

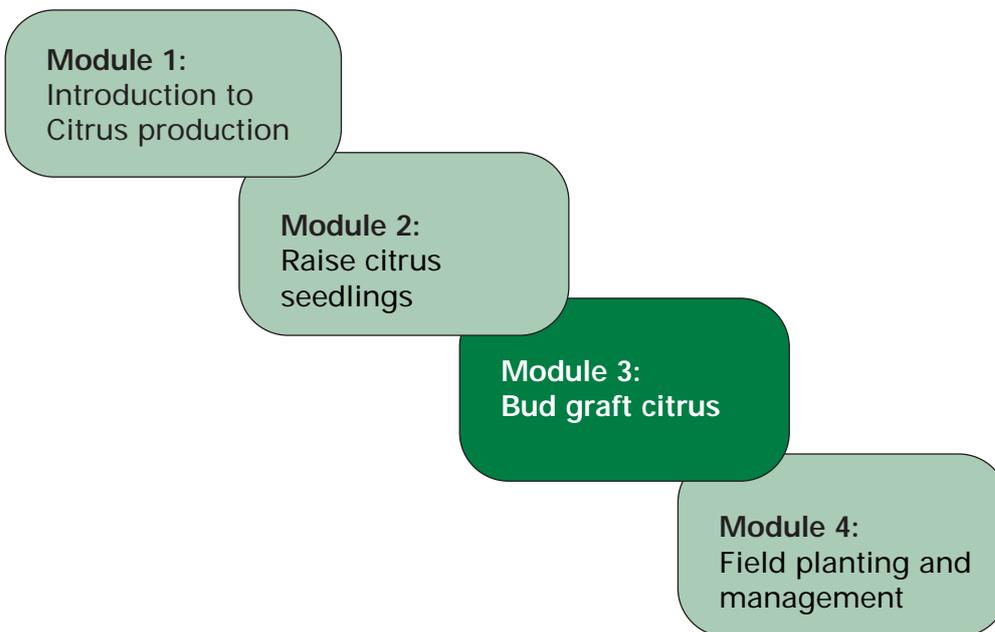


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***bud graft citrus***

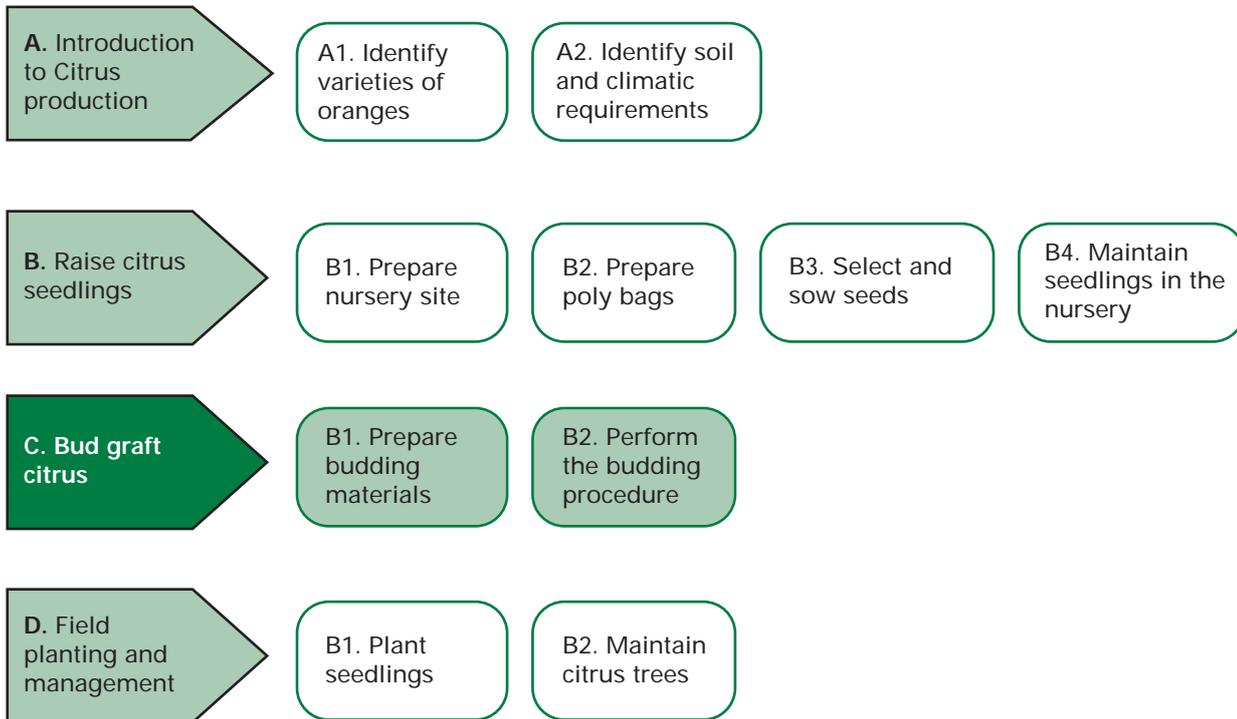
Program: **AGRICULTURE AND FISHERIES**  
Course: **BUD GRAFT CITRUS**  
Module Code: **AF014iii**  
Module Code: **Raising citrus seedlings**



**Competency Profile: Bud graft citrus**

**Duties**

**Task**



**CURRICULUM GUIDE**

<b>Program:</b>	<b>AGRICULTURE</b>
<b>Course:</b>	<b>Growing citrus</b>
<b>Module code:</b>	<b>AF014iii</b>
<b>Modules:</b>	<b>Bud graft citrus</b>
<b>Duration:</b>	<b>3 hours</b>
<b>Content:</b>	<b>C1: Prepare budding materials</b> <ul style="list-style-type: none"><li>• Importance of bud grafting citrus</li><li>• Root stock</li><li>• Bud wood</li></ul> <b>C2: Perform budding procedure</b> <ul style="list-style-type: none"><li>• Steps in budding</li><li>• Handling of stock</li><li>• After care of budded seedlings</li></ul>
<b>Pre-requisite:</b>	There are no pre-requisites to this module.
<b>Method:</b>	This module should be delivered using the following Methodologies: <ul style="list-style-type: none"><li>• Lecture</li><li>• Discussion</li><li>• Practical Activity</li><li>• Demonstration</li></ul>
<b>Instructor:</b>	The ideal instructor to deliver this course <ul style="list-style-type: none"><li>• should have a Certificate in Tropical Agriculture</li><li>• Must have gone through Training Methodologies</li><li>• Or must be an experienced citrus farmer.</li></ul>
<b>Assessment method:</b>	The participant will be assessed using the following assessment approaches: <ul style="list-style-type: none"><li>• Written/Oral tests</li><li>• Direct Observation</li><li>• Demonstration of practical tasks through activities</li></ul>
<b>Assessment condition:</b>	<ul style="list-style-type: none"><li>• All materials and equipments will be provided.</li><li>• Assessment will be conducted in farm environment</li></ul>
<b>REFERENCES:</b>	<ol style="list-style-type: none"><li>1) Liklik Buk by Amanda Twohig Year: 2000</li><li>2) "How to bud graft citrus" National Agriculture Research Institute November, 2002</li><li>3) Home Fruit Production-Citrus Website: <a href="http://aggie-horticulture.tamu.edu">http://aggie-horticulture.tamu.edu</a></li></ol>



**APPENDIX 1: Training and Assessment guide**

Task C1: Prepare budding materials  
Suggested minimum instructional time: 1 hours

**Learning outcomes**

- 1 Prepare all materials required for budding operation.

**Teaching strategy:**

Learning activities for the trainee must include the instructor to:

- Identify all materials required for budding
- Explain size of root stock to be used for budding and identify those that are not suitable for budding
- Explain and identify appropriate type of bud wood to be used for budding.

**Assessment condition:** Trainee must be given access to:

- i) information and handouts
- ii) tools and materials

**Assessment criteria:**

- 1.1 All materials required for budding operation are identified.
- 1.2 Features of a good root stock are identified
- 1.3 Features of a good bud wood are identified.

**Assessment method:** To demonstrate achievement of the above criteria the trainee will be given:

- oral questions
- or written questions
- practical demonstration of tasks

**APPENDIX 2: Training and Assessment guide**

Task C2: Perform budding procedure  
Suggested minimum instructional time: 2 hours

**Learning outcomes**

1. Demonstrate budding procedure.
2. Care for budded seedling

**Teaching strategy:**

Learning activities for the trainee must include the instructor to:

- Explain the importance of using healthy root stock and bud wood when budding.
- Demonstrate the inverted "T" cut using a budding knife
- Demonstrate cutting of the bud from the bud wood.
- Demonstrate inserting of the bud to the root stock.
- Demonstrate wrapping of the bud to the root stock using the budding tape.

- Explain the timing for removing budding tape
- Demonstrate cutting back of the root stock to allow the bud to grow
- Explain and demonstrate after care of budded seedlings.

**Assessment condition:** Trainee must be given access to:

- i) information and handouts
- ii) root stock seedlings
- iii) Bud wood
- iv) Budding tools (budding knife, budding tape)

**Assessment criteria:**

- 1.1 Disease free root stock and bud wood is used
- 1.2 Cuts are made without any overlaps
- 1.3 Bud is fitted into opening without any overlap
- 1.4 Bud is tied firmly onto the rootstock.
- 2.1 Cutting back of root stock is explained and demonstrated
- 2.2 Maintaining of root stock is explained and demonstrated.

**Assessment method:** To demonstrate achievement of the above criteria the trainee will be given:

- oral questions
- or written questions
- Practical demonstration of task

### Appendix 3 Instructional notes

#### How to Bud Graft Citrus

One way to produce high yielding, good quality, or pest, disease and drought resistant oranges, pomelos and mandarins is by vegetative propagation. There are many ways of propagating citrus vegetatively. Here we will describe the most commonly used method which is called bud grafting.

In bud grafting we have a rootstock and a scion. The plant used to provide the root system is called the rootstock and the bud that comes from a twig or a branch is called the scion. The scion grows up to become the stem, branches, leaves and the fruits of the grafted plant. We use a seedling for rootstock and the scion is a bud taken from an improved or pre-selected tree. The joining of scion to the rootstock is called bud grafting or budding. A plant produced in this way is called a clone. A clone should be almost identical to the mother tree from which the bud was taken.

Before budding you will require the following:

- a. **A nursery to supply the root stock.** The root stock you choose will depend on many factors like tolerance to pests and diseases, climate, soil, water, expected yield and targeted market. Seeds for the nursery can be ordered from overseas or collected from good rough orange or lime trees. It should be noted that some root stocks will affect the taste of the orange so it is best to use rootstock seeds like Carrizo citrange, Troyer citrange and Trifoliata seeds usually ordered from overseas (see your nearest DAL, DPI, FPDC office or NARI for help).
- b. **Bud wood source trees are the trees which you obtain bud wood from.** These will be the Didman's selected sweet oranges, Valencia, Naval oranges, Mandarins or may be oranges or any type of citrus selected by you because of their good quality. good yields or other good character such as trees that withstand pests, diseases and adverse soil or climate conditions or just to increase the number of plantings from your single backyard tree.
- c. **Budding knife.** These can be bought from major Didiman suppliers. If you cannot afford this special knife, you can use scalpel blades, a razor blade or small knives but they must be kept sharp.
- d. **Budding tape.** This can be bought from major Didiman suppliers such as Farmset, and AgMark. If you can not get any and are budding only small numbers you can use

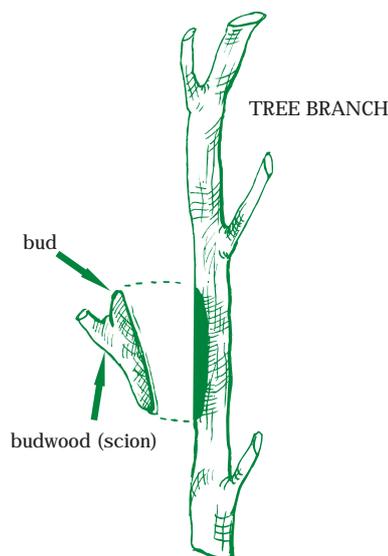
plastic strips of about 2 cm wide. Even strips made from rice packets can sometimes be used successfully for budding citrus.

#### The Rootstock

- a. The chosen seedling should be actively growing single stemmed and trimmed clean for 15-30 cm above ground. It should be at least 1 cm thick at 15 cm above ground before budding is attempted. There are new methods to graft much younger rootstocks but these are not described here.
- b. Dry rootstocks cannot be grafted successfully! They must be watered and seedlings kept moist prior to grafting. However, the rootstock should not be wet during budding.
- c. Up to 25% of the seedlings in the nursery will be undersized or misshapen. These should be discarded – to avoid budding on a generally inferior rootstock.

#### The Bud wood (Scion)

- a. Bud wood is selected from the semi hardwood section (green wood turning brown) of a round branch, about 5 mm average in diameter. Avoid using angular branches as this usually results in plants with vigorous vertical growth. Suitable scion wood should have visible bud growth at the base of each leaf stalk. You should encourage bud formation by curing, i.e. by tipping and removing all the leaves of the selected scion wood two weeks before cutting of the scion wood for grafting.



- b. Budding must commence immediately following cutting of the bud wood. They must be kept moist at all times during grafting by wrapping in wet hessian or wet plastic bag both during the collection of the scion wood and the budding operation.



- c. If necessary, budding can be delayed up to a maximum of 48 hours. Here you should dip cut petioles and bud stick ends into melted paraffin wax to prevent them drying out. The bud wood should be stored in moist sawdust or placed in plastic bags and stored in a refrigerator or esky for transporting.

### How to do budding

The method is called inverted 'T' Budding.

The inverted 'T' cut (upside down 'T') is made in the root stock at least 15 cm (if planting in wet areas at 20-30 cm) from the ground, budding lower must be avoided to stop the soil covering the bud union, which leads to a disease called collar-rot.

Remove the bud with a clean slicing cut just below the bud. To avoid damaging the bud, the cut should be made from the lower end where the leaf stalk attaches to the branch. Try to remove as little wood from the bud wood as possible but if the bud is sliced off with a small portion of wood, do not worry about removing it.

The 'T' cut is made with a bowing action with the knife which slightly lifts the corners of the bark flap. The bark flap can be lifted further with the bone handle of the budding knife to give way for the inserting of the bud. This cut should be made after you have removed the bud.

The bud is pushed firmly home from the bottom to the top of the upside down 'T' with the bone handle of the budding knife. The bud is then tied up with plastic budding tape (0.05 mm thick x 1.5 cm wide x 10 cm long). This tape is transparent and the bud 'take' can be seen through it. One roll of tape will tie about 200 nursery seedlings of normal size.

The tape commences below the bud with a half loop and the bud is completely covered by the tape which pulls the bark flaps back firmly against the stock to ensure quick callusing of flaps. It is finished above the bud with a half hitch and pulled tight. The budded plant is left for 14-21 days. By this time the bud will have 'taken' and the plastic is removed by simply slitting the tape with the budding knife on the side of the stock opposite the bud. A good budding will result with only a faint scar.

Stocks on which the bud has failed to 'take' should be rebudded as soon as possible on the opposite side of the first budding.

### Handling of stock

The rootstock should be de-headed as soon as the tape is removed to force the bud to sprout. De-heading or cutting the tip of the root stock should be done carefully with a secateur, cutting

from the budded side, and holding the secateur so as not to bruise the stock.

The cut should be just above the bud, so that the wound grows over quickly as the new shoot develops from the bud. Buds are lost after heading, however, in very hot weather, buds can be killed.

### After-Care of the Nursery Trees

After heading the trees must be staked. As the new shoot grows it should be tied firmly at regular intervals. The new shoot from the bud should be trimmed to one stem. Allow this stem to grow to its full height and do not head it further. This is preferable as it facilitates all nursery operations. A single stem tree offers other advantages: it is easier to handle and pack, and when planted in the field it can be headed to correct height. This will give strong trees with well-spaced branches and a well-developed crown.

## THE ILLUSTRATED STEPS OF BUD GRAFTING

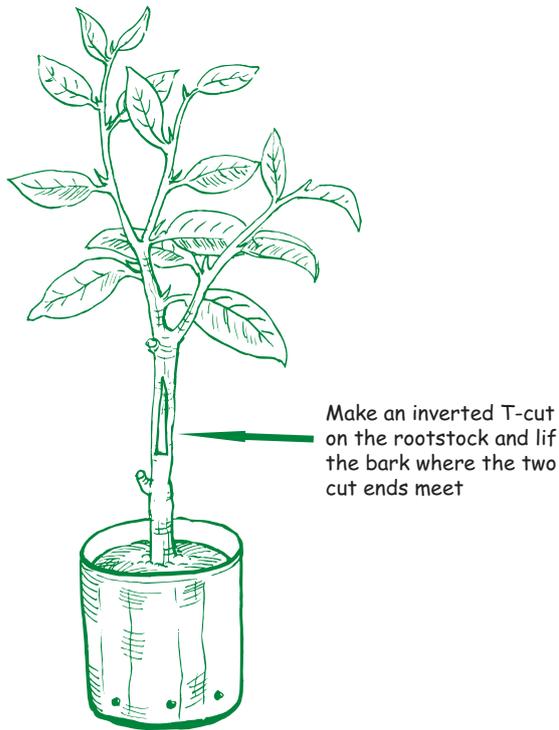
### Step 1

The rootstock you choose to use should be healthy and vigorous. Avoid using inferior stocks.



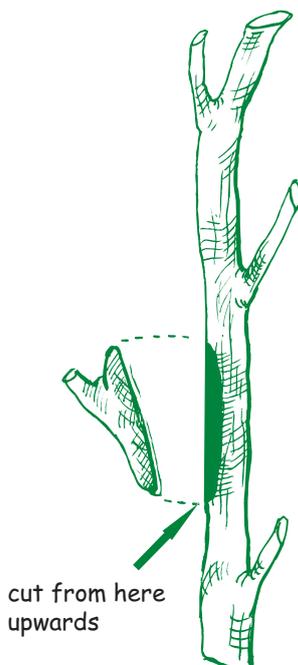
**Step 2**

Make an inverted T-cut on the rootstock and lift the bark where the two ends meet.



**Step 3**

Remove the bud from the bud wood with a clean slicing cut from below the leaf stock. It is easier if the bud wood is held with the tip facing you.



Do not slice off the bud from above the bud to avoid damaging it.

**Step 4**

Insert the bud behind the bark flap created by the inverted 'T' cut by slicing it from the bottom upwards.

Make sure that the bud is facing upwards!



**Step 5**

Slide the bud up behind the bark until it fits into the slot of the T-cut.

It is now ready for wrapping with budding tape to prevent the bud from drying out.



**Step 6**

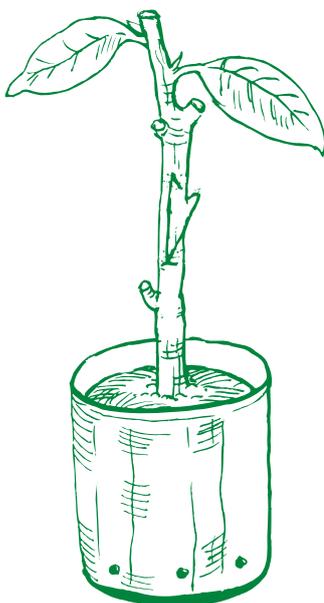
Wrap the bud with budding tape from the bottom to the top making sure all wounded areas and bud are covered.

The tape should be removed 14 days after budding.



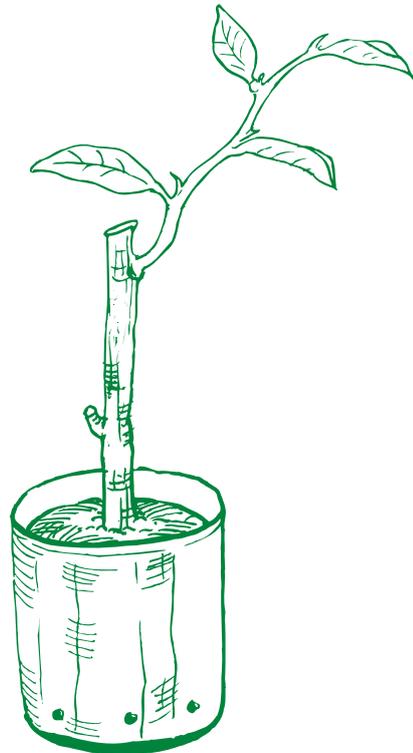
**Step 7**

If the budding was successful, the bud will still be green when the tape is removed. If the bud is green, then cut back the top of the rootstock and remove all but two or three leaves. Any new shoots that grow from the rootstock should also be removed.



**Step 8**

Cut back the rootstock to just above the newly sprouted bud. remove all shoots that grow from the rootstock. Water as required and maintain growth until they are ready for planting – usually after about 3 months





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