GAME CHANGING 'FRUIT-TECH' FOR PRODUCTIVITY AND SUSTAINABILITY

Economic conditions in fruit growing and horticulture are still very challenging, with input and production costs increasing faster than the sale price of produce.

Agri-TechE members argue that innovation has potential to transform the sector. Many growers are working closely with researchers and technologists to co-develop solutions to industry challenges.

Here we capture some of the technologies and tools that are becoming available for:

- *precision targeting of inputs*
- *management of pests and diseases*
- *automating cultivation and harvesting*
- *enhancing pollination*
- *controlling the growing environment*

***Agri-TechE** is a business focused membership organisation, supporting the growth of a world-leading network of innovative farmers, producers, scientists, technologists and entrepreneurs who share a vision of increasing the productivity, profitability and sustainability of agriculture.*

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NIAB

Professor Xiangming Xu of the independent science-based crop research organisation NIAB says there is still appetite to invest in projects that will improve crop management.

"Growers are still willing to invest in R&D projects when they can see the potential benefit for the future. The projects I'm aware of are related to increasing production efficiency, reducing labour requirements, and improvements to crop management, by automation and sensing systems.

"In glasshouse crops, a number of the largest producers are willing and able to invest in R&D projects, such as crop scouting, crop protection, and energy efficiency.

He gives the example of orchard precision spray systems and sensing/mapping hardware and software where the benefits are significant:

- significant reductions in inputs (e.g. pesticides and other crop protection products, and fuel)
- reduced labour requirements
- higher percentage of apples in Class 1 category increasing orchard profitability

In terms of timescale, some elements are already commercially available (e.g. variable rate spray machine, aerial mapping of blossoms) but uptake seems to be minimal so far, likely due to the investment required and growers not yet certain of the Return on Investment (ROI).

He concludes that uptake of these technologies should improve as more elements become commercially available, improving the ROI and making the economic case clearer.
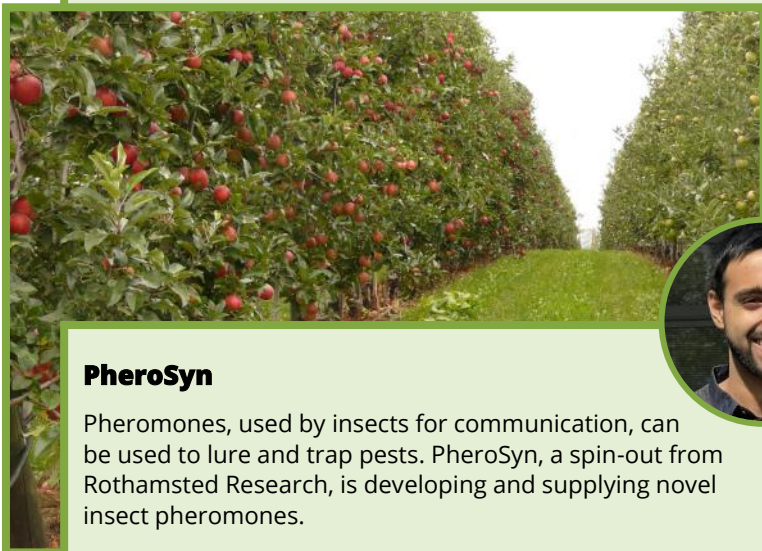
PheroSyn

Pheromones, used by insects for communication, can be used to lure and trap pests. PheroSyn, a spin-out from Rothamsted Research, is developing and supplying novel insect pheromones.

"Our specialist expertise enables PheroSyn to synthesise species-specific pheromones that target the most prolific and damaging pests," says co-founder **Daniel Bahia**.

"Our monitoring systems enables the crop to be treated at exactly the right time and with the right pesticides, so wasteful and inefficient over-spraying is avoided."

Projects include:

- Pear gall midge and pear leaf midge pheromones under trials.
- Developing attractants in bee pollination to improve nutrition in strawberries.
- Pea midge and pea and bean weevil pheromone smart monitoring systems are commercially available following successful GEP validated trials with the Processors and Growers Research Organisation (PGRO).

Farmable

Farmable is a user-friendly farm management system, inspired by a team of Norwegian fruit farmers, and tailored to the needs of fruit and vegetable growers.

The Farmable app organizes data to visualise the profitability of each field while simplifying the compliance documentation for the farm. Once they download the Farmable app, growers can quickly start managing field notes, crop applications, advisor recommendations and harvest records from their mobile phone.

Kaye Hope, COO of Farmable, says of the global fruit and vegetable industry: "We are at the early stages of leveraging technology in the field. That means there is a lot of potential to improve both the profitability and the sustainability of production."

The core functionality for compliance is available to UK farms for £99 GBP per farm per year.
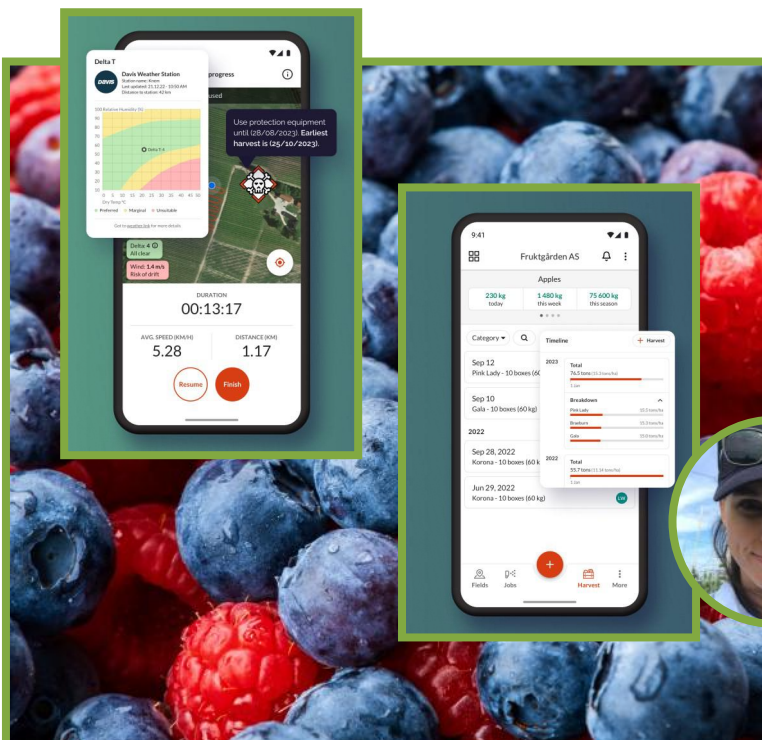
RootWave

RootWave uses electricity to give better weed control whilst protecting health and helping nature restore its soils, water, and biodiversity.

The RootWave eWeeder for fruit is a tractor powered machine that kills all weeds and their roots. eWeeding generates heat within the weed and root, killing it instantly.

Tom Archer comments: "Over the last five years we have been working hard with commercial orchards and vineyards to develop the technology for top fruit and vineyards.

"Field trials along with on-farm use demonstrations have helped to refine and fine-tune the technology to ensure the RootWave eWeeder for fruit is market-ready for the commercial machines arriving on-farm in 2024."

Designed for vineyards, orchards and bush fruit, eWeeder meets the criteria for Defra grant funding.

AgriSound

AgriSound provides smart listening technologies that can track pollinator activity within fruit production environments. This data supports improved pollinator management and results in improved fruit yield and marketability.

Casey Woodward, founder and CEO of AgriSound, comments: "The core use case (precision pollination) is broadly market ready and supported by external validation data.

"As every farm/site is different, we do need long-term collaborations with growers to see the benefits and optimise for individual sites. Further investment is required to offer enhanced functionality, e.g. new algorithms for pest monitoring."

University of Essex

The University of Essex School of Computer Science and Electronics Engineering University is focussed on building agricultural robots to automate a range of 'laborious, repetitive' harvesting jobs in the farms for which there is a critical shortage of labour.

Dr Vishuu Mohan explains: "We work across a number of crop types, for example robotic picking of strawberries in vertical growing systems, robotic seedling transplanting and float handling in hydroponic facilities (e.g. lettuce), mushroom picking, and more recently looking at robotics for tomatoes, onions, flowers and even silkworms in India!

"We are specifically focussing on applications that require a high level of manual dexterity, speed, soft-interaction, task-learning and cognition.

"Interestingly, while building such robots, we engineers are also trying to understand how our brains enable us to do these tasks so efficiently. So, in this journey, building intelligent robots and understanding the brain are two sides of the same coin!"

Challenges the team are addressing include increasing the efficiency of harvesting, automation and simplification of farm logistics, disease monitoring/mitigation, and energy optimization through crop intelligence.

Some applications are close to being market ready, for example lettuce harvesting/transplanting with collaborative robots, and some are undergoing successful field testing such as strawberry picking.

The university is focussing on significant reduction of unit costs of autonomous robots to make these systems affordable.

Investment is needed to scale-up and transition to low-cost market ready solutions that offer user-friendliness with visualization and trust worthiness.

Some essential first steps to accelerate technology adoption:

1. Greater collaboration between the stakeholders: government teams, technology providers and supply chain players – to share the cost of innovation adoption.

2. Affordable network access for rural communities so technology can be implemented.

3. More smaller businesses willing to pilot technology to ensure user-friendly products.

4. Development of more public infrastructures, such as geo-spatial systems for field maps, to reduce the obstacles for adoption of farm-friendly products.

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