CONCLUSIONS

There is a great need to modify nursery practises in every aspect to produce trees for Chinese orchards of the future. Both stock and scion selection of existing and newly introduced cultivars is of paramount importance. This work has now begun. The establishment of virus-free mother tree plantings of selected clones, and their constant monitoring, is also underway.

Nursery hygiene and tree training to accommodate mechanized orchard management is a new concept now being demonstrated, together with all of the inherent benefits of container-grown tree production.

TOWARD A WORKABLE SOFTWOOD CUTTING TECHNIQUE FOR PROPAGATING AVOCADOS

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Abstract. Comparisons were made of the rooting responses of cuttings taken from terminal flushes of 'Duke 7' avocado which were stimulated by wire constriction, etiolation, marcottage, and combinations of these treatments. After seven weeks the treated terminal shoots were removed from the parent tree and placed in a peat-vermiculite mix in 125 mm pots under mist. Only seven cuttings with wire constriction, etiolation, and marcottage, or a combination of them, produced roots after 57 days. All cuttings produced a vegetative flush within 8 to 16 weeks.

INTRODUCTION

Avocado trees are usually propagated by grafting proven scion cultivars onto avocado seedlings, which are very heterozygous. Recently there has been interest in using vegetatively propagated rootstocks, particularly from the Duke 7 cultivar which has shown moderate resistance to *Phytophthora cinnamomi* (9). Frolich (5) pioneered the "etiolation technique" for vegetatively propagating rootstocks and this has been modified and patented by Brokaw (4). The modified technique involves the following basic steps:

a) A scion of the rootstock cultivar is grafted on to a nurse seedling.

b) A girdling ring is fitted over the intermediate rootstock and the grafted plant is etiolated for one month.

c) An enclosing black bag is raised, more potting mix added and the desired commercial scion cultivar grafted onto the rootstock scion (double graft).

d) The rootstock makes roots assisted by nutrients from the nurse seedling until the girdling ring constricts further development and the intermediate rootstock takes over completely.

e) The section below the ring sloughs off.

f) The scion develops and the desired cultivar on a clonal rootstocks is ready for planting out in 18 months.

A more conventional approach is to use cuttings under mist. Ben-Ya'acob and Kadman (2) showed that soft cuttings of avocado usually rooted faster than semi-hardwood cuttings, although soft cuttings were more prone to disease attack. In contrast, Assaf (1) and Bourdeaut (3) showed that semi-hardwood cuttings gave the best rooting. Reuveni and Raviv (8) found that the rooting percentage was correlated to the number of leaves retained by the cuttings.

No information is available about the establishment of scion cultivars grafted onto disease-resistant rootstocks propagated from cuttings. This experiment was carried out to assess the effects of various pre-treatments on cuttings of the *Phytophthora cinnamomi* tolerant rootstock, Duke 7, and the subsequent growth of plants from these cuttings.

MATERIALS AND METHODS

A single 6-year-old Duke 7 seedling tree from clonal Duke 7 was chosen at Tzana Farm, Alstonville, New South Wales (29°S). The following treatments were applied at random to branches of the parent tree and replicated 10 times.

1) Control

2) Wire constriction

3) Etiolation

4) Wire constriction + etiolation

5) Marcottage + wire constriction

6) Marcottage + stem wounding

7) Marcottage + wire constriction + stem wounding

In the wire constriction treatment pliers were used to place a single strand of 1 mm copper wire tightly around the penultimate flush of terminal growth. Black electrical tape was wound tightly around 6 cm of stem to effect etiolation.

Wounding was effected by means of a slanted cut 1 to 2 cm long cut half way through the stem and kept apart with a small stick dipped in No. 2 Seradix rooting powder.

Marcottage was applied with peat moss wrapped in black polythene.

After seven weeks treated shoots were removed from the parent tree and dipped in a 50:50 v/v mixture of Rite Grow No. 6 hormone rooting powder and Captan fungicide.

At the Tropical Fruit Research Station, Alstonville, these treated cuttings were placed in 125 mm red plastic pots under intermittent mist in a temperature modified glasshouse covered by 50% shadecloth and given bottom heat of 27 ± 1°C. The rooting medium of peat and vermiculite was adjusted to a pH of 6.5 with the addition of lime.

The cuttings were assessed for root development at 32 and 57 days. After eight weeks cuttings with root development were potted into 140 mm red plastic containers. Two grams of Osmocote (NPK 19:2.6:10) which releases nutrients over a 3 to 4 period were added to each container. Finally, the time to complete the first flush of growth was recorded.

RESULTS AND DISCUSSION

Five cuttings with wire constriction, etiolation, and marcottage — or a combination of them — produced roots within 32 days which is comparable to that reported by Moll and Wood (7). By 57 days another two cuttings produced roots (Table 1). However the breakdown of the temperature regime in the glasshouse when ambient air temperatures reached 36° to 38°C for three days in mid-summer caused some mortality. Despite this a total of seven cuttings which had produced roots within 57 days went on to complete a flush of shoot growth within 8 to 16 weeks after being potted into 140 mm pots.

It is stressed that excellent root systems were formed on cuttings from shoots that had been both etiolated and wire constricted. By contrast, when only one of those treatments was given to the shoots, no roots formed on the derived cuttings.

Further experiments are required to establish the reliability of a wire and tape pre-treatment for rooting cuttings. Scion cultivars would have to be grafted onto these cuttings and greater growth rates achieved than in the technique described by Brokaw (4).

Table 1. The number of 'Duke 7' cuttings forming roots in 32 and 57 days in response to treatments and the time taken to complete the first flush (adapted from Griffith (6)). Each treatment involved 10 cuttings.

Treatment	No. of days under mist: 32	57	No. of weeks to complete first flush
	No. of cuttings with roots		
1) Control	0	0	
2) Wire constriction	0	0	
3) Etiolation	0	0	
4) Wire constriction + etiolation	2	3	8, 10, 13
5) Marcottage + wire constriction	1	1	13
6) Marcottage + stem wounding	0	1	16
7) Marcottage + wire constriction + stem wounding	2	2	14, 16

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