

leaving the petioles. It is important to leave the petioles because the scion will shed them at the base and seal itself naturally.

A cleft graft is used. The top of the rootstock is removed leaving two healthy leaves below the graft. Clean smooth cuts are essential. A scalpel is the best implement to use. The graft is tied with clear polythene grafting tape and, under no circumstances, must the top of the rootstock be covered. Petroleum jelly or vaseline is applied to the cut petioles and the wound area. The grafted plants are placed in full sunlight outside and must not be allowed to dry out. If drying out occurs the scion will be shed by the rootstock.

About two weeks after grafting, the leaf petioles commence shedding cleanly at the base and a swelling commences at the same point. At this stage the plant is potted on. Growths that arise from the rootstock should not be touched until the growth of the scion is about three to five cm. long. They are then tipped and finally removed when the scion is established and growing strongly.

So far, our success rate has not been good but I feel that we shall succeed eventually. I feel that success lies, not in technique, but in knowing when all conditions are right at the same time and in learning from our mistakes. I would strongly suggest to anyone attempting grafting eucalypts to sow seeds in lots of 50 at weekly intervals from late September to early November (spring) to give a succession of grafting material.

SOME OBSERVATIONS ON THE INFLUENCE OF TEMPERATURE ON WALNUT PROPAGATION

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For over 25 years I have been struggling with the production of named cultivars of walnuts by budding and grafting. This was taken on more by the way of a challenge than any particular interest in the crop.

Results from patch budding varied dramatically from season to season. All attempts at variation in techniques gave no conclusive answers. For several seasons there would be almost complete failure but the next season the percentage would be high and the resultant growth of the buds was always very satisfying, generally growing an average of 1.5 meters in a single season.

I then realised that temperature subsequent to budding was

an elusive factor and that, in seasons when the success was high, budding would have been followed by hot sunny calm weather for at least 10 days. This seems to be verified by the fact that successful commercial propagators of walnuts were located in climates where the weather at the time of budding or grafting could be relied on to be hot and settled.

Grafting outdoors, using dormant scions on to rootstocks that were beginning to grow, gave very low percentages, if any at all. Scions were collected when quite dormant and stored, half covered, in sawdust in a bin in a cool shady position. One problem was the copious bleeding of the rootstock when cut. It flooded the cut surfaces and seemed to inhibit callusing.

Bench grafting, using bare rooted one or two-year seedlings of *Juglans nigra* or *J. regia*, solved the problem of bleeding but callusing was still poor and the results disappointing. Grafting was done in August (late winter), using scions fresh from the tree. I then came across a reference to work done overseas with bench grafting using a hot box to induce callusing. Our initial experiment was to place a number of bench-grafted walnuts with their roots wrapped in peat in a carton lined with polythene in a hot cupboard at my home. After 21 days the callusing was spectacular but the prolonged period of heat produced another problem, that of a mass of etiolated shoots too tender and delicate to salvage. We did find, however, enough buds on the scions sufficiently retarded to use. The final result of over 60% survival encouraged us to persevere.

As this point I reasoned that the sudden activity of the rootstock and the scion while in the hot box was due to the stimulus of winter cold. If the scion was grafted before it experienced the natural cold stimulus of winter it would remain dormant. We did this by harvesting the scions immediately after leaf fall and before the tree had received much cold stimulus from winter frosts. Grafting was then done as soon as the rootstocks could be lifted after their leaf fall. The bench grafts were then placed in bags and given 15 days in the hot box at 25°C. Callusing and the health of the grafts was pleasing when they were taken out. The grafts were left in their callusing bags undisturbed and placed in an unheated glasshouse until some signs of bud movement occurred before potting. After 60 days the whole batch of 170 remained quite dormant apart from eight which made very weak short growths. This new growth deteriorated until renewed growth occurred in the summer.

Fortunately I had also picked up the information that growers in Oregon, U.S.A., which has a similar climate to ours, were collecting scions in the equivalent to our August so we decided in the past winter to keep at least half of our material for prop-

agating at this time. The second batch was grafted in August using fresh scion wood which was still quite dormant on the trees but had experienced cold stimulus with the natural wintering. When removed from the hot box after 14 days at 25°C both rootstocks and scions showed some bud movement but not excessive enough for damage to occur after exposure to light and air.

Potting of the grafts made in August was done within seven days of their being removed from the hot box. This period gave etiolated shoots a chance to green up and the plant to adapt to the cooler temperature. Plants were potted into long five pint plastic bags and placed in a tunnel house to encourage developing growth and give protection from late frosts. After 20 days the growth was very rapid, some shoots growing 25 cm in this time. In practice, we have not found that undue growth occurs in the callusing period provided they are inspected daily and removed in good time.

After this very evident success of the second batch in August we felt encouraged to continue grafting in September. This was done using scions that had been gathered in August and stored just above freezing in the cool store in peat. By this time both scion and stock had experienced a greater length of wintering and, as a result, started very rapid growth when placed into the hot box. The percentage of success dropped from 90% with the August batch to about 50%.

Fortunately we had not disturbed the first batch, apart from potting the eight that showed signs of growth. This enabled us to place them in their callusing bags in cool storage (0-3°C) in an attempt to give them sufficient cold stimulus to break dormancy. After three weeks one bag was removed and placed in an unheated house but the response to heat was still sluggish and the balance was left in coolstore for a total of seven weeks. Even then their response to warmth was not sudden but was thankfully quite even and steady.

In conclusion, the August batch of grafts was far more satisfactory than either earlier or later graftings and they emerged from the hot box neither too dormant nor too advanced. This has led us to conclude that the amount of cold stimulus that the scions and rootstocks have received prior to grafting could be very important.