

# SMART PRODUCTION NURSERY

GOLDEN GROVE

## SITE AND ENVIRONMENTAL ISSUES

Golden Grove Nursery is a 2ha citrus production nursery in Torbanlea, Queensland, producing and supplying commercial growers with containerised fruit-tree nursery stock for planting in orchards. Golden Grove Nursery is an innovative operation; recent additions to the production nursery include a new smart irrigation system and a redesigned growing container (pot) for horticultural tree stock. There is increasing pressure on the nursery industry in Queensland to manage and limit inorganic nitrogen and phosphorus loads in the environment. Runoff from Golden Grove drains into an on-site dam, which when full, overflows into a series of dams, water storages and drains spread over 19 km, well before flowing into Hervey Bay, approximately 100km from the Great Barrier Reef marine park. Dissolved inorganic nitrogen is notoriously difficult to measure and model, therefore mitigating the risk of off-site movement is critical.

Golden Grove Nursery is a pilot production nursery for the National Landcare Program and Hort Innovation funded project *Digital remote monitoring to improve horticulture's environmental performance* which aims to develop tools to help Australian horticultural businesses improve nutrient, water and labour efficiency, and reduce barriers to BMP

adoption. Greenlife Industry Australia (GIA) and their environmental management guidelines, EcoHort, have provided a wealth of industry knowledge and input into the pilot smart production nursery and BMP alignment.

**Applied Horticultural Research** is developing water balance, nutrient load and growth models which will feed into a digital Control Tower (Web-based Dashboard).

**Hitachi Vantara** is developing the Control Tower to holistically measure production nursery productivity and environmental stewardship by integrating sensor data, weather forecasts and biophysical models. The Control Tower will automate collection of the data EcoHort requires in the audit reports and provide growers with decision support tools for managing nutrient runoff and leaching.

## PILOT SMART FARMS HAVE ALSO BEEN ESTABLISHED IN THE FOLLOWING INDUSTRIES:

- Bananas, Innisfail QLD
- Vegetables, Bundaberg QLD
- Avocados, Bundaberg QLD



## TECHNOLOGY

The following technology has been installed on the pilot smart production nursery:

TECHNOLOGY	PRODUCTIVITY	ENVIRONMENTAL	BMP REPORTING
<b>Weather Station</b>	On-site real time weather information, such as wind and rain	Overwatering can be minimised	Spray records are automatically populated
<b>Smartphone and Tablet</b>	Reduced time required for audit forms	Improved accuracy of audit forms	EcoHort records are automated
<b>Weight based irrigation system</b>	Improved irrigation management	Overwatering can be minimised	Irrigation water use is recorded
<b>Dam monitoring</b> (pH, temperature, depth and EC)	Improved water quality management	Improved release water quality	Irrigation water quality is recorded
<b>Drain monitoring</b> (pH and EC)	Improved irrigation and nitrogen management	Nutrient loss to environment can be minimised	Release water quality is recorded
<b>Pest cameras</b>	Improved pest management	Improved pesticide management	Site surveillance record is automatically filled
<b>Leachate monitoring</b> (volume, pH, EC and temperature)	Improve nutrient/water management	Improved release water quality	Release water quality is recorded
<b>Desktop photometer</b>	Improved nutrient management	Nutrient loss to environment can be minimised	Release water quality is recorded



Dam temperature, pH, EC, REDOX and salinity monitoring



Weather station



Low cost, high resolution cameras for monitoring sticky traps

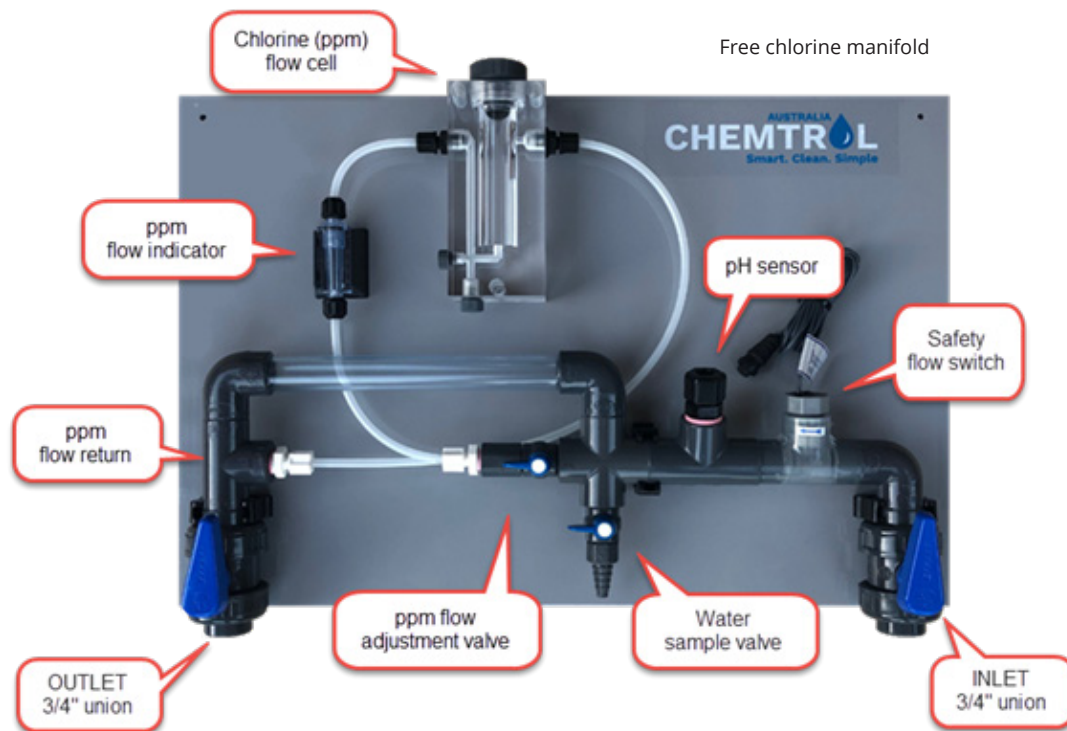
## DECISION SUPPORT TOOLS

- Simple displays of container moisture, evapotranspiration and plant stress data show if irrigation matches plant water use.
- Monitoring water storage overflow quality values to ensure compliance with environment expectations.
- Real-time irrigation system feedback monitoring for variations to BMP standards.
- Irrigation water quality and temperature in storage drives water extraction decisions for crop irrigation.
- Simple displays of current and predicted pesticide spray conditions with guidelines on when to avoid spraying.
- Interactive production nursery overlay of field conditions, plant health, sensors and assets.

### FREE CHLORINE SENSOR (INNOVATIVE SENSOR)

A free chlorine sensor is being deployed at the Golden Grove Nursery. This sensor will measure the level of residual free chlorine in the irrigation water. This system will tell the grower whether successful

disinfestation of the irrigation water has occurred. The sensor will be able to report the level of residual free chlorine directly to the Control Tower, negating the need for manual free chlorine monitoring. The free chlorine sensor will be installed into a manifold that will allow the retention and analysis of a water sample.





Hitachi Control Tower

## Golden Grove Map

Updated January 2020

- Free Cl sensor
- Storage tank
- Dream II (EC/pH)
- Weather station
- Pressure transducers
- Leachate monitoring
- Fly trap cameras
- Pot Moisture

ICT Communications Node  
 240v Electricity Outlet



## UPCOMING ACTIVITIES AND EVENTS

- Continued data collection and site maintenance
- Additional installation of sensors
- Development of nutrient and growth models
- Development of Hitachi Control Tower
- Field days and webinars
- Factsheets and technology guides

### CONTACT DETAILS

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