

# **Ensuring high health planting material for citrus**

Tim Herrmann  
Australian Citrus  
Propagation Association Inc

Project Number: CT04022

## CT04022

This report is published by Horticulture Australia Ltd to pass on information concerning horticultural research and development undertaken for the citrus industry.

The research contained in this report was funded by Horticulture Australia Ltd with the financial support of the citrus industry.

All expressions of opinion are not to be regarded as expressing the opinion of Horticulture Australia Ltd or any authority of the Australian Government.

The Company and the Australian Government accept no responsibility for any of the opinions or the accuracy of the information contained in this report and readers should rely upon their own enquiries in making decisions concerning their own interests.

ISBN 0 7341 1512 1

Published and distributed by:

Horticultural Australia Ltd

Level 1

50 Carrington Street

Sydney NSW 2000

Telephone: (02) 8295 2300

Fax: (02) 8295 2399

E-Mail: [horticulture@horticulture.com.au](mailto:horticulture@horticulture.com.au)

© Copyright 2007



*Know-how for Horticulture™*

**CT04022**  
**(Completion date 30/04/2007)**

**Ensuring high health planting material for citrus**

**Author:**  
**Tim Herrmann**

**Research Provider:**  
**Australian Citrus Propagation Association Inc**

**Project number:**

CT04022

**Completion date:**

30/04/2007

**Project title:**

Ensuring high health planting material for citrus

**Project leader:**

Tim Herrmann  
Auscitrus Manager

**Contact details:**

PO Box 269  
Dareton NSW 2717  
Ph 03 5027 4411  
Fax 03 5027 4744  
Mob 0417 570065  
Email [tim.herrmann@auscitrus.com.au](mailto:tim.herrmann@auscitrus.com.au)

This is the final report for project CT04022.

Funding for this project is through Horticulture Australia Limited, supplemented by Auscitrus own funds. Other sections of this development are funded by the Federal Governments Regional Partnerships program.



Report date: 27 March 2007

*Any recommendations contained in this publication do not necessarily represent current HAL Limited policy. No person should act on the basis of the contents of this publication, whether as to matters of fact or opinion or other content, without first obtaining specific, independent professional advice in respect of the matters set out in this publication.*

## Contents

Media Summary .....	2
Technical summary .....	3
Introduction .....	5
Material and methods .....	6
Results .....	7
Discussion .....	7
Technology Transfer .....	11
Recommendations .....	11
Acknowledgements .....	11

## **Media Summary**

The project “CT04022 Ensuring high health planting material for citrus” was designed to assist Auscitrus in the development of essential infrastructure for a new citrus seed and budwood multiplication development in Dareton NSW. Auscitrus provides a significant proportion of the citrus industries propagation material, by supplying citrus seed and budwood that has been tested for disease and assessed for trueness to type. Through the use of this material, the Australian citrus industry can establish and maintain orchards of a high health status, of known performing citrus clones.

Key components of this project included:

- The development of business plans for the new development
- Development of infrastructure essential to the development, including
  - Electricity supply
  - Clearing re-growth
  - Preparing nursery and shedding sites
  - Fencing
- Soil surveys
- Installation costs associated with establishment of new citrus foundation repository houses

From the basic infrastructure set up through this project, Auscitrus has begun development of a modern facility, designed from the outset for the production of citrus propagules under strict biosecurity and quality regimes. This will eventually solve past issues with under supply of seed/budwood, and will improve efficiencies and allow greater control over operating costs.

As this new development comes on line over the next few years, Australian citrus growers and nurseries will have available a world class resource, and this asset to the industry can be utilised by growers and nurseries in all growing regions across Australia.

## Technical summary

The existing Auscitrus plantings are predominantly on the NSW DPI&F research station at Dareton NSW, with some plantings utilised for budwood at Griffith NSW (also NSW DPI&F), and some seed sourced from SACIS (South Australian Citrus Improvement Society) plantings at Monash, SA. Seed has been sourced from NSW DPI&F Research station at Gosford, NSW, but use of this source is currently being phased out.

A decision was made some years ago to work towards purchasing and developing a property wholly owned and operated by Auscitrus, on behalf of the Australian Citrus Industry. This decision was made for a number of reasons, including:

- Lack of control of operational parameters while operating on NSW DPI&F land
- Lack of control of operational costs (especially staffing costs)
- A need to expand plantings to satisfy industry demand for seed and budwood
- Inadequate area in current plantings to plant new, contiguous areas of seed and budwood trees
- Lack of control of biosecurity on existing plantings
- An urgent need to expand the nursery rapid multiplication system
- An urgent need to upgrade the nursery rapid multiplication system to meet NIASA standards
- The requirement for an office facility to house Auscitrus staff now that administration has been relocated to Dareton

A property has been purchased on River Road in Dareton to allow expansion and relocation of Auscitrus operations. The chosen site was previously occupied by CSIRO for horticultural research, and consists of 32 ha in total, of which 11ha are suitable for citrus field production. Non-irrigable land will be utilised for construction of the nursery/shedding/office complex, and to provide a buffer zone around seed and budwood plantings.

This project has focused on assisting Auscitrus with the development of infrastructure, as follows:

Business plan – a business plan was prepared by Scholefield Robinson Horticultural services, which assessed and detailed the likely costs and timelines associated with this development. This business plan was used as the basis for budgeting and project management by Auscitrus management.

Clearing/Preparation of site – local earthmoving contractors were employed to clear remnant vegetation from CSIRO's occupation of the land and native re-growth, to remove an old and derelict fence line, and to clear and level the site for the shedding and nursery buildings.

Provide power and water to the site – a power pole and transformer was installed by Country Energy and connected to the supply running past the property. A variable speed irrigation pump was installed on the river site, which will supply irrigation water to the field and nursery.

Fencing – a 1.6m high ring lock mesh fence was erected around the property, topped with barbed wire to deter human access and rabbit proofed at the base. This fence will restrict access to two gates, both of which will have access controlled to essential staff only to enhance biosecurity.

Foundation greenhouse – The citrus foundation trees are currently housed at the NSW DPI&F EMAI facility at Camden, however the decision was made to shift these trees to the Auscitrus property at Dareton. This project assists in the costs of establishing a new foundation

screenhouse on the new Auscitrus property. Once established, rootstocks will be grown in insect proof conditions (to preclude aphids, vectors of Citrus Tristeza Virus) and new foundation trees will be established from budwood sent from the existing trees at EMAI.

Soil surveys – soil surveys were carried out by Sunraysia Environmental services, which identified the areas suitable for citrus production, and highlighted areas requiring amelioration with ripping and/or mounding.

The significant outcome from this project has been the development of essential infrastructure to allow Auscitrus to commence the development of this new facility for the Australian Citrus industry. The development is now progressing rapidly, with shedding and nursery structures complete and land ready for planting. Irrigation pumps are installed and awaiting connection to the main line, and the electricity is connected awaiting completion of internal cabling.

Once complete, this development will provide Australia with a world class facility for seed and budwood production. A high level of biosecurity will be inherent in the design, and improvements in design and layout will permit implementation of improved quality assurance systems.

This will lead into the introduction of a seed and budwood certification system for citrus nurseries, which will ensure growers can source planting material of the best available quality. Further work is required in the future to establish the parameters for the operation of an industry endorsed certification system.



## **Introduction**

The Australian Citrus Propagation Association Incorporated, trading as Auscitrus, has existed in one form or another for many years, with a background dating back to the early 1900's. Its function and purpose has evolved over this time, to the point where it now supplies the majority of citrus seed and budwood (tested for disease and trueness to type) to the Australian citrus industry, and is the primary industry organisation responsible for importation and evaluation of new citrus varieties.

Auscitrus is also responsible for overseeing the maintenance of the citrus foundation repository, a resource belonging to the Australian Citrus industry which holds two trees of each commercial variety in a virus free state in insect proof screenhouses. This facility is currently located at EMAI Camden, NSW.

Auscitrus has close ties with the NSW Department of Primary Industries, and the majority of its seed and budwood source plantings are currently located on the NSW DPI Research Station at Dareton, NSW. While this arrangement has been largely successful in the past, some uncertainties surrounding the long term future of research facilities, along with continued uncontrollable increases in operating costs, has made it necessary to develop a new facility owned and operated by Auscitrus on behalf of the Australian citrus industry. Much of the infrastructure presently used by the scheme, particularly nursery facilities and offices, is in urgent need of expansion and redevelopment. In addition, many plantings of critical commercial varieties are inadequate to supply industry demand and must be expanded. All of these issues can be best resolved by developing a new property, rather than trying to redevelop existing sites.

The final outcome from this development will be a consolidation of Auscitrus current activities at NSW DPI research facilities at Dareton, Griffith, and Gosford, as well as relocation of some functions from EMAI, Camden. In particular, the shifting of the foundation repository currently held at EMAI will allow experienced Auscitrus nursery staff to manage and maintain these trees, in conjunction with other nursery duties in the Auscitrus rapid multiplication nursery. The foundation repository screenhouses currently used at EMAI are too small in area and too low in roof height to allow the repository trees to grow to a suitable size to allow fruiting and trueness to type checks. This new development will see a modern, high roofed structure built to accommodate these trees.

Also key to this new development is the integration with a sound quality assurance scheme, and implementation of strong biosecurity protocols. An inherent problem with operating on a research facility is the lack of control of access to field plantings, a situation which places seed and budwood plantings at risk of contamination by visitors. All facilities in the new development have been designed from the outset with biosecurity as a primary consideration, and the nursery facility has been designed to comply with NIASA nursery accreditation standards.

In summary, this project aims to kick-start the development of this property, which will result in improved supply of propagation material of key citrus varieties, the establishment of a world class, quality assured seed and budwood production facility, and relocation of the citrus foundation repository onto an industry owned and operated facility.

## **Material and methods**

Commissioning of business plan – a business plan was prepared by Scholefield Robinson Horticultural Services which detailed the likely costs and timeframes associated with the development of this new property. Industry standard costings were used for many items, and the total likely cost of labour was calculated.

Land clearing – the site selected was Crown Land on River Road, Dareton, and was previously leased by CSIRO for horticultural research. As such, the area to be developed had already been cleared and worked for horticulture, however substantial re-growth of native vegetation had occurred, and some remnants of CSIRO's plantings remained on the property. A contractor was employed to clear this re-growth, clear old fence remnants, and prepare the area for planting and buildings.

Preparation of site – Additional earthworks were required to prepare the nursery and shedding sites. An excavation contractor was employed to level the pads for shedding and nursery structures.

Provide power and water to site – Power lines run past the property, but there was no power supply to the site. A new power pole was erected, with a suitably sized transformer, and this was connected to the power grid. An irrigation pump has been installed on the river to supply water for field and nursery irrigation and seed processing.

Security fencing – a 1.6m high boundary fence topped with barbed wire was installed to preclude rabbits, kangaroos and stock, and to deter human access. Access is restricted to two gates, one for each side of the road (the property is split by River Road into a northern and a southern section). These gates are lockable, and will enable access to the property to be restricted to key personnel only, or to visitors who must first sign in at the office. This fence was installed by a contractor following conventional fencing practices.

Shifting of foundation screenhouse from EMAI to Dareton – an insect proof screenhouse has been designed, constructed, and delivered to the site, and is awaiting installation during calmer conditions in late April/May. This will house new foundation trees.

Soil surveys – soil surveys were conducted on the new property by Sunraysia Environmental using standard soil survey techniques, and a detailed report with accompanying survey maps was provided.

## Results

All of the tasks listed above have been completed.

## Discussion

The development of the new Auscitrus property is progressing well, now that council approvals have been obtained. Delays in obtaining some of the necessary approvals have held up this development for some time, and hence milestone dates for this project had to be moved back. All approvals required are now complete, and work is able to progress as fast as the availability of contractors and equipment will allow.

The soil surveys showed some 11 hectares of soil on this property suitable for citrus production under drip irrigation. Some areas will require shallow ripping to break a natural hard pan, and one area could benefit from mounding to increase the useable area of soil. This area coincided with the area previously farmed by CSIRO, and the purchase of the property conveniently included a combined right to pump and irrigate this area, so additional approvals for irrigation were not required. Separate water allocation licenses have been purchased by Auscitrus, and more will be purchased as the development commences.



Figure 1 soil survey pit

Native vegetation issues were overcome by the fact that the native vegetation on the property is classified as re-growth, and so this was able to be cleared without further approvals. All larger vegetation was cleared by heavy equipment, while remaining small growth was slashed and the area harrowed to remove small bushes and remnants of sticks and stumps. The entire area to be planted is now ready for sowing to a cover crop of cereal rye.

The development of the nursery/shedding site was more complicated than expected. This was largely because of the sloping site selected for the nursery complex, which required significant earthworks to provide level sites for sheds, nursery structures, and surrounding work areas. This is now complete, with a very workable site forming the basis of the complex. This site was chosen because it was an area of very poor, shallow soil. Although other sites were flatter, they were generally good citrus growing soil, and it was decided not to waste good soil by placing buildings on it.



Figure 2 nursery site

A new power pole was required on the property to feed the irrigation pump and nursery/shedding complex, along with a new three phase 200kva transformer. This was installed by Country Energy, and is awaiting connection to sheds and irrigation pumps.



Figure 3 Power pole and transformer

A secure fence was erected around the entire perimeter of the property. This fence is 1.6m high and topped with barb wire, and is constructed of a ring-lock mesh with rabbit proof netting at the base. This has formed a very strong boundary fence which will serve to keep out rabbits, kangaroos, and people. As biosecurity is a primary focus of this new development, all access is restricted to one gate on each section of the property. The gate on the northern section will only allow access to key staff for working the budwood orchard and harvesting budwood. An automatic remote controlled gate will be installed in the future to ensure this gate remains closed and locked at all times. The gate on the southern section opens into the nursery/shedding complex, and will open directly onto the office building once it has been built. A further gate and internal fence will restrict all non-essential visitors to the parking area in front of the office, and

all visitors will be required to sign in and be escorted onto the property following Auscirus biosecurity protocols. An additional internal fence will isolate the nursery complex from other orchard operations, and provide a second layer of security to the foundation repository and other nursery structures. A monitored security system will be installed into all nursery buildings once construction is complete.



Figure 4 Fence surrounding property

The decision was made to construct a new screenhouse at Dareton, and to propagate new foundation trees from the trees at EMAI, rather than to shift the existing trees. This was to minimise the risk involved in transporting disease free trees 1000km across the country, and to allow re-propagation onto a more suitable rootstock. Many of the existing foundation trees are propagated on rough lemon rootstock. This places the trees at considerable risk of death if an infection with *phytophthora* root disease were to occur, and otherwise results in a large and difficult to control tree. Propagation onto *P. trifoliata* rootstock will give strong resistance to *phytophthora*, and will result in a smaller, more manageable tree. A suitable screenhouse has been purchased from Redpath, VIC, which is significantly larger (600 square metres) and taller (4 metres to the gutters) than the existing screenhouse. This will be installed on the new site, rootstocks propagated in this house (hence kept virus free), and these rootstocks will be budded to each of the varieties in the foundation repository as soon as the stocks are ready. Once these new trees have fruited and are proven true to type and disease free, a decision will be made as to the future of the trees in the EMAI screenhouse.



Figure 5 Foundation screenhouse components on site

In general the development is on time and in budget. Several budget items were under budgeted initially, however funding was able to be reallocated from other items to maintain the overall budget figure within the expected figure. This project has funded the initial works of many of the development processes, however there are significant other funds coming from other funding bodies and Auscitrus's own funds to complete the project.

It is expected that development works will continue for another 2 years, and then another 3-4 years will elapse before significant quantities of seed and budwood are supplied from this property. After this time, the Australian citrus industry should see the benefits of expanded plantings of seed and budwood trees, and will be benefiting from the improved standards of operation and efficiencies resulting from having an industry owned and operated seed and budwood production facility. More immediate results will be seen in the increase in supply of budwood from nursery rapid multiplication, and in the knowledge that the citrus foundation repository trees are safely maintained in industry hands on an industry owned property. The nursery will be NIASA accredited as soon as it is operational, and a modern drip irrigation and advanced fertigation system will be in place for rapid growth of seed and budwood trees.

## **Technology Transfer**

The technology resulting from this project is not directly transferable, although the benefits to the wider citrus industry will be conveyed to growers and other industry people through regular updates in Australian Citrus News, local Sunraysia print and radio press, and presentations at grower meetings (including Australian Citrus Growers conference, April 2007).

An official opening will take place once the majority of the development is complete, at which time a series of posters (and power point presentations) will be displayed showing the progress of the development from start to finish, and outlining the benefits to industry of this new development.

Indirect evidence of the improvements associated with this development will be a decrease in the level of shortfalls of seed and budwood of some varieties in future years, and an increase in the consistency of quality of seed and budwood produced by the scheme.

## **Recommendations**

This project has started this new development off, but as stated earlier there is still much to do to finalise the development and ensure it is a world class facility once complete.

Future works may include the development of semi-commercial trial blocks for evaluation of new varieties, or possibly the development of larger insect proof screenhouses for growing budwood in a protected environment.

Ongoing promotion of Auscitrus to industry is required to ensure maximum returns from this investment. Support from growers and nurseries is essential if the scheme is to retain it's current levels of return and therefore remain viable.

Further research is needed on streamlining the disease indexing process, and reducing the overall cost of indexing. Developing efficient but reliable methods of testing for the major citrus diseases would greatly enhance the Auscitrus scheme, and would reduce operational costs, thereby allowing a reduction in the cost of seed and budwood borne by the citrus growers and nurseries.

## **Acknowledgements**

The support of the Auscitrus Executive committee must be acknowledged, particularly regarding their vision for the future of the Auscitrus scheme.

Assistance in the planning process from selected citrus nurserymen was invaluable in determining final designs and layouts for the nursery complex. Also invaluable was advice from the NSW Nursery and Garden Industry Development Officer.

The support of Australian Citrus Growers must also be acknowledged, whose assistance with this and other funding applications has enabled this development to be completed to a high standard.