



auscitrus

**Australian Citrus Propagation Association
Incorporated**

ANNUAL REPORT

2021

DRAFT

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GOVERNANCE

MISSION STATEMENT

Auscitrus will ensure that adequate supplies of healthy, true to type, and certified citrus propagation material are produced in a scientifically sound, efficient, and economically sustainable manner

AUSCITRUS MEMBER ORGANISATIONS AND DELEGATES

Member organisation	Delegate
Citrus Australia Ltd	David Stevens (grower)
Nursery and Garden Industry NSW & ACT	Gary Eyles (nursery)
Nursery and Garden Industry NSW & ACT	Mark Engall (nursery)
Nursery and Garden Industry Qld	Wayne Parr (nursery)
Nursery and Garden Industry VIC	Sean Arkinstall (nursery)
Queensland Citrus Improvement Scheme	Nick Ulcoq (grower)
South Australian Citrus Improvement Society	Mike Arnold (grower)
South Australian Citrus Improvement Society	Steve Burdette (nursery)
Sunraysia Citrus Growers	Greg Chislett (nursery)
Sunraysia Citrus Growers	Matt Cottrell (grower)
WA Citrus	Anthony Innes (nursery)

AUSCITRUS EXECUTIVE COMMITTEE

Mike Arnold (Chairman)

Wayne Parr (Vice Chairman)

Gary Eyles (Public Officer)

Steve Burdette

Greg Chislett

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BUDWOOD SCHEME

Final bud sales for the 2020/21 season were:

Public varieties 1,044,139

Private varieties 173,614

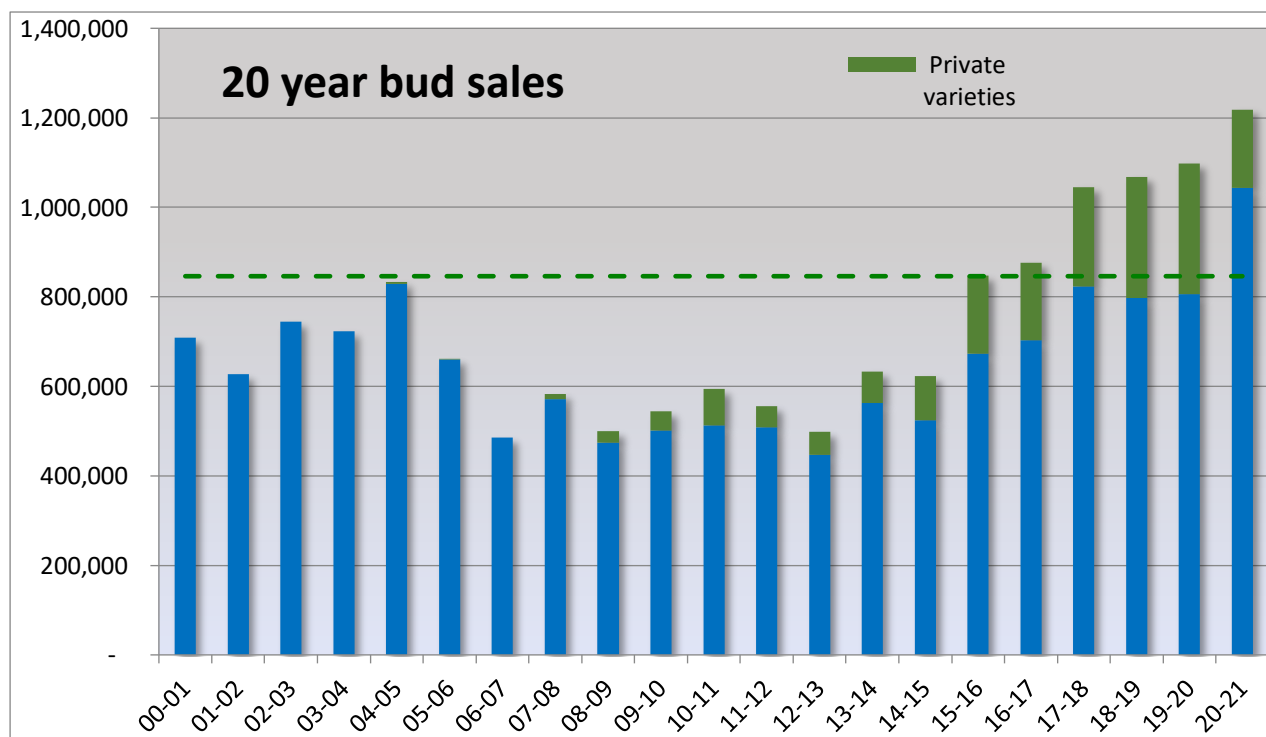
For a total of 1,217,753 buds.

This turned out to be record sales, surpassing last year's sales of 1,098,438. Previous high for public varieties was 823,012 in 2017/18.

Top 10 varieties for the year were:

Variety	Total
Navel Washington	155,401
Afourer	151,179
Cara Cara Navel	80,370
Lime Tahiti	62,409
Lemon Eureka	50,725
Lane Late Navel	49,969
Hamlin	41,170
Lemon Meyer (806)	38,894
Keenan Valencia	36,860
Imperial Mandarin	35,166

Demand was very high for Washington and Afourer, and some nurseries used budwood from indexed orchard trees. Original orders for Afourer were around 300,000 buds.

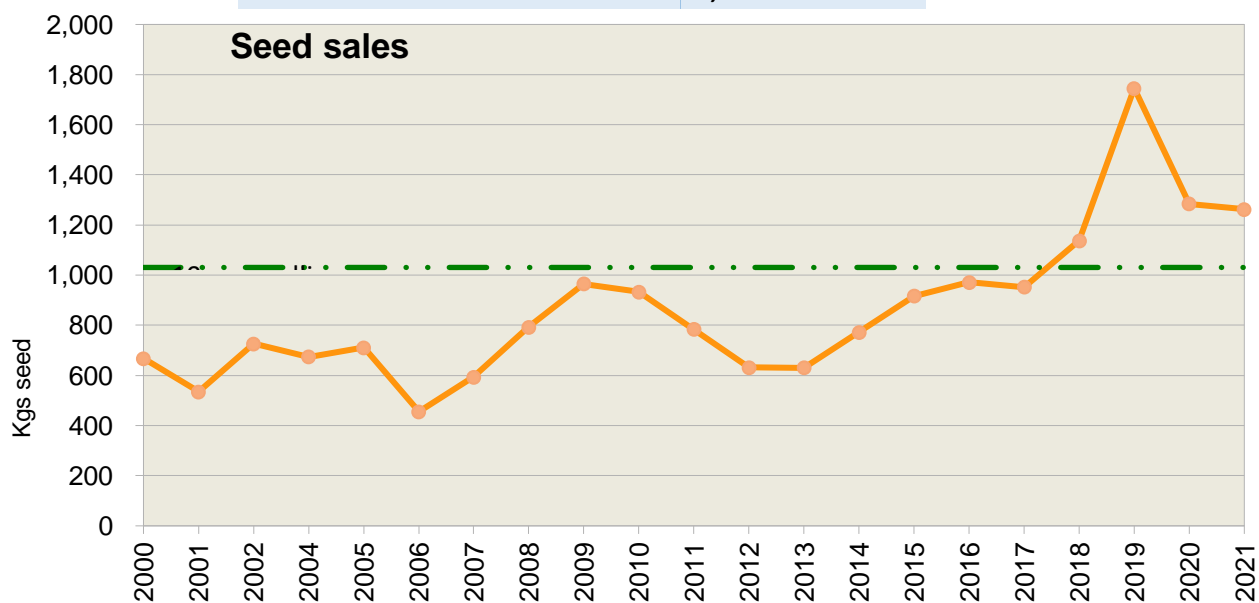


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SEED SCHEME

Seed sales for the year came to 1,263kg, down from 2020 but still following the steady upward trend.

Rootstock	Kgs supplied
Carrizo Citrange	375.4
<i>Poncirus trifoliata</i>	240.1
Troyer Citrange	208.6
C35	100.9
Flying Dragon	91.1
Swingle Citrumelo	59.5
Cox Mandarin Hybrid	56.4
Benton citrange (short supply)	47.5
Cleopatra Mandarin	25.7
Zao Yang	17.0
C22 (including imported)	12.9
Volkameriana	8.6
Sour Orange	5.2
Rough Lemon	4.5
Rangpur Lime	2.1
C57	1.8
West Indian Lime seed	1.8
Sweet Orange	1.1
Bitter Sweet Seville	1.0
C54	0.6
Anjiang hongju	0.5
Macrophylla	0.4
Tanghe	0.1
Donghai	0.1
Grand Total	1,263



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CAPITAL WORKS

The recently completed budwood production screenhouse has been performing exceptionally well, with the pad and fan cooling system comfortably maintaining 28-30 degrees even in 45 degree Sunraysia heat. Plant growth has been excellent, although some issues with bud takes were determined to be due to high nitrate sap levels, so fertigation has been moderated to suit.

The 2500 square meter budwood house is around 75% full, so work has commenced on replacing the existing shadehouse with a duplicate of the screened budwood house, to give a total production area of 5000 square meters. The shadehouse has been removed, groundwork has been completed, quotes obtained for all structural and electrical components, and a development application lodged. It is hoped this house will be operational for the 2022/23 season. This stage 2 expansion is being wholly funded through Auscitrus retained profits, although some of the electrical and irrigation infrastructure is already in place from the Hort Innovation funded project for stage 1.



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A clean room for seed drying and processing has been constructed, comprising a coolroom panel structure inside one of the existing sheds, with split system air conditioners to maintain temperature and humidity. A motorised seed sieve was also purchased to improve the grading out of small seed and peel pieces. The seed quality for 2021/22 is looking better than ever as a result. There were some issues with 2020 seed after some time in storage, probably due to inadequate drying or fungal contamination. This new clean room is expected to resolve those problems and produce a more consistent product.



CITRUS SECURE

Auscitrus has been working on implementing a citrus nursery tree certification program for some years. Delays by the IT systems developer have dragged this on far longer than anticipated, but it is soon to be launched following live nursery testing with selected trial nurseries.

All Auscitrus internal operations associated with orders, bud sources, dispatches and traceability have been moved to a secure cloud-based custom database system, replacing the older paper based systems. All data acquisition is now electronic, with QR codes on all bud and seed sources ensuring accurate collection of source code information.

The final implementation will allow registered nurseries to log in to a secure web portal and generate tree certificates by allocating past bud purchases to tree dispatches. This will greatly improve traceability and provide nurseries that use tested budwood from the industry scheme with a method to prove to purchasers the source of budwood. We expect this to be a market advantage for registered nurseries due to grower demand for certified trees.



AUSCITRUS OPERATIONS AT EMAI

Citrus is affected by several graft-transmissible organisms, which can be spread through propagation of infected material or via sap on cutting tools. Some organisms cause serious disease or death whilst others induce only mild symptoms. There is no cure for graft-transmissible diseases therefore it is important to prevent orchard infections by propagating new citrus trees using propagation material sourced from health-tested trees. The Auscitrus source trees are routinely tested for graft-transmissible diseases. Independent testing is provided by the NSW Department of Primary Industries (NSW DPI) at the Elizabeth Macarthur Agricultural Institute (EMAI) located on the outskirts of south western Sydney. At EMAI there are quarantine laboratories and a nursery that are certified under ISO 9001. Auscitrus is involved in 2 main areas at EMAI:

- National Citrus Repository Program;
- disease testing of budwood and rootstock seed supply trees.

The following report covers activities during the 2020/21 financial year.

NATIONAL CITRUS REPOSITORY

The 'National Citrus Repository for High Health Status Clones' currently holds (260) citrus accessions with at least 1 tree of each variety held in screen houses in 2 locations; the Auscitrus property at Dareton (in the Sunraysia citrus growing region) and at EMAI (not in a citrus growing region). The repository contains both public (124) and private (136) citrus varieties from imported and local sources.

The 'National Citrus Repository for Inoculated Clones' is housed in a controlled environment green house at EMAI. This repository contains citrus clones that have been inoculated with a mild strain of *Citrus tristeza virus* (CTV). The mild strain serves to protect against more severe strains of the virus that may be introduced to trees in the field by aphids – this control mechanism is called mild strain cross protection.

Before a new variety enters the repository system, a foundation tree is propagated and rigorously tested for graft-transmissible citrus pathogens. A range of biological, serological and molecular methods are used to check the health status of the tree. If a pathogen is detected it must be eliminated by shoot tip grafting before a variety can enter the repository system. This ensures the high health status of trees held in the National Citrus Repositories. Imported varieties are tested and undergo pathogen elimination in post-entry quarantine run by the Australian Government Department of Agriculture, Water and the Environment. Auscitrus provides the service of pathogen testing and elimination by shoot tip grafting for new varieties selected in Australia.

During the 2020/21 year, five Australian selections and six imported varieties entered the repository program, all privately owned.

After entering the repository system, foundation trees are re-tested for graft-transmissible pathogens according to a designated schedule. Trees are tested annually for CTV but are not tested every year for those pathogens not transmitted by insect vectors. This is because the risk of infection with non-vectorised pathogens is low for trees managed under strict biosecurity protocols in the repository.

The maintenance and testing of trees of publicly owned varieties is funded by Hort Innovation and Auscitrus and for private varieties is paid for by the variety owner.

It is important to note that the *high health* status of repository trees means that no viruses or viroids have been detected in these trees using current test methods. These trees have a *high health status*, but pathogens may be detected in these trees through improved test methods and the discovery of new pathogens.

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TESTING FOR CITRUS DISEASES

CTV is graft-transmissible and can be spread by aphids. The repository houses are screened to exclude aphids but every tree in the repository is tested annually for CTV using a serological test called a direct tissue blot immunoassay (DTBIA). This test is used to confirm that the virus is not present in the high health status clones and to confirm that the virus is present in the inoculated trees.

High health status trees in the Dareton and EMAI repository screenhouses were tested for CTV in autumn 2021. No CTV was detected.

Inoculated repository trees tested positive for CTV in autumn 2021. Some trees were weakly positive but viral particles were still detected. Budwood is only sourced from inoculated trees that test positive for CTV during their last test. Trees where CTV was not detected, or only weakly detected, will be re-inoculated in spring 2021.

EMAI repository trees were sampled for testing for other graft-transmissible diseases during autumn 2021 including citrus exocortis viroid, citrus bent leaf viroid, hop stunt viroid, citrus dwarfing viroid, citrus bark cracking viroid, citrus viroid V, citrus viroid VI, citrus viroid VII, citrus tristeza virus, citrus leaf blotch virus, citrus tatterleaf (caused by apple stem grooving virus), citrus psorosis virus, citrus concave gum associated virus and citrus virus A.

Testing for pathogenic viroids was completed for 1449 Auscitrus budwood supply trees during the year.

PATHOGEN ELIMINATION

Viruses and viroids can be removed from infected mother trees by shoot tip grafting. Successful shoot tip grafted plants then require testing to determine if the pathogens have been eliminated. Auscitrus provides the service of pathogen testing and elimination for Australian citrus selections.

During the 2020/21 year, 16 varieties were processed as part of the variety testing program for Australian selections, with pathogen elimination required for 12 of these varieties. Five selections were released from the Australian variety testing program and entered the National Citrus Repository Program during the 2020/21 year.

RESEARCH AND DEVELOPMENT

The high health status of the Australian citrus industry is largely dependent upon accurate testing of propagation material for viruses and viroids which can cause graft-transmissible diseases. NSW DPI and Auscitrus are working together on an industry funded project supported by Hort Innovation to find better methods for screening citrus plant material. The current project (CT17007) started in November 2018 and will run until September 2022. Improvements to current protocols were identified through the previous project (CT14009), continue to be identified in the current project, and are adopted by Auscitrus where relevant.

TEAM MEMBERS

Nerida Donovan	Citrus Pathologist
Adrian Dando	Auscitrus Indexing Officer (0.6 FTE)
Wendy Forbes	Auscitrus Indexing Officer (0.4 FTE)
Grant Chambers	Technical Advisor
Anna Englezou	Technical Advisor
George Haizer	Nursery Contractor (casual)
Vipawee Iamsa-at (Noi)	Nursery Contractor (casual)

APPENDIX 1: 'NATIONAL CITRUS REPOSITORY FOR HIGH HEALTH STATUS CLONES' AS OF JUNE 2021

Accession No.	Variety	Accession No.	Variety
Grapefruit		I.N.87.0551	Newhall 55-1 Spanish
I.N.91.0736	Flame	I.N.10.0984	Palmer 1051
I.N.89.0620	Henderson	I.N.86.0549	Parson Brown
A.N.73.0068	Marsh (3970 Druitt)	I.N.90.0739	Pera Bianchi
A.N.91.0632	Marsh (3962 Druitt)	I.N.90.0741	Pera Olympia
I.N.89.0619	Ray Ruby	I.N.90.0742	Pera Limeira
I.N.89.0708	Rio Red	I.N.87.0547	Pineapple
I.N.89.0709	Star Ruby	A.S.17.1043	Poorman's orange
A.N.04.0950	Star Ruby (Cant)	I.N.93.0860	Salustiana
A.N.91.0633	Thompson (N Eagle)	I.N.98.0921	Sanguine
Pomelo		A.Q.78.4020	Smith - Joppa
A.Q.19.1061	K15	I.N.08.0968	Tarocco Ippolito
I.N.01.0925	Namroi	I.N.07.0965	Tarocco Meli C8158
I.N.94.0786	Tambun	I.N.07.0966	Tarocco Rosso C4977
Citron		A.S.75.5074	Thomson
I.N.01.0926	Bergamia Bergamot Castagnaro	Mandarin and hybrids	
I.N.94.0904	Buddha's Hand	I.N.99.0909	Afourer
I.N.09.0979	Etrog	I.N.99.0913	Avana Tardivo
Lemon		I.N.99.0914	Avana Apireno
I.N.01.0927	Eureka (Allen)	I.N.98.0920	Clementine (Caffin)
A.N.75.0034	Eureka (Lambert)	I.N.89.0704	Clementine (Clementard)
A.N.75.0035	Eureka (Taylor)	I.N.99.0910	Clementine (Corsica 1)
I.N.89.0703	Fino	I.N.99.0911	Clementine (Corsica 2)
A.Q.93.0785	Lemonade	I.N.87.0544	Clementine (Fina)
I.N.00.0918	Lisbon (Limoneira 8A)	I.N.87.0552	Clementine (Marisol)
I.N.75.0036	Lisbon (Prior)	I.N.05.0957	Clementine (Nour)
A.Q.91.0631	Lisbon (Queensland)	I.N.87.0543	Clementine (Nules)
A.NT.15.1032	Tropical Meyer	I.N.04.0955	Clementine (Orogrande)
I.N.89.0705	Verna	I.N.87.0545	Clementine (Oroval)
Lime		I.N.04.0953	Clementine (Sidi Aissa)
A.N.08.0969	Tahiti lime	I.N.91.0733	Daisy
A.N.90.0771	West Indian lime (Schweppes)	A.N.75.0090	Ellendale (Herps)
Orange			Ellendale / EM3
A.S.10.0985	Arnold blood	I.N.90.0736	Encore
I.N.86.0600	Atwood	I.N.08.0974	Etna
A.S.75.5095	B/3010	I.N.89.0707	Fallglo (VI 484)
A.Q.75.4022	Benyenda	I.N.90.0695	Fallglo (S-837-4-2)
A.Q.78.4021	Benyenda - thorny	I.N.93.0859	Fortune
A.S.94.0782	Berri 3501	A.Q.94.0787	Fremont
I.N.06.0960	Bintangcheng # 2	A.N.75.0041	Hickson
I.N.08.0973	Bintangcheng Renbin # 5	A.N.75.0043	Imperial 0043/2
I.N.97.0924	Pigmented navel (Cara Cara)	A.Q.04.0952	Murcott tangor (Benham)
A.N.14.0993	Cara cara new	A.Q.90.4149	Murcott tangor (Turner)
A.V.94.0780	CSIRO 5	A.Q.94.0778	Nova (Trott)
I.N.94.0902	Delta seedless	I.N.91.0734	Nova (Spain)
I.N.86.0597	Fisher	I.N.04.0951	Parsons Special /2
I.N.99.0912	Fukumoto	I.N.86.0599	Pixie
I.N.86.0548	Hamlin	I.N.04.0954	Primosole
A.S.75.5077	Hockney	A.N.75.0065	Satsuma (Silverhill)
A.N.73.0073	Houghton	I.N.89.0706	Satsuma (Clausellina)
A.S.92.0772	Hutton	I.N.91.0852	Satsuma (Okitsu Wase)
I.N.02.0930	Jaffa	I.N.91.0853	Satsuma (Miho Wase)
I.N.06.0959	Jincheng 447	I.N.20.1068	Shiranui
A.V.93.0774	Jenner 4439	A.Q.94.0886	Sunburst
A.N.75.0032	Lanes Late 3976	I.N.90.0818	Topaz tangor
A.N.73.0072	Leng	A.NT.15.1034	Tropical Emperor
I.N.92.0901	Lima 156 (acidless orange)	Papeda	
A.V.94.0781	Lloyd/3 Leng	I.N.94.0776	Kaffir lime (Malaysia 4669)
I.N.94.0903	Midnight	A.D.97.0907	Kaffir lime (Nathanael)
I.N.92.0900	Natal	I.N.00.0916	Kaffir lime (Eyles)
I.N.86.0550	Navelate	I.N.15.1020	Sudachi
I.N.87.0546	Navelina Spain 7.5	A.N.13.0991	Yuzu
I.N.93.0899	Navelina 315 ex Italy	Kumquat	
A.S.92.0773	Neilson	A.N.15.1033	Calamondin
A.N.75.0029	Newton - Keenan 3125	I.N.04.0956	Nagami
A.N.75.0030	Newton - Keenan 3247	Rootstock	
I.N.86.0598	Newhall California	A.N.18.1054	Benton citrange