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## Auscitrus — The Australian Citrus Budwood Scheme®

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### PRESENT STRUCTURE OF AUSCITRUS

Auscitrus is the trading name of the Australian Citrus Propagation Association Incorporated (ACPA). The ACPA is comprised of ten citrus and nursery industry organisations. Representatives from each of these organisations are nominated as representatives on the Auscitrus board. Auscitrus is an industry owned and operated, not-for-profit organisation. The seed and budwood scheme is entirely self-funding through seed and budwood sales. Cultivar importation, cultivar evaluation, and the maintenance of foundation trees, are funded by industry grants through Horticulture Australia Limited.

Currently Auscitrus employ a full time manager, part time administration officer, full time scientific officer (indexing), full time casual indexing assistant, full time bud cutter, full time casual bud cutter/nursery hand, plus one or two seasonal casual staff for bud cutting and fruit harvest. New South Wales Department of Primary Industries (NSW DPI) research scientists on behalf of Auscitrus carry out horticultural evaluation.

### HISTORY OF AUSCITRUS

**1927.** Fruit Industry conference recommendation to establish a controlling body for the buying and selling of selected citrus budwood.

**1928.** Cooperative Bud Selection Society formed — startup funding from government grant of £1500. First selected trees established at Narara Research Station, Gosford.

**1938.** “Certificate from Nurseries” introduced to identify trees propagated from Bud Selection Society’s budwood.

**1941.** *Phytophthora citrophthora* discovered to be cause of extensive tree losses in Australian orchards. Demand for trees on highly resistant *Poncirus trifoliata* stock increased.

**1947.** Scaly butt (exocortis viroid) recognised as bud transmitted disease affecting *P. trifoliata*.

**1952.** Australian Citrus Improvement Association (ACIA) formed with objectives including virus screening/indexing, breeding, selection, improvement, and evaluation of rootstocks and scions.

**1967.** Dareton selected as the site for budwood multiplication plantings, managed by NSW Department of Agriculture specifically for budwood production.

**1969.** Horticultural Stock and Nurseries Act (HSNA) passed.

**1974.** HSNA came into effect by Proclamation — all trees sold must bear a label to specify: name and address, and registered number of nursery, kind and cultivar of scion, kind of rootstock (if applicable), and either the declaration “Propagated from approved material obtained from the NSW horticultural propagation co-operative society limited”, or “Not propagated from approved material.”

**1990s.** South Australian (SA) (est. 1950s) and Queensland (est. 1931) schemes ceased supplying budwood. Queensland due to presence of severe stem pitting strains of Tristeza virus in the region, and SA due to limited indexing capacity (SA scheme now operates in association with Auscitrus, providing a supplementary supply of seed and budwood, indexed for disease by Auscitrus). Australian Citrus Propagation Association scheme now the main supplier of budwood to all Australian states.

**1993.** Australian Citrus Propagation Association Inc. (ACP) formed.

**2000.** Horticultural Stock and Nurseries Act abolished — industry unregulated from this point on.

**2001.** ACP merged with ACIA, began trading as Auscitrus.

## **CITRUS SEED/BUDWOOD PRODUCTION**

The majority of plantings are on the NSW DPI Research Station at Dareton NSW (2075 budwood trees of 108 cultivars, 664 seed trees of 32 cultivars). Current budwood sales are around 700,000–800,000 buds per year, seed around 600–700 kg (around 3 million seeds).

Auscitrus operates under deed of license with NSW DPI for seed/budwood production at Dareton, Griffith, Gosford, and for disease testing at Camden.

NSW DPI staff performs general operations such as irrigation, fertigation, and weed and pest control in budwood and seed blocks, under direction of the Auscitrus manager.

Auscitrus source quantities of seed from plantings at Gosford NSW and Monash, SA, and budwood from Monash, SA and Griffith, NSW.

A rapid multiplication polyhouse at Dareton is used to grow budwood of newly released cultivars while field budwood trees become established. All budwood is cut to order, trimmed of leaves in the field, sealed in plastic bags, and placed in a cool room to remove field heat, and for short-term (few days at most) storage.

The majority of seed and budwood is distributed via Australia Post. Budwood is packed into foam boxes with an ice container, packaged in cardboard, and sent around Australia. Three days is usually the maximum time in transit, most areas are 2 days, and some customers receive their budwood the next day.

## **DISEASE TESTING**

All disease testing is carried out at Elizabeth Macarthur Agricultural Institute (EMAI), NSW DPI, in Camden, NSW. Budwood trees are indexed every 2 years on Etrog citron indicator plants for citrus exocortis viroid (CEV) and for milder viroids (CVd I-IV) that may cause dwarfing. Trees showing suspect symptoms are further

tested for pathogens using sequential polyacrylamide gel electrophoresis (sPage) laboratory tests to determine which viroids are present. All budwood trees are indexed once every 6 years on sweet orange seedlings for orange stem pitting strains of citrus tristeza virus (CTV) and for psorosis virus. Grapefruit trees are particularly susceptible to stem pitting strains of CTV, and so are indexed annually to determine the severity of the CTV strains present. Seed trees are indexed every 6 years for psorosis virus. Other significant citrus diseases found in Australia are not seed transmitted.

Shoot-tip grafting *in vitro* is used to remove viruses and viroids from infected plants when necessary. This involves excising a 0.15-mm shoot tip from the infected plant (which hopefully does not carry the virus), and grafting onto a 2-week-old rough lemon seedling growing in sterile agar medium in a test tube. If successful, the resulting grafted seedling is grown on and indexed to confirm the virus/viroid has been removed.

Two trees of each cultivar are held in an insect-proof screenhouse at EMAI, Camden, as foundation virus free (FVF) trees. Many varieties also have two trees each pre-immunised with a protective strain of citrus tristeza virus (CTV PB61), which protects against severe stem pitting strains of CTV as found in Queensland. All trees propagated for budwood supply are propagated from budwood from these trees.

### **BENEFITS OF AUSCITRUS SCHEME TO INDUSTRY**

The scheme provides a readily available source of citrus seed and budwood of highest possible health status from trees routinely checked for trueness-to-type and grown specifically for budwood production. High health status maintains productivity of orchards and therefore improves competitiveness in export markets and viability in domestic markets.

The scheme ensures trueness-to-type of orchards and therefore consistency of product, which flows on to consumer confidence in product. It is also a part of a larger strategy to maintain access to markets with strict quarantine regulations, e.g., budwood or seed movement can spread citrus canker. The scheme also provides access to budwood of newly developed or imported cultivars, enabling access to potential export markets.

### **WHY DO OUR CUSTOMERS USE THE SCHEME?**

#### **Growers.**

- Major rootstocks/cultivars grown are intolerant of graft transmissible diseases found in growing regions, and infection has serious effect on yields.
- Long-running education campaign (spanning decades) to stress importance of using clean propagation material from the citrus budwood scheme.
- Most growers respect the risks involved in planting infected trees in an orchard.
- As establishing an orchard involves a large investment, growers appreciate the security in using a known source of propagation material, tested for trueness-to-type and of the best available clonal material for each cultivar.
- Many of the better nurseries promote the use of Auscitrus material to growers.

### Nurseries.

- Understanding of the implications of introducing a graft-transmissible disease into the nursery.
- Customer demand for trees propagated from healthy, tested material.
- Confidence in quality of material grown specifically for propagation (not harvested from orchards).
- Pride in quality of trees produced.
- Convenience of having seed/budwood arrive ready to use.
- Sometimes no other source of material available.

### IMPEDIMENTS TO SUCCESS OF SCHEME

- Perception that there is no advantage in using virus-tested propagules, due to lack of education on the subject or ignorance.
- Perception that quality of budwood is not as good as budwood cut by the nursery (not necessarily justified).
- Lack of recognition of the value of budwood.
- Long lead-time (5–6 years) from release of cultivar to production of commercial quantities of budwood, encourages nurseries to rapidly multiply their own budwood.

### MAJOR RISKS TO SCHEMES LONG-TERM OPERATION

The scheme is dependant on a handful of individuals and their specialist skills could be difficult to replace. Similarly a breakdown in scientific support could lead to loss of credibility and reduced confidence in health status of propagules.

Any serious disease outbreak in parent trees could devastate the scheme.

The cost of propagules may turn nurseries away from using scheme, which is a compounding problem (i.e., reduced sales, therefore need to increase price to recover fixed costs, which leads to reduced sales again). Finally, there is a certain supply point where scheme becomes economically unsustainable.

### FUTURE OF AUSCITRUS

Increases in the costs of running the scheme on Government land will affect the viability of the seed and budwood operation, so our aim is to move the production components onto Auscitrus-owned land. We will maintain links with DPI for cultivar evaluation and scientific support in order to retain scientific base to the scheme.

We recently acquired a parcel of land, which will be privately owned by Auscitrus on behalf of the citrus industry. Operations will start moving to the new block in 2005. Our aim is to start planting new seed and budwood trees in Spring 2006. The new seed and budwood block should be fully operational and producing 100% of the industries requirements within 10 years.

**Accreditation of Citrus Nurseries.** Auscitrus is working on bringing in a formally audited citrus nursery accreditation scheme, so that nurseries who comply with the requirements of accreditation (and are audited for compliance) can promote their planting material as coming from an accredited source.

**Accreditation of Schemes Operations.** A formal quality assurance scheme is being put in place to ensure continuity of the operation should key personnel leave.

## POINTS TO CONSIDER WHEN SETTING UP A PROPAGULE SCHEME

Firstly the goals of the scheme must be identified, e.g., disease freedom (or known status), selection of best-performing clonal lines, trueness-to-type, production and distribution of propagules, or all of the above.

There must be enough usage of the scheme over a long period to make it financially viable. Low usage will result in high cost per propagule to recover costs, which will further reduce usage. There must also be a significant advantage to the general industry in using the scheme, otherwise it will be underutilized and may fail.

If health status is an important feature of the scheme, sound scientific support is required to identify the respective diseases, to determine suitable testing regimes, and to carry out the testing. This needs regular review and assessment, preferably by independent peers in the scientific community.

There may be a large capital requirement to set up the scheme — industry funding or grants may be required. People will also need to be recruited to run the scheme — finding the right person, who has the industry's well-being at heart, can be difficult. Strategies need to be put in place to allow for key staff to be replaced without jeopardizing the schemes operations.

Accreditation of nurseries can be a significant aid in increasing usage of the scheme, however this can be a complex and controversial system to implement.

The scheme must have the support of the major industry bodies, and preferably advisory services such as Department of Primary Industries, etc.

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## Some Problems in Water Recycling<sup>©</sup>

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Strict water regulation by the Council of Australia Governments is imminent. Tight controls in water use will make us all more frugal with Australia's limited water resources — having to make do with a lot less. We will be forced to conserve water and use it without degrading the environment. The government plans to return rivers to their original flows.

At Alstonville we are blessed with an average annual rainfall of 1600 mm, mainly falling in the first half of the year. The creek flowing through the property is unreliable and the underground water supply also proved unreliable. Water recycling was the answer. It seemed to be very expensive at the time but should give us dividends in the future. Our system has minimal effect on the environment and gives us a secure water supply.

Ten years of water recycling has revealed a range of challenging problems. We chose a 12.5-ha site for our nursery. The production area is located on a gentle slope all running down to a catchment dam. We received considerable assistance from N.S.W. Agriculture in the design of our system (Fig. 1).

All production areas were leveled and graded to a 1–80 fall. Drains were formed with 200- $\mu$ m plastic with agricultural pipe laid in drains, 7-mm blue metal was laid around the pipe. A 75-mm depth of 20-mm blue metal was then laid on plastic covered by weedmat. All areas were piped away commencing with 150-mm PVC underground in low volume areas, with the size increasing as volume increased to 225 mm into catchment dam. All drainage is in straight lines, with storm water pits