10 YEARS OF THE REAP START-UP SHOWCASE

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.

Agri-Tech**E**

CELEBRATING TEN YEARS OF THE REAP START-UP SHOWCASE

Over the last ten years the REAP Start-Up Showcase has profiled 63 companies.

Of these companies we estimate that nearly 50 are still operational, creating a strong pipeline of innovation to support the transformation of agriculture.

To celebrate ten years of Agri-TechE, we are providing an update on the progress of some of our members that have been featured in the Start-Up Showcase.

Agri-tech innovation is maturing, and many of the technologies that have been profiled in the REAP Start-up Showcase over the years are now being used commercially.

2024 sees the use of agri-robotic harvesters on commercial crops, drone imagery directing precision nutrition for lettuces, and regenerative farmers using a range of sensors and monitors to provide evidence of soil health.

Now well established, these products and services were just concepts a decade ago.

"Although a number of start-ups have raised significant investment – for example: Better Origin ($16m), Pherosyn (£1.2m), FOTENIX (£2.5m), and Fieldwork Robotics (upward of £1.5m) – sadly, others have not gained the support they needed at a crucial time, most notably Small Robot Company."

Rethinking the scale-up model

The Start-up Showcase line-up is carefully curated to ensure that each company is focused on solving a genuine on-farm challenge and has real potential for growth.

However, the ambition for many of these early-stage companies is beyond the scope of the domestic market, which lacks the critical mass for some of these advanced technologies. This creates an imperative to scale quickly to reach an international market, and unfortunately a major pinch-point has been their ability to access the finance required.

Dr Belinda Clarke OBE, Director of Agri-TechE, comments: "The success rate of these agri-tech companies has been good, with nearly 50 of the cohort still in business.

"A deeper analysis reveals a need to rethink the model for scaling early-stage companies to one that gives the time that technology needs to mature and be tested on-farm."

In all industries, start-ups have a high failure rate, but agri-food is particularly challenging. Food production is highly regulated, which can create a barrier for new entrants. Seasonality means there might be only one data set per year, and extreme environmental conditions can disrupt trials.

"Margins are also extremely tight in the industry, and farmers need to reduce risk, so they may have limited bandwidth to explore new approaches," Belinda continues.

"That said, what has been notable across the Agri-TechE ecosystem is the number of progressive farmers willing to push the frontiers in agri-tech, and to pilot technologies that might offer little immediate financial return. This market pull also demonstrates evidence of an unmet need for investors."

International perspectives

The challenge of scaling start-ups is not restricted to the UK. Agri-TechE has cultivated relationships with other agrifood ecosystems internationally, including the St. Louis Agtech Cluster, a vibrant community of R&D organisations and research institutes in Missouri.

Phil Taylor, Director of Ecosystem Development for Crop Science R&D at Bayer, is based in the cluster and will be participating in the Supply Chain Panel at REAP 2024 on 6th November.

He comments: "The key challenge with early-stage companies is how they scale. It's super cool to see what organizations like Innovate UK and UKRI are doing to support innovation, but it is not particularly sustainable – and we see this in the US too. Often, there is too much kindling and not enough firewood.

"This is one of the reasons we have set up ReACH (Regen AgriFood Coalition in the Heartland) with BioSTL. The 'H' is for 'heartland' as we are in the US Midwest and working with partners up and down the value chain. The aim of the consortium is to evaluate and test technologies in a consolidated way and, where appropriate, help get them to market.

"From the outset there needs to be clear line of sight for both the innovative value proposition and the grower value proposition. Otherwise, we're going to have some awesome innovations that will not get taken up.

"The analogy I draw here is from the pharmaceutical space, where there's a very clear roadmap for drug discovery and you can clearly identify the stage of the innovation. Everyone understands what that means, including the expectations around spend, funding, needs, etc, and can provide the right support so that people can get it done."

Belinda agrees: "Agri-tech needs patient capital but also buy-in from the entire value-chain to share risk and reward more equitably."

Presenters from the REAP 2023 Start-Up Showcase with session Chair Nicole Sadd (Rothamsted Enterprises) (centre) (from l-r): Robyn Sands (Autopickr), Nima Eskandari (Agtelligence), Martin Stocks (HotHouse Therapeutics), Tony Miller (PlentySense), Matthew Dobbs (HerdVision) and Jim Bailey (PES Technology) (not pictured is Cian Duggan from Resurrect Bio, who appeared via video).

YAGRO

featured in 2015

YAGRO is a pioneer in the development of analytics for agriculture. Its technology aggregates on-farm business data into a simple online tool and gives the farm manager incredible detail and insight on the farm's current and historical performance. It enables them to benchmark against others and focus on driving efficiencies, growing their operations, or mitigating risks.

Managing Director **Gareth Davies** was instrumental in the formation of Farm Data Principles, aimed at protecting 'farm data' and building trust and transparency in the industry (farmdataprinciples.com).

In 2021 YAGRO joined the Frontier group of companies; PR manager Luke Sayer says the company has grown from six people in 2015 to the current 52, with no signs of slowing.

"Our focus remains on providing value to farmers and we aim to transform the food and farming industry through accessible, advanced data analytics."
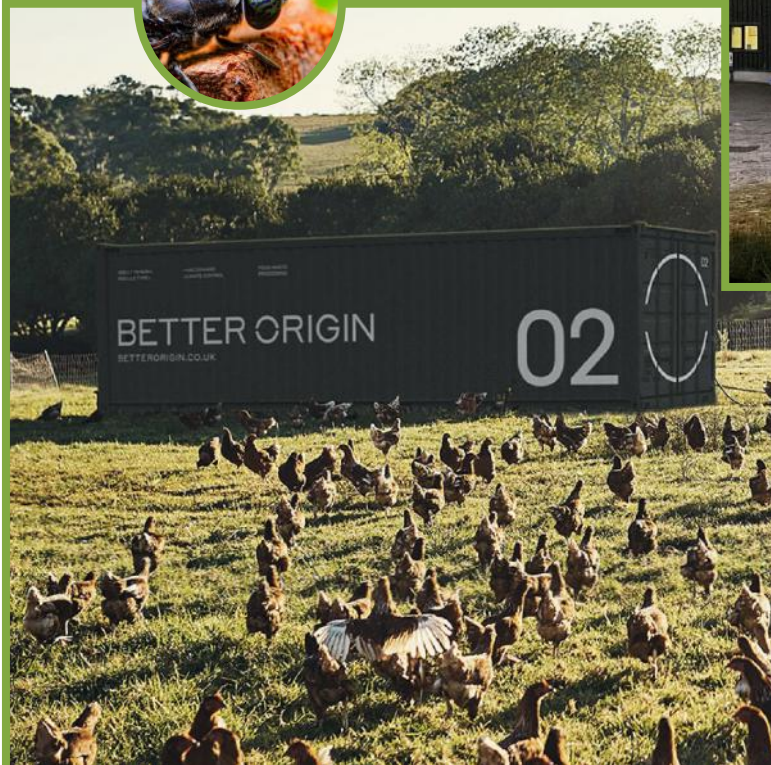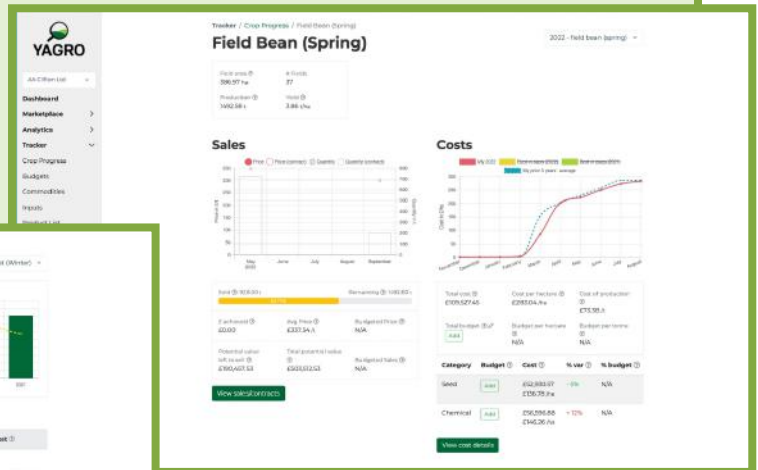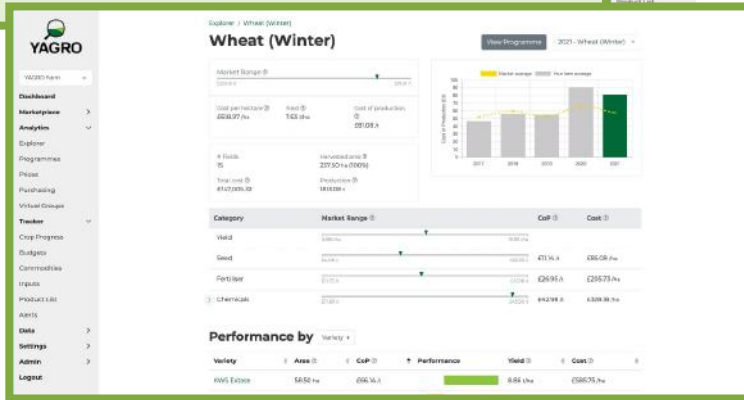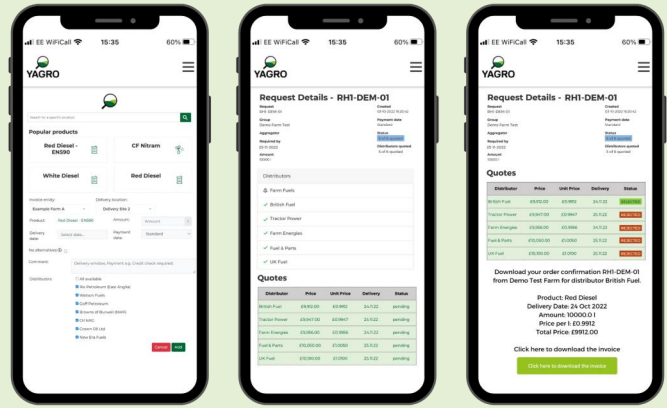
BETTER ORIGIN

featured in 2015

Better Origin is the developer of the world's first autonomous insect mini farm. It uses black soldier flies to convert waste biomass such as food waste into insect biomass that is rich in proteins and fats. It is locating its shipping container-enclosed 'farm', in free range egg farms.

In 2021, the company, formerly known as Entomics, announced a partnership with UK supermarket chain Morrisons that aimed to reduce the amount of soy feed on ten of the latter's farms. The two companies worked on a pilot system for more than a year before launching the initiative together.

Better Origin then raised $16m in 2022 to help scale its AI Mini Farm internationally.

HUMMINGBIRD TECHNOLOGIES

featured in 2016

Hummingbird Technologies presented at REAP 2016 as one of the first artificial intelligence businesses, to provide farmers and agronomists with a suite of maps to help them make informed farm management decisions.

It developed a groundbreaking monitoring, reporting and verification (MRV) system and was acquired in 2022 by Agreena, Europe's largest soil carbon programme.

As the need for accurate and trusted MRV technology becomes increasingly vital for the future of the global food chain, Hummingbird will see its original vision carried through into this exciting new venture, working with one of the biggest names in the industry to develop solutions that deliver impact globally.

FOLIUM SCIENCE / FLOURISH

featured in 2018 & 2022

Bacterial diseases cause devastating losses. Some are controlled by antibiotics, which results in damage to beneficial organisms in the microbiome and the risk of resistance. FOLIUM Science offers an alternative strategy: by disrupting the metabolism of the pathogen it enables natural competition to restore a healthy balance to the microbiome.

FOLIUM Science CEO **Ed Fuchs** explains: "We have developed a unique and patented technology that will selectively remove unwanted bacteria and restore the microbiome to good health.

"This technology is called 'Guided Biotics®'. It will help to reduce the use of antibiotics in farmed animals and crops and enable new microbiome-based traits to be developed.

"We recognise all the challenges caused by bacterial infection in farmed animals and have been shocked by the limited solutions that are currently available in the industry.

"With our partner BiomElix, from the animal nutrition industry, on board, we have become the first biotechnology business to commercialise a CRISPR/Cas-based solution for controlling Salmonella enterica in poultry."

The company was recently awarded funding to develop a pre-commercial CRISPR-Cas validated system for the control of Campylobacter in poultry production.

Ed Fuchs returned to the Start-Up Showcase in 2022 with FLOURISH, a daughter company to FOLIUM.

FLOURISH uses Guided Biotics® technology to modulate the microbiome of plants, seeds and soils, by selectively removing the pathogens that cause disease – protecting crop yields without chemicals.

GUIDED BIOTICS

SMALL ROBOT COMPANY

featured in 2017

Small Robot Company developed a series of agri-robotics to offer a Per Plant Farming service.

Following a successful pilot that showed it can reduce herbicide applications by 77% and fertiliser by 15% it rolled out its service to 50 farms in 2022.

The service uses intelligence from the Tom monitoring robot to identify weed density and treat only problem areas. Tom scans the crop to a level of detail that identifies individual plants, gathering data on plant and weed distribution to determine the optimum treatment path. Once identified it produces a map that can direct a targeted intervention.

Sadly, despite the support of the farming community, successful commercial pilots and a crowdfunding that nearly met its target of £1.5m, SRC was unable to raise the funds required to scale the company. It went into liquidation in February 2024.

ALSO FEATURED AND STILL GOING STRONG

Agvesto (Agrisolum)

AgriInsight

FieldMargin

Vidacycle

Dogtooth Technologies

Fa-Bio (FungiAlert)

Anu (GroPod)

Agrilytix

Petiole Pro

Connecting Food

DryGro

Breedr

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.

Its specialist expertise enables PheroSyn to synthesise species-specific pheromones that target the most prolific and damaging pests.

Its monitoring systems enables the crop to be treated at exactly the right time and with the right pesticides, thus avoiding wasteful and inefficient over-spraying.

Daniel Bahia, co-founder and Director of Operations, says the company has further developed its midge pheromone technology: "We have expanded our smart monitoring platform towards midge pests of peas, beans and pears.

"Our smart monitoring systems for pea midge, and pea and bean weevil pheromones are commercially available following successful GEP validated trials with PGRO. The pear gall midge and pear leaf midge pheromones are undergoing trials, and we are also developing attractants in bee pollination to improve nutrition in strawberries."

The company is venture backed and has received funding through a mixture of non-dilutive grants (including five Innovate UK grants) and equity investment and expanded its team and facilities.
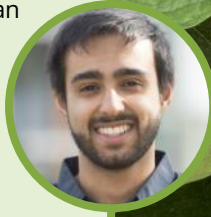
MANTLE LABS

Mantle Labs is a UK-based leader in remote sensing and AI technology, dedicated to advancing environmental monitoring and data analytics.

Back in 2020 it was discussing its revolutionary AI algorithm called Helios for 'seeing through clouds', increasing the accuracy of satellite imagery for risk assessment and crop monitoring.

With Helios, its Geobotanics crop monitoring platform could use data from multiple satellites to provide a daily update with zero interference from clouds. The data could be used to develop agricultural risk and decision-making indices specific to industry sectors linked to agriculture.

The company has more recently developed its Geotree platform for assessing and improving the quality of environmental projects. Its global analytics spans nature-based solution projects including agroforestry, regenerative agriculture, sustainable rice cultivation, and grassland management.

In 2024 Mantle was chosen to partner with leading carbon market registry Gold Standard. This organisation was established by WWF to create a best practice standard, to ensure that projects reducing carbon emissions also fostered sustainable development. Gold Standard is partnering with Mantle to assess how artificial intelligence can lower barriers to carbon finance for smallholder rice farmers in Vietnam.

Jon Pierre, CEO of Mantle Labs, comments: "Artificial Intelligence holds transformative potential for the carbon market, particularly in streamlining and enhancing the efficiency of processes involved in carbon finance."

FOTENIX

featured in 2019

FOTENIX is a leading provider of crop analytic software. Using a monitoring device mounted on a robot or tractor, FOTENIX can provide early warning of diseases such as light leaf spot and phoma in oil seed rape (OSR) and Septoria in wheat crops.

The company has developed a patented spectral camera and light setup that enables detection of disease in days, compared to months in traditional methods. It creates a disease map to enable targeted intervention before significant crop losses, and continuous monitoring provides evidence of control or the need for re-emergence treatment.

Managing Director **Charles Veys** says that the company's core mission is profitable farming through collaboration ('One Agriculture'). "The use of our systems and maps by agronomy firms to provide data-driven and cost-effective advice is a good example of this.

"We have seen our systems used on more traditional tractor equipment in recent years and have recently launched a new boom-mounted arable system in the UK."

"Since 2019 we have raised £4.5M and seen a commercial installation of our system at the UK's leading glasshouses, vertical farms and robotics."

ECONOMAD

featured in 2019

Anaerobic digestion (AD) turns waste into biogas and a nutrient-rich soil additive – but the current solutions are too complex and expensive for smallholdings. To give smaller farmers the benefit of AD, agri-tech start-up EcoNomad Solutions (founded by **Ilan Adler** and Alex Demenko) has re-engineered the technology to create a more affordable option that uses passive heating methods and naturally occurring bacteria.

The company has since developed its product BioNomad™, an innovative, modular and scalable waste-to-energy platform which produces biogas for generating onsite heat and energy, and that can be easily installed in small livestock farms.

BioNomad was highly commended by The Anaerobic Digestion and Bioresources Association (ADBA) and the World Biogas Association. Since 2019 EcoNomad has raised more than £600K from grants and equity investments, installed more than 10 BioNomads across the UK and has already completed initial sales of accessories and appliances overseas, with more to come.

ALSO FEATURED AND STILL GOING STRONG

MOA Technology

Zelp

The Land App

Antobot

Xampla

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.

The sensors can track pollinators in real-time and enable targeted interventions such as habitat enhancement.

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 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."

Agrisound's partnership with M&S saw the infield sensor technology rolled out to 18 farms in 2023, across a range of fruit, veg and salad cropping. The collaboration is part of the supermarket's Farming with Nature programme which aims to improve resilience to environmental challenges.

GARDIN

Gardin's technology provides an early indication of plant stress by measuring the photosynthetic performance of a plant growing in either a vertical farm or greenhouse. The contactless system uses a robotic sensor to monitor the crop in real-time, with sensors scanning in static and mobile platforms.

Chlorophyll fluorescence is a powerful technique to measure the health and performance of plants, but its use was previously limited to research laboratories due to the cost and size of the sensors. Gardin has developed a scalable, commercial sensor that can be used to measure production environments, enabling growers to make data-driven decisions to increase yield whilst reducing resources.

Gardin now has sensors deployed across Europe, North America, Middle East and Africa. Its product, Gardin Pulse, has been used to assess the physiology of more than 15 species of vegetable, fruit and floriculture crops, with the most popular crops being lettuce, strawberries and cucumbers.

Gardin's recent case study with Bayer demonstrated a 25% reduction in water usage whilst improving yield, representing a significant step forward in addressing water scarcity challenges in agriculture.

ALBOTHERM

Albotherm has developed a heat sensitive coating which optimises the amount of sunlight entering the greenhouse or polytunnel, increasing crop yields by up to 34% by allowing more light in during cooler periods.

Developed by the University of Bristol spin-out, the coating stays transparent on cooler days to let maximum light through, but becomes opaque as temperatures rise.

Molly Allington, co-founder and CEO of Albotherm, says the company is making good progress: "Last year we raised a £1.2M seed investment round and secured a £500k Innovate UK grant from the DEFRA farming innovation pathways grant stream.

"We are currently starting to deliver on our commercial pilots; these include one with Vitacress and another with Flavourfresh. Building on the success of these pilots, we are preparing to launch our technology into the greenhouse market across Europe over the next 18 months."

28 °C

30 °C
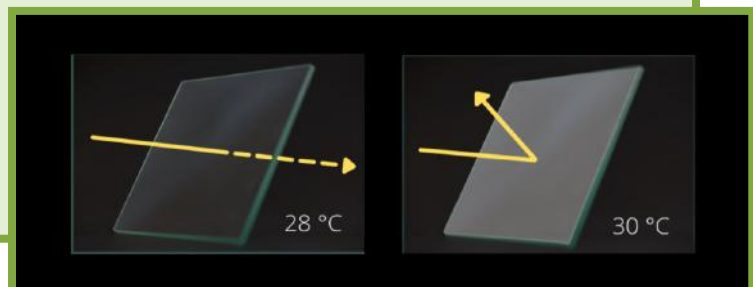
FIELDWORK ROBOTICS

featured in 2021

Fieldwork Robotics has developed the world's first raspberry harvesting robots, which are already picking fruit in Portugal at farms run by the Summer Berry Company. Customers of the Summer Berry Company include leading supermarkets such as Sainsbury's, Waitrose and M&S.

Fieldwork concluded a c. £2m Seed funding round in October 2023, the proceeds of which have been used to expand the team and further develop its technology and product offering.

The company has also been awarded over £1.9m in grants from Innovate UK to support two projects: BerryBot and Berry AI. Both projects have been integral to the company's technology development. The BerryAI project saw Fieldwork collaborating with FOTENIX to bring AI-powered vision and advanced decision-making technology to its robots.

Previously, the cameras on Fieldwork's robots have mostly utilised the human visual spectrum, mimicking the ability of a human harvester. The BerryAI project, however, incorporated technology that utilises wavelengths invisible to the human eye, improving the robot's ability to detect the crop and determine ripeness.

Fieldwork's latest robotic system consolidates the engineering advancements achieved through the BerryBot and BerryAI Projects. The model has enhanced artificial intelligence (AI) capabilities, meaning that it has the capacity to work in a fleet, with one operator running multiple robots across the field. This significantly reduces the labour intensity of the harvesting process and improves harvesting efficiency.

Fieldwork is currently engaging with raspberry growers across the world, particularly in its target markets of Australia and the USA, to establish field testing opportunities and a growing customer pipeline.

The company is on track to begin its Series A fundraise in 2025.

MUDDY MACHINES

featured in 2021

Muddy Machines has developed an automated asparagus harvesting platform capable of distinguishing spears from weeds, even under challenging field conditions. The robot uses an automated gripper arm to cut the asparagus that is within the grower's spec and place it in a container, and it can predict yields, thereby increasing the value of the crop.

Muddy Machines raised £1.5m in 2022, which it used to scale production of its robots, such as a small herd of Sprout robots which has just completed the 2024 asparagus harvest season.

ALSO FEATURED AND STILL GOING STRONG

MicroBiotech

Omega Crop

ANTLER BIO

Subclinical signs of stress are difficult to detect so Antler Bio is harnessing epigenomics, gene expression data and AI to reveal the impact of nature and nurture on the status of the herd. Farmers are given advice on targeted interventions that will increase performance, efficiency, welfare and sustainability

Maria Jensen, CEO of Cambridge-based Antler Bio, says that results from its recent collaborative research project have exceeded expectations.

"Using EPIHERD we are able to do a deep dive to investigate, for example, why genetically similar individuals in the herd have lower milk yield, and to report this back to farmers so they can take action."

HERDVISION

HerdVision provides objective body condition and mobility scoring for cattle. The camera system can be retrofitted on the parlour or cattle race and provides 2D and 3D imaging of the animal. This enables body condition to be scored and lameness or other injuries to be detected.

The information is synced automatically with the herd management system and made available through an app. This enables timely interventions.

Matthew Dobbs, co-founder of AgSenze and HerdVision, explains that body condition scoring is a key indicator of health and fertility in dairy cows: "We have extended our product development and now offer a solution for the beef industry to 'weigh' cattle by camera!"

The company completed a Series A fundraise in October 2023 and now is "full steam ahead on developments and commercial ventures."

PES TECHNOLOGIES

PES Technologies is developing sensors to monitor soil health. The technology offers an electronic nose to sniff out soil health, delivering results to a farmer's phone in five minutes. The company is able to create an aroma fingerprint from gas released by microbes in the soil.

Jim Bailey, CTO and Co-founder of PES Technologies, says: "Microbes in the soil are producing gases all the time through various means. Our product is essentially a sophisticated electronic nose that reacts to these gases as they are given off from the soil to create an electronic fingerprint for the sample.

"This fingerprint is then run through our machine learning algorithm that has been trained using soils of various types from across the UK, and results provide soil quality indicators for the specific soil sample. The whole process, from loading the soil sample to receiving results to your phone, takes a little over five minutes. There is no need to transport samples back to a lab

"Every sample analysed by the tool also includes the GPS coordinates of where a sample is taken. This makes it easy to track how your soils' health is changing over time."

SUGAROX

SugaROx is developing a biostimulant with potential to prevent yield-loss in wheat by up to 14% when applied after a drought event, and boost yields by up to 22% under typical growing conditions. The foliar application slots seamlessly into existing agricultural practices, offering UK farmers ease-of-use.

The spinout from Rothamsted Research and University of Oxford was formed following collaborative work published in Nature that discovered that a modified version of a natural plant molecule, trehalose-6-phosphate (T6P), had the potential to stimulate carbon allocation into grains.

Since its launch in February 2021, SugaROx has improved the T6P synthesis process licensed from Rothamsted and Oxford, reducing COGS by 65%, expanded wheat field trials into more sites in the UK and internationally, obtained proof-of-concept for the use of T6P on additional crops and developed a registration strategy.

To date, SugaROx has raised £2.1M from private investors and £1.7M in grants from the UK government. Its ongoing Seed Round has recently been extended by £1M to access match funding for new grants secured this year – £400k is still available for subscription.

PLENTYSENSE

PlentySense has developed sensors that allow farmers to measure the real-time nitrate levels in the soil under crops.

Around 50 percent of nitrogen (N) applied to crops is not taken up and can leach into the environment. Now sensors developed by PlentySense, a spinout from John Innes Centre, can measure the amount of nitrate the growing crop actually needs, optimising fertiliser usage.

The PlentySense sensors can be positioned across the field at the start of the season using the farmer's yield maps, which can indicate where more information would be valuable. They communicate across a LoRaWan (Low Power Wide Area Network), providing data in real-time, and are reusable for further seasons.

In 2023 it deployed, through its various partners, nearly 100 in-soil nitrate sensors for the 2023 growing season in multiple locations throughout the UK. Most of these trials were on wheat and potato, the company's primary focus, with a more limited number used on onions and grassland.

Further trials are planned for 2024 to increase understanding of the benefit of different farming methods and fertiliser products.

AGTELLIGENCE

Providing evidence of best environmental practice 'when the computer decides' is currently difficult to do for farmers. A new tool, 'FarmScore', from Agtelligence aims to distil this complexity into a simple score that can be used by banks, financial institutes, and funding agencies to quickly benchmark progress against sustainability metrics.

Agtelligence, based at Harwell, Oxford, is an early growth spacetech company that combines Earth observation data and AI with a weighted scoring model to measure critical environmental indicators such as biodiversity and soil health, at the field and landscape scale. The result is an objective score that enables fields, farms and catchments to be easily benchmarked.

A key challenge to rewarding environmental land use management is how to quantify 'additionality', or the impact of measures that have been taken to increase the value of environmental assets.

By using historical land use data from the last ten years and current land management data updated every six days, Agtelligence can provide this type of assurance.

Agtelligence is one of nine UK startups selected for the 2024 SoCal-UK Space Accelerator organized by Mandala Space Ventures and backed by the UK Space Agency.
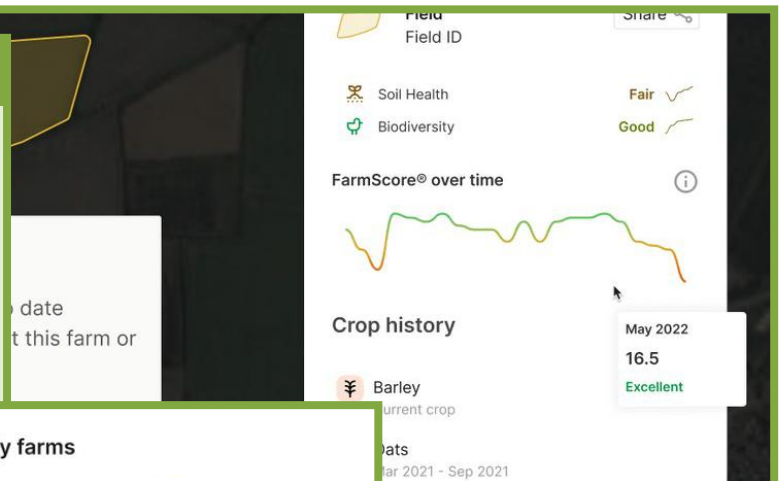
ALSO FEATURED AND STILL GOING STRONG

ALVÁTECH

Tremap

Deep Planet

Resurrect Bio

Autopickr

HotHouse Therapeutics

REAP Conference 2024:
The Agri-Tech Balancing Act – Optimising One or Managing Many?

REAP 2024

Innovation in agri-tech is creating a dilemma: how do you balance optimizing the potential of the individual with maximizing productivity across the entire crop, herd or flock?

Technologies are now available for ever more precise management of plants, animals, and soils, enabling the delivery of bespoke treatments. But when are these justified? At what point do the costs outweigh the benefits?

And, crucially, how can you assess which interventions deliver the greatest returns for quality, welfare, performance, profit, or the planet?

At REAP 2024 we'll be considering where the balance lies between "management of the many" as compared with "optimisation of the one."

Join us to find some answers – as well as hearing about the hottest start-ups, the exciting emerging science, and meeting existing and future contacts.

Speakers will include:

Elliott Grant, Mineral.ai

Phil Taylor, Crop Science R&D at Bayer

Mark James, John Deere

James Holmes, Unilever

Mike Gooding, AHDB

Helen Reeve, Waveney Dexter Beef

Nick Sheppard, Upton Suffolk Farms

Richard Ling, Rookery Farm

Nicole Sadd, Rothamsted Enterprises

Tom Pearson, Manor Farm

Marcelo Precoppe, Harper Adams University

Louise McNicol, SRUC Beef and Sheep Research Centre

Robert Jackson, NIAB

Marcello Calisti, University of Lincoln

Ashleigh Lister, Earlham Institute

Adrian Clarke, University of Essex

Who will feature in the 2024 Start-Up Showcase?

The lineup for the REAP Conference Start-up Showcase 2024 is a closely guarded secret.

But it will feature exciting technologies and early-stage companies that are set to make a significant impact on the agrifood system.

It is well known that the world is facing global challenges – at REAP we are interested in the potential solutions and creating a better future for us all.

Come and join us at REAP 2024!

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Join us on **6 November 2024**

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