

the rootstock and scion material are in excellent growing condition. This also enables the tree to continue to grow rapidly when planted into the field.

Vigor is probably the key which caused many failures in Australian macadamia propagation. CSR required medium sized seedlings to graft and efforts were made to grow trees 2 to 4 feet high in 8 to 12 months to reduce nursery costs. This growth rate has been achieved and bettered with trees grown in full sunlight and such healthy trees have improved the propagation success rate for grafts or buds. Such seedlings produce grafted trees 4 to 6 feet high which is suitable for orchard planting but is difficult for nurserymen to pack for consignment to customers. Thus other commercial nurserymen attempt to grow small but healthy trees but this is difficult to achieve with a tree which grows very rapidly when conditions are good. This conflict of nursery requirements with tree growth habits is responsible for the widely varied methods in the commercial propagation of macadamia.

## **PUNCH BUDDING OF MACADAMIA**

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Australia has many beautiful and useful native plants but macadamia is the only one under cultivation to produce food for man.

Grafting of macadamias is not as easy, as fast, or as sure as most orchard species. This is demonstrated by the early difficulties experienced with grafting macadamia and the numerous propagation methods which have been developed.

In 1969 scionwood supplies of desired cultivars was in short supply. We offset our scionwood shortage by going onto patch budding instead of grafting. Results and propagation rate were similar to grafting. (Propagation rate was approx. 100 / man / day.) It was while doing this laborious patch budding that the idea of punch budding occurred to me.

On 15th January, 1970 two 0.303 bullet shells were used to prove that macadamia buds could be punched. Our first punch-budded trees resulted from this and tens of thousands of trees produced since then have proved the benefits of punch-budded trees for CSR Limited requirements.

## REQUIREMENTS

- 2 punches — each approx. 10 cm long made from tube steel of approx. 10 mm and 7 mm inside diameter. The cutting end is slightly flattened to produce a flat sided oval shape. The cutting end is then shaped to fit stems and sharpened. Two sizes allow selection in accordance with stem size.
- Secateurs — Must be sharp and in good condition to allow clean removal of leaves from budwood.
- Budwood — Must be in good condition where the bud will lift freely and clean. Very young wood should be avoided. Mature wood which has not lost its leaves has given best results.
- PVC Tape — For wrapping the buds (a recent small trial with "Speed Easy" budding tape suggests that these may replace PVC tape).
- Colgraft — For painting bud when wrapping is removed.
- Rootstocks — Must be in good condition and have a minimum stem diameter of approx. 7 mm at a point approx. 25 cm from soil.

## METHOD

Select internode position approx. 25 cm from soil.

Select a bud to suit.

Remove bark patch from rootstock.

Remove bud from bud stick.

Place bud in position.

Wrap bud completely with PVC tape.

Allow six weeks, then remove tape.

If bud is green and healthy cap rootstock at node above bud.

Paint bud and cut on rootstock with Colgraft.

Remove any growth from rootstock as it shows.

When bud is established remove stub from rootstock.

## BENEFITS

Simple; easy; at least a threefold increase in budding rate; and, most important, a punch-budded macadamia seedling can maintain juvenile, and comparatively fast growth during the production of an advanced macadamia nursery tree.

In answer to those who suggest that we should grow cuttings or nut grafts, I can say that cuttings and nut grafts are in-

teresting alternatives which have been frustratingly slow growers in our nursery to date.

Perhaps the slow growth rate from cuttings and nut grafts is due to physiologically aged plant material. The plants produced from cuttings and nut grafts look excellent but their slow growth rate make them uneconomical as advanced nursery trees.

I believe punch budding to have application on other plants especially those which tend to have brittle, non-pliable bark.

## **EFFECT OF SUPPLEMENTARY LIGHT AND AUXIN APPLICATIONS ON ROOTING LEAFY CUTTINGS OF CERTAIN AUSTRALIAN SPECIES**

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**Abstract.** In studies undertaken with five Australian native species supplementary light was found to produce a small but statistically significant increase in the percentage of cuttings which rooted and in the number of roots per cutting. In a study using 9 species a concentrated-dip auxin application of IBA + NAA was found to be far superior to a talc dust containing only IBA in increasing both the percentage of cuttings which rooted and the roots produced per cutting.

### **EFFECT OF SUPPLEMENTARY LIGHT**

In all types of plant growth light is of major importance since it is the source of energy in photosynthesis. In rooting leafy cuttings, the products of photosynthesis are important for root initiation and growth. Therefore, during rooting, light intensity and duration must be sufficient to ensure that carbohydrate production is in excess to that required for respiration.

There is some evidence that the photoperiod under which stock plants are grown may exert an influence on the rooting of cuttings taken from them. This may be related to carbohydrate accumulation since the best rooting has been observed under photoperiods which favor carbohydrate accumulation. There are, however, examples where stock plants held under short photoperiods have produced the best rooted cuttings (9).

The photoperiod under which the cuttings are rooted may also effect root initiation. A number of workers have suggested that long days result in earlier and better rooting of many species (1,2,6,8) but delay rooting in others (4).