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Preliminary Study on Methods of Grafting Teak (Tectona Grandis Linn.) for Vegetative Propagation

by
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ပင်ပိုင်းမျိုးပွားနိုင်ရန်အတွက်
ကျွန်းပင်ကိုင်းဆက်နည်းများကိုပဏာမစူးစမ်းခြင်း

ဦးစိုးဝင်း၊ ဒေါက်တာဥာဏ်ထွန်း
သစ်တောမျိုးရိုးနှင့် ရုက္ခဗေဒဌာနစိတ်၊ သစ်တောသုတေသနဌာနဗိမ္မာန်
နှင့်
ဦးတင်ထွန်း
အရှေ့ပဲခူးရိုးမ သစ်တောစိုက်ခင်းစီမံကိန်း

<u>စာတမ်းအကျဉ်းချုပ်</u>

မျိုးရိုးဗီဇမပျက်စေပဲ အပင်များကို မျိုးပွားစေနိုင်သော နည်းမှာ ကိုင်းဆက်နည်း၊ ကိုင်းထိုးနည်း၊ အဖူးဆက်နည်း စသည်တို့ဖြစ်ပေသည်။ ၎င်းနည်းများကို ရုက္ခဗေဒပညာရှင်များ၊ သီးစားပင်စိုက်ပျိုးသူများနှင့် ဥယျာဉ်မှူးများအနေဖြင့် နှစ်ပေါင်းများစွာကပင် ကျွမ်းကျင်စွာ အသုံးပြုခဲ့ကြပါသည်။ မြန်မာနိုင်ငံတွင် မကြာသေးမီ အခိုန်မှစ၍၊ သစ်မျိုးကောင်းမျိုးသန့်ဖော်ထုန်ရေး အစီအစဉ်တရပ်အနေဖြင့် ကျွန်းပင်များကို ပင်ပိုင်းမျိုးပွားရာ၌ ၎င်းနည်းများကို အသုံးပြုလေ့လာခဲ့၍ ရရှိသောအပင်များကို ဗီဇဘဏ်စိုက်ခင်းများတွင်လည်းကောင်း၊ သစ်စေ့ဥယျာဉ်များတွင်လည်းကောင်း၊ စိုက်ပျိုးထားပါသည်။ ဤစာတမ်းတွင် ကျွန်းပင်များကိုင်းဆက်ရာ၌ အသုံးချသောနည်းများနှင့် ပဏာမစမ်းသပ်တွေ့ရှိချက်များကို ဖော်ပြထားပါသည်။

Preliminary study on Methods of Grafting Teak (*Tectona grandis* Linn) for Vegetative Propagation

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Abstracts

Grafting, budding, stem cutting, bark grafting, etc. are methods of vegetative propagation which are familiar to botanists, horticulturists, and gardeners. Recently, the methods were applied to propagation of Teak in the tree improvement program in Burma. The propagated trees were then planted out either in Germ plasm bank or seed orchards. The present paper is concerned with the preliminary findings of tests on methods such as cleft grafting, bark grafting, budding and stem cuttings.

Contents

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1. Introduction

Grafting, budding, Layering, stem outings, root cuttings, etc., are ways of propagating plants vegetatively and they are well known and much practiced by Botanists, Horticulturalists and Gardeners. Since the early part of the twentieth century, the above mentioned methods become tools for tree breeders in Fur ope. The methods are used in tree improvement of conifers such as pines and spruces. Recently the methods are used in the tree improvement work for teak.

Due to increased extraction of commercial species, reforestation work on large scale becomes a necessity. To establish good plantations, 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. This is the logic behind and therefore research on teak grafting methods was carried out and applied in the propagation of germ plasm.

Grafting methods were tested in Moswe and in Toungoo as part of the tree improvement program and some preliminary findings are presented here. Although the tests are not yet completed, presentation here is to encourage people to participate in the tree improvement programme.

Defination 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 (coin), 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 the scion part is only a small piece of bark (and sometime wood) containing a single bud, the operation is termed budding.

2. Materials and Methods

2.1 Instruments Used

The following instruments are used in the tests for grafting methods:

Grafting knives, budding knives, cutting knives of various sizes, razer blades, small hammer, hand saw, secateur, glass beaker, petri-dishes, grafting tapes, rubbeer bands, plastic bags of various sizes, plastic sheats and earthern pots. Different instruments and different materials are used for different grafting methods.

Collection and Transportation of Stock and Scion

Stocks, at least one year old are obtained from the nursery. Teak wildings were also uprooted and collected from the forest for trial. The stock materials which were transported from places very far were placed in gunni bags and kept them moist and out of the sun.

Scions were obtained by removing branches from selected trees by climbing the tree. Since some of the selected trees were located in other districts like Prome of Toungoo, Scions had to be transported by train or cars and sometimes it took about five days. The Scions were put in gunni bags and kept them moist and out of the sun all the time.

2.2 Methods

The following methods are tested for grafting teak.
(1) Bud Grafting
(2) Bark Grafting
(3) Cleft Grafting

2.2.1 **Bud Grafting**: Diagram No.1)

The stock was prepared by cutting the collected teak seedling, with the shoot being about six to eight inches above the root collar, the tap root six to eight inches below the collar and lateral roots pruned. Then 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 grafting tape carefully. Strong plastic sheets were cut into ribbons and used for binding. Rubber bands were then used to secure the binding.

Grafted materials are then potted either in earthen pots (Diagram No.6,7,8) or in large plastic bags measuring 6" in diameter and 14" in length which were filled with a mixture of six parts forest soil, two parts manure and one part sand. The potted materials were then placed in the shade until they sprouted and in the following week they were exposed to the sun gradually. During that time, moist condition was created by pouring water near and around the pots.

Scions were also grafted on to pre-potted and sprouted stocks.

In Toungoo, where parallel tests were done, the grafted materials were put in moist chamber. (Diagram No. 5).

2.2.2 **Bark Grafting:** (Diagram No.2)

Here in this case a twig or a small branch was used as scion. In the upper end of the stock, two parallel and vertical cuts were made equal to the diameter of the scion. The cuts were about two inches long. A cut was made horizontally to the first

cut leaving only half an inch at the lower part of the cut. The scion (a twig) was cut in a sloping manner on one side with the shorter cut on the opposite side.

The scion was inserted into the slop made by removing the bark in the stock, slipping end of the scion under the raised flap or the bark. The place of the union was thoroughly bound with grafting tapes and also with rubber bands. The cut top of the stock was also covered with tapes.

The grafted materials were then placed in the shade and moist condition was created like in the case of bud grafting.

The scion materials were grafted to the stock and then only planted in the pot. The scions were also grafted to the pre-potted stock materials. The difference between the two methods were observed.

This method of grafted was not tested in Toungoo.

2.2.3 Cleft Grafting: (Diagram No.3)

In this method, the stock was split from above for about 2-3 inches long. A twig was used as scion which was about 6-8 inches long. The twig was cut making a tapering wedge about 2-3 inches long leaving one side of the wedge slightly thicker than the other. The split in the stock was held opened by using a screw driver. Then the scion was placed in the stock carefully so that the cambium layer of the thicker edge matched that of the stock (Diagram No.4). After the scion was properly placed, the screw driver was with drowned. The union was cover thoroughly with grafting tape and then with rubber bands.

In this method also, the grafting was done both on the prepotted and pre-sprouted stock as well as freshly collected stock. Then grafted materials are placed in a moist chamber and under the shade till they sprouted. After a weeks time, they are exposed to sunlight gradually.

2.2.4 Stem Cutting

200 of terminal twigs (½ inch dia.) were planted in earthen pots. They were watered once a day and kept under the shade in moist condition. And also 100 of branches (one inch dia.) about 2 feet long were planted in pots and also kept in a moist condition.

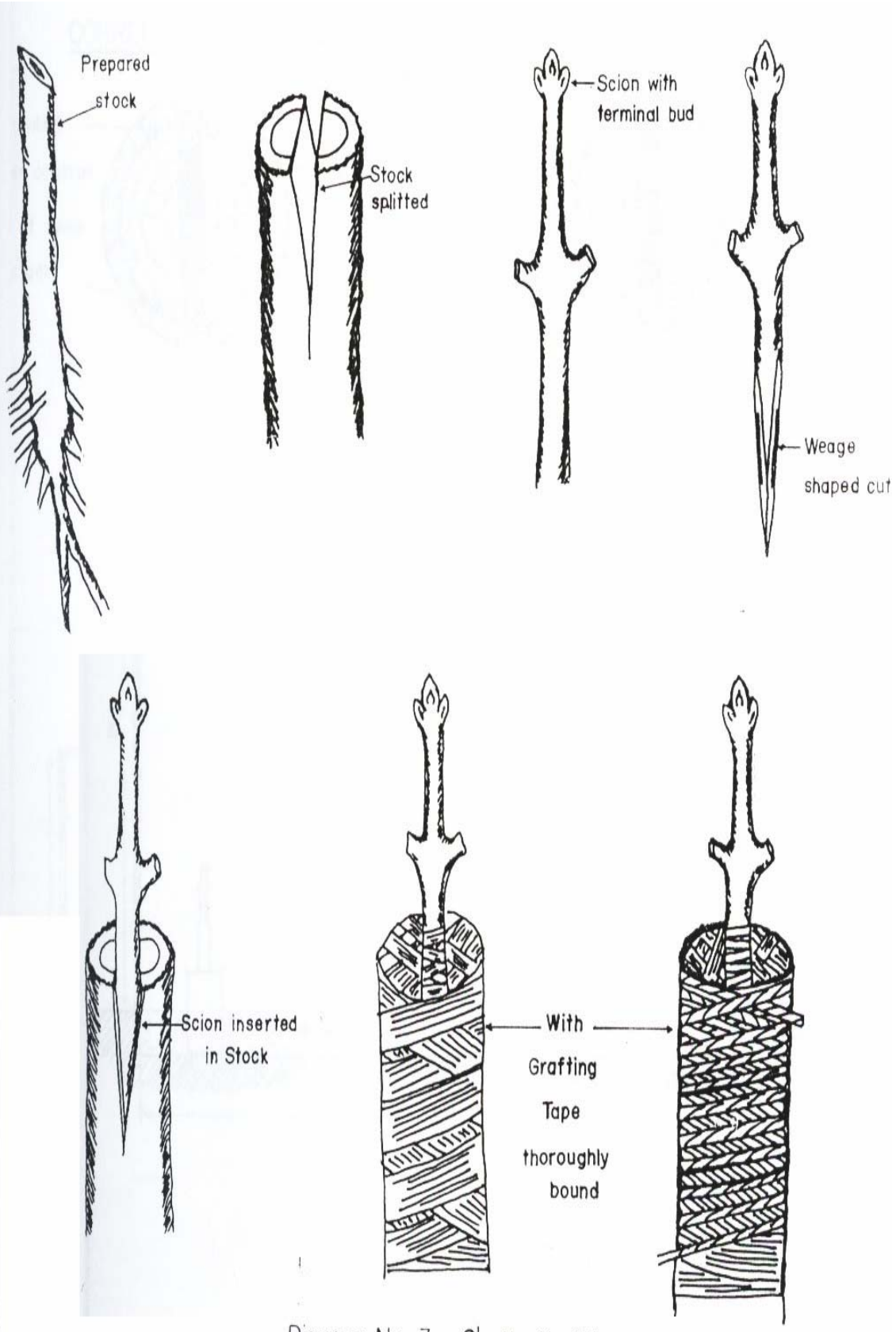

Diagram No. 3 Cleft Grafting

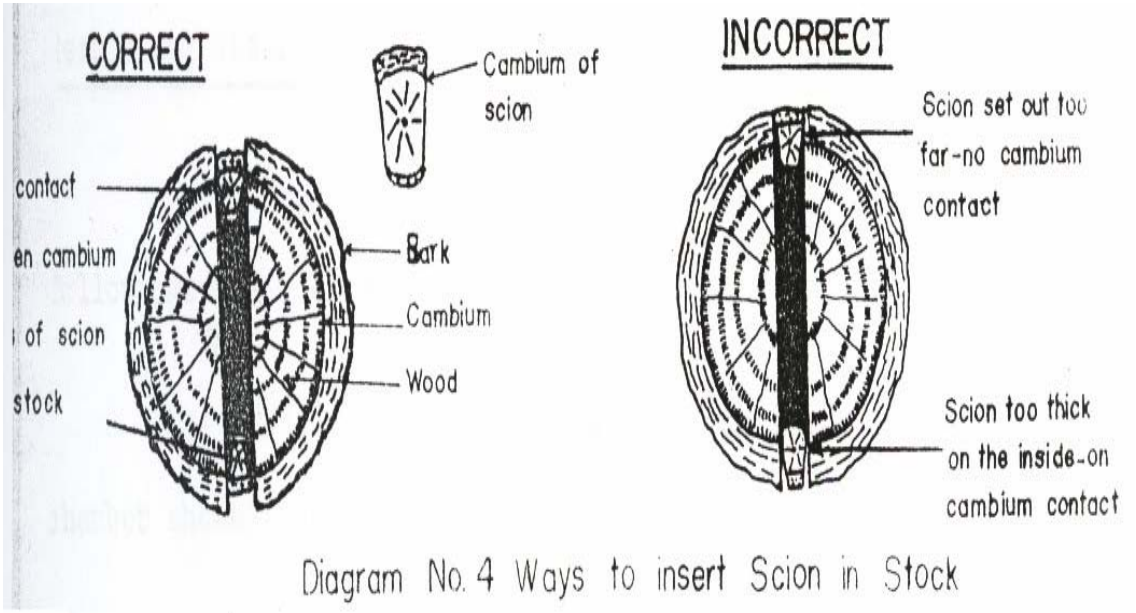

Diagram No. 4 Ways to insert Scion in Stock

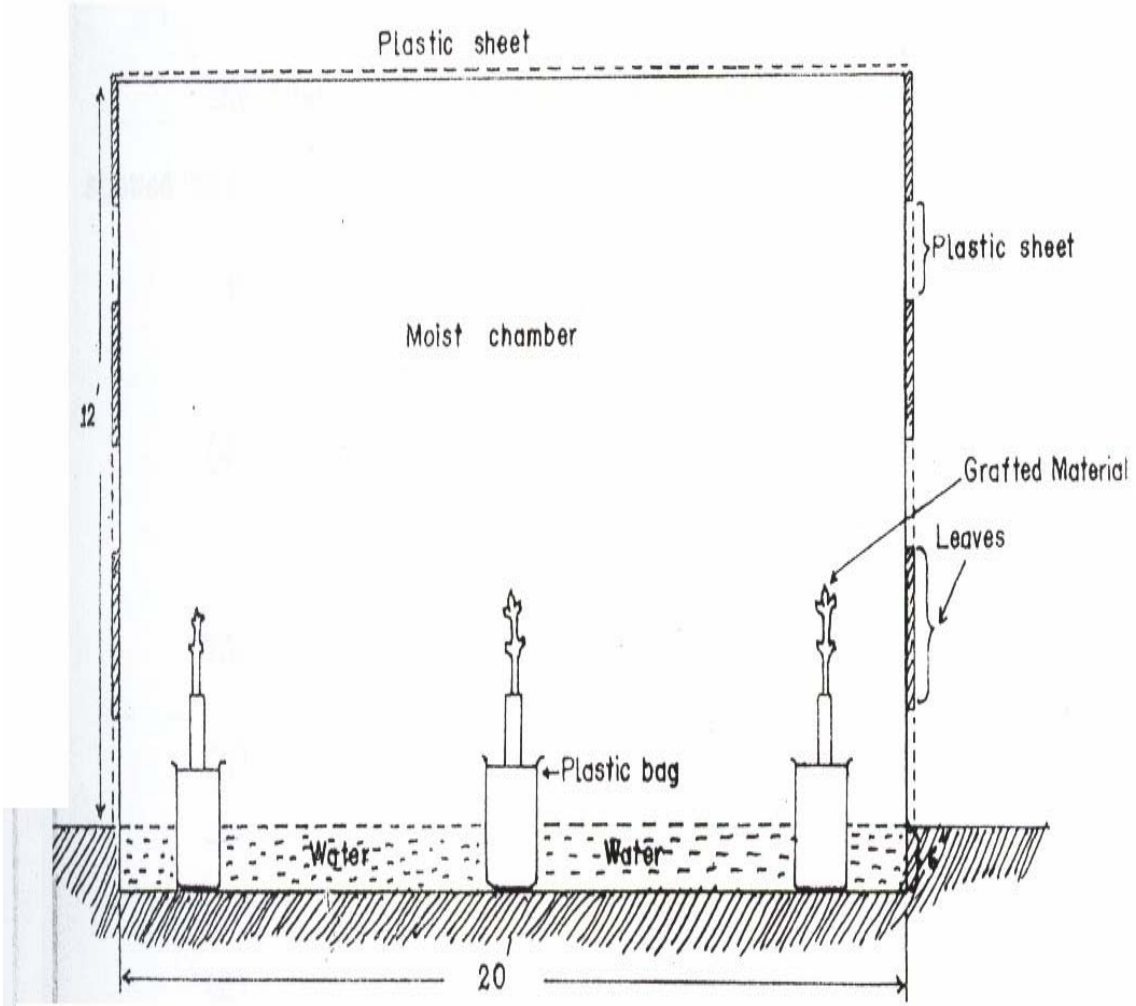

Diagram No. 5 Moist Chamber

3. Result and Observations

As the tests were conducted in Moswe and Toungoo, the followings are the results of tests: (Table 1 to 5).

The tests conducted at Moswe without in the moist chamber showed the following results:

(1) In the bud grafting percentage of success was 39%.
(2) In the Bark grafting percentage of success was 58%.
(3) In the Cleft Grafting percentage of success was 54%.

The test conducted at Toungoo with the moist camber showed the following results:

(1) In the bud grafting percentage of success was 73%.
(2) In the Cleft grafting percentage of success was 71%.

The following observations were made:

(1) Grafting of teak could be done through out the year but the best time was during March, April and May.
(2) Scions sprouted faster when grafted on to the pre-sprouted and prepotted stock.
(3) Bark and Cleft grafting methods were easier than the bud grafting in handling and operation.

Table No.1 Bud Grafting (in Toungoo)

Number	Month	Number		%	Days Required to Sprout
		Grafted	Sprout		
1	Nov/80	18(a)	13	72.22	10 days
2	Dec/80	19(a)	14	73.15	10 days
3	Jan/81	56(a)	32	57.14	14 days
4	Feb/81	-	-	-	-
5	Mar/81	22(b)	10	45.45	7 days

Table No.2 Cleft Grafting (in Toungoo)

Number	Month	Number		%	Days Required to Sprout
		Grafted	Sprout		
1	Nov/80	80(a)	57	71.25	10 days
2	Dec/80	120(a)	56	46.66	10 days
3	Jan/81	452(a)	126	27.87	14 days
4	Feb/81	823(a)	334	40.58	7 days
5	Mar/81	946(b)	447	47.25	7 days

(a) = Grafted on normal stump and then potted.
(b) = Grafted on pre-potted and pre-sprouted stock.

Table No.3 Bud Grafting (in Mosee)

Number	Month	Number		%	Days Required to Sprout
		Grafted	Sprout		
1	Feb/81	60(a)	7	11.66	37 days
2	Mar/81	200(a)	57	28.50	22 days
3	Apr/81	100(a)	31	31.00	15 days
4	May/81	100(b)	39	39.00	7 days

Table No.4 Bark Grafting (in Moswe)

Number	Month	Number		%	Days Required to Sprout
		Grafted	Sprout		
1	Feb/81	100(a)	19	19.00	23 days
2	Mar/81	90(a)	27	31.00	15 days
3	Apr/81	200(a)	66	33.60	15 days
4	May/81	209(b)	122	58.37	5 days

(a) Grafted on normal stump and potted.
(b) Grafted on pre-potted and presprouted stock.

Table No.5 Cleft Grafting (in Moswe)

Number	Month	Number		%	Days Required to Sprout
		Grafted	Sprout		
1	Feb/81	100(a)	22	22.00	25 days
2	Mar/81	100(a)	34	34.00	10 days
3	Apr/81	200(a)	70	35.00	10 days
4	May/81	170(b)	92	54.11	5 days

(a) Grafted on normal stump and potted.
(b) Grafted on pre-potted and presprouted stock.
(3) Using a moist chamber had advantage over normal shade and moist condition given to grafted materials.
(4) Scion materials could be stored in a moist and shade condition up to six days.

Some observations on planted stem and twigs cuttings

(1) Out of 200 terminal twigs (½ inch dia.) cuttings, 80% sprouted but only 3 cuttings rooted.
(2) Out of 100 branch cuttings, 67% sprouted no rooting was observed.

4. Preliminary Conclusions

The following preliminary conclusions could be drawn:

(1) The easiest methods, for teak grafting are bark and cleft graftings, although it may be the best methods because they are susceptible to various infections.
(2) The best time of the year to graft is during March and April. It gives also enough time for the graft to grow before out planting in June and July.
(3) Scions grafted on to the prepotted and presprouted stock sprout faster than in other cases.
(4) Grafted materials placed in the moist chamber have much more advantages than the ones under normal shade and moist conditions.

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Diagram No. 6 Bud Grafting (potted)

Diagram No. 7 Bark Grafting (potted)

Diagram No. 8 Cleft Grafting (potted)