AVOCADO SMART FARM

AUSTCHILLI

WELCOME TO AUSTCHILLI'S SMART AVOCADO FARM

There is a growing desire from farmers and consumers for their produce to be grown using more efficient and environmentally friendly on-farm practices. A key step in achieving this goal is to find new and innovative ways to deliver real-time field data into the hands of farmers, allowing them to make best decisions for their crop.

Bundaberg growers AustChilli have established a pilot smart farm to develop new technologies and tools that will help Australian horticultural businesses improve nutrient, water, and labour use efficiencies. AustChilli is the largest chilli grower in Australia has a young 40ha avocado orchard, is family owned and operated, and has vertically integrated on-site production, processing, and packing.

The new systems, developed by project partners Applied Horticultural Research and Hitachi Vantara, focus on real-time monitoring and data collection combined with a user friendly interface. This combination can help farmers maximise nutrient and water use efficiency and minimise inputs of inorganic nitrogen and phosphorus inputs, reducing potential run-off.

The establishment of the AustChilli pilot smart farm allows these technologies to be tested in a working farm environment.

AUSVEG and Freshcare are also supporting the project by exploring ways in which these new technologies can be used to automatically collect and provide evidence for certification audits and BMP systems, including EnviroVeg and Freshcare ENV. This will significantly reduce barriers to Best Management Practice adoption for Australian farmers

The AustChilli smart farm is a part of the *Digital remote monitoring to improve horticulture's environmental performance* project funded by the National Landcare Program and Hort Innovation.

Applied Horticultural Research is developing water balance, nutrient load and growth models that will be updated by soil, plant, and weather sensors.

Hitachi Vantara is developing the Control Tower to holistically measure farm productivity and environmental stewardship by integrating sensor data, weather forecasts and biophysical models.

The project will automate much of the Freshcare Environmental audit reports and provide 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
- Nursery, Torbanlea QLD

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TECHNOLOGY

The following technology has been installed on the pilot Avocado smart farm:

TECHNOLOGY	PRODUCTIVITY	ENVIRONMENTAL	BMP REPORTING
Soil Moisture to 80cm	Improved irrigation management	Overwatering can be minimised	Leaching events are detected
Full Stop Wetting Front Detectors	Improved nitrogen management	Nitrate loss to environment can be minimised	Nitrate runoff and leaching load manually monitored
Weather Station	On-site real time weather information, such as wind and rain	Overwatering can be minimised	Spray records are automatically populated
Smartphone and Tablet	Reduced time required for audit forms	Improved accuracy of audit forms	Freshcare Environmental records are automated
Band Dendrometer	Improved irrigation and tree stress management	Overwatering can be minimised	
Sap Flow Sensors	Improved irrigation and tree stress management	Overwatering can be minimised	

Communications node with dedrometer and soil moisture sensors with a dendrometer

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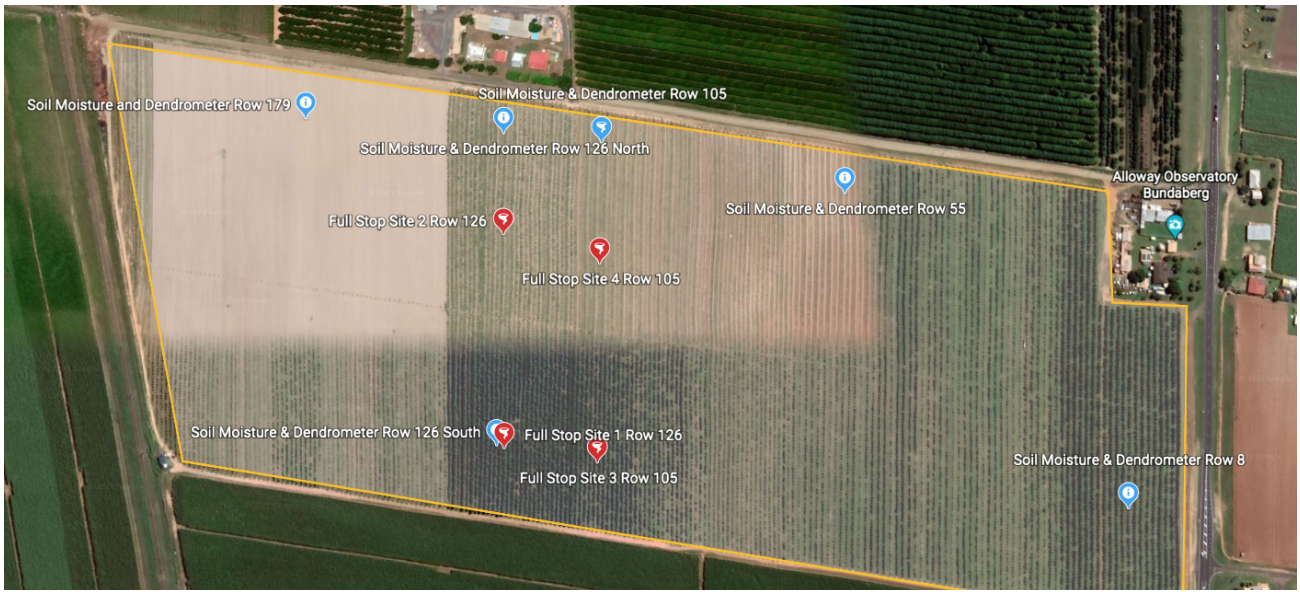
BAND DENDROMETER (INNOVATIVE SENSOR)

Band dendrometers have been installed near the base of six trees in the avocado orchard at AustChilli. The dendrometers will provider real time data on the circumference of the trunk, which is used to calculate maximum daily shrinkage and the growth rate of the trunk. Tree stress can be detected early if either the trunk circumference or growth rate is measured outside the expected values. The dendrometers have a resolution of 1µm, allowing for analysis of any variations in trunk circumference. Band dendrometer data pairs well with soil moisture data, also measured at the same location.

Soil moisture sensors installed in the rootzone

Band dendrometer installed on avocado tree



AustChilli avocado sensor layout

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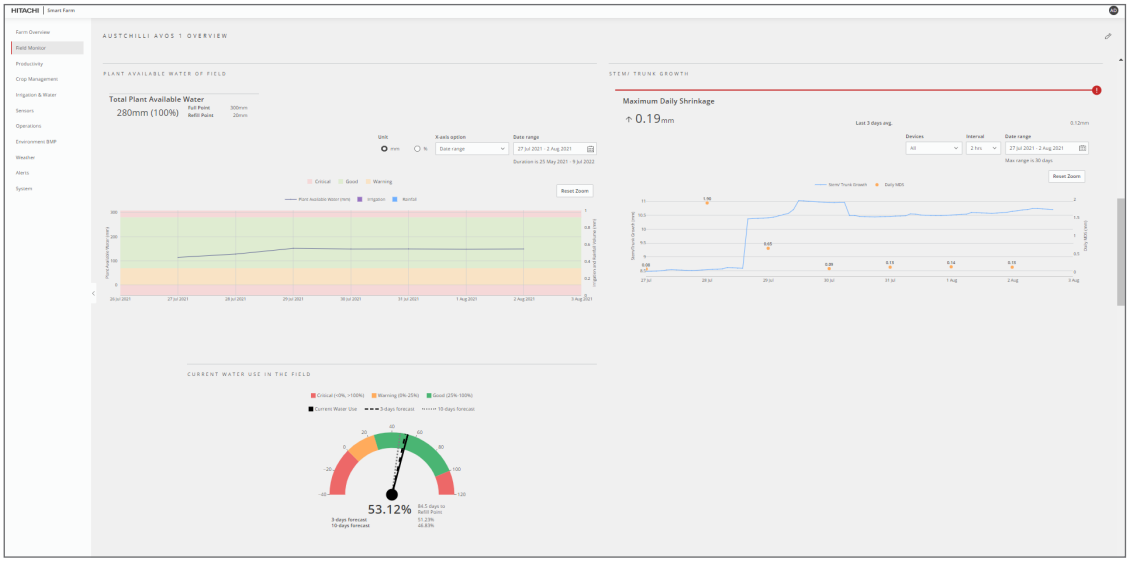

Hitachi Control Tower

DECISION SUPPORT TOOLS

- Simple displays of soil moisture, evapotranspiration and plant stress data show if irrigation matches plant water use.
- 7 day forecasted nutrient runoff and leaching for better managing irrigation and fertiliser timing.
- Growing degree day forecast to predict a fruit maturity date using short-term and seasonal forecasts.
- Simple displays of current and predicted spray conditions with guidelines on when to avoid spraying.
- Interactive farm overlay of field conditions, plant health, sensors and assets.

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

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