



“Technology can bring integration required for the smart sustainable food systems of the future.”

## Machinery Smart technology

# Driving evolution

The global requirement for more sustainable agriculture is driving innovation. CPM delves into a recent report on the role technology has to play in sustainable food production, as well as picking out a few of the most recent launches.

By Charlotte Cunningham

With the fourth agricultural revolution well underway, the true potential of digital and smart technology is starting to shine through — promising what looks to be huge benefits to both farm businesses and the wider environment.

The fundamental drivers behind much of this technology are to increase efficiency and subsequently, sustainability, something which both UK agriculture and the government are becoming acutely focused on.

Though we've known of changes to environmental-based payments for some time, this was confirmed recently, with Defra announcing details of the Sustainable Farming Incentive.

Now in the early pilot stages, this — alongside two other schemes — has committed to paying growers who use sustainable farming practices, improve

environmental outcomes, and reduce carbon emissions.

### Environmental sustainability

Digital software platform, KisanHub, recently released a report titled 'Environmental and financial sustainability in fresh food production' which focused largely on the role technology plays in this. "Many businesses are looking for ways to reduce waste and improve profits," says Giles Barker, KisanHub co-founder. "The holy grail for intelligent food production is gained through integration. An integrated supply chain draws on data created outside of a business, so decisions made inside the business will save time, money, and resources.

"The changes in regulations add a potential layer of complexity to existing complicated supply chains. Technology can bring integration required for the smart sustainable food systems of the future."

The report looked at how technology can, and is, creating synergies on farm between environmental and financially viable food production, and according to Giles, one big advantage is being able to capture data at source. "At farm level the big pain points are siloed and unusable data. This happens by using Excel or WhatsApp to share photos, which means information is not live so multiple versions are shared around, taking up time and storage space. It's essential that we break this detrimental cycle.

"In-field tools, such as mobile apps that provide point solutions on pests or soil

sensors can collect data, but often are not 'talking to each other', nor integrated with other systems, therefore siloed.

A cloud-based platform solution allows field teams to share data in real-time and update notes as they go, which saves time and resources."

The sharing and instant access of data can often mean less travel time, which also has benefits, he adds.

"The recent lockdowns have demonstrated that teams are able to rely on platforms, like KisanHub, to remotely monitor these fields instead. Across all our clients, that can be several hundred tonnes of CO<sub>2</sub> saved per year. With average car CO<sub>2</sub> emissions of 140g/km, reducing field journeys by just 25% saves nearly 2t CO<sub>2</sub>e/year per team member.

Technology such as daily satellite imagery



Technology has a leading role to play in improving agricultural efficiency, says Giles Barker.

## Added advances for Syngenta's Spray Assist app

An entirely new version of Syngenta's Spray Assist App has been launched in a bid to advance spray application advice and techniques.

Along with a new look for easier spraying forecast guidance, the addition of a novel nozzle drift risk calculator enables operators to instantly evaluate the drift risk rating from any nozzle, according to the pressure at which it is being operated, says Syngenta new farming technology application specialist, Harry Fordham.

"The simple slide-bar calculator enables growers to see the effect of pressure on the droplet spectrum produced for any individual nozzle, and hence the susceptibility to drift and the safe working parameters for the conditions."

Harry says that operators must be aware that a

nozzle with a 3\* LERAP rating, for example, may only achieve that up to a certain pressure. "The calculator clearly shows the impact if you move out of that optimum pressure."

The droplet spectrum may also be important to optimise leaf coverage or penetration into the crop canopy, according to the desired target zone for the application.

"Using Spray Assist will help to select the most appropriate nozzle for any application," he advises. "The new version includes a quick and easy 'Nozzle search' function to explore the huge database of information."

The App's upgrade has also seen a shift to a new platform, as part of the Syngenta Protector digital initiative to develop powerful agronomy



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tools for future crop management, adds Harry. "By integrating with Syngenta's Protector initiative operators will be able to manage information on separate blocks of land more easily, as well as link spraying advice with other crop management and agronomy decisions. Spray Assist can still be operated as a stand-alone App."



From a business point of view, Andrew Williams is confident that this robotics and automation is where the future lies.

enables real-time decision-making at a global scale and at the local farm level, points out Giles. "Satellite images can help determine spatial biomass differences in crops and fertiliser requirements, leading to reduced product use through variable-rate spreading, thereby attributing to reductions in manufacturing emissions."

Then there are also time and 'tree-saving' benefits to consider, says Giles, and this is something the firm have been focusing on particularly with its new Load Passport app — enabling 'paperless' information transfer.

"This saves a significant amount of paperwork and subsequently, time and waste. As data is captured at source and moved along the supply chain, it reduces emissions from return haulage, transport and worldwide shipping on produce that is out of spec or sent to the wrong place — namely, CO<sub>2</sub> methane, nitrous oxide."

And finally, there is the traceability element of such technology, adds Giles. "Technology can provide reliable data on ►

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Proud from our knowledge



Home Farm, Suffolk, has taken delivery of a Robotti 150D from manufacturer Agrobot, which claims to be the first robotic tractor to be fully operational on a farm in the UK.



Field obstacles such as telegraph poles or trees are logged at the programming stage of the Robotti.

► crop quality to optimise procurement and distribution, plus reduce the likelihood of rejections.

“Avoiding rejections also reduces the carbon footprint of our food. For example, refrigerated container shipping carbon emissions average 12.9g CO<sub>2</sub>e /t-km. If two containers of produce are rejected each year, 48t of produce is destroyed. This produce has typically travelled over

11,000 km from Asia to the UK market. Whether you measure physical crop attributes in the field or conduct lab detection tests, technology can collect and store your data in a secure, easily accessible online platform; available any time, any place.

## Leading role

“Technology has a leading role to play in improving agricultural efficiency,” he adds. “This will make the industry more sustainable from both a profitability and environmental perspective. With an integration mindset and the right software partners, the benefits can be huge. With access to more data you can get visibility of opportunities, make proactive decisions to save money, see the whole picture to be more informed and save time by reacting faster to changes in markets.”

And though commercially viable technology, like autonomous systems, may seem a far-off goal, a fully robotic tractor is now in operation on one farm in Suffolk.

Improving technology, coupled with the difficulty of sourcing seasonal labour, has led to a significant investment for Home Farm Nacton in Suffolk.

The organic fresh produce farm has taken delivery of a Robotti 150D from Danish manufacturer Agrobot, which claims to be the first robotic tractor to be fully operational on a farm in the UK.

Producing both organic and conventional vegetables across 1940ha, Home Farm was looking for ways to adopt more advanced technology into the business, and the Robotti 150D ticked all the boxes.

“I heard about Robotti through our Fram Farmers membership, namely, from Gordon Cummings (Fram’s machinery manager) who

had been looking into the use of robotics in the fresh produce sector for two years,” explains Andrew Williams, farm director at Home Farm.

“From a business point of view, we’re confident that this is where the future lies,” he continues. “A large amount of our produce is organic, so we’re increasingly limited in how we can control weeds.

“Mechanical weeding is repetitive work, as is manual weeding, and sourcing seasonal, overseas labour is becoming increasingly difficult. We wanted to future-proof the farm and Robotti is perfectly suited to our set-up.”

The Robotti 150D has now been in operation on the farm since mid-April, weeding a number of vegetable crops using a harrow attachment.

According to Agrobot, this is one of 50 robots which will be working in Europe by the end of the year.

“It can be in operation 24hr/day, so there’s a long window of opportunity for it to make a difference in the crucial weeding stages of the crops, fitting well into our cropping plan. It does exactly what we need, moving soil in the early stage of growth with guaranteed precision,” says Andrew.

“It will initially be used for weeding this year, but we also plan to use it for topping and drilling in the future, maybe even transplanting or — who knows?”

The Robotti 150D is autonomously controlled by GPS via an onboard computer, not dependant on a human driver and instead following a pre-programmed planned route in the field.

The model at Home Farm has two Kubota 75hp diesel or bio-fuel engines. The left engine propels the machine and powers the

## New analysis unlocks soil health

New soil testing from Eurofins Agro is claimed to help farmers and agronomists understand soil in a more detailed way than ever before, with the tests launched in the UK and Ireland to provide chemical, physical, and biological insight, offering farmers a better way to monitor, manage and improve the health and fertility of their soil.

“Three new products are now available to UK and Irish agriculture — Fertilisation Manager, Soil Crop Monitor and Soil Life Monitor,” explains Dan Robinson, managing director, Eurofins Agro UK.

Fertilisation Manager measures soil fertility. “This includes the chemical values of macro and micronutrients,” says Dan. “Soil pH and the overall structure of the soil is also analysed in conjunction with biological components such as fungi and bacteria.”

The microbial biomass from the sample will help farmers to understand the sensitivity of the soil to conventional farming methods such as ploughing, he adds. “The number and nature of the bacteria present in a soil sample will also facilitate the accurate calculation of what nutrients need to be added to the soil to optimise plant health and growth.”

For testing soil during the growing season, Soil Crop Monitor will provide the most accurate analysis, reckons Dan. “Unlike some tests, Soil Crop Monitor analyses both the soil and the plant. This measures the plant-available nutrients and the nutrients absorbed by the crop.”

Soil Life Monitor determines the total microbial biomass, fungi, bacteria and protozoa. It also identifies some physical characteristics



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such as pH and the quality of organic matter. “PLFA (phospholipid fatty acids) found in soil can be measured to provide a fingerprint of the soil content. PLFAs are degraded quickly in the soil, so the analysis gives an indication of the amount of living biomass,” he concludes.

## John Deere extends Machine Sync

John Deere's Machine Sync — which enables machines to exchange data on the move and allows combine operators to guide a tractor and trailer alongside the harvester — has now been made available for forage harvesters and tractors to take control during other crop unloading operations.

Machine Sync was introduced in 2012 and John Deere remains the only supplier of an integrated system. According to the firm, the technology is especially useful during night-time operations and long working days.

The global navigation satellite system (GNSS) based synchronisation allows combines to automatically control the speed and travel direction of tractors and trailers relative to the

combine. Machine Sync therefore makes harvesting safer and reduces stress for the operators, says the company. Deere also claims it eliminates waste during unloading and avoids damage to both machines and crops, even at higher driving speeds.

The technology is not just applicable to combine harvesters but also to all harvesting processes where crops are continuously loaded into trailers. As a result, John Deere is now offering Machine Sync for use on self-propelled forage harvesters and tractors.

For operation, Machine Sync requires JDLink telematics, a StarFire satellite receiver and a Gen4 Premium display with automation activation.

*John Deere's Machine Sync has now been made available for forage harvesters and tractors to take control during other crop unloading operations.*



conventional three-point hitch, meaning it can be fitted with standard implements and perform multiple tasks in the field throughout the season.

The right engine drives the PTO. Each engine takes 110 litres of fuel, which is

enough for the machine to run continuously for approximately 24hrs.

"The accuracy lies in the GPS mapped field, with Robotti taking the same exact lines every time," explains Frederik Rom, Agriointelli sales manager. "It's equipped



*The model at Home Farm has two Kubota 75hp diesel or bio-fuel engines.*

with RTK GPS, so the set up on any farm is simple. It took approximately 10 minutes to map a 1.6ha field at Home Farm, and a further 10 minutes to log the weeding plan into the system. It's important for this to be accurate from the start, as it will determine reliable performance."

Field obstacles such as telegraph poles or trees are logged at the programming stage. Any other obstacles outside of this will make Robotti stop in its tracks for safety, until the obstacle is removed from its path. In the office, Andrew has access to the online Robotti portal, providing real-time updates of the machine's progress.

"I can leave Robotti working in the field quite happily, knowing that it will send me an alert if there is an issue, or if something unexpected is in its way. It has front and rear cameras, which I can view at any time. I am able to check the progress of crop growth at any location within that field, without having to walk to see it."

"The portal tells me how much fuel is in the tank, how many hours it has done, and how much time it has left before the fuel runs out. It will also tell me when it's finished one field, so I can ensure it's taken to the next field to start its new job." ■

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