B-hive

TRACER-PEST:
Trap Recognition and AI-based Classification for Early Response to Pests

May 2026 - April 2028

P E SIMMONS & SON LIMITED

Farmacy
Advisors to Agriculture

UNIVERSITY OF WARWICK

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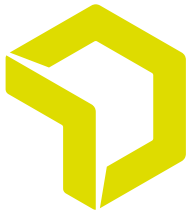
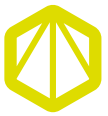
Accelerating Innovation that transforms the sustainability of food production



B-hive



HarvestEye™

Powered by B-hive

Our Purpose

- Optimise marketable yield
- Add value to the supply chain
- Reduce waste
- Enhance produce quality



Project Challenge

- UK onion & brassica sector worth £983M+ annually.
- Major pests: Bean Seed Fly (BSF) and Swede Midge (SM):
  - BSF: £35M losses in onions (nationwide).
  - SM: £26M losses in (just) broccoli.
- Increase pressure on growers due to:
  - Restricted pesticide use
  - Climate change effects
- Monitoring relies on: Manual trap collection, expert identification, slow and labour-intensive process
- Treatment window can be as short as 3 days → high risk of missing intervention timing

Bean Seed Fly (BSF)







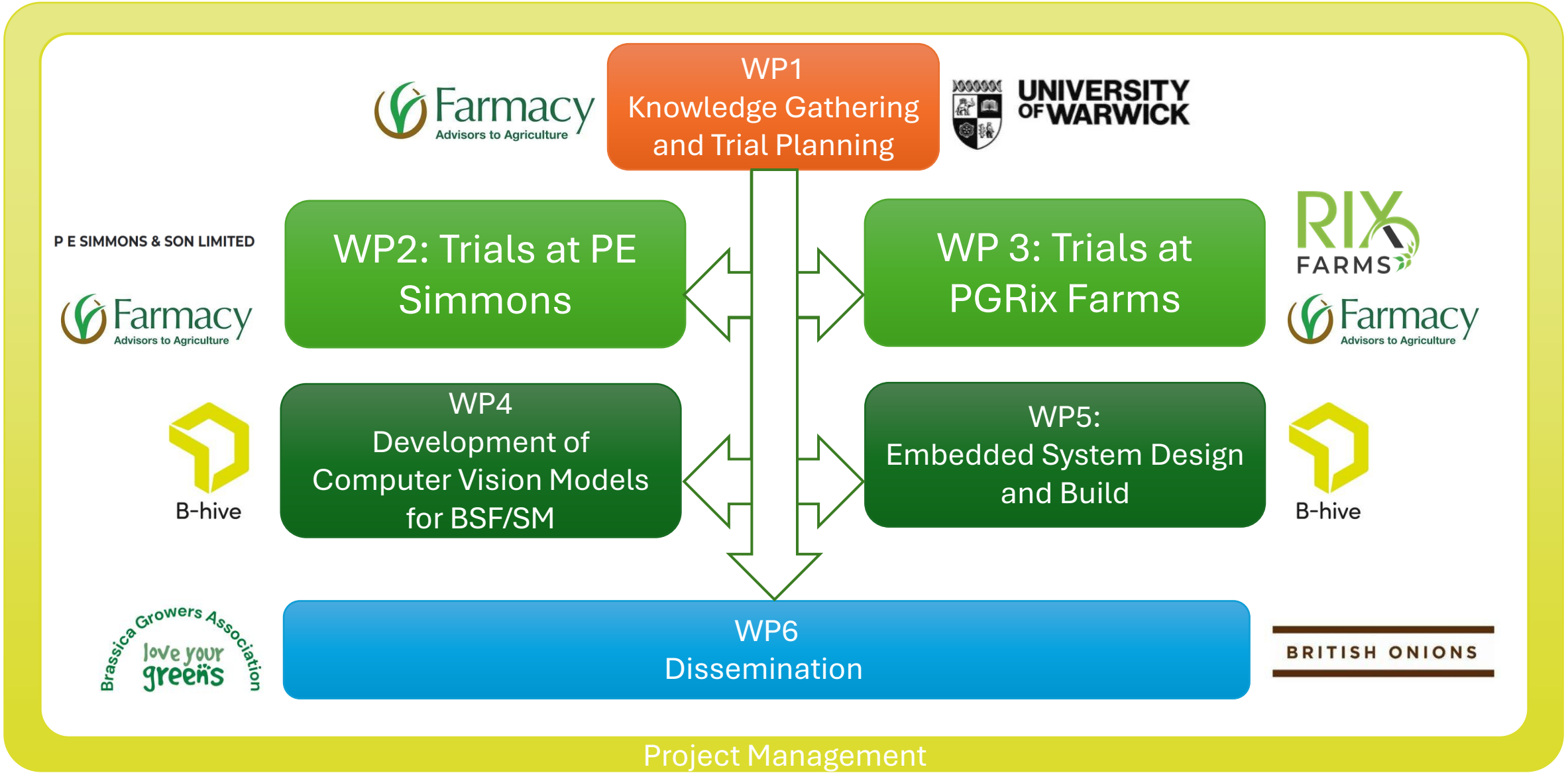
Swede Midge (SM)





AHDB Horticulture Allium and Brassica

TRACER-Pest at a glance...



TRACER-Pest

Target Pests

Bean Seed Fly (BSF)



Swede Midge (SM)



Damage









Trace-Pest

Solar Pannel

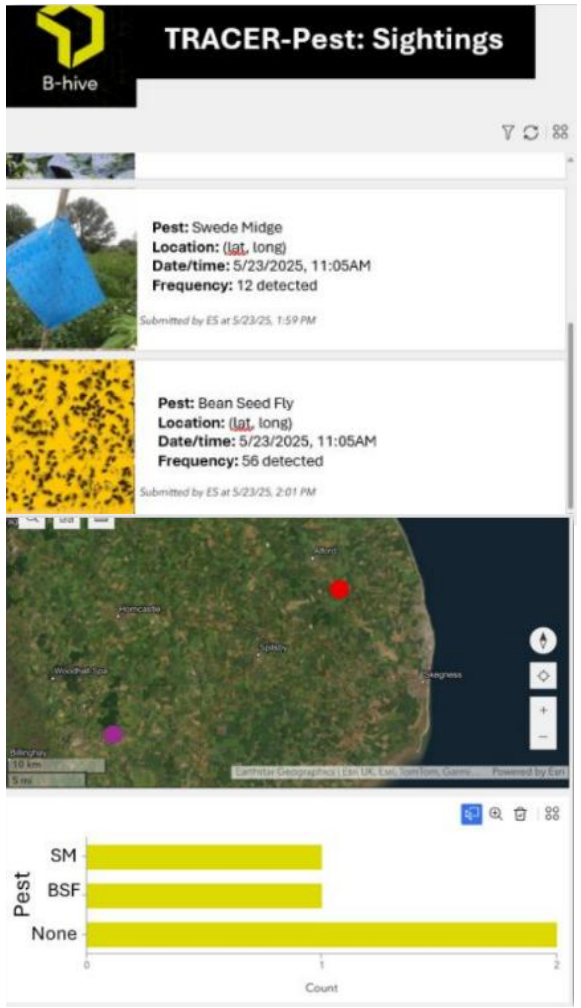


Electronic box

Camera

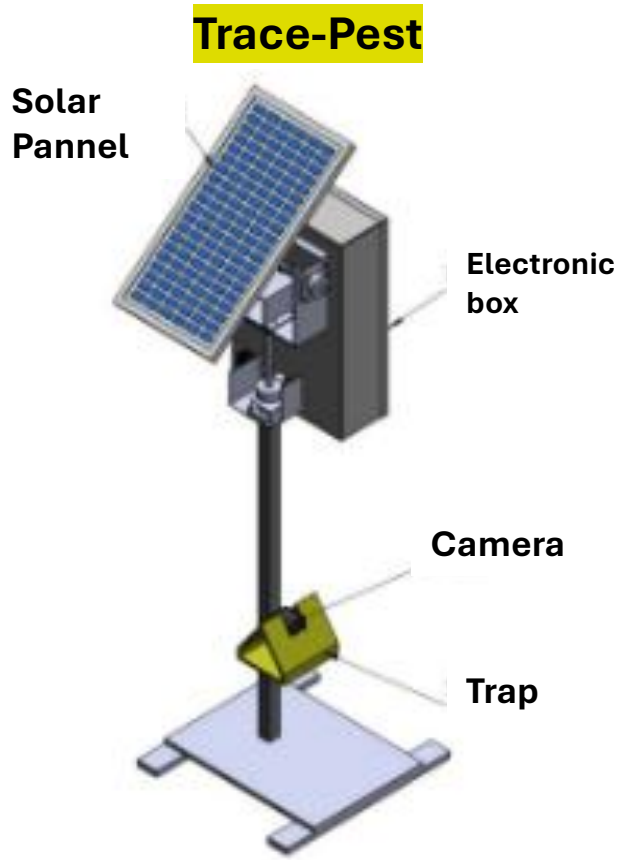
Trap

Output



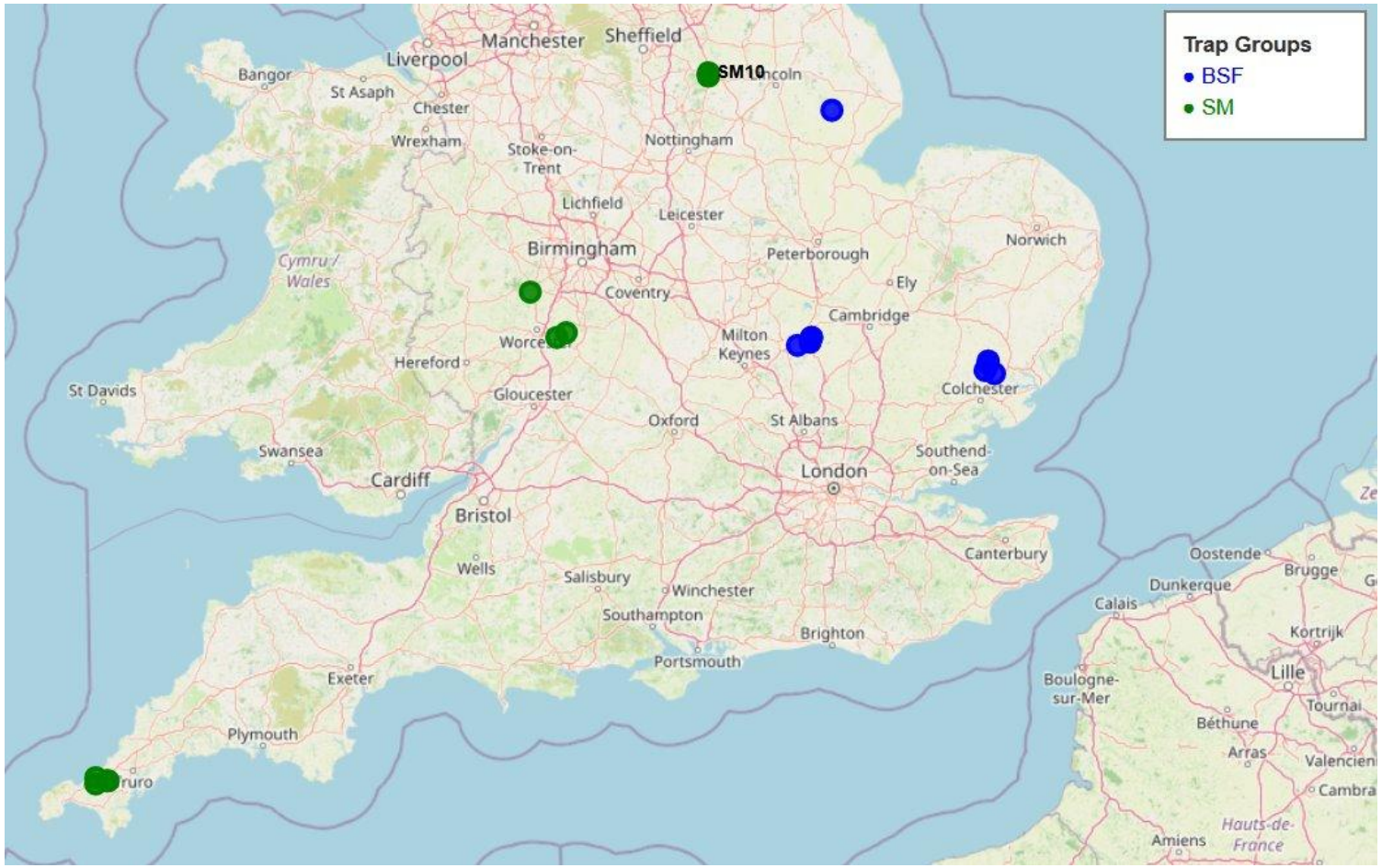
Project Solution

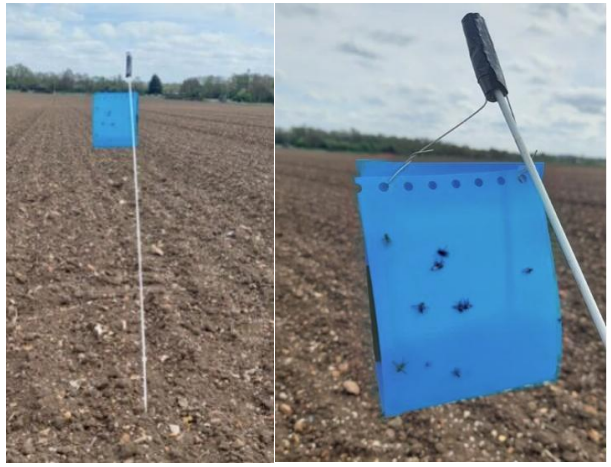
- **Automated Pest Monitoring System:** In-field, real-time detection using:
  - Solar-powered imaging
  - AI / computer vision models
  - Targeting BSF and SM
  - Integrates with existing commercial traps
- **Reduce reliance on labour-intensive:**
  - (Initial calculations) could save ~£5,000 per-site.
- **Rapid Response:**
  - Timely intervention and prevent missing the 3-day treatment windows.
- **Reducing losses** by just 10% would be in the £M:
  - Up to 50% reduction potential.
- Allow for targeted intervention saving up to £155-185 per hectare



How can we increase knowledge on SM and BSF and potential treatments?

Knowledge Gathering and Trial Planning







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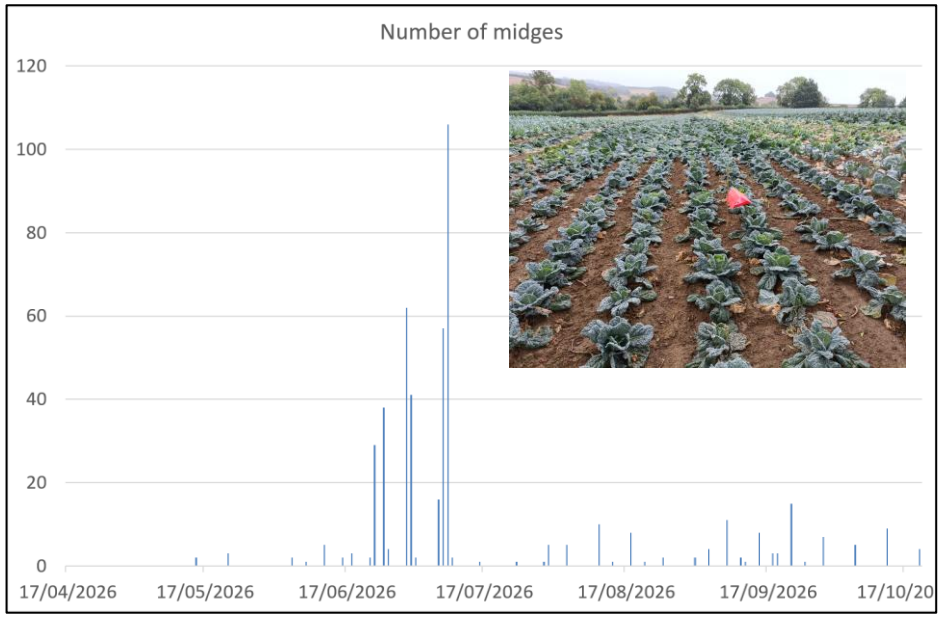
Knowledge Gathering and Trial Planning

Bean Seed Fly (BSF) Monitoring	Swede Midge (SM) Trial Plan (July)
10 monitoring traps deployed across Bedfordshire, Lincolnshire, Essex and Suffolk trial sites.	6 monitoring trap deployed: Cornwall: Riviera Produce (Tenderstem broccoli), Nottinghamshire: Hammonds (Savoy cabbage)

- Proposed programme includes 16 treatments, evaluating:
  1. Physical exclusion (mesh covers for 2, 3 and 4 weeks)
  2. Standard and combination drench treatments (Verimark-based programmes)
  3. Follow-up insecticide applications
  4. Biological control option (Capirel nematodes)

Knowledge Gathering and Trial Planning

- Monitoring SM with pheromone traps and collecting samples for analysis with camera/lens.
- Gathering information about pattern of activity in different areas.
- Using the information to learn more about 'risk' of infestation and possible approaches to manage swede midge
- Two trial sites, and in other crops, some by volunteers outside the project
- Towards the end of the season:
  - >20 traps per week being run and assessed
  - >400 trap samples in total.
- Will continue running traps at Wellesbourne over winter and revise strategy for 2027



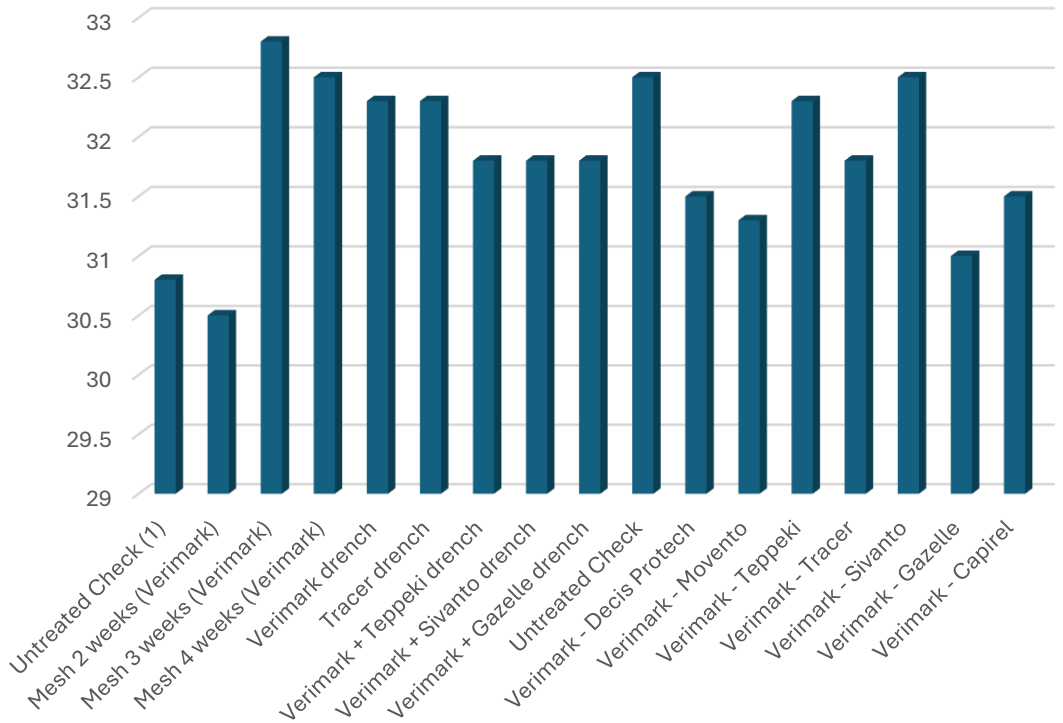


Swede Midge Trials



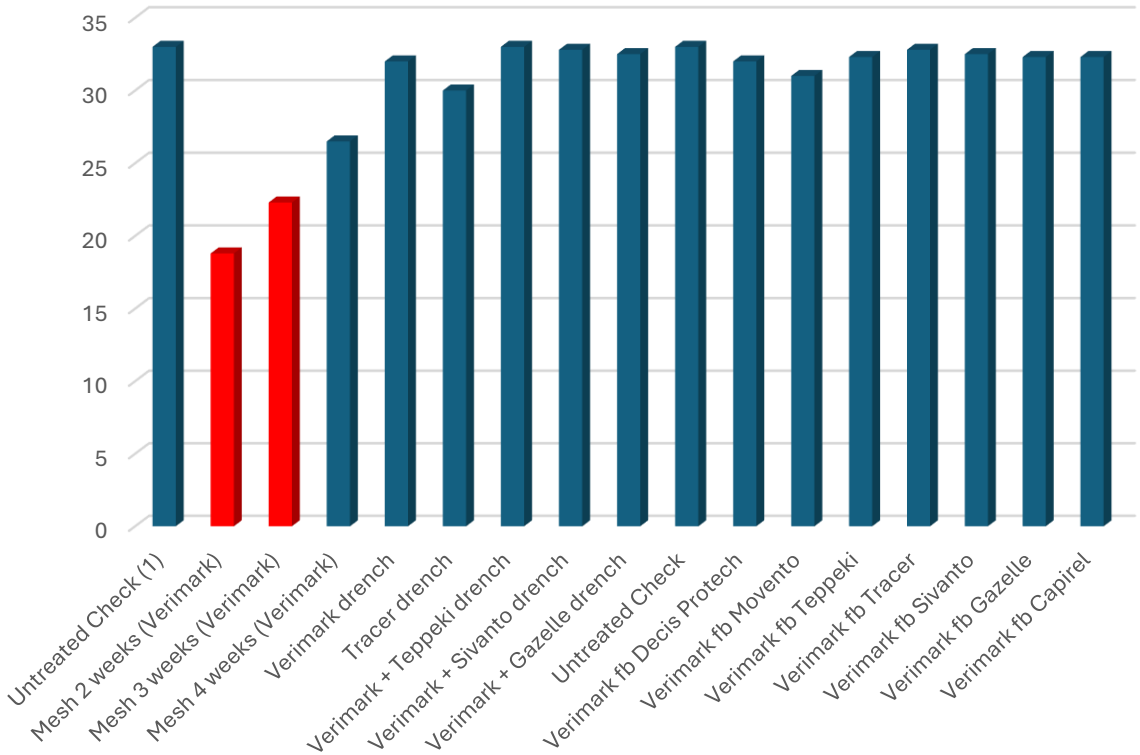
Swede Midge, Notts (no s.d.)

Healthy Plants 10.08.26 41 days post plant, sample size 33 plants



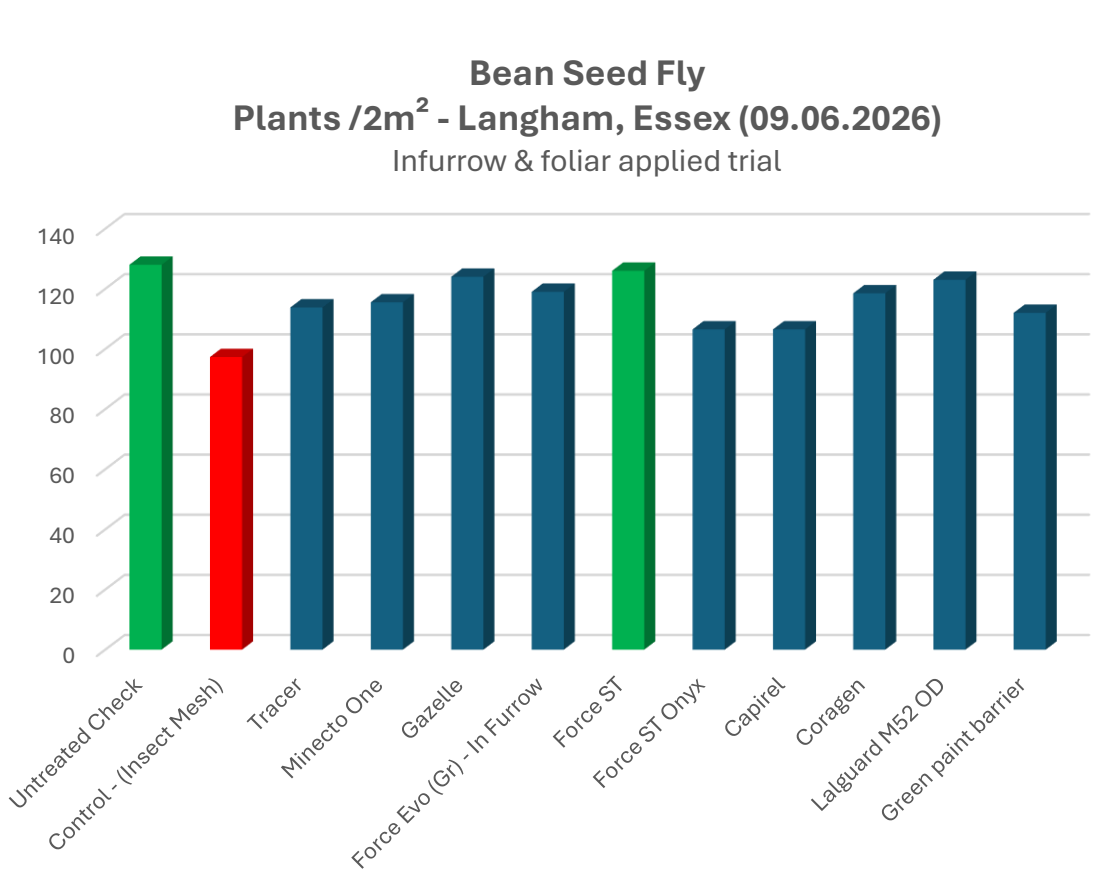
Swede Midge, Cornwall

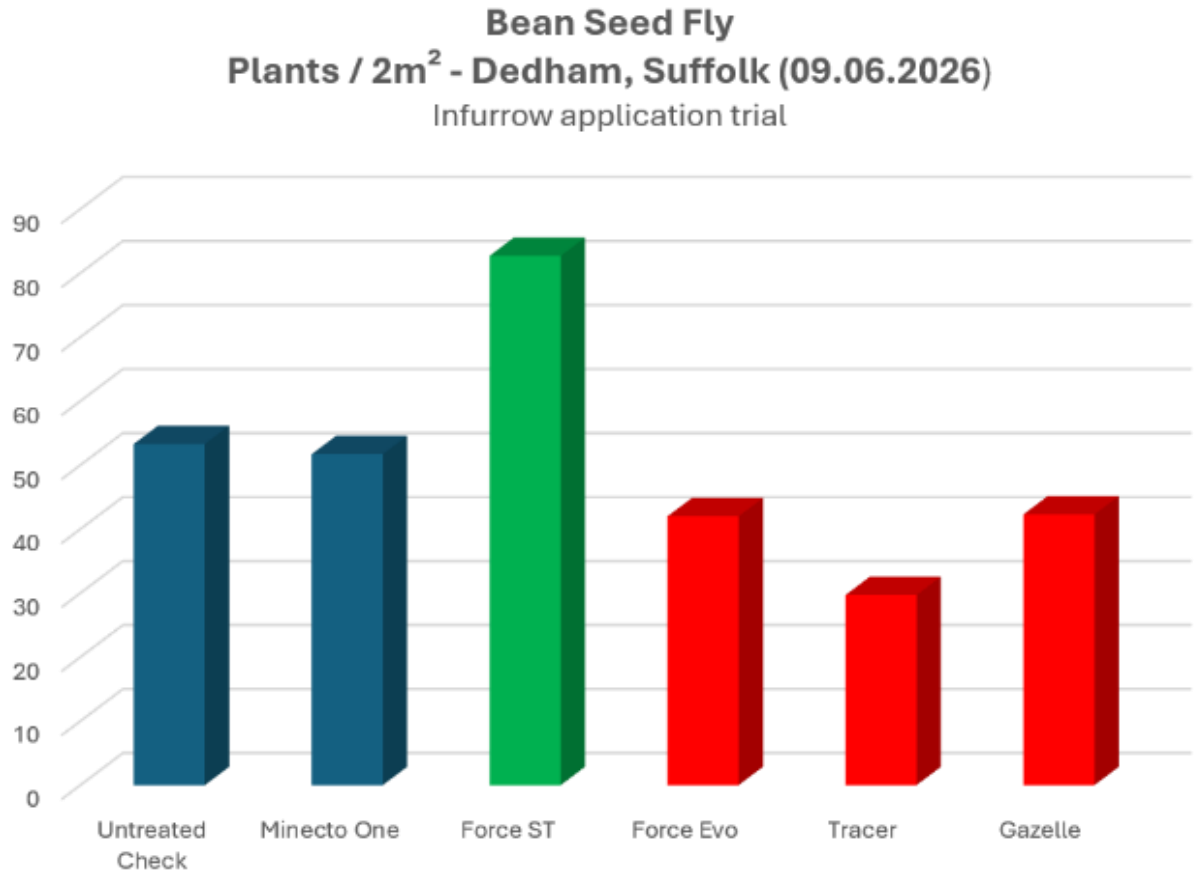
Healthy Plants 30.07.2026 21DAA, sample size 33 plants



- Limited difference between treatments
- Due to the little or no SM infestation during the trial
- Effect with mesh covers is due to herbicide application

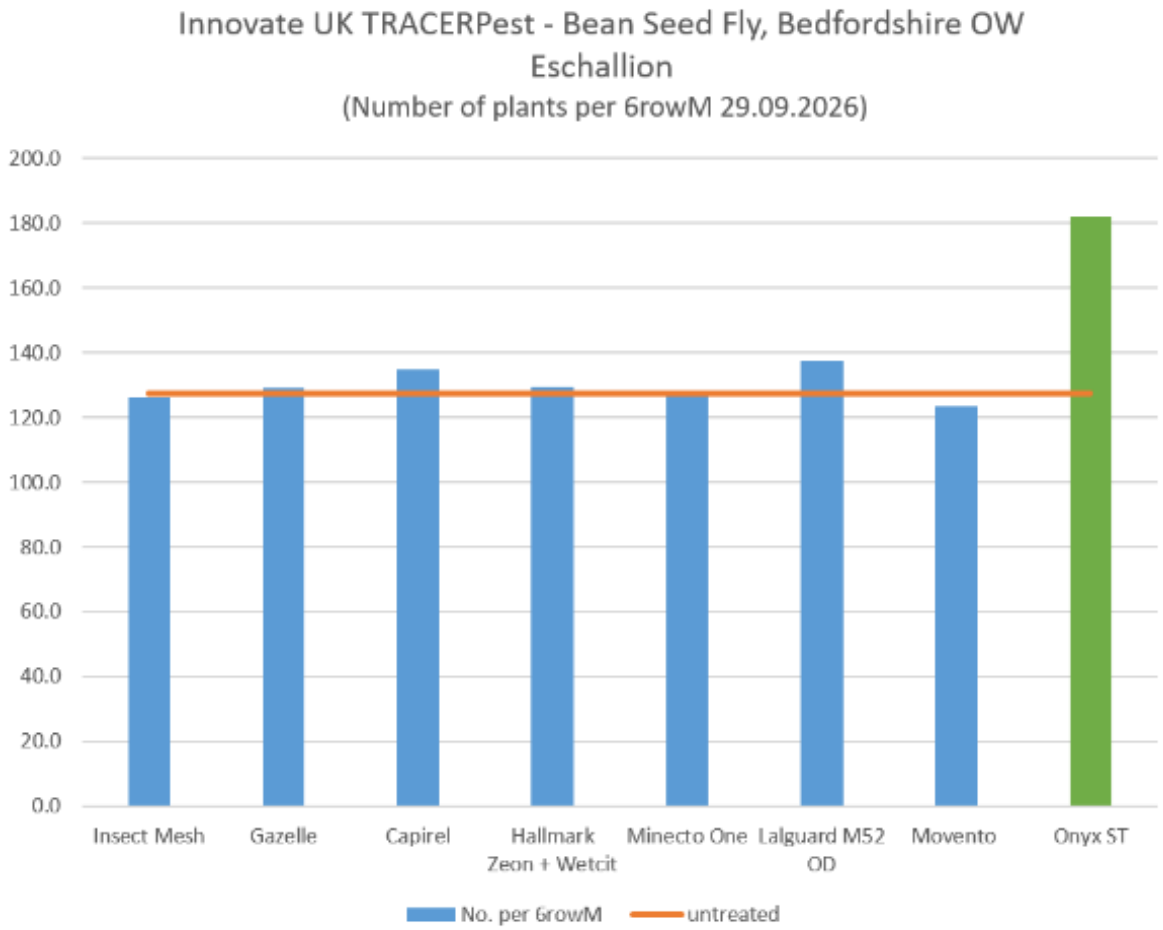
Bean Seed Fly Trials





- The plots show the different treatment against plant numbers.
- Higher plant number the trial was considered successful.
- No much variability on the treatments

Bean Seed Fly Trials



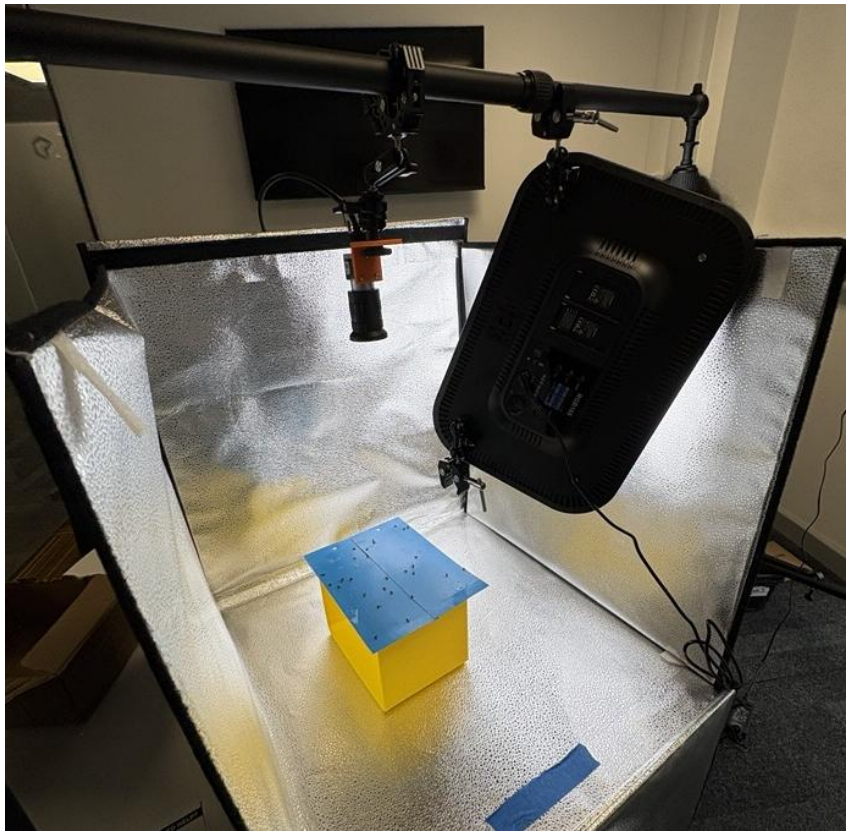


Onyx ST is the most effective

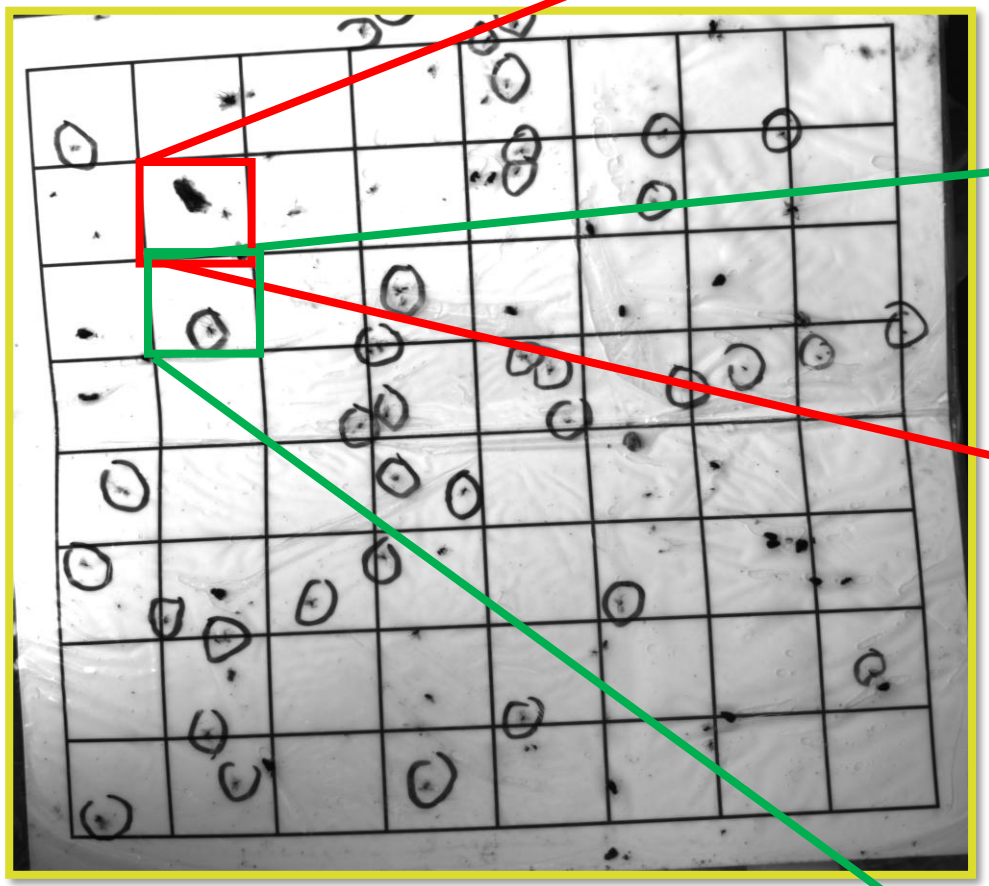
How can technology support growers detect BSF and SM faster?

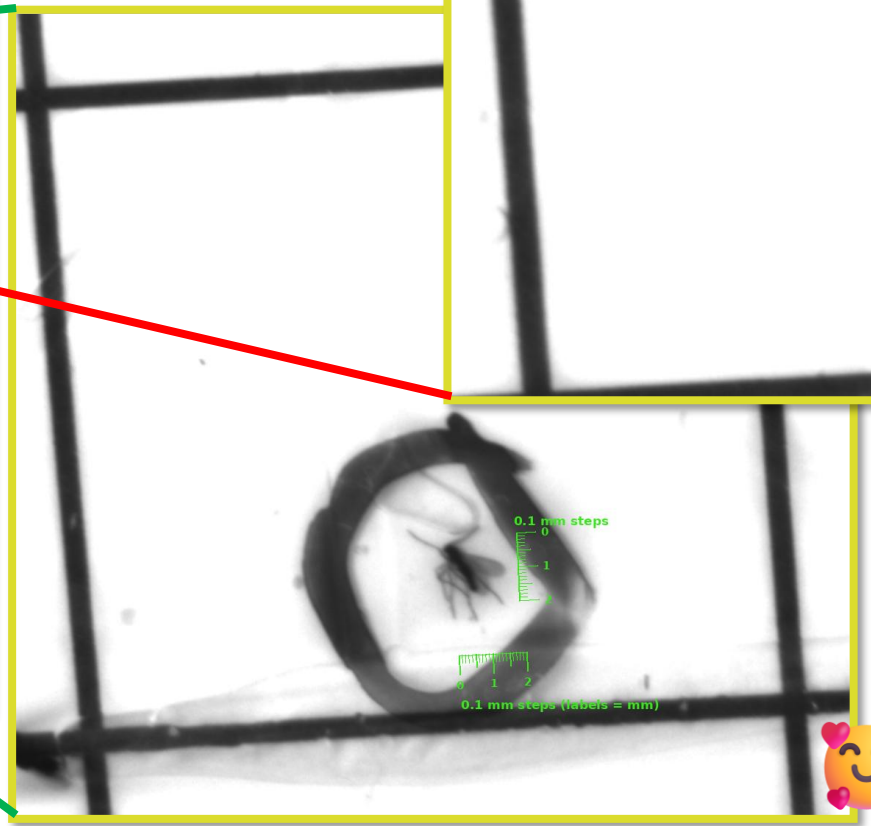
Data collection and System set-up

- Key components:
  - High-resolution camera and macro lens.
- Field of view optimized for trap dimensions of 20×18.5 cm (SM).
- Spatial resolution: Achieves 0.037mm/px and 0.051mm/px along the short and long axes, respectively.
- Target resolution: Objects of approximately 1×1mm
- Controlled illumination: LED light
- Enclosed imaging box: Closed chamber designed to optimize light distribution, reduce external light interference, and maximize image consistency.



Data collection and Sy

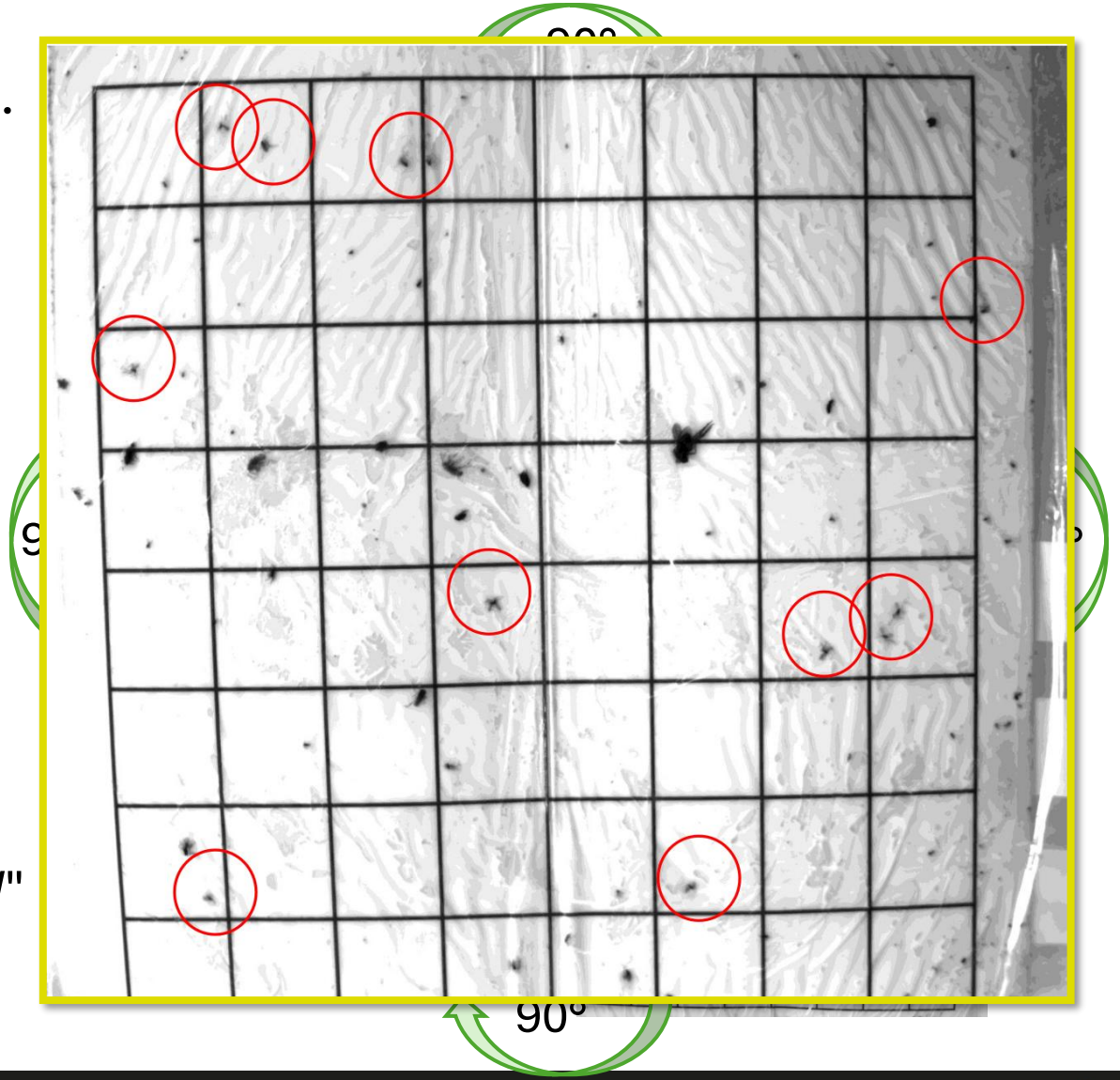




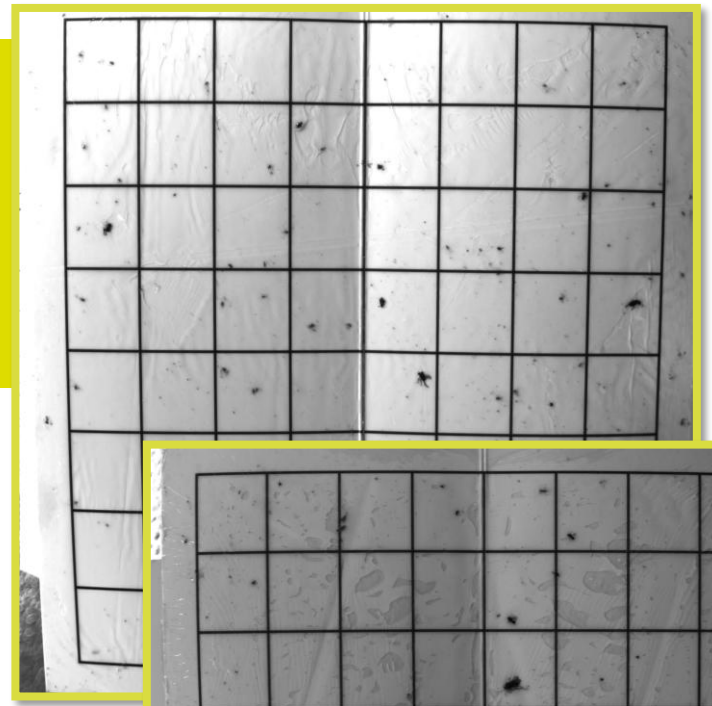


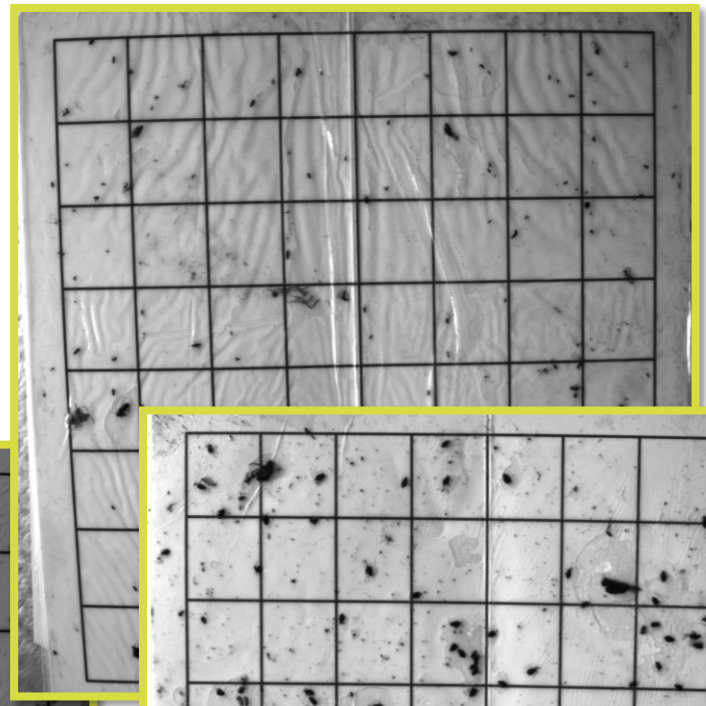
Data collection Approach

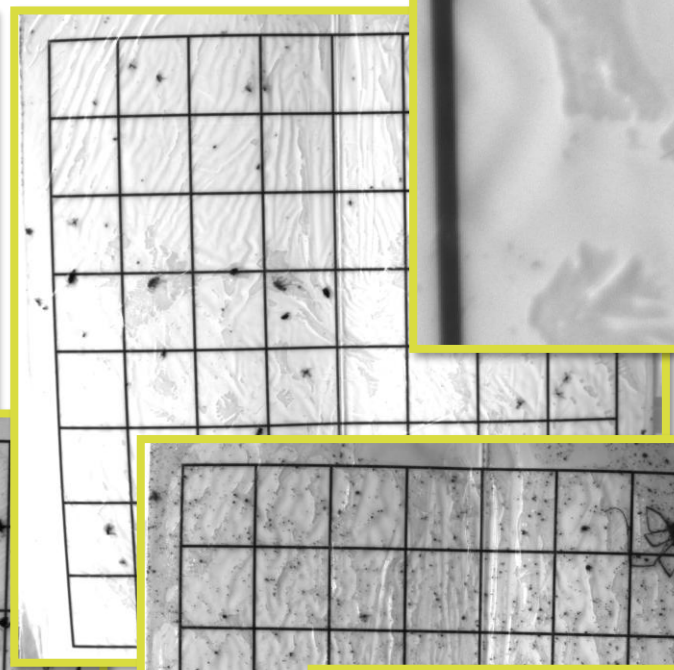
- Trap placed to maximise field-of-view coverage.
- Four images acquired per trap:
  - Rotation-based acquisition increases dataset size by 4
  - Improves robustness to insect orientation during model training.
- Image resolution 5472 x 3648px
- Images manually reviewed by Prof Collier at the University of Warwick.
- Positive identifications will provide the groundtruth for the initial round of model training.
- Models will be developed using this "*lab-based*" imagery over the next few weeks.

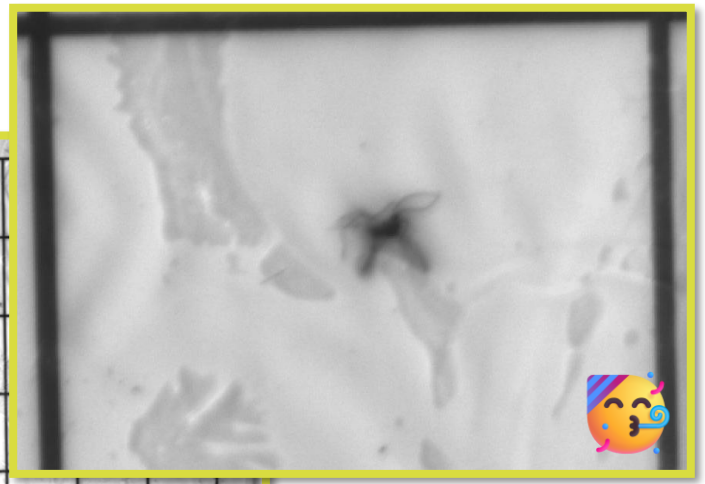


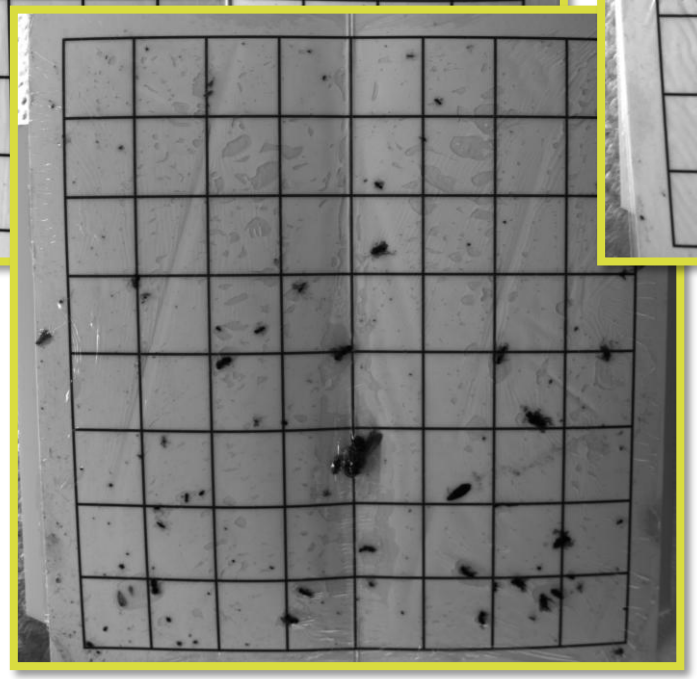
Data collection

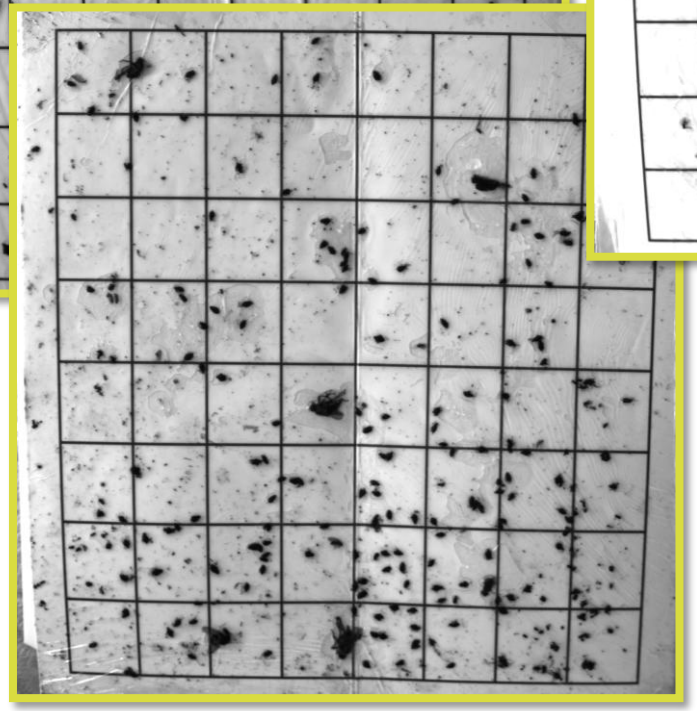


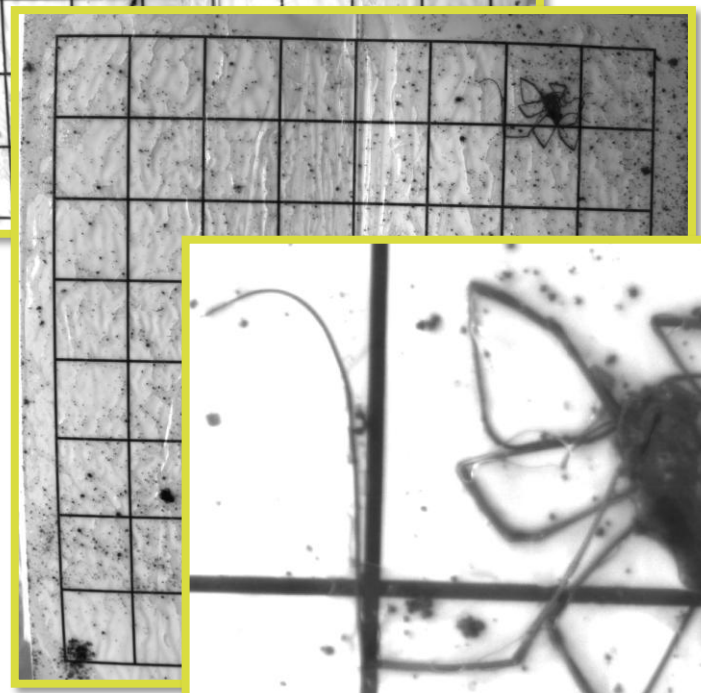












Up Next

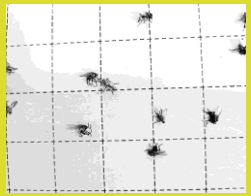


Image Acquisition

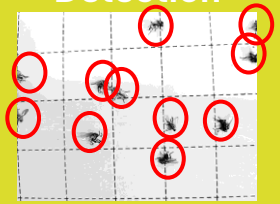


Data Upload

Pre-processing



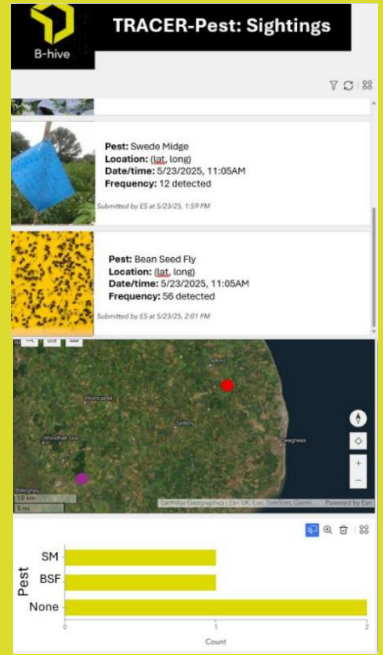
Object Detection



Object Classification

BSF:11
SM:0

Real-Time Reporting



Summary

- TRACER-Pest is a 24-month Feasibility Study. We are now 6 months into the 24-month project.
  - The goal is to answer: can BSF and SM be detected on traps and monitored real time?
- Year 1 field trials are now complete.
  - Pest pressure was low and patchy, and the drench and foliar treatments showed no consistent benefit.
  - Onyx ST worked best against Bean Seed Fly. Insect mesh shows promise but damaged the crop unless it was suspended above it.
- The imaging system is built, and can be deployed in-lab.
- We have created a dataset with BSF and SM to use in a baseline model.

Up Next:

- Choose higher-risk trial sites and cover more sites and timings.
- Test combined treatment programmes, and separate the mesh's effect on pests from the effect of crop management under it.
- Finish annotating images, train refined detection models, and deploy in TRACER-Pest hardware.
- We will be working on assembling >3 systems for trap monitoring in-field during the 2027 season.



Any questions?

Thank you!