

# Reworking citrus trees

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### Factors to consider before reworking trees

Reworking or topworking established citrus trees to a different variety is sometimes necessary to meet changing market demands. Reworking should only be carried out on healthy trees using good quality budwood, which is free of pests and diseases, especially viruses. Ideally budwood should be sourced from the Australian Citrus Propagation Association Inc. (Auscitrus at [www.auscitrus.com.au](http://www.auscitrus.com.au)) which supplies budwood of a known health status. The new tree grafts should make good growth because of the established root system but the existing rootstock will still influence the fruit quality of the new scion.

The new scion must be compatible with both the rootstock and interstock. Incompatibility problems normally result in restricted sap flow in the tree

causing stunting and/or death of the new grafts over time. Compatibility is not known for all variety combinations but work at Gosford and more recently at the Dareton Research station has shown that reworking navel and Valencia oranges to a wide range of orange and mandarin varieties has been successful (some problems have been experienced with Kara and Murcott mandarins). Reworking lemons and grapefruit is less successful due to virus transmission and is not recommended. A summary of the health risks in reworking citrus onto different scion/rootstock combinations is contained in Table 1.

Blocks with a history of residual herbicide use may also present problems. Residual herbicides (e.g. bromacil, diuron) should not be used in the block at least twelve months prior to grafting. Wind can cause significant damage to the new grafts (causing them to break off) so consider establishing a temporary quick growing windbreak in every second row (e.g. Jumbo sorghum or sudax).

### Tree preparation prior to reworking

In late winter or early spring, cut down one side of the tree on either the eastern or southern side, unless strong winds are a problem from

Table 1. Summary of the health risks in reworking citrus into the existing scion.

| Tree to be topworked                                                                                            |                   | Grafting wood  |                |
|-----------------------------------------------------------------------------------------------------------------|-------------------|----------------|----------------|
| Rootstock                                                                                                       | Scion             | Orange         | Mandarin       |
| <i>P. trifoliata</i> , Citrange                                                                                 | Valencia or Navel | S <sup>1</sup> | S <sup>1</sup> |
| RL, sweet orange                                                                                                | Valencia or Navel | S              | S              |
| <i>P. trifoliata</i> , Citrange                                                                                 | Mandarin          | S <sup>1</sup> | S <sup>1</sup> |
| RL, sweet orange                                                                                                | Mandarin          | S              | S              |
| S = satisfactory S <sup>1</sup> = satisfactory only if grafting wood is free of exocortis and tatter leaf virus |                   |                |                |



this direction. In hot climates you need to protect the new grafts from the hot westerly sun. Leave approximately 1–2 limbs (about one quarter to one third of the tree) as nurse branches (Figure 1). These branches will help to protect the grafts and maintain sap flow in the tree.

Nurse branches:

- ✓ provide sun protection to the recently exposed parts of the tree;
- ✓ reduce the effect of strong winds on the graft area;
- ✓ maintain sap flow in the tree to allow the grafts to establish and grow rapidly.



Figure 1. Cut back the tree and leave behind 1–2 nurse limbs.

When preparing trees to be reworked by a contractor, leave an extra 150–200 mm stub on the cut branches so the contractor can remove this to allow for a fresh grafting surface.

Pruning and grafting equipment should be sterilised with a 1% bleach solution (1 part household bleach to 3 parts water). Sterilise equipment between each grafting session and when starting new blocks.



Figure 2. Paint or spray the tree with white plastic paint diluted with water (1:1).

Immediately after cutting back the tree, paint or spray all exposed trunks and large limbs with a diluted solution of white water-based paint (1 part paint to 1 part water) to prevent sunburn (Figure 2). Exposed bark is highly susceptible to sunburn with significant bark death on non-painted trunks.

Remember to reduce irrigation requirements in proportion to the reduced tree size.

### Preparation of grafting wood

Obtain rounded 1-year-old grafting wood, 5–7 mm in diameter and 100–150 mm in length with 3–6 buds. Store grafting wood in sealed plastic bags. For long term storage use long-life vegetable bags. Store in a refrigerator at 5°C until required. Keep grafting wood away from the freezer, as slight freezing of the wood will destroy it.

One to two hours prior to grafting (no longer than 2 hours) make a sloping cut 50 mm long on one side of the graft stick (Figure 3) and a shorter sloping cut 5–10 mm on the opposite side, to form a wedge (Figure 4).



Figure 3. Prepare a graft stick with a long sloping 50 mm cut on one side.



Figure 4. Make a shorter cut 5–10 mm long on the other side of the graft stick.

When taking the graft sticks into the field, ensure the material is kept cool and does not dry out (i.e. wrap in a cloth and place on freezer bricks in an esky).

## Grafting

Grafting is carried out in late winter to spring, as soon as the bark can be easily lifted from the cut surface (bark slip).

Make a fresh cut on the limb immediately prior to grafting (Figure 5). Grafted limbs should be less than 150 mm in diameter as it can take many years for the cut surface to callus over and stabilise. Cut the limb about 0.8–1 m above the ground. A low grafted tree will provide a good limb structure for the lower parts of the canopy. Trees grafted too high develop a poor tree structure and can increase the amount of ladder work required for harvesting.



Figure 5. When ready to graft, cut the top off a limb to prepare a new surface.

Two grafts per limb are used. Make a 50–70 mm vertical cut through the bark and ease the top of the bark away from the cut surface (Figures 6 and 7). Push the graft stick down under the bark flap (Figure 8).



Figure 6. Make a 50 mm to 70 mm vertical cut on the limb.



Figure 7. Peel back the bark slightly.



Figure 8. Push the graft stick into the slot.

Leave a small part of the graft above the stump (Figure 9). This aids in the formation of callus tissue that will eventually cover the cut surface of the stump.



Figure 9. Make sure about 5–10 mm of cut graft stick is above the graft union.

Secure the graft with wide 25 mm budding tape (Figure 10). The graft area and cut surfaces can be sprayed with a fungicide to prevent fungal infection if required. (Check chemical registrations for your state.)

Cover the grafts with a plastic bag inserted inside a thick paper bag (Figure 11). Cut the top of the paper bag, fold and close with a paper clip and place over the graft (Figure 12). This allows for easy inspection of the grafts later. The bags also prevent the grafts from drying out and provide shade. Tie the bag securely to the limb with strong string or plastic coated wire.



Figure 10. Wrap and tie budding tape around the grafts.



Figure 11. Prepare a paper bag with a plastic bag inserted inside it.



Figure 12. Put a paper clip on the top of the bag and secure it over the graft.

In Japan they use stretchable budding tape wrapped around the limb and graft stick. The buds are then able to break through the stretchable budding tape.

## Post Graft Management

The buds on the new graft stick should commence growing in 3 to 4 weeks. As the shoots grow, gradually open the plastic and paper bags. When the new shoots are about 20–30 mm in length (about 5 to 6 weeks after grafting), cut a 50–75 mm slot in the top of the plastic bag. The paper bag should not be closed, but have a narrow opening at the top. About 7 to 10 days after cutting the slit in the plastic bag, fully open the plastic and paper bags. Remove the bags when shoots are about 300 mm in length. Bags can be left on longer if necessary for wind protection. After removing the bags, seal the cut surface with a grafting mastic or similar compound to stop it drying and splitting.

Initially the graft union is weak so regularly prune the new growth, as wind and the weight of the foliage can cause the new scion to break or tear off. Monitor the new growth for pests such as aphids, citrus leaf miner and crusader bugs and control if necessary. Be careful when using knock down herbicides such as glyphosate as these can be absorbed through the roots of the tree and damage the new growth, especially during the first season. Adjust irrigation and nitrogen application rates to compensate for the reduced tree size.

Remove nurse limbs in the second season, and strengthen grafts by topping the new growth. Commence pruning of the new tree in the second season to establish a good framework. Topping of vigorous shoots may be required to encourage side branching.

## Advantages

- ✓ The strong, well established root system of the existing tree helps to produce rapid regrowth of the new scion.
- ✓ A quick return to full production with good crops is achievable in 3 to 5 years.

## Disadvantages

- ✗ Poor results are obtained with unhealthy trees or old trees.
- ✗ Reworking may be expensive if you need to hire a professional contractor to graft trees.
- ✗ Viruses present in the existing tree may cause graft failure.
- ✗ Some varieties are incompatible.

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ISSN 1832-6668

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Job number 8563