Modernisation of the

Canberra Phytotron

Recent major modifications allowing the facility to operate as a PC2 (Planthouse) for work with transgenic plants.

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TYPE LB+LBH CABINET

The Canberra PHYTOTRON

The Canberra Phytotron was commissioned in 1962 and has been a key facility serving the research needs of many CSIRO Divisions, universities and other external research institutions.

While initially focused on the disciplines of plant physiology, agronomy and plant breeding, the Phytotron has been recently refurbished to comply with PC2 (planthouse) standards and is now extensively used for experimentation in the areas of modern plant molecular biology. Today, 80% of all plants grown with the facility are genetically modified.

Phytotron facilities IN AUSTRALIA

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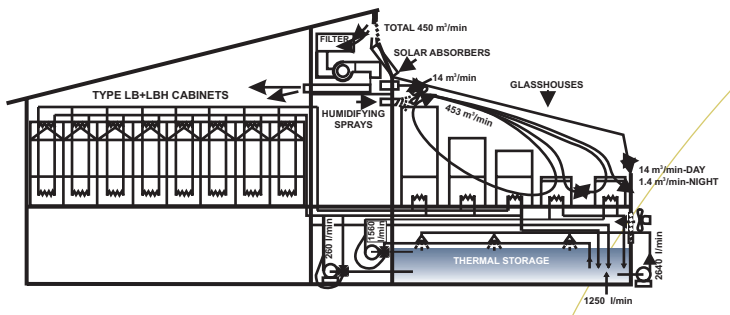
Artificially lit cabinets:

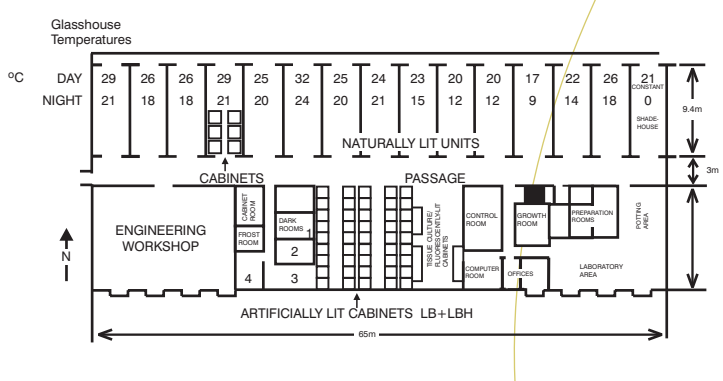
- Two types of artificially lit cabinets are available, designated LB and LBH cabinets. The latter offers humidity control with an accuracy of ± 2% RH.

- 36 LB and 8 LBH cabinets are available.

- These cabinets provide the greatest degree of temperature control with a range of 30C to 400C and with an accuracy of ± 0.2% RH.

- Metal-halide lamps generate a photosynthetic photon flux density (PPD) of 650 mmol quanta m-2 sec-1 at the base of the cabinet.





Other facilitites:

Additional facilities include:

- Arabidopsis growth cabinets/laboratory
- Tissue culture cabinets
- High CO2 cabinets
- Vernalisation cabinets
- Propagation and plant hardening facilities
- Shade rooms
- Controlled environment darkrooms (4)
- Frost room
- Computing facilities
- Microscopy facilities
- Drying ovens
- Leaf area meters
- Infra-red gas analysers
- Well equipped laboratory areas
- Autoclaves

Description of phytotron facilities

The Canberra phytotron provides a variety of controlled environment facilities with differing levels of control and accuracy:

Glasshouses:

- There are 15 glasshouses covering a total floor area of 605m2.

- Temperature control in the glasshouses is in the range of 90C to 320C ± 0.50C. Sine wave control simulates a more natural pattern of heating and cooling.

- Fogging units can be set to provide at least 40% RH.

- Photoperiod extension is available in each glasshouse.

Naturally lit cabinets:

- Located within the glasshouses, but operating independently, there are a total of 56 naturally-lit cabinets.

- The length of the daylight period is controlled by automatic shutters and all cabinets provide photoperiod extension.

- Supplementary photosynthetic light using metal-halide lamps can be provided.

- Temperature control is in the range of 50C to 330C ± 0.50C.

Upgrading of the phytotron to PC2 (planthouse) standard

During 1999/2000, $A 1.5 million was spent on the Canberra Phytotron to make the facility compliant with requirements set out by the Australian Government's, Office of the Gene Technology Regulator (OGTR).

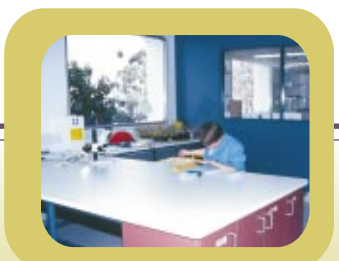
Changes that have been necessary include:-

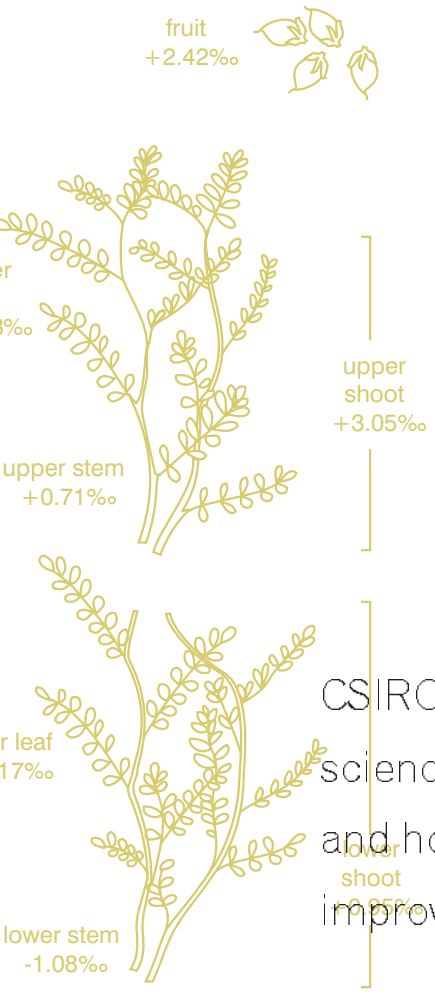
- Re-glazing of all 15 glasshouse and modifications to glasshouse waste water handling systems to ensure that containment standards are met.

- Upgrading of laboratory areas to PC2 standards and the provision of 'clean' rooms for tissue culture work and other laboratory-based gene technology work

- The re-design of the laboratories required major upgrades to air handling systems, improved waste water management (filtering/collection/settling ponds) and changes to the buildings floorplan to direct staff movement through ante-rooms. The ante-rooms serve to encourage a high level of work place hygiene by providing a place for staff to change into laboratory/glasshouse protective clothing and providing facilities for staff showers and other amenities.

- Introduction of plant/soil waste handling and sterilization procedures. All waste is processed to kill all viable seed or other organisms by either autoclaving or steam-sterilization.





(b) Chickpea
+2.70 ‰ ±0.33
whole shoot

CSIRO PLANT INDUSTRY

CSIRO Plant Industry applies strategic research in the plant sciences to promote profitable and sustainable agri-food, fibre and horticultural industries, develop novel plant products and improve natural resource management.

Divisional headquarters are located in Canberra, with ten other research locations around Australia including Kununura, Perth, Darwin, Atherton, Townsville, Brisbane, Adelaide, Merbein, Narrabri, and Sydney.

The Division employs almost 800 staff throughout the following key research areas:

- Gene Expression and Plant Development
- Genetic Engineering for Plant Improvement
- Australian Flora Resources and Management
- Cotton Improvement and Production
- High Performance Crops
- Horticultural Crop Improvement
- Horticultural Systems
- Mediterranean Crops and Pastures
- Profitable Sustainable Agriculture
- Gene Technology in Cereal Improvement
- Integrated Crop Physiology and Genetic Improvement

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