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Citrus Budding in Pakistan

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Introduction

Citrus varieties should be grown on rootstocks to overcome disease and soil problems. Without a rootstock, a citrus tree may not reach full production or it may die. A scion (variety) is joined to a rootstock (variety) by budding, where a small scion bud is inserted into a rootstock seedling. The scion bud grows into the upper canopy of the tree and the rootstock develops a strong trunk and root system below the bud union. The rootstock variety can also influence tree growth, fruit size and quality (taste).

Reasons for using rootstocks

- The fruit from the new tree will be the same as that from the bud source tree.
- Trees grown from seed have a juvenile stage where there are more thorns and upright growth of branches, and it can take a long time to produce good quantities of fruit.
- Rootstocks can be chosen to suit the soil conditions and influence fruit production (i.e. early maturing, high sugar content).
- Sour orange and rough lemon rootstocks (commonly used in Pakistan) produce a vigorous root system but these varieties are susceptible to many root diseases that are spreading in Pakistan. Other varieties, like Troyer citrange or *Citrus trifoliata*, may be used that are resistant to some soil diseases.

More information about rootstocks is presented in the Rootstocks for Pakistan factsheet.

Budwood selection:

Best times for budding citrus are early autumn or spring. It is best to source budwood from trees that are kept in an enclosed shade house or screen house and are free from insects and diseases. Budwood collected from orchard blocks may carry graft-transmissible diseases, such as huanglongbing, *Citrus tristeza virus* and *Citrus exocortis viroid,* which can kill trees. There is no cure for these diseases. Graft-transmissible diseases may not show symptoms in some varieties but budwood may still be infected and be a source of infection for other trees. It can also be spread to a healthy tree from an infected tree on infected cutting tools, root grafting under the soil or insects that feed between trees. Therefore it is important that budwood is sourced from trees that have been tested and found to be free from graft-transmissible diseases.

The next best source of budwood is a progeny block that has trees produced from disease-free trees and is no older than 10 years. These blocks are at government research centers and some private nurseries. It is best to inspect the budwood trees and if they look old or sick do not accept the bud-wood. Bud-wood can be sourced from an orchard, but there is a high risk that these trees will have diseases that can infect the young trees and retard their growth.

When selecting a tree to cut budwood from, choose a tree that is:

- healthy with actively growing shoots;
- productive with good quality fruit;
- does not have disease symptoms.

Select budwood that is:

- dormant - buds that have not yet sprouted;
- approximately the same thickness as the rootstock that the bud will be put onto;
- not showing signs of disease or infected with insects;
- rounded. The most suitable material for budding is found on the centre third of a shoot with rounded wood but triangular wood may be used if material is limited.

Preparation before Budding:

- Always make sure that your hands and work surface are clean before starting to bud.
- Sanitize the budding knife by dipping in a chlorine solution (90ml of water with 10ml of bleach)
- Always use a sharp knife.

Budwood collection:

- Remove unwanted wood and leaves from the shoot; leave the petioles to protect the bud.
- Use budwood within 1-2 weeks.
- Store budwood in a sealed, labelled plastic bag in a dedicated refrigerator or cool room (~5°C).
- Label the bag with the variety name and the date on which it was cut.

Chip budding

There are two main methods used to bud citrus; T budding and chip budding. Chip budding can be slightly faster than T budding, does not require the bark of the rootstock to slip and is reported to increase bud take and promote early growth.

Bud onto the rootstock at about 20 cm above the height of the potting media. This ensures that when the trees are planted the scion will be away from the soil that harbors disease.

Select a true to type rootstock plant and remove all leaves and thorns from around the region where the bud will be inserted.

1. On the budstick, make a cut about 5 mm below the bud on an angle. Then make a cut down from the top behind the bud, meeting the original cut, to remove the bud. If possible, make the bud the same length and width as the cut made in the rootstock.
2. Use a similar cut for the rootstock. Make a long shallow cut, slightly angled through the bark of the rootstock (approximately 2 mm deep and 12 mm long) using a sharp, clean grafting knife. Make a second cut to remove approximately 5 mm of the bark flap, leaving a small area of rootstock wood exposed.
3. Slide the bud in behind the bark flap so that the edge of the bud lines up with the cuts in the rootstock; if the bud is small make sure it lines up on one side.
4. Wrap the bud with about 20cm of budding tape and tie the end. The tape should be wound firmly to completely cover the bud. This ensures that the cut side of the bud has good contact with the rootstock and it will not dehydrate. If budding tape is unavailable, use a 20-30cm long and 12- 14mm wide strip of polythene. The plastic polythene should be able to be stretched by about 25%.
5. Label the grafted tree with scion and rootstock variety names and the date of budding
6. Place newly grafted plants in the shade.

Figure 1: left to right: (1) Angle cut from above/ top. (2) Cut from Bottom. (3) Removal of bud from stick. (4) Bud between fingers

Figure 2: Left to right: (1) Removing a section of bark from the rootstock. (2) Inserting a bud into the rootstock. (3) Wrapping bud with a strip of polyethylene.

Post-grafting

- Ensure the trees are watered daily to maintain good sap flow.
- Remove rootstock suckers below the graft site, which is called the graft union.
- Give grafted plants optimum water and nutrients; avoid over watering.
- Remove the tape 3 to 4 weeks after budding. Check a few buds to see if they have taken before removing the tapes from all of the trees that were budded on the same day. Remove the tape by slicing with a sterile blade on the opposite side of the rootstock to where the bud was inserted. Dissolvable budding tape does not need to be removed.
- If trees are grafted in spring, cut off the rootstock about 2cm above the graft 3 weeks after budding. If trees are grafted in autumn, wait until spring to cut off the top of the rootstock. Cutting off the rootstock will force the bud to sprout.