

# The Australian Citrus Improvement Programme

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Citrus bud selection in New South Wales (N.S.W.) began in 1928 when grower and nurserymen's organizations formed the N.S.W. Bud Selection Society. Selected candidate trees were assessed by officers of the N.S.W. Department of Agriculture over a 3-year period for cropping, fruit quality, tree size, vigor and genetic variability.

Two major developments in the mid 1940's considerably affected bud selection: a) root rot caused by *Phytophthora citrophthora* (Sm. & Sm.) Leon. caused extensive losses of trees on Rough lemon and sweet orange rootstocks during a succession of wet seasons and led to a sudden increase in demand for trees budded on trifoliate orange (Fraser, 1949); b) scalybutt was recognized as a bud-transmitted virus disease affecting trees on trifoliate orange rootstock (Benton *et al.*, 1950).

Use of trifoliate orange stocks necessitated selection of trees free of exocortis virus. Candidate trees had to be more than 10 years old and growing vigorously on trifoliate orange rootstock with no signs of scaling. Each tree had to conform to other bud selection standards. Difficulties in obtaining budwood from the few trees meeting these requirements led to the introduction of a Parent Tree Registration Scheme in 1953. This scheme provided two classes of registration: a) trees free from exocortis virus; b) trees on stocks other than trifoliate orange, which could not be guaranteed free from exocortis virus.

Trees were nominated for registration by growers or nurserymen. Nominations were referred by the Bud Selection Society to the N.S.W. Department of Agriculture for inspection over 3 years by a plant pathologist and a horticulturist. Nominated trees and trees in a 13 m radius were inspected for mutations and virus dis-

eases. Budwood from the nominated trees was screened for psorosis virus using sweet orange seedlings as indicators and for xyloporosis using seedling Orlando tangelo trees. Indexing for psorosis was done in the glasshouse but indexing for xyloporosis was done in open ground screening plots at the N.S.W. Department of Agriculture Horticultural Research Station, Somersby.

The supply of budwood from approved trees required the owner's consent, so that, as properties changed ownership, the sources of budwood often became unavailable. In 1968 a mother-tree block was established at the N.S.W. Department of Agriculture Horticultural Research Station, Dareton. Trees were planted 1.66 m apart in rows spaced at 6.6 m. Rough lemon was used as the rootstock for Eureka lemon and trifoliate orange for all other scions. Scion material included in the mother-tree block is listed in table 1. Due to salting problems, Troyer citrange is now replacing trifoliate orange as a rootstock.

The increase in incidence of Australian dieback (Broadbent and Fraser, 1976) during the past 3 years has added to the problems of maintaining mother-tree blocks. Fortunately trees with dieback are self-indexing and transmission by budding from infected trees is very low. Mother trees are regularly sprayed with 30 per cent w/v dimethoate in an attempt to keep down populations of possible vectors, and are examined closely in spring and autumn for the first symptoms of dieback. To date five trees of Seminole tangelo with early symptoms of Australian dieback have been removed from the N.S.W. mother-tree block.

As a precautionary measure, an additional mother-tree block is to be established on a wider spacing at the Viticultural Research Station, Griffith, N.S.W.

## AUSTRALIAN CITRUS REPOSITORY

A repository of virus-tested citrus is to be established soon at the Horticultural Research Station, Dareton. In addition, trees will be maintained in an insect-free glasshouse at the Biological and Chemical Research Institute, N.S.W. Department of Agriculture, Rydalmere. Scion material for these trees was collected at the time of virus screening.

This repository will form the nucleus of virus-tested mother trees for Australia. It will be the responsibility of each citrus growing state in Australia to establish and maintain multiplication units of this material. New South Wales has the responsibility for indexing material for inclusion and for establishing and maintaining the repository.

Candidate trees of the major commercial varieties of citrus are being screened for inclusion in the repository. As all citrus trees in Australia are infected with tristeza virus, candidate trees will preferably carry a mild strain of this virus. Grapefruit (Thompson and Marsh) must carry a mild strain of stem-pitting virus as evidenced by a very mild West Indian lime reaction and freedom of the scion parent from trunk pitting, stunting and malformed or small fruit.

Freedom from exocortis virus will be assumed if the scion parent has grown vigorously on trifoliate orange for 10 years and no reaction is produced on Etrog citron 60-13 or Arizona 861. Both requirements are necessary as severe strains of tristeza virus often interfere with the exocortis reaction on Etrog citron; and some scions which produce dwarf trees with no scaling of the trifoliate orange rootstock give a positive reaction on Etrog citron (Broadbent *et al.*, 1971).

Indexing for psorosis, crinkly-leaf, and tatter-leaf viruses is being done in the glasshouse using seedlings of sweet orange, Eureka lemon, Excelsa, and Rusk citrange.

Xyloporosis indexing is being done on Orlando tangelo seedlings in the field and on Ellendale tangor trees on trifoliate

TABLE 1  
SCION BUDWOOD AVAILABLE FROM  
THE N.S.W. CITRUS  
MOTHER-TREE BLOCK

Scion	Accession number
<b>GRAPEFRUIT</b>	
Davis	719N
Marsh	3962
Marsh	3970
Thompson	3513 X
Wheeny	2081 X
<b>VALENCIA</b>	
Newton	3125 X
Newton	3247 X
St. Ives	3066 X
<b>NAVEL</b>	
Bellamy	2006
Herps	2051
Houghton (Hutchinson)	3779
Lane's Late	3976N
Leng	2090
<b>LEMON</b>	
Doncaster Lisbon	3525X
Lambert nucellar Eureka	2013 X
Prior Lisbon	3924
Taylor nucellar Eureka	3402
Villa Franca	3658
<b>MANDARIN</b>	
Emperor	3585 X
Hansen	3911
Hickson	3674
Imperial	3579 X
Kara	707 X
Late Emperor	3107 X
Silverhill satsuma	3059
<b>TANGELO</b>	
Minneola	3923
Seminole	714 X
<b>TANGOR</b>	
Leng Ellendale	3239

orange rootstock in nursery containers. Field trees will be observed for 8 years but it is hoped that results for xyloporosis will be achieved in 2 years using container-grown Ellendale tangor/trifoliate orange plants.

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