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Smart Trapping in Sweetcorn

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VEGETABLES NZ & FRUITFED SUPPLIES

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Introduction

Insect pest monitoring is a foundational practice in the management of commercial horticultural crops, particularly where market access, product quality, and environmental sustainability are concerned. Among sweetcorn growers in New Zealand, one of the most significant insect pests is *Helicoverpa armigera*, commonly known as Corn Ear Worm (CEW). This polyphagous moth poses a threat to sweetcorn quality and yield by laying eggs in silks, where the emerging larvae tunnel into the cob, damaging kernels and leaving behind frass, rendering product unmarketable. Left unmanaged, infestations can result in substantial economic losses for growers and processors alike.

Traditionally, in-field scouting and pheromone-based bucket traps have been the primary tool for monitoring CEW populations. These traps rely on synthetic sex pheromones to lure male moths, providing a measure of pest presence and pressure that informs spray timing and other control decisions. However, the manual labour involved in inspecting and maintaining these traps, along with the lag in data availability (often up to a week between inspections), can reduce their responsiveness and effectiveness in fast-moving pest outbreaks.

As the New Zealand vegetable industry embraces more sustainable, Integrated Pest Management (IPM)-based approaches, the need for timely, accurate pest population data is increasing. Many of the newer, softer control options, such as biological agents or selective insecticides, are the most effective when applied early in the pest lifecycle. To maximise their efficacy, growers need faster warning systems to detect pest emergence and rising pressure levels.

Recent advancements in smart trapping technologies, particularly those incorporating AI-powered image recognition, offer a potential step change in pest monitoring. These systems can remotely identify and count pest species in real-time, transmit data daily, and reduce the need for labour-intensive manual inspections. If proven reliable, smart traps could become a valuable tool in the IPM toolbox, offering the dual benefits of improved responsiveness and reduced operating costs.

This project sets out to trial ScoutLabs electronic moth traps, a commercially available smart trapping solution equipped with an AI camera, solar power source, and data available through an easy to interpret dashboard. The pheromone lure designed to attract *H. armigera* and sticky bases were sourced from Fruitfed Supplies. The key goals of the trial were to:

- Assess the accuracy of smart traps in identifying and counting corn earworm compared to standard bucket traps.
- Evaluate the practicality and reliability of using these traps in commercial sweetcorn fields over a typical growing season.
- Determine whether the timeliness of data delivery from smart traps can enhance pest decision-making, particularly when used to support IPM strategies.

The trial was carried out across the major sweetcorn production regions in New Zealand, with support from growers, agronomists, and industry bodies. The outcomes are intended to guide future investment in pest monitoring technology and to inform the best practices for integrating smart traps into mainstream crop protection programs.

Acknowledgements

This project was a collaborative initiative between Vegetables NZ Inc. and Fruitfed Supplies Ltd (a division of PGG Wrightson), made possible through funding by Te Ahikawariki under its new technology investment stream.

We would like to sincerely thank the growers and processors who hosted the traps and contributed their time and field expertise to the project. Special thanks to the monitoring coordinators; Carmen Pieterse, Ange Doleman, Ryan Gittings, and Pete McNaughton, for their leadership in coordinating data collection and maintaining the trial sites. Their efforts ensured a high level of data quality and regional coverage throughout the monitoring period.

Methodology

Trial Objective

The primary objective of the trial was to assess the accuracy, timeliness, and operational feasibility of Scoutlabs electronic smart traps for monitoring CEW in New Zealand sweetcorn crops. This was achieved through a direct comparison with conventional pheromone bucket traps, which served as the industry benchmark.

The trial aimed to:

- Evaluate how well AI-enabled traps detect corn earworm moths in commercial field conditions.
- Compare the timeliness of data between smart and conventional trap systems.
- Assess usability, cost implications, and grower interest in adopting technology.

Figure 1 Smart trap from Scoutlabs.

Trial Sites and Deployment

Ten smart traps were installed in key sweetcorn production sites across New Zealand, providing a geographical cross-section of typical sweetcorn environments:

Region	No. of Traps
Pukekohe	3
Gisborne	3
Hawke's Bay	2
Canterbury	2

Figure 2. Trap locations around New Zealand.

While the primary focus was sweetcorn, sites in Canterbury were located within a green bean crop to explore cross-crop applicability. Trial locations were selected based on regional importance, grower willingness, and local capacity for technical support via Fruitfed Supplies representatives.

Trap Specifications

- Scoutlabs Mini Smart Traps: included an AI-enabled camera, a pheromone lure specifically formulated for *Helicoverpa armigera*, a sticky card, a solar panel, a battery pack, and remote connectivity for real-time data transmission. Each trap generated daily visual data.

- Standard Bucket Traps: Equipped with a pheromone lure specifically formulated for *Helicoverpa armigera*, inspected and counted manually every week.

Traps were installed on 1.8 m stakes, placed on the crop edge to maximise moth interception. Traps were positioned in a consistent layout to ensure spatial separation and exposure uniformity between trap types (Figure 2). Fields were divided into quarters, with traps placed between the 1st–2nd and 3rd–4th quarters.

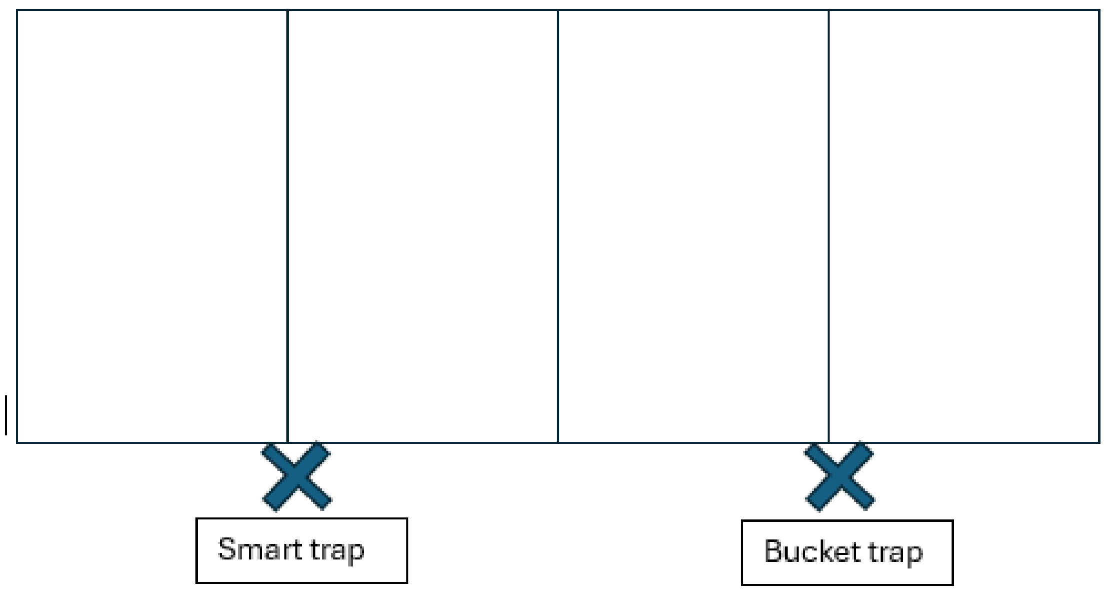


Figure 3. Trap layout within a paddock.

Monitoring and Maintenance Protocol

Identification and Verification:

- Moths detected by smart traps were identified via image recognition. Images were available via the online Scoutlabs platform.
- Suspicious or ambiguous detections were referred to project leads for confirmation.
- If identification remained unclear, physical specimens were collected, labelled (location, date, time), refrigerated, and stored for potential expert analysis.

Data Collection and Analysis

- **Insect Counts:**
  - Weekly moth counts were recorded manually from both trap types.
  - Smart trap data was available daily, enabling comparisons in detection timing.
- **Accuracy Assessment:**
  - Cross-validation of images and manual counts were performed to identify:
    - **False positives** (non-target moths misclassified as *H. armigera*, e.g., native cutworm).
    - **False negatives** (failures to detect CEW moths present in manual counts).
- **Flow-of-Information Analysis:**
  - Time saved (days of early warning) was calculated by comparing daily smart trap detections to the weekly smart trap detections. These “days saved” were averaged over time.
- **Performance Metrics Recorded:**
  - AI reliability and misidentification rates.
  - Maintenance effort and field durability.
  - Operational issues (e.g., battery failure, connectivity loss).
-

- **Reporting:**
  - Weekly data and field notes were compiled and shared with central coordinators for aggregation and interpretation.

Maintenance:

- Sticky card inserts in smart traps were replaced weekly.
- Pheromone lures were replaced every four weeks in both trap types.
- Solar panels were cleaned weekly to ensure optimal power capture.
- Trap condition (hardware reliability, insect obstruction, weather exposure) was assessed during each site visit.

Results

Comparison to bucket traps.

Smart traps were compared to bucket traps in terms of their ease of use and sensitivity, i.e., which trap type caught more moths. Bucket traps were found to catch more moths than sticky traps in almost all cases. In Gisborne, across all three sites, bucket traps caught an average of 14.9 moths per week, versus 6.7 moths per week in sticky traps, and this trend was similar over all sites (Table 1). Trap numbers from smart traps, over the week, did not equal the total moths caught from the bucket traps. However, the peaks in numbers, week-to-week, were similarly timed between bucket traps and smart traps, showing that both traps showed similar trends in numbers (Figure 3).

Bucket and smart traps in Canterbury were set up later in the season and were initially delayed in finding a suitable crop. It was decided that the traps would be set up in a crop of green beans, as they are a known host of CEW. However, no moths were caught in both pairs of traps, so data has not been included from this region.

Table 1. Total moths captured at each trap pair location, comparing smart traps to bucket traps over the same period. Some traps (i.e., Hawke's Bay 2 and Pukekohe 2) were not included in pairs, so data is not shown. Canterbury traps are not included, as no data was captured.

	Total moths captured	
Trap Location (Number)	**Smart traps**	**Bucket traps**
Gisborne 1	50	74
Gisborne 2	50	58
Gisborne 3	61	183
Hawke's Bay 1	1	20
Hawke's Bay 3	48	166
Pukekohe 1	53	80
Pukekohe 3	14	26
Total	**277**	**607**

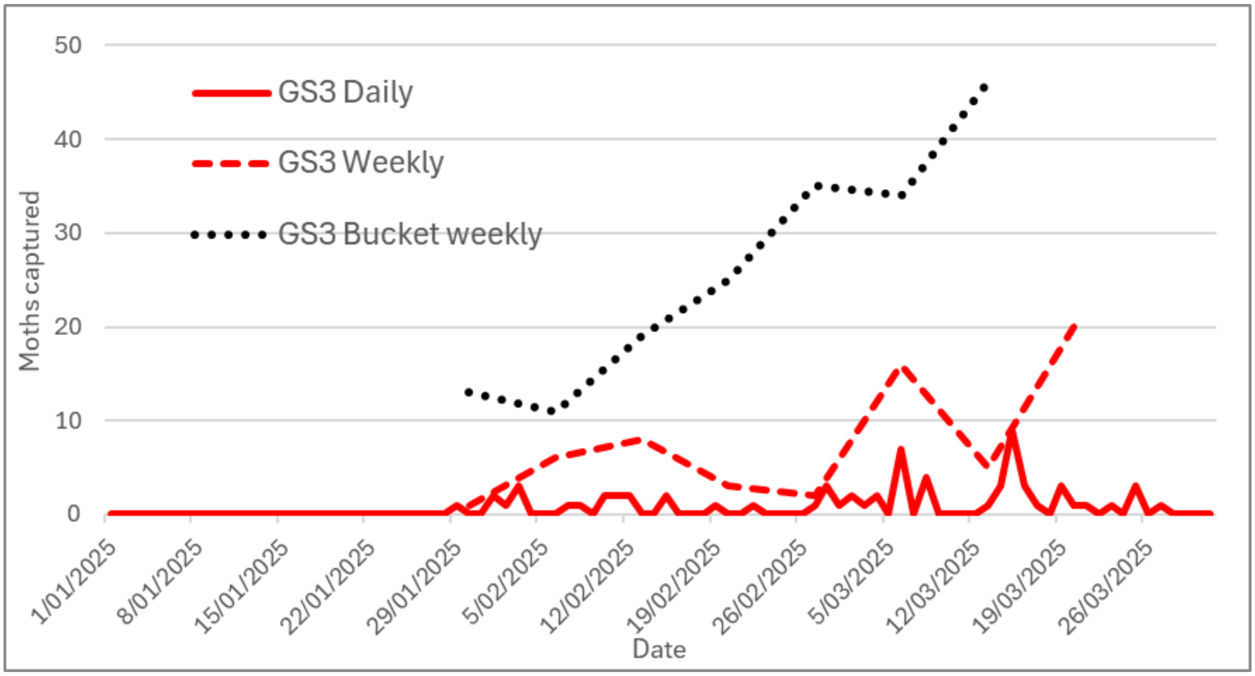


Figure 4 Captures of corn earworm (H. armigera) from a representative Gisborne trapping location. Comparison of daily smart trap data (GS3 Daily) vs. weekly smart trap data (GS3 Weekly) vs. weekly bucket trap data (GS3 Bucket weekly).

Figure 5 smart trap and bucket trap in sweetcorn paddock

Accuracy

Smart trap detections were initially validated against manual assessments of the same traps to assess the software's accuracy in terms of false positives and false negatives. Images available on the Scoutlabs app are not always clear, which can make manual confirmations difficult. As such, all traps from Gisborne were collected and visually assessed in person to verify. In some cases, false positives were detected by the smart trap, including misidentifications of deposited scales (Figure 6), and at least one instance where another species of noctuid moth was incorrectly identified as CEW in Pukekohe.

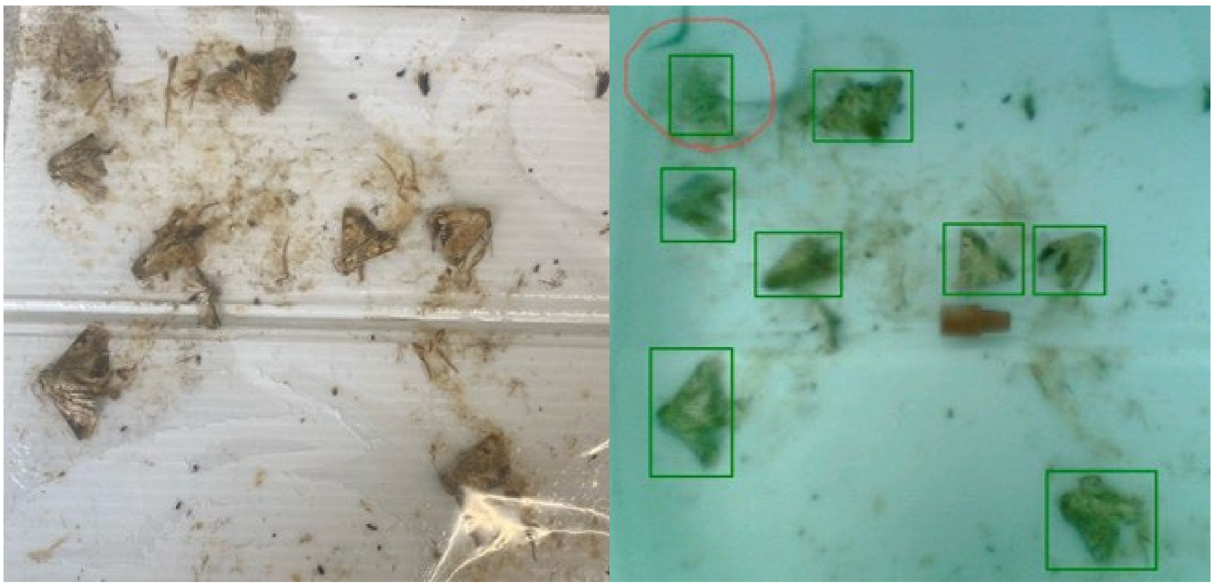


Figure 6 Manual (in-person) assessment of sticky base from a Gisborne trap (left). Smart trap output (right) showing detections of H. armigera (green boxes). The red circled area shows a false positive where a mass of scales has been misidentified as a moth.

Whilst the individual instances of misidentifications were not all catalogued, the overall accuracy of 3 Gisborne traps was summarised throughout the project (Table 2). In all cases, the smart traps detected more CEW moths than were manually counted each week. On average, this was a 13% increase in the number of positive identifications. It is possible that weekly manual counts contain false negatives, as there is potential for moths to escape in the days following its detection by the smart trap.

Table 2. Comparison of smart trap detections vs. manual trap assessments (on the same traps). In Gisborne, catches of H. armigera were from 27/01/2025 to 27/03/2025.

Comparison of *H. armigera* Detections			
	Gisborne Trap 1	Gisborne Trap 2	Gisborne Trap 3
Smart trap	47	49	40
Manual trap	46	46	31

Earliness of information flow

As there was a sizable difference between the number and timing of moth captures between smart traps and bucket traps, daily smart trap data were not directly compared to weekly bucket data. Instead, daily smart trap data was compared with weekly smart trap data, allowing for a like-for-like comparison.

Conventional monitoring involves checking traps once a week. Earliness of information was calculated by the difference in days between the daily catch data from a smart trap and a weekly manual check of the same trap.

For example, if a moth was detected by the smart trap on Tuesday, and the trap would normally be checked manually on a Thursday, the smart trap provided the information 2 days earlier. This difference was calculated for all detections across the season and averaged across all traps. On average, smart traps provided information 3.1 days earlier than weekly monitoring (Table 3).

Table 3. Total moths captured at each trap pair location, comparing smart delta traps to bucket traps over the same period. Some traps (i.e. Hawke's Bay 2 and Pukekohe 2 were not included in pairs, so data is not shown; Hawke's Bay 1 is not shown as only 1 moth was caught in total.

Earlier Detection from Daily Smart Trap Monitoring (Days)	
Trap Location (Number)	**Average days of earliness**
Gisborne 1	3.1
Gisborne 2	3.6
Gisborne 3	3.3
Hawke's Bay 3	3.0
Pukekohe 1	2.8
Pukekohe 3	3.2
Weighted average	**3.1**

Discussion

Trap accuracy & volume

Bucket traps catch more moths than smart traps, as can be seen in Table 1. However, trends of moths caught are similar, meaning that information from both traps can be used to support decision-making in the field. Bucket traps may be more suitable under lower pest pressure, due to their higher catch.

Trap accuracy (87%) was determined to be fit for purpose. While there were some miscounts within the technology, these were considered the minority. While CEW is a significant pest in sweetcorn, the accuracy of the information from the traps does not need to be 100%. Codling moth (*Cydia pononella*) surveillance systems in apples, for export purposes, may need to be more accurate, but for sweetcorn production, 80-95% accuracy is acceptable.

Further investigation of the AI's ability to identify specific moths when there are higher instances of by-catch may still be required.

Availability of information

The smart traps resulted in information being available to growers an average of 3 days earlier compared to conventional trap monitoring. CEW control can be difficult, and once they burrow into the cobs, controlling them becomes nearly impossible. Any additional time to target eggs and early larval instars before they burrow into the cobs provides an opportunity for control and valuable to growers and advisors.

Additional lead time allows for better utilisation of IPM practices and the use of biological insecticides. Early instar larvae are more susceptible to bio-insecticides containing *Bacillus thuringiensis* (Bt), which must be ingested by the CEW larvae. As larvae grow larger, control declines and once they burrow into the corn cob, the Bt sprays cannot reach the feeding site of the larvae, making it ineffective.

Bt sprays are highly selective and have minimal impact on beneficial insects, which can provide another level of control by predating or parasitising CEWs. This makes Bt sprays the perfect addition to an IPM program.

The timing of application is important to Bt and other 'softer' control options therefore, having an additional 3 days of information on moth flights is highly valuable to growers and advisors.

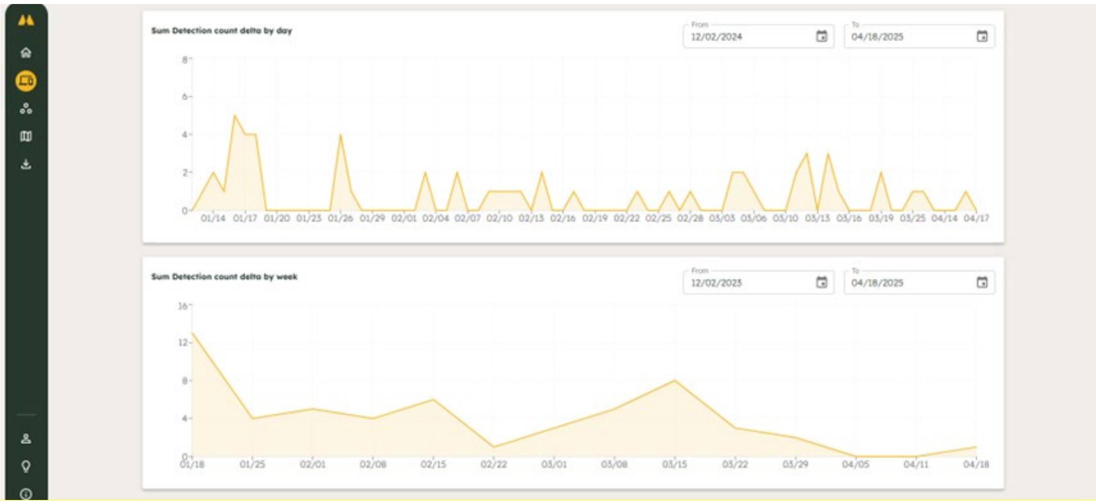


Figure 7. Data as displayed on the Scoutlabs dashboard

Trap suitability

Figure 8. Smart trap showing solar panel on edge of paddock

The Scoutlabs smarts traps were suitable for use in paddocks. The traps had no issue with weather or cropping conditions. The technology was able to connect to the New Zealand mobile network and had minimal issues with connectivity. The solar panels did need a wipe from time to time; however, this was an expected outcome. The sticky bases of the smart traps did need to be replaced; depending on moth catch, this could be as frequent as every week, resulting in a similar level of maintenance compared to the bucket trap. All 10 traps were recovered in a functional state which gives credibility to the >3 year advertised lifespan by Scoutlabs.

Bucket traps caught a high number of bumblebees regularly. Moving away from a bucket trap with yellow colouring has been suggested as a potential solution.

At the beginning of the project, a 10-trap (2, 5-pack deals) could be purchased for $1,233.4, or $123.34 each. At the time of this report, the price of each trap is $84/year which includes both hardware and software subscription. There are options to receive weekly, rather than daily data, which reduces the price to $50/year. This is a low investment in technology and would not be considered a barrier to uptake. Notably, for growers employing these tools, it could also offer time savings as weekly trap maintenance may not be necessary if there have been no, or limited catches on the sticky base.

Grower feedback

At least 3 growers who hosted traps in the study have asked for details to purchase this smart trap, which suggests it is a tool that growers may see as useful in their production. Furthermore, another grower has indicated a strong interest in deploying these traps this season for their sweetcorn production.

Feedback from those involved in the setup and maintenance of the smart traps indicated the tool is straightforward to use, as was data from the app. or website.

Conclusion

The trial of Scoutlabs electronic smart traps in New Zealand sweetcorn systems has shown potential for enhancing pest monitoring practices, particularly in the context of IPM. The traps demonstrated:

- Acceptable accuracy levels, with the ability to ID and capture data on CEW.
- Significantly faster information delivery, enabling earlier decision-making, is particularly valuable for targeting vulnerable pest life stages (e.g., eggs and early instars) with biological or selective control products.
- Consistent performance across multiple regions and environmental conditions, reinforcing the robustness and reliability of the technology in real-world field use.
- Bucket traps were more sensitive, with more moths caught than smart traps. This may make them more appropriate under lower pressure. Trends across traps were comparable.

Results across traps, regions, and paddocks were all highly variable, suggesting the highly localised pressure of corn earworm. This highlights the need for effective monitoring techniques to capture this granularity. Any tool will be an advantage for growers in this space, and smart traps offer a convenient option that is very scalable.

The response from growers was positive, with a number already expressing interest in adopting smart trap systems into their crop protection programs. This early engagement is an encouraging sign for wider adoption and scale-up.

As horticulture continues to move toward smarter, data-driven systems, technologies like Scoutlabs represent a viable pathway toward precision pest monitoring, delivering better timing, reduced chemical use, and more efficient use of agronomic resources. Smart trapping offers the potential to be a central pillar in the modern sweetcorn IPM programme, which should only improve over time.

Recommendations and Future Outlook

Supplementary Tool: At current accuracy and price levels, smart traps should be viewed as a complementary tool within an integrated pest management program, not used in isolation.

Early Warning System: Their greatest value lies in providing earlier signals of pest presence, supporting proactive intervention under IPM.

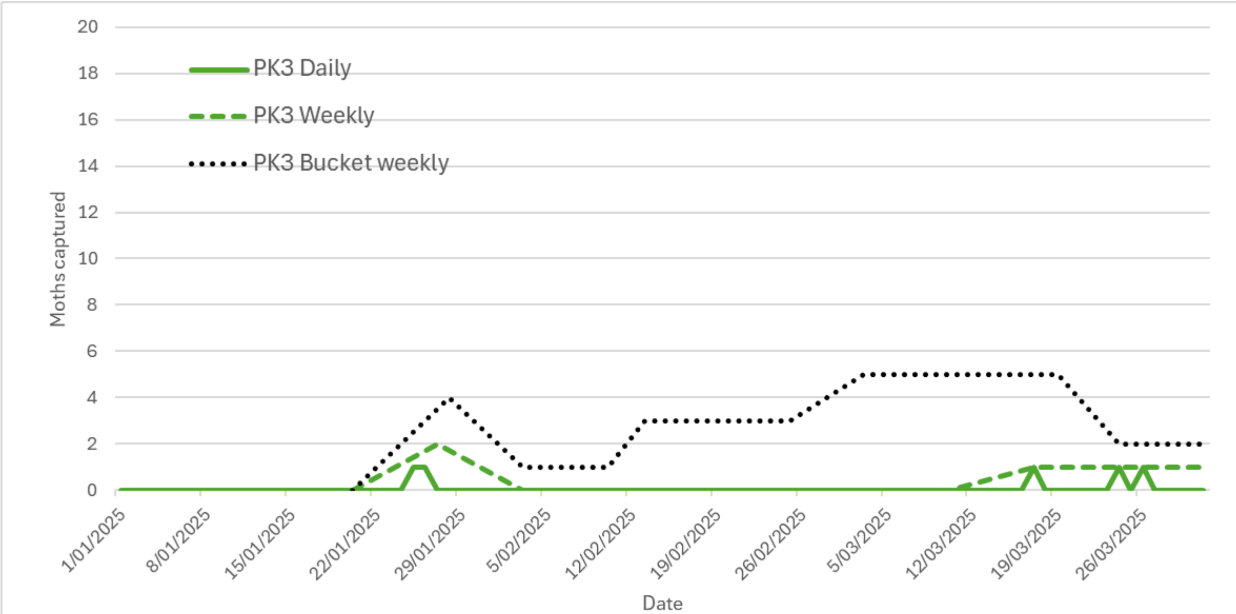
Ongoing Evaluation: Additional seasons of data, particularly across varying pest pressure years, would help refine accuracy models and further test long-term durability and cost-effectiveness.

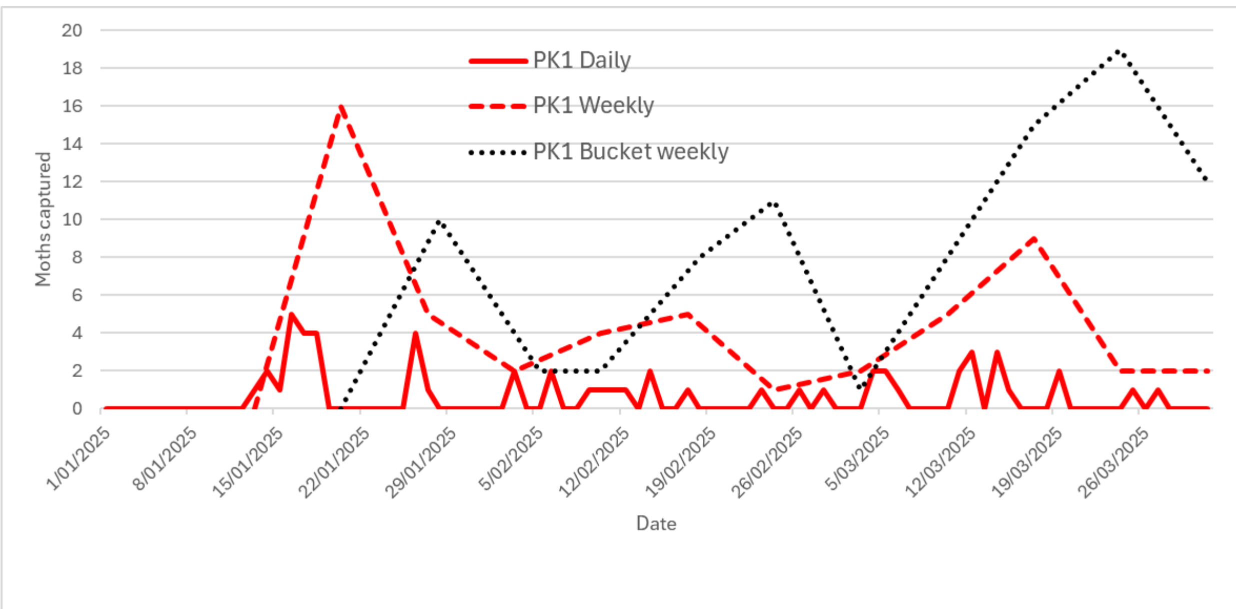
Technology Evolution: Future iterations may benefit from improved algorithms, larger image libraries, and integration with degree-day models or mobile alerts.

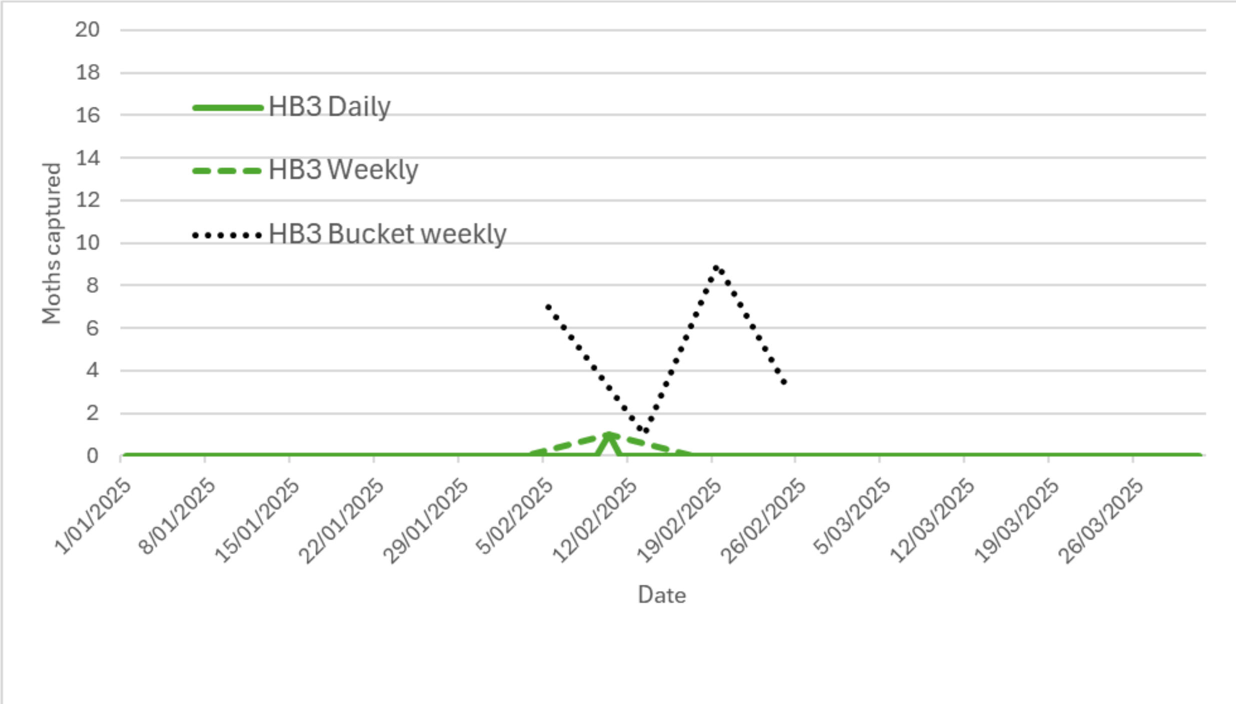
Smart bucket traps: As buckets provided high moth catches, the combination of smart ID technology and bucket trapping would be of value to investigate in improving sensitivity or reduced maintenance

Pest pressure alerts: Customisable, threshold or trend driven notifications could be used to alert growers when pest pressure exceeds relevant levels.

Appendix 1 - Trap data comparison






HB3 Daily
HB3 Weekly
HB3 Bucket weekly
Moths captured
Date
0
2
4
6
8
10
12
14
16
18
20
1/01/2025
8/01/2025
15/01/2025
22/01/2025
29/01/2025
5/02/2025
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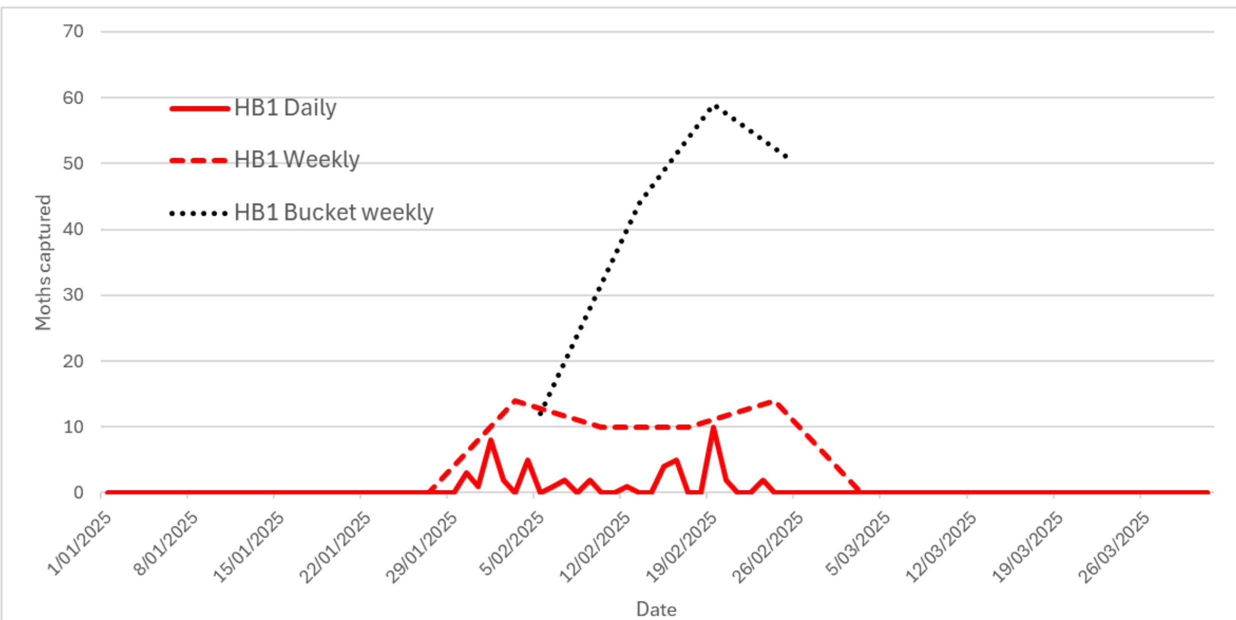
19/03/2025
26/03/2025


HB1 Daily
HB1 Weekly
HB1 Bucket weekly
Moths captured
Date
0
10
20
30
40
50
60
70
1/01/2025
8/01/2025
15/01/2025
22/01/2025
29/01/2025
5/02/2025
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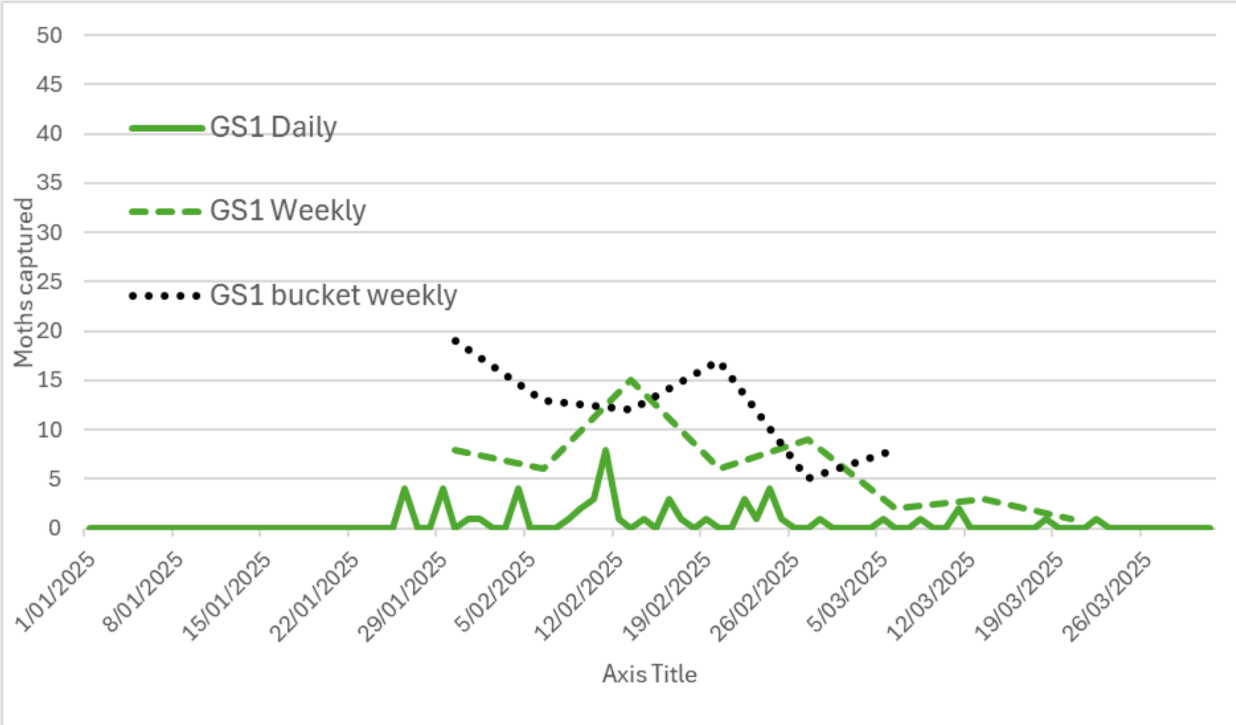
19/03/2025
26/03/2025


50
45
40
35
30
25
20
15
10
5
0
Moths captured
GS1 Daily
GS1 Weekly
GS1 bucket weekly
1/01/2025
8/01/2025
15/01/2025
22/01/2025
29/01/2025
5/02/2025
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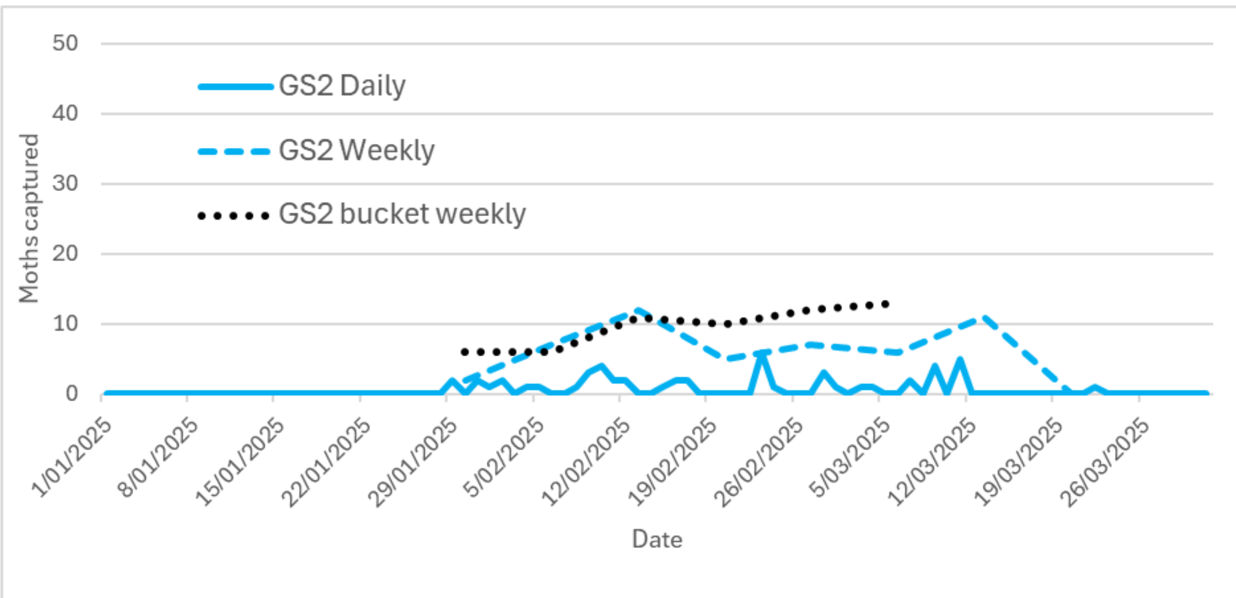
26/03/2025
Axis Title


50
40
30
20
10
0
Moths captured
GS2 Daily
GS2 Weekly
GS2 bucket weekly
1/01/2025
8/01/2025
15/01/2025
22/01/2025
29/01/2025
5/02/2025
12/02/2025
19/02/2025
26/02/2025
5/03/2025
12/03/2025
19/03/2025
26/03/2025
Date

Appendix 2 - Trap raw data

	Trap ID (Trap type, Data frequency)															
	Gisborne						Hawke's Bay				Pukekohe					
Date	GS1 (Smart, Daily)	GS1 (Bucket, Weekly)	GS2 (Smart, Daily)	GS2 (Bucket, Weekly)	GS3 (Smart, Daily)	GS3 (Bucket, Weekly)	HB1 (Smart, Daily)	HB1 (Bucket, Weekly)	HB3 (Smart, Daily)	HB3 (Bucket, Weekly)	PK1 (Smart, Daily)	PK1 (Bucket, Weekly)	PK2 (Smart, Daily)	PK2 (Bucket, Weekly)	PK3 (Smart, Daily)	PK3 (Bucket, Weekly)
1/01/2025	0		0		0		0		0		0		0		0	
2/01/2025	0		0		0		0		0		0		0		0	
3/01/2025	0		0		0		0		0		0		0		0	
4/01/2025	0		0		0		0		0		0		0		0	
5/01/2025	0		0		0		0		0		0		0		0	
6/01/2025	0		0		0		0		0		0		0		0	
7/01/2025	0		0		0		0		0		0		0		0	
8/01/2025	0		0		0		0		0		0		0		0	
9/01/2025	0		0		0		0		0		0		0		0	
10/01/2025	0		0		0		0		0		0		0		0	
11/01/2025	0		0		0		0		0		0		0		0	
12/01/2025	0		0		0		0		0		0		0		0	
13/01/2025	0		0		0		0		0		1		0		0	
14/01/2025	0		0		0		0		0		2		0		0	
15/01/2025	0		0		0		0		0		1		0		0	
16/01/2025	0		0		0		0		0		5		0		0	
17/01/2025	0		0		0		0		0		4		0		0	
18/01/2025	0		0		0		0		0		4		0		0	
19/01/2025	0		0		0		0		0		0		0		0	
20/01/2025	0		0		0		0		0		0	0	0		0	0
21/01/2025	0		0		0		0		0		0		0		0	
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23/01/2025	0		0		0		0		0		0		0		0	
24/01/2025	0		0		0		0		0		0		0		0	
25/01/2025	0		0		0		0		0		0		0		1	
26/01/2025	4		0		0		0		0		4		0		1	
27/01/2025	0		0		0		0		0		1		0		0	
28/01/2025	0		0		0		0		0		0	10	0		0	4
29/01/2025	4		2		1		0		0		0		0		0	
30/01/2025	0	19	0	6	0	13	3		0		0		0		0	
31/01/2025	1		2		0		1		0		0		0		0	
1/02/2025	1		1		2		8		0		0		2		0	
2/02/2025	0		2		1		2		0		0		0		0	
3/02/2025	0		0		3		0		0		2		0		0	1
4/02/2025	4		1		0		5		0		0		2		0	
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7/02/2025	0		0		1		2		0		0		1		0	
8/02/2025	1		1		1		0		0		0		0		0	
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11/02/2025	8		2		2		0		0		1		0		0	
12/02/2025	1		2		2		1		0		1		0		0	
13/02/2025	0	12	0	11	0	19	0	44	0	1	0		0		0	3
14/02/2025	1		0		0		0		0		2		0		0	
15/02/2025	0		1		2		4		0		0		0		0	

	Trap ID (Trap type, Data frequency)															
	Gisborne						Hawke's Bay				Pukekohe					
Date	GS1 (Smart, Daily)	GS1 (Bucket, Weekly)	GS2 (Smart, Daily)	GS2 (Bucket, Weekly)	GS3 (Smart, Daily)	GS3 (Bucket, Weekly)	HB1 (Smart, Daily)	HB1 (Bucket, Weekly)	HB3 (Smart, Daily)	HB3 (Bucket, Weekly)	PK1 (Smart, Daily)	PK1 (Bucket, Weekly)	PK2 (Smart, Daily)	PK2 (Bucket, Weekly)	PK3 (Smart, Daily)	PK3 (Bucket, Weekly)
16/02/2025	3		2		0		5		0		0		0		0	
17/02/2025	1		2		0		0		0		1		0		0	
18/02/2025	0		0		0		0		0		0	8	0		0	
19/02/2025	1		0		1		10	59	0	9	0		1		0	
20/02/2025	0	17	0	10	0	25	2		0		0		1		0	
21/02/2025	0		0		0		0		0		0		3		0	
22/02/2025	3		0		1		0		0		0		0		0	
23/02/2025	1		6		0		2		0		1		2		0	
24/02/2025	4		1		0		0		0		0	11	0		0	
25/02/2025	1		0		0		0	51	0	3	0		0		0	3
26/02/2025	0		0		0		0		0		1		1		0	
27/02/2025	0	5	0	12	1	35	0		0		0		0		0	
28/02/2025	1		3		3		0		0		1		0		0	
1/03/2025	0		1		1		0		0		0		0		0	
2/03/2025	0		0		2		0		0		0		0		0	
3/03/2025	0		1		1		0		0		0	1	0		0	5
4/03/2025	0		1		2		0		0		2		0		0	
5/03/2025	1		0		0		0		0		2		0		0	
6/03/2025	0	8	0	13	7	34	0		0		1		0		0	
7/03/2025	0		2		0		0		0		0		0		0	
8/03/2025	1		0		4		0		0		0		0		0	
9/03/2025	0		4		0		0		0		0		0		0	
10/03/2025	0		0		0		0		0		0		0		0	
11/03/2025	2		5		0		0		0		2		0		0	
12/03/2025	0		0		0		0		0		3		0		0	
13/03/2025	0		0		1	46	0		0		0		0		0	
14/03/2025	0		0		3		0		0		3		0		0	
15/03/2025	0		0		9		0		0		1		0		0	
16/03/2025	0		0		3		0		0		0		0		0	
17/03/2025	0		0		1		0		0		0	15	0		1	
18/03/2025	1		0		0		0		0		0		0		0	
19/03/2025	0		0		3		0		0		2		0		0	5
20/03/2025	0		0		1		0		0		0		0		0	
21/03/2025	0		0		1		0		0		0		0		0	
22/03/2025	1		1		0		0		0		0		0		0	
23/03/2025	0		0		1		0		0		0		0		0	
24/03/2025	0		0		0		0		0		0	19	0		1	2
25/03/2025	0		0		3		0		0		1		0		0	
26/03/2025	0		0		0		0		0		0		0		1	
27/03/2025	0		0		1		0		0		1		0		0	
28/03/2025	0		0		0		0		0		0		0		0	
29/03/2025	0		0		0		0		0		0		0		0	
30/03/2025	0		0		0		0		0		0		0		0	
31/03/2025	0		0		0		0		0		0	12	0		0	2