BANANA SMART FARM

BARTLE FRERE BANANAS

SITE AND ENVIRONMENTAL ISSUES

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.

Bartle Frere Bananas is a 100 ha family owned and operated, Freshcare Environmental certified plantation in Boogan, Queensland. There is increasing pressure on the banana industry in Queensland to manage phosphorus and limit inorganic nitrogen loads, which are notoriously difficult to measure and model. Runoff from the farm drains to the Moresby River, which is 30km from the Great Barrier Reef.

Bartle Frere Bananas converted a sugar cane block to bananas in 2019, providing an ideal location for the pilot project. The block was built up to provide industry leading drainage, with a vegetated drain designed to absorb nutrients and retain soil. Gavin Devaney won the 2021 ABGC Future Farming Award for his contribution to the Banana BMP and the broader industry.

Australian Banana Growers' Council and **Freshcare** are supporting the project by exploring ways in which these new technologies can be used to automatically collect and provide evidence for certification audits for Freshcare ENV. This will significantly reduce barriers to Best Management Practice adoption for Australian farmers.

The Bartle Frere Bananas 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 which will feed into a digital Control Tower.

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 Control Tower 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:

- Avocados
- Vegetables
- Nursery

TECHNOLOGY

The technology installed on the pilot farm was designed to improve farm productivity, reduce costs and simplify compliance with environmental regulations. RFID bunch tracking and GPS vehicle tracking will guide farm staff directly to work areas, avoiding unnecessary trips and improving labour efficiency. Freshcare Environmental audits will be significantly automated, further improving labour efficiency and improving the accuracy of data provided in remote audits.

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

Technology	Productivity	Environmental	BMP
Soil Moisture to 80cm	Improved irrigation management	Overwatering can be minimised	Leaching events are detected
Nitrate sensor	Improved nitrogen management	Nitrate loss to environment can be minimised	Nitrate runoff and leaching load monitored
Full Stop Wetting Front Detectors	Improved nitrogen management	Nitrate loss to environment can be minimised	Nitrate runoff and leaching load manually monitored
Rated Flumes	Improved irrigation and nitrogen management	Nutrient loss to environment can be minimised	Runoff loads can be calculated
Weather Station	On-site real time weather information, such as wind and rain	Overwatering can bew 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
Irrigation Pressure Transducers	Improved irrigation management	Overwatering can be minimised	Irrigation records automated
Vehicle Asset Tracking	Improved labour management	Reduced interrow traffic and erosion	
RFID Bunch Tracking	Improved crop management	Reduced interrow traffic and erosion	

Communcations node with soil moisture sensors. Grower Gavin Devaney pictured

Runoff flume with flow rate monitoring

## TRIOS NICO NITRATE PHOTOMETER (INNOVATIVE SENSOR)

A TriOS NICO real-time nitrate photometer has been installed at Bartle Frere Bananas to measure nitrate concentration of leachate leaving the farm. The sensor will measure leachate from pre-existing sub-surface ag-pipes that drain the pilot project block. The TriOS is paired with a rated flume and real time pressure transducer to measure flow rate and total volume of leachate passing through the subsurface ag-pipe. This combination of sensors will provide a constant data stream to support Bartle Frere Bananas' fertiliser and irrigation decisions. Additionally, it will provide a revolutionary data source for nutrient modelling and become a case study for the industry.

Soil moisture sensors installed 10, 20, 40, 60, 80cm
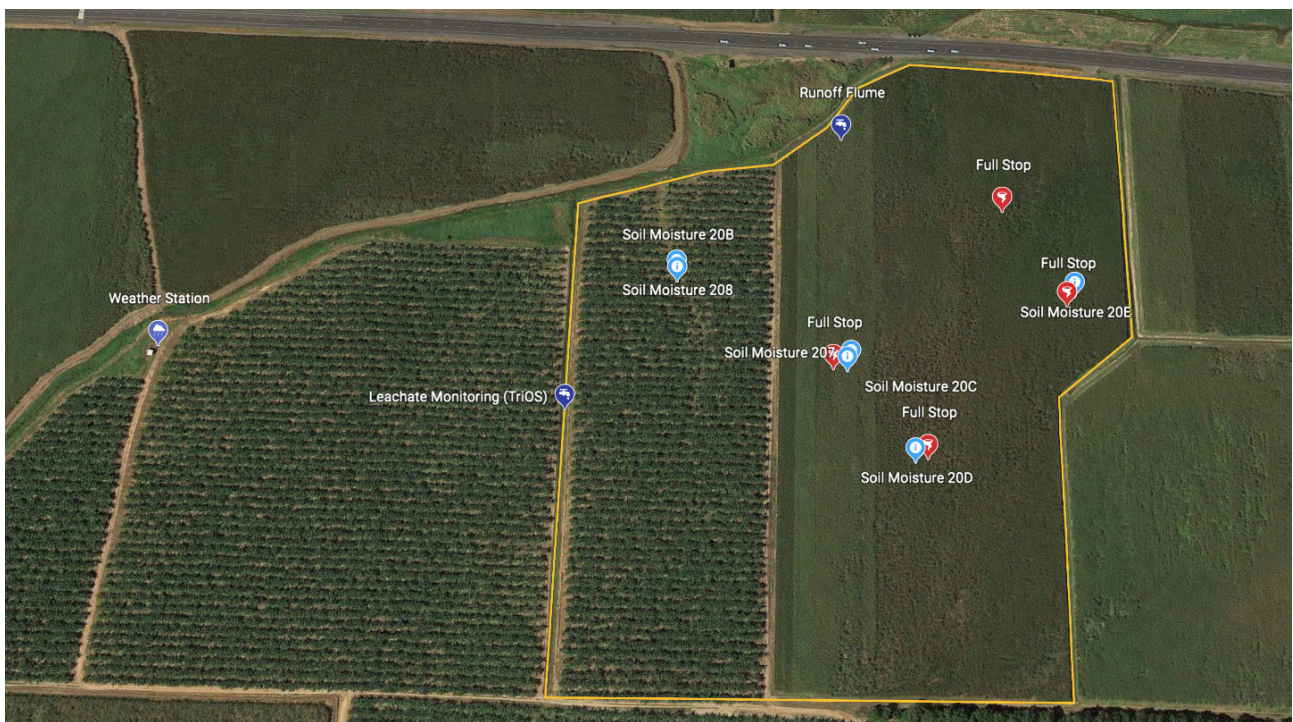
Bartle Frere Sensor Layout
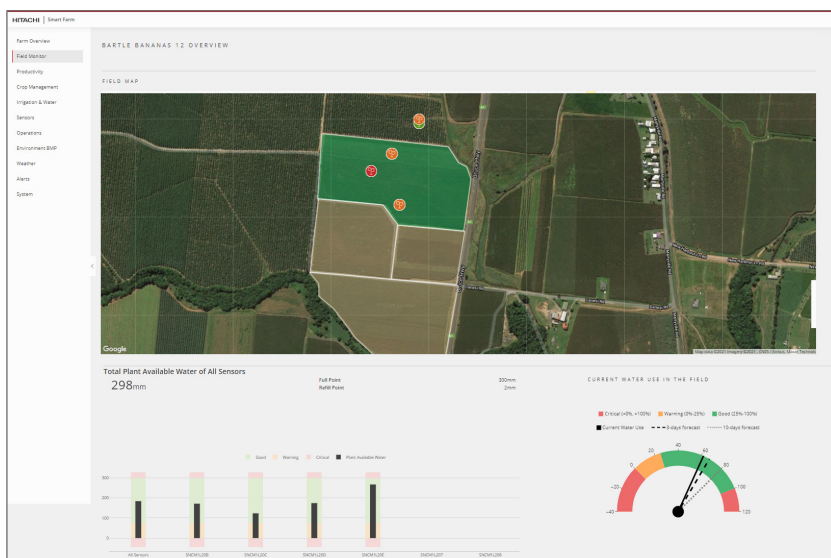
Hitachi Control Tower

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 can be used to better manage 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.

UPCOMING ACTIVITIES AND EVENTS

- Cassowary Coast Banana Growers' meeting

- 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 | **Liam Southam-Rogers**   ✉ liam@ahr.com.au   📞 0418 235 842