
HINKLER AGTECH INITIATIVE

# Autonomous Insect Trap Technology

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

Pest monitoring is an essential component of management operations in agriculture, helping growers to determine the timing and type of control methods needed. Insect pests can cause considerable damage to crops, leading to reduced yields and lower crop quality, which can ultimately impact the profitability of farming operations.

Chemical application is the most common control method used but requires precise timing of application. Applying insecticides too early can be ineffective, as the insect population may not yet have reached a threshold that requires treatment. Applying insecticides too late can also be ineffective, as the pest population may have already caused considerable damage to the crop.

By monitoring insect populations, farmers can determine the most appropriate time to apply insecticides, based on the life cycle of the pests, weather conditions and effectiveness of the insecticide. This can help to reduce the amount of insecticide needed and minimise the risk of developing resistance. Insect monitoring typically involves regularly checking crops for the presence and abundance of insect pests. This can be done through a variety of methods, including visual inspection, pheromone traps, and sticky traps. By monitoring insect populations, farmers can detect pest outbreaks early and take appropriate action to control them.

## The Technology

The metos iSCOUT trap is a digital insect trap used for monitoring insect pests in agricultural crops, using a combination of visual and pheromone-based attractants to lure and capture target insects. The traps are equipped with a solar panel and SIM card and can connect to a cellular network to send data to a Cloud-based platform for analysis, which can be accessed using a mobile app or web portal.

The captured insects are then counted and identified using an image recognition algorithm. The use of solar power and cellular connectivity makes the iSCOUT trap system easy to install and operate and eliminates the need for manual data collection and analysis. This allows growers to remotely monitor their insect populations and receive alerts when certain thresholds are reached, providing real-time data to make informed decisions about pest management and insecticide application. There are several types of iSCOUT traps available, each designed to target specific insect pests by using different pheromone attractants and visual cues.

## The Trial

Two pheromone iSCOUT traps were trialed in a mature macadamia orchard to detect and count macadamia nut borer moths. The traps were placed at the end of tree rows to enable access to the solar panels and were spaced approximately 300m apart. The pheromone lures were changed approximately every 4-6 weeks depending on weather conditions. The trial orchard was located approximately 15 minutes from Bundaberg and had good internet connectivity.

## RESULTS

The traps performed reliably during the trial period, with each taking a photo of the captured moths every day. The photos were successfully uploaded to the online dashboard each day, and the quality of the images was high. The Artificial Intelligence (AI) system was also reasonably successful at automatically identifying macadamia nut borer moths, however more model training was required as not every photo was consistently annotated during the initial stages of image capture and this affected performance. The online dashboard was easy to access and use, with historical data reliably captured and displayed.

At the end of the trial, one of the traps stopped reporting images. After investigation it was discovered that ants had infested the trap, however it was able to be cleaned easily and made operational again with fast and effective technical support from the company.

## Value to Business

Crop protection represents a significant area of time and money investment for growers. Scouting to inform these operations is time consuming, and historical data is often not reliably kept in a format that is easily analysed. Smart traps have the potential to save on scouting time and to better inform growers of their spray needs in a format that can be analysed to determine historical trends. Growers also have access to more data because the traps do not need to be manually checked and can give daily pest numbers in comparison to weekly or biweekly numbers due to time shortages using manual methods.

Metos systems also incorporate other monitoring systems, such as soil probes and weather stations. The platform is also able to accommodate multiple brands of weather stations and sensors through an API connector, allowing growers to integrate multiple systems onto the single platform and providing additional analysis value, including pest and disease predictions and modelling.

Due to the relatively high cost of smart traps compared to manual traps, growers may be limited to fewer scouting locations. Each pheromone trap evaluated during this trial cost $1850.00*, with an additional $180.00* required for a 1-year Telstra sim card and subscription. There is also a cost for online data storage of historical images, however this cost may vary depending on trap numbers and frequency of data capture. This cost may impact on a grower's ability to monitor large areas of their farm, and to both account for variability across larger areas and understand movement of pests throughout their crop. Growers, however, can work with their agronomists and pest specialists to best place the smart traps in locations that will provide the most value, for example as an early warning system in known hotspots, while supplementing with manual traps.

## 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

Smart traps that utilise images require some level of connectivity to upload large amounts of data compared to other types of traps that do not operate on image-based detection. The connectivity requirements of any smart trap should be considered before investment to ensure images can be uploaded and analysed.

As for most outdoor electrical equipment, ants and other insect infestations are a consideration. Despite the traps being designed to operate autonomously, some level of maintenance is required to ensure the traps remain free of infestations. Pheromone lures and sticky cards also need to be changed regularly.

## Further Information

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

For further details, including full technical specifications of the system, visit:
metos.at/en/iscout

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

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