

PROPAGATION OF SOME FRUIT CROPS IN THE 1990s

HENRY HILTON

*Nightingale Orchards
Stanley, Victoria 3747*

INTRODUCTION

The two crops to be discussed in this paper are apple (*Malus*), and chestnut (*Castanea*). Both are deciduous and are grown in the cooler regions of Australia.

The public demand for the fruits of these crops has a direct effect on the nursery production of the trees. Should a particular cultivar of apple or chestnut become hard to sell in the market place then the grower will cease to produce the fruit and demand for the nursery-grown trees will diminish. It is important, therefore, that the growers and the nurseries communicate with one another for future requirements.

Both apples and chestnuts are introduced crops to Australia, and are basically of European origin. Since the introduction of apples there has been a number of chance seedling cultivars discovered throughout the production regions.

Today and throughout the 90's the introduction of new cultivars, particularly in apples, is going to be of great importance to the nursery industry. Breeding programmes are carried out overseas to find superior cultivars which cater for people's ever-changing tastes. These cultivars are being imported through Plant Variety Rights and other means.

THE PAST/PRESENT/FUTURE

The propagation of various apple cultivars has taken place using seedling rootstocks for many years but the popularity of clonal dwarfing rootstocks has increased since the early 1960's.

Current trends in Australia are to use mainly 'Northern Spy' rootstocks, Malling Merton (M.M.) 106, M.M. 111, and some seedlings.

In the early years, trees were grown at wide spacings 7.25m. x 7.25m., (187 trees/ha.) and generally an intercrop was grown between the trees.

Currently, apple trees are planted at much closer spacings, 5m. x 3m. (680 trees/ha.). The future will see spacings even closer, 4m. x 1.5 to 1m, and in a 2 or 3 row bed system creating anything from 1000 to 1500 trees/ ha.

For these very high density plantings to be successful, dwarfing rootstocks must be used, enabling a very compact tree to be grown, which produces high quality fruit very early in its life, i.e. in years 2 to 3. Dwarfing rootstocks include: 'M.27' (most dwarfing), 'M.9', 'M.26', 'Ottawa 3', and '793' (New Zealand). The economics of

growing apples today and the public's desire for a better quality product has necessitated change. The nurseries, therefore, must keep abreast of these changes. Apple cultivars of the present and future:

Present

Red Delicious—'Starking'
 —'Hi Early'
 —'Royal Red'
 —'Richared'
 —'Royden'

'Granny Smith'
 'Golden Delicious'
 'Jonathan'
 'Delicious'

Future

Red Delicious—'Red Chief'
 —'Hi Early'

'Granny Smith'
 'Red Fuji Naga Fu2'
 'Royal Gala'
 'Golden Delicious'
 'Bonza'

During the 90's there is going to be ever-increasing pressure applied to all forms of agriculture and horticulture and the way they interact with the environment. Reduced applications of insecticides and fungicides will become a necessity. Research is currently being undertaken at the Institute of Horticultural Research, East Malling, England, to develop cultivars that have resistance to apple scab (*Venturia inaequalis*) and powdery mildew (*Podosphaera*). Should this ever be achieved then it will mean a big saving to the grower and the environment. I see the development of cultivars on their own roots as a distinct possibility, as this could result in a cheaper tree from the nursery, which is an advantage to the grower when planting densities are increased.

With the constant change in cultivars and rootstocks it is important that the nurseries can compete. They must look at their propagation techniques and outputs.

With chestnuts, however, the situation is a little different. These trees are strong growing and require plenty of room to grow and develop. Nuts are produced only on the current season's growth, therefore the greater the tree canopy, the greater the crop load. Final tree spacings can be up to 20m. square, but it is possible in the early years to plant trees a lot closer.

The propagation of all chestnut cultivars takes place on seedling stock and this is likely to be the case in the foreseeable future. There has been some work done with hardwood cuttings with only limited success.

As with apples, the public's demand for a quality product is increasing. Currently, the size of the nut is a crucial factor relative to the growers' return price. The future will also see a greater emphasis on eating quality. Again, it is important for the nurseries to keep these factors in mind when deciding what cultivars to propagate.

Chestnut cultivars grown in northeastern Victoria that are currently suitable for today's market and on into the 90's include:

'King of the Valley'; 'Sword'; 'Wandiligong Wonder'; and some privately named cultivars.

Some fruit tree propagation methods of the 90's are: stool or mound layering; hardwood cuttings; micropropagation.

Stool or mound layering and hardwood cuttings can be said to be the traditional methods used for raising apple rootstock material and will, no doubt, continue to be used for some years to come. However, with increased technology the use of micropropagation (1) will advance very quickly. Some reasons for this are:

- a) The change to dwarfing rootstocks, of which some are difficult to produce under traditional methods, e.g., 'M.26.'
- b) To bulk-up large quantities of stock quickly.
- c) To take advantage of a mutation or selection of a cultivar quickly if it has possibilities commercially.
- d) A means by which to export plants to other parts of the world.
- e) Improved performance in the orchard situation.

Some interesting research has been carried out at the Institute of Horticultural Research—East Malling, England, into the micropropagation of fruit trees where the rejuvenation *in vitro* causes vigorous growth in the field of the rootstock/scion combination of apple trees. Composite trees of apple, large enough for orchard planting can be produced routinely within three months of grafting at any time of the year. Trees of the cultivar, 'Greensleeves' were produced in 1985 on 'M9', 'M27', and 'M25' rootstocks by grafting producing 25cm. tall micropropagules. The various rootstock/scion combinations are now larger than the corresponding combinations of apple trees produced by conventional budding.

CONCLUSIONS

Development of new cultivars is a slow process, taking from ten years onwards. It is, therefore, necessary when a new cultivar is released that the maximum benefit from it be developed as quickly as possible. The techniques of micropropagation are then essential to nurseries and growers alike. To be successful in any area, from the propagation of the tree through to the selling of the fruit produced, will require a great deal of integration among the involved parties.

LITERATURE CITED

1. Jones, O and C. Webster. 1987. Micropropagation of fruit trees. rejuvenation '*in vitro*' and '*in vivo*'. *Institute of Horticultural Research Annual Report* pp. 27-28.