



HINKLER AGTECH INITIATIVE

Digital Harvesting Assistant

INTRODUCTION

This trial was undertaken as part of CQUniversity's Hinkler AgTech Initiative. The Initiative aimed to increase the productivity and profitability of the Bundaberg region's agricultural sector through greater availability and utilisation of agricultural technology (AgTech). An extensive consultative process undertaken with agribusinesses identified on-farm needs that may be addressed using AgTech. Trials of selected AgTech products and services were then undertaken in partnership with agribusinesses and technology providers to determine the technologies' efficacy in on-farm conditions. This summary provides an overview of findings from one of the technology trials, including grower feedback and considerations for other growers when deciding whether to utilise the technology in their own enterprise.

Background

Monitoring of crop yield and harvest activities is a critical component of many horticultural farming systems to inform decisions relating to both crop management practices and staff management. However, both monitoring and harvesting are time-consuming, labour-intensive, and represent a significant business cost. Conventionally, crop yield data is often recorded and stored manually. A reliable system is needed to easily monitor crop yield and provide insights into the efficiency of pickers during harvest.

The Technology

"Harvest Ant" is a near-field communication (NFC) based system developed to monitor the efficiency of harvesting activities and crop yield. The system consists of several integrated components:

- **Digital Assistant** - a rechargeable, compact device carried by each picker
- **Smart Tags** - used to label task types, crop rows and picking crates
- **Smart Scales** - record the weight of produce harvested by each picker
- **Gateway** - transfers data to the Cloud for analysis and reporting

Each picker is assigned a uniquely labelled Digital Assistant (DA). The picker uses the DA to tag onto Smart Tags to record the task, row number and crate number prior to picking. The crates are then scanned and weighed by the Smart Scales. Recorded data is date/time stamped, creating a traceable record of who picked the produce, the rows from where it was picked, the time taken to harvest, the temperature at harvest, and the weight of the produce. The Harvest Ant system can also operate offline if required, using a mesh radio network to transfer data between devices and uploading data when connectivity is established.

The Trial

The Harvest Ant system was trialled for monitoring the harvesting of baby cucumbers in a protected cropping system from March to September. Each picker was given a digital assistant and trained in the use of the Harvest Ant system. Daily harvest data was collected using the mesh radio system, Smart Scales and Gateway. The purpose of this trial was to assess the reliability and practicality of the system, and the value it provided to the business.



RESULTS

Supervisors acknowledged the ease of use of the Harvest Ant system, which was readily adopted by picking staff. The training and technical support provided during the implementation of this system was sufficient to allow staff to use the system effectively and its ease of use provided a foundation for consistent and reliable data collection.

Data provided to the grower was summarised by row and picker identification. During the trial period, significant differences in the amount of produce picked were recorded between pickers. These data can help supervisors and managers to identify staff that require further training or as a basis for performance-based incentives. The distribution of DAs to picking staff was manually recorded (hand-written) during the trial period. This was highlighted as a weakness in the traceability of the system and has since been replaced by NFC tags encrypted with staff names.

Setting up the system in the greenhouse was made very quick and easy with the use of poles and smart row tags. The grower's existing crates were also easily modified with the smart crate stickers. Although some hardware issues occurred during the trial, these issues were addressed promptly by the service provider.

Value to Business

The data collected by Harvest Ant provides insights into crop variability to identify areas of poor crop health as well as problems in harvest efficiency and staff performance. Harvest Ant provided real-time crop yield data, which is particularly valuable in rapid production systems such as baby cucumber in protected cropping, where the amount of fruit produced can vary daily due to changes in environmental conditions. This data also assists growers with planning staff requirements for packing operations and market supply.

Management staff noted that the Harvest Ant system brought structure and visibility to their operations. The system also provided a means of accurately and easily recording harvest data, compared to manual records. The ability of Harvest Ant to be used offline during harvest makes it well suited to remote fields and regional areas, without the complication of data loss due to poor or interrupted connectivity.

The cost to lease and deploy the Harvest Ant system, including digital assistants, smart scales and gateway, is \$4.40 per picker per day*, for a minimum of 12 pickers. This cost does not include minor consumable items such as smart tags and row tags which are purchased outright and retained by the grower.

Grower Feedback

Trial Summary Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I see value in this technology					✓
I found the technology easy to use					✓
The technology was easy to integrate within my business				✓	
I was satisfied with the service provided by the AgTech company					✓
I intend using this technology in my business			✓		
I recommend this technology to other growers			✓		

Other Considerations

The potential application of Harvest Ant for crop scouting was identified as another area where this system could provide value to farming systems. Smart Tags could potentially be used by staff during crop management operations to record when and where target pests or diseases are observed. This scouting data could then be used to inform scheduling of spray applications.

Given the wide range of crops harvested by hand and variation in harvest practices, Harvest Ant has been designed as a flexible system which can be adopted into a range of farming systems. Smart crates may be weighed at the greenhouse and/or at the packhouse. Crates may also be used for a single row, rather than multiple rows, to maximise yield traceability.

Some time commitment is required to ensure the hardware components are charged and in working order before harvest begins.

Further Information



For further information on this trial and results, email CQUniversity's agricultural research team: agriculture@cqu.edu.au

For further details on Harvest Ant and other services provided by Grow Logic: linktr.ee/harvestant

Summaries of other technology trials undertaken through the Hinkler AgTech Initiative are available at: bundbergagtechhub.com.au

The CQUniversity Hinkler AgTech Initiative was funded through the Hinkler Regional Deal. The Hinkler Regional Deal is a collaboration between the Australian Government, Bundaberg Regional Council and Fraser Coast Regional Council.

CQUniversity will not be liable for any damage arising directly or indirectly from reliance on information obtained from this document. It is provided in good faith without express or implied warranty. *All published costs and other details are current as of February 2023.



Australian Government

