

PROPAGATION AND DEVELOPMENT OF SOME NEW FRUIT AND NUT CROPS FOR SOUTHERN AUSTRALIA

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Many horticulturists would argue for the development of crops in areas that seem most suited to the growing requirements of the species in question. Thus, it is thought that avocados should be grown in Queensland, almonds on the Adelaide Plains, and pistachios in the Murray Valley. In general this tends to be the way things are, and so it should be.

Certain aspects of the fruit and nut market however, encourage the spread of crops into areas where their presence may be considered unusual. For example avocados in the Adelaide area. Avocados are not produced in any quantity or quality in Queensland in January or February, and in these months prices rise sharply as a result. Avocados grown in the Adelaide area are harvested later, and can supply fruit during this period. The high prices obtained compensate for the increased production costs and lower yield.

Producers of unusual fruits and nuts can take advantage of the special interest generated by their produce locally grown. There are several examples of crops whose normal range has been extended due to these market factors, and nurserymen who have attempted to tap this potential.

CLIMATIC FACTORS

Adelaide, in South Australia, seems to have a climate which is suitable for a wide range of tree crops. These include almonds, avocados, stone fruits, pome fruits, citrus, mango, guava, carob, pistachio, pecan, and quandong.

The largely frost-free winter enables almond flowers to set while avocados and mangoes comfortably survive the cold. There is enough cold weather however, to provide the chilling required for pistachios, pome and stone fruit. The good winter rains flush salts from the soil, which have built up during summer irrigation.

The moderately long warm summer provides enough heat to mature the guava, pistachio, and pecan. The low summer rainfall and humidity tends to limit fungal diseases associated with areas with a summer rainfall and high humidity. Carob, pistachio, and quandong do well free from these diseases.

It has been found that with irrigation and the use of wind breaks that a wide range of tree crops grow very well in this area.

PROPAGATION

The traditional in-ground propagation of trees was not used in our nursery. Systems for growing all species in containers have been developed. Growing plants in containers removes many of the constraints of field-grown plants and has many benefits:

- (a) Plants can be grown in disease-free soil-less media
- (b) Plants can be moved from one environment to another to maximise growth rates
- (c) Operations such as potting, moving, selling, or planting-out can be undertaken at any time.

Several innovations in propagation practices have occurred in our container-based nursery. Some of these are:

Avocados. Seed is collected in early winter (June) and heat-treated to remove possible infection with *Phytophthora cinnamomi*. They are planted into milk cartons in a light soil-less mix.

Seeds germinate evenly over-winter in an igloo and grow to grafting size by late spring. Grafting may occur at any time after this.

A whip graft is used. Grafting is usually done during a cool spell. The plants are then placed under shade for growing on. These grafted plants have established a reasonable top growth by winter and are potted-on in spring. They are grown-on under shade until they are ready for sale.

All avocados produced for commercial growers are grown in sterile soil-less mix, and raised on benches. This is to avoid infection by root-rot fungi.

Botrytis and light-brown apple moth are two consistent pests during high growth periods and must be controlled with regular sprays.

Pistachio. Field-grown trees are notoriously difficult to transplant so container-grown plants are essential.

Seeds are germinated in winter and plants reach graftable size the following winter. They are whip-grafted in winter and grow away strongly in a spring flush of growth which can be from 10 to 30 cm long. This growth hardens off in December at which time they may be planted.

Some trees will make an autumn flush of growth which may make a total growth of about 40 to 50 cm. The best planting time is from April to September.

This system of propagation relies on the slow growth of callus tissue over winter at temperatures with a typical daily range of 7 to 14°C.

Quandong. Seeds are germinated using the CSIRO technique (1). The seedlings are planted into pots when the roots are 4 to 10 cm long. Quandong, *Fusanus* spp. or *Santalum* spp., is a partial root

parasite so the host plant needs to be planted in the same container when the seedling is about 10 cm high. Gazania, lucerne, and strawberry clover have all been used successfully as host plants. Several trimmings are required to keep the host plant under control.

Seedlings can be planted out after 6 to 12 months, preferably in late autumn or early winter. Plants should not be over-watered and can be susceptible to "wet feet" in heavy soil. Many seedlings will bear 4 to 6 years after planting.

The future development of a commercial quandong fruit industry depends on the discovery of fruit types that have desirable marketing factors.

There is a high variability among field populations so an efficient clonal propagation system is needed. This will also allow the large numbers of trees needed for a commercial-sized planting. CSIRO has reported some success in this regard.

Chestnut. The Spanish chestnut is a temperate climate crop with good market potential. It is, however, very sensitive to root diseases, especially *Phytophthora* spp. There is a danger that these root diseases may be transmitted by field-grown plants from infected nursery soils and, as with avocados, growers must be confident that they have not planted infected trees.

Chestnuts are grown in containers in sterile soil in the nursery to ensure they are free of root diseases. The propagation methods are the same as for avocados, i.e. the seeds are heat-treated, germinated in sterile media, potted up into treated potting mix and grown ready for grafting.

A whip graft is made using dormant, cold-stored graft wood. Careful follow-up nursery culture results in strong growth and a tree that is ideal for planting out in autumn.

The compact fibrous root system produced in the container enables good field establishment without losses due to poor root initiation sometimes associated with larger field grown trees.

LITERATURE CITED

1. Sedgley, M. 1984. Australia's first commercial fruit? *Aust. Hort.* 82(10), 52-59.