက်မျိုးသန့်ဥယျာဉ် တည်ထောင်ရန် ရည်ရွယ်ပါသည်။ ယခုအချိန်ထိ စမ်းသပ်ချက်အရ အခေါက်ခွာ၍ ကိုင်းဆက်ခြင်းနှင့် လက်ခံပင်ကို ခွဲ၍ ကိုင်းဆက်ခြင်းတို့မှာ အအောင်မြင်ဆုံး တွေ့ရှိရပါသည်။

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Abstract

Various methods like stem cuttings, cleft grafting, bark grafting and budding are tested for propagating padauk (*Pterocarpus macrocarpus* Kurz.). Results showed that the grafting methods e.g. bark grafting and cleft grafting are the most suitable methods for vegetative propagation with padauk. The most suitable methods will be used for propagating the selected materials of padauk in this establishment of clonal seed orchards.

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1. Introduction

Grafting, budding, stem cuttings, root cuttings, etc., are ways of propagating plants vegetatively and they are well known and much practiced by Botanists, Horticulturist and Gardeners. Since the beginning of the twentieth century, the above mentioned methods became tools for tree breeders. At first the methods are used in tree improvement of conifers such as pines and spruces. Recently the methods are used in tree improvement work for teak and other hardwood species.

Padauk (*Pterocarpus marcocarpus* Kurz) is an indigenous species and the demand for its timber is high in international market. Due to increased extraction of the species, reforestation work on large scale becomes a necessity. To establish good plantation, it is imperative to look for good seed source. To have good seeds, selection of quality trees must be done. For the future quality seed source, seed orchards must be established. To establish seed orchards, selected trees must be propagated vegetatively. As there are some well known methods of propagation such as budding, grafting and cuttings, the purpose of this paper is to find out the most suitable method with which one can propagate padauk vegetatively in order to use in the establishment of clonal seed orchard.

The methods are tested in Moswe at the research station number 5. Other methods are under testing and this paper produced only the results of the methods tested up to date.

1.1 Definition and Explanation

Grafting is the art of joining parts of plants together in such a manner that they will unite and continue growth as one plant. The part of the graft union which is to become the upper portion is termed scion (cion), and the part which is to become lower portion or root is termed the root stock, or just the stock. All methods of joining plants are properly termed grafting, but when scion part is only a small piece of bark (sometime wood) containing a single bud, the operation is termed budding.

2. Materials And Methods

2.1 Material

One year old potted padauk seedlings with stem diameter of half-inch were used as stick.

Scion materials are collected from various padauk trees in Moswe area.

Instrument Used. The following instruments are used in the tests for methods of propagation.

Grafting knives, budding knives, cutting knives of various sizes, razor blades, hand saw, secateur, petridishes, plastic sheets, rubber bands and earthen pots. Different instruments and different materials are used for different grafting methods.

2.2 Methods

The following methods are tested for vegetative propagation of padauk.

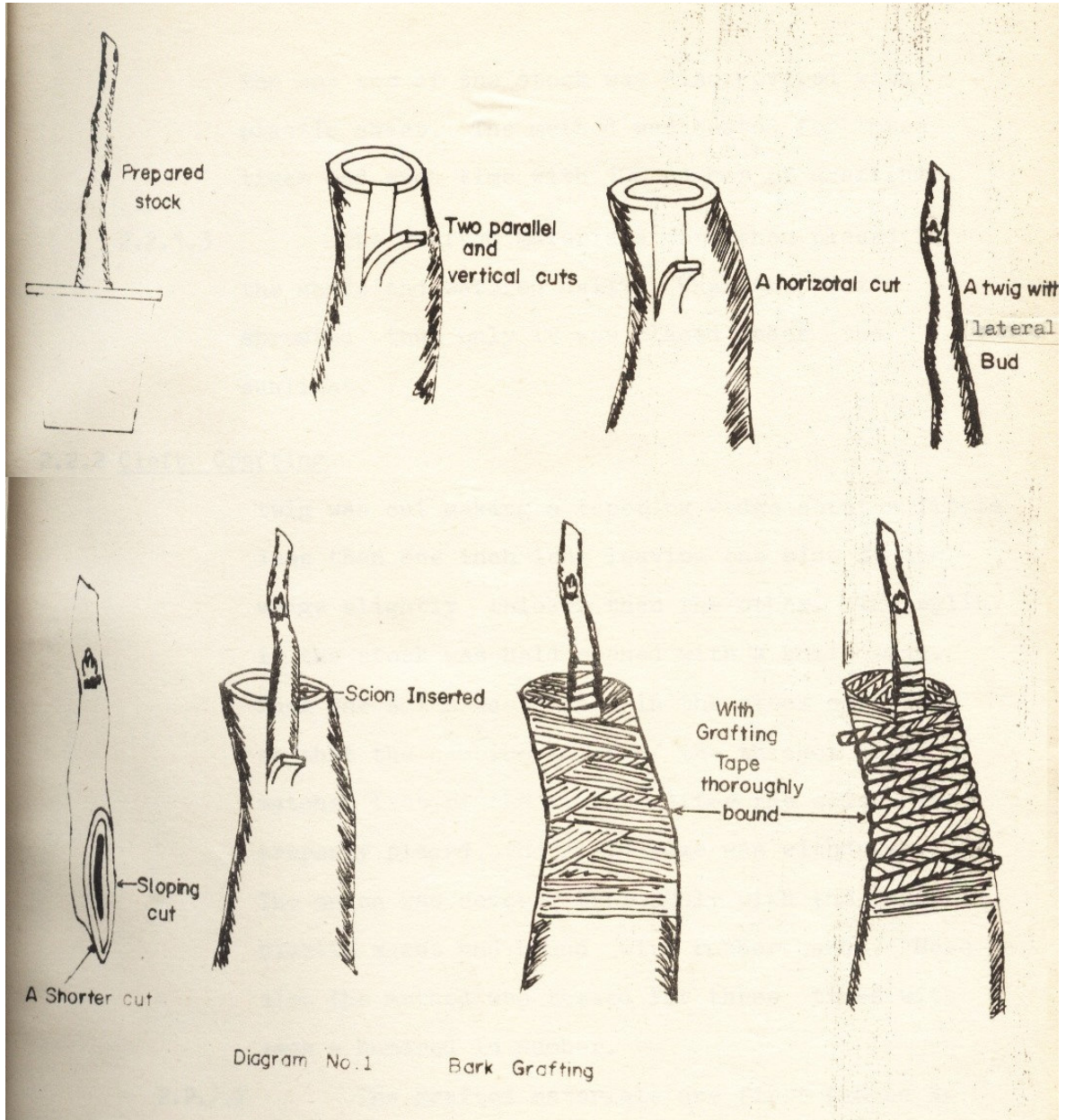
- (1) Bark Grafting
- (2) Cleft Grafting
- (3) Bud Grafting
- (4) Cuttings

2.3 Bark Grafting

In this method (Diagram No. 1 and Fig 1) a twig or a small branch was used as scion. In the upper end of the potted seedling, which is used as stock, two parallel and vertical cuts were made equal to the diameter of the scion.. The cuts were about one inch long. And then a cuts was made horizontally to the first cuts leaving only a quarter of an inch at the lower part of the cut. The scion was prepared by making a cut in a sloping manner on one side with the shorter cut on the opposite side.

The scion was inserted into the slot made by removing the bark in the stock, slipping end of the scion under the raised flap of the bark. The place of the union was thoroughly bound with a band of plastic sheet and also with rubber bands. The cut top of the stock was also covered with plastic sheet. The method was tested for three times and each time with 100 number of graftings.

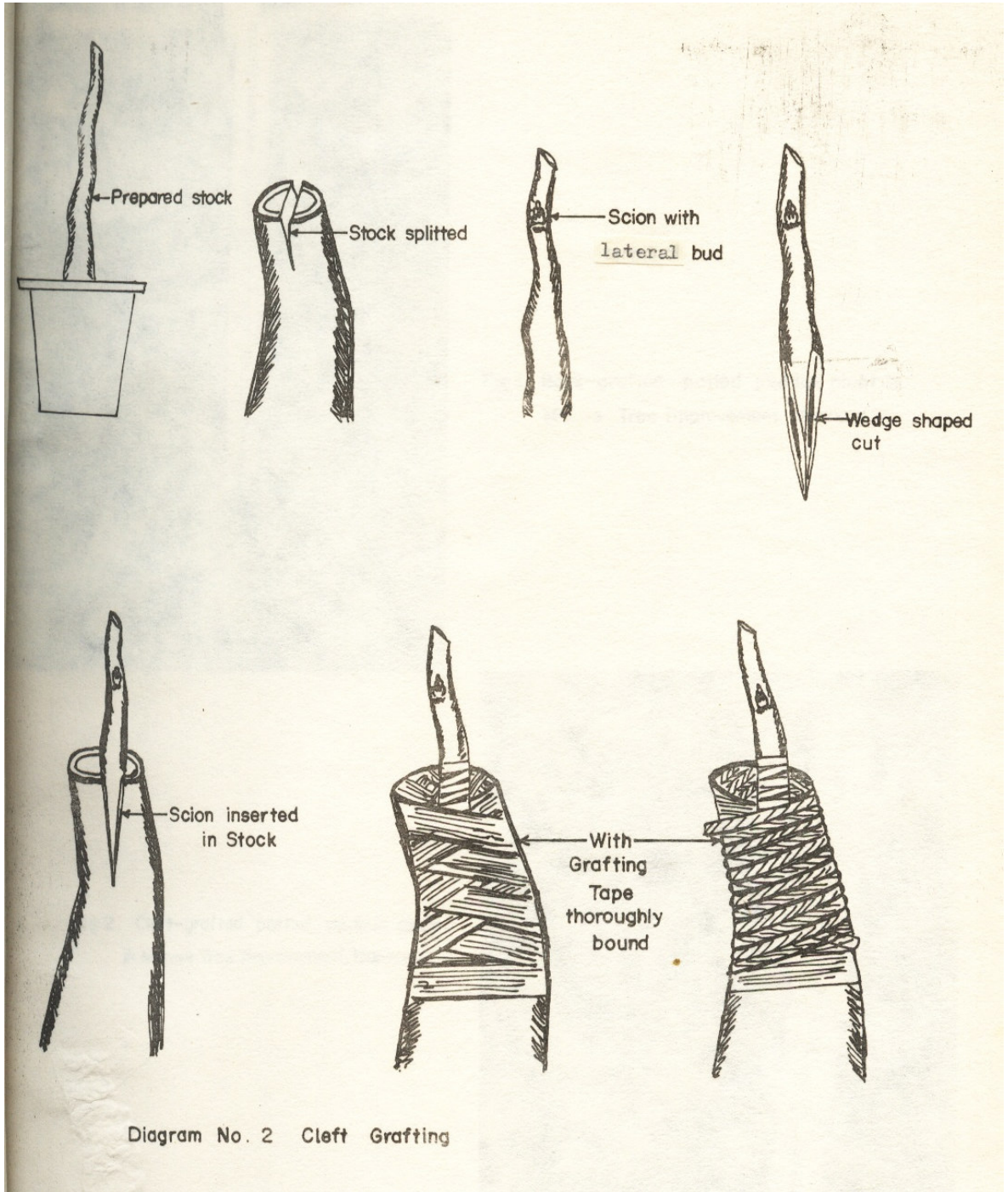
The grafted materials were then placed in the shade and watered daily. When the scion sprouted then only it was placed under the sunlight.



2.4 Cleft Grafting

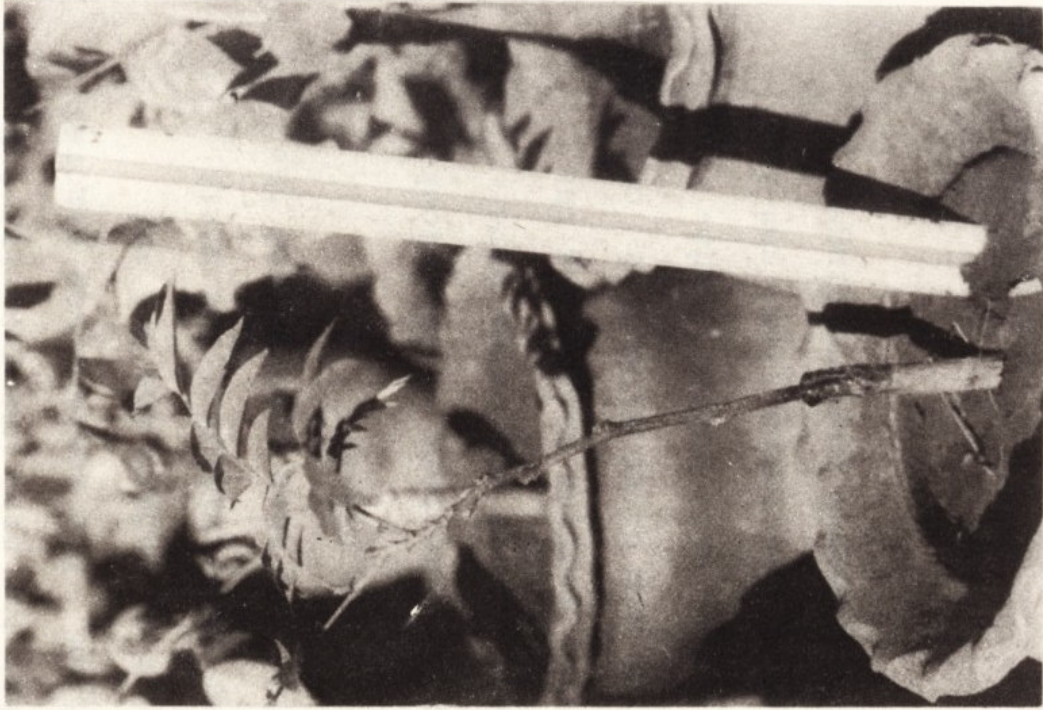
In this method (Diagram No.2) the stock was split from above for about an inch long. A twig or a small branch was used as scion which was about 4-6 inches (5-10 cm) long. The twig was cut making a tapering wedge about a little less than one inch long leaving one side of the wedge slightly thicker than the other. The split in the stock was held opened with a knife edge. Then the scion was placed in the stock carefully so that the cambium layer of the thicker edge matched that of the stock. After the scion was properly placed, the knife-edge was withdrawn. The union was covered thoroughly with the band of plastic sheet and bound with rubber bands. Here also the method was tested for three times with each a hundred in number.

The grafted materials are first placed in the shade until they sprouted and after a few days time, they are exposed to sunlight gradually.





**Fig 1. Bark-grafted potted padauk plant in
Moswe Tree Improvement Nursery.**



**Fig 2. Cleft-grafted potted padauk plant
in Moswe Tree Improvement Nursery.**

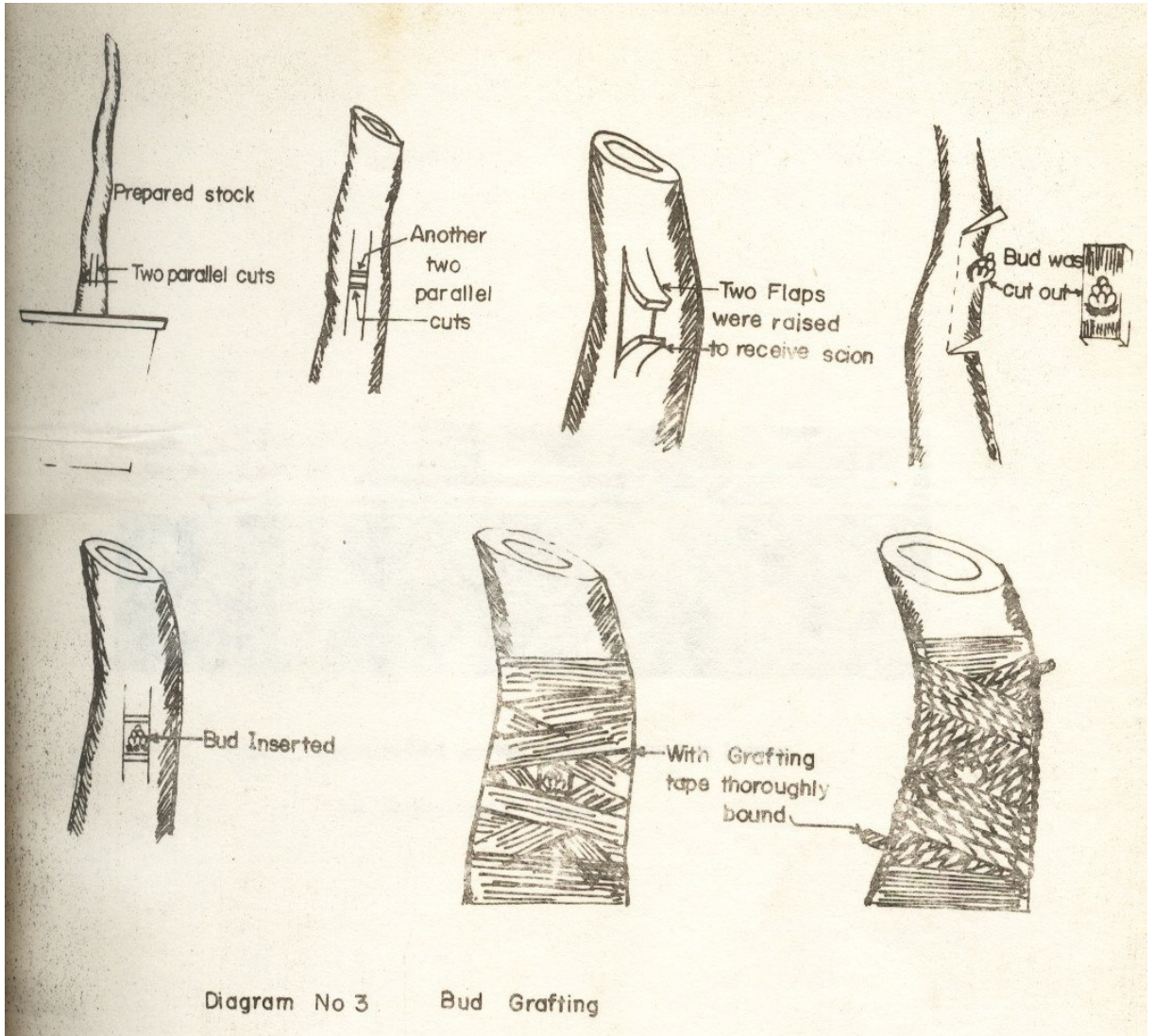
2.5 Bud Grafting

In this method (Diagram No.3) two parallel cuts were made through the bark to the cambium tissue at a place an inch or two below the top of the stock. Another two parallel cuts were made in the middle of the first cuts. In order to protect the cut in the stock from desiccation, a small piece in the centre of the cuts was not removed immediately. Budding knife was used in the cutting. By using budding knife, the bud was cut out making clean and parallel cuts. The bud was cut so that the size was just fit for the cut in the stock. The section was removed carefully so as not to injure the

bud and placed it in water in petridish. The small piece in the centre was then removed and the bud was inserted in the place.

The sections of the bark of the stock which were loosened above and below were pulled back over the section containing the bud. And the union was bound with band of plastic sheet and also with rubber bands. The method was tested for three times and for every time with one hundred bud-graftings.

Here in this case also budded materials were placed in the shade until they sprouted and in the following week, they were exposed to the sun gradually. Watering was done everyday.





**Fig. 3. Bud-grafted potted padauk plant in Moswe
Tree Improvement Nursery.**

2.6 Cuttings

500 cuttings with various diameter sizes (between 9 mm-43 mm) are planted in earthen pots and watered everyday. The methods was repeated twice.

3. Results

The results of the three tested conducted for the bark grafting method showed sprouted scions of 63/100, 42/100 and 28/100 with the average of 44.33 (See table 1)

The number of scions sprouted in the three tests for cleft grafting method were 56/100, 40/100 and 35/100 respectively and the average was 43.6 (See table 2)

The three tests for bud-grafting had the result of 21/100, 28/100 and 15/100 with the average 21.33 (See table 3)

(a) The tree cutting tests showed 23%, 62% and 42% sprouting with average of 42.3% (See table No.4)

(b) Sprouting initiated after a weeks time.

(c) Rooting started after 6 months time with daily watering for the same period. (Unpublished report of tests conducted showed wilting and dying of cuttings after a month.)

(d) No. of sprouted cuttings rooted after 6 months were 30, 80, 35 respectively for the three tests

Table 1. Results of Bark Grafting.

Test No.	No. tested	Success	Remarks
1	100	63	
2	100	42	
3	100	28	
	Average	44.33	

Table 2. Results of Cleft Grafting.

Test No.	No. tested	Success	Remarks
1	100	56	
2	100	40	
3	100	35	
	Average	43.6	

Table 3. Results of Bud- grafting.

Test No.	No. tested	Success	Remarks
1	100	21	
	2	100	28
	3	100	15
	Average		21.3

Table 4. Results of planted Cuttings

Test No.	No. tested	Success	%
1	500	105	23
2	500	310	62
3	500	210	42
Average			42.3

4. Discussion and Conclusion

Concerning the two grafting methods viz. Bark grafting method and Cleft grafting method the results showed little significant by the former over the latter method. There are other advantages also for the first method which are for example when the grafted materials are allowed to grow for 6 months healing of wound was slow and some fungus infection set in the second method. In the first Method healing of wound was faster and the difference of sizes between the stock and scion was not much then the two grow together as one very soon.

Concerning budding or bud-grafting method there are some difficulties such as the small size of the bud which is hard to handle and when the small bud is placed in the cut, plant secretion sets in very fast and caused the small bud unable to sprout.

When various sizes of cuttings were planted there were small indications of which the difference in diameter size may have some significant (test not included in this paper). A belief that padauk cuttings grow very easily is not so true unless watered every day or planted near the stream. (Unpublished report of field trial planting of padauk cuttings showed only a few survived in 1979 in Moswe.)

5. Conclusion And Suggestions

Other tests such as on-site-grafting and other methods of graftings and test for correlation between cuttings and watering, light intensities, hormones, etc. are under way so conclusion for the above tests are by no means complete.

The method which would be most suitable up to date was bark-grafting method followed by cleft-grafting.(Tests of on-site-grafting which are under way indicated also bark grafting as suitable.)

Due to secretion and small size of the bud, bud-grafting method is not so suitable unless the method is improved. (Note : With the improved method the budding method might be suitable because bud material is abundant compared to twigs or stems.)

Cuttings compared with grafting according to the results showed in the experiments grafting methods are more suitable although planting of cuttings method was cheaper and easier.

6. SUGGESTION

Vegetative propagation methods like bark grafting and cleft grafting selected padauk trees should be used for establishing padauk clonal seed orchards.

Cuttings should also not be abandoned altogether but further tests using hormones watering techniques, size selection, choosing the right season for planting, etc, should be made.

Further tests should be conducted concerning graft compatibility.

References

1. Garner R.J., The Grafter's Handbook. Faber and Faber, London & Boston. (1970)
2. Hastmann, U.T., Kester D.E. (1975) Plant Propagation, Prentice-Hall, Inc., Englewood Cliffs, New Jersey (1975) Pg. 271-428.
3. Win – S. Tun T., Htun N., Preliminary study on methods of Grafting Teak (*Tectona grandis* Linn.) for Vegetative Propagation. F.R.I. pub. Leaflet No. 13/1982.
4. Doo. C., Propagation of Padauk.
5. Paulker R., Seed Orchards Forestry Commission Bulletin 54, London Her Majesty's Stationery Officer 1975.Pg. 38-48.