



Potato Days event

Net zero potatoes

Sustainability was the key discussion point at the new Potato Days UK event held at Dyson Farming in Lincolnshire. CPM joined delegates to find out more.

By Mike Abram

Sustainability – whether debating the question of if net zero is possible, or indeed necessary, within potatoes, or looking for ways of reducing inputs to grow the crop in a more environmentally-friendly way – was the key theme at the new Potato Days UK event hosted recently.

Held at Dyson Farming headquarters on the Nocton Estate and run by Agritechnica organiser DLG, the two-day event was opened by Mark Willcox, agronomy director at Branston. He began by kicking off a panel session which debated whether net zero is possible in potatoes.

“We can have a good go at making

a dent in the [carbon footprint] number, even if we can't ultimately get there,” he suggested, with optimism.

Mark explained that UK agriculture's percentage of the country's carbon emissions is increasing due to other industries making progress in reducing their footprints, while agriculture remains flat.

“Our 50M tonnes of emissions now represent about 12% of UK PLC,” he said. “It's fair to say we haven't really applied ourselves to the challenge yet, but with retailers thinking about commitments and brands considering what they can claim, that might be the compelling reason for getting the numbers moving.”

Big buckets

Modelling suggests around 100,000t of carbon dioxide equivalent emissions are wrapped up in a 350,000t end-to-end potato supply chain, with growing and storing potatoes accounting for between a quarter and a third of emissions. Transport and haulage of potatoes and packaging are the other ‘big buckets’ when it comes to emissions, added Mark.

Perhaps unsurprisingly, fertiliser, especially nitrogen, accounts for the largest chunk of emissions

associated with growing and storing, while cold storage accounts for 18% and farm fuels next on the list.

According to Mark, Branston has already taken steps to reduce its scope-one and -two emissions by doubling its solar capability to provide around 30% of its total energy, and by deducing that finished goods don't have to be chilled



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for seven or eight months of the year. Whereas previously, they were chilled all year round, he said. “Which has saved a lot more fuel than you’d think.”

The firm also has a target for a double-digit reduction in mpg for fuel use, which it’s achieving through minor modifications to vehicles and measuring trailer and driver performance.

Mark said investment is also helping. For example, a new mashed potato facility has been installed with an ammonia refrigerant system with zero global warming potential. Then, other plans include using renewable energy guarantees of origin (REGO) sourced electricity, exploring ground source heat pumps as an alternative to heating the last remaining factory which uses fossil fuels, and alternative fuels for trucks.

“Out of our 70 trucks, one of them is electric – I’m not sure about it – while a stepping stone to hydrogen might be biomethane. That could be an option, so we’re trialling one of those too,” said Mark.

He added that an onsite anaerobic digestion plant could potentially supply biomethane if the gas was scrubbed.

Collaborative project

On the farming side, progress had been accelerated through involvement in a 3.5-year Innovate UK-funded project with B-Hive, the University of Lincoln, Crop Systems and two potato growers, he said, with six potential mechanisms for reducing emissions identified.

These include low nitrogen varieties, which studies have shown capable of achieving the same marketable yield but using 50% less applied nitrogen. “We now have to work out whether they cook properly and eat consistently,” said Mark.

The second mechanism is using low carbon fertiliser – Branston has been undertaking a six-year trial with a product from CCM Technologies which could cut emissions by 70%, with others also being tested.

Alongside using alternative fuels in tractors, Branston is also measuring the release of greenhouse gases after every type of cultivation on different soil types to understand the impact of cultivations, added Mark.

Whereas a fourth part of the mix could be using in-crop removals which capture carbon dioxide such as applying basalt rock to soils ahead of potatoes or other crops. Another example of potential in-crop removal is photocatalytic foliar applications which react with sunlight and



To open the new Potato Days UK event, a panel session debated whether net zero is possible in potatoes. Photo: Mike Abram.

convert passing nitrous oxide molecules into harmless nitrogen and oxygen gases.

Reducing the energy required for long-term potato storage by more than 50% is another target the project is investigating, comparing a low energy store with an existing one. “Around 30% would be achieved by new innovation, with the remaining 20% from solar panels which should be standard on stores if affordable,” suggested Mark.

Finally, opportunities through the Precision Breeding Act to develop

varieties which cut waste, for example, by reducing bruising, could prove a quick way to reduce carbon footprints, he said.

These potential changes and innovations are behind Mark’s optimism regarding whether net zero could be possible. “Currently, a potato crop emits about 82kgCO₂e/t packed, and just using low carbon fertiliser will reduce that by 30kgCO₂e/t, new fuels another 4.5t and if the low energy cold store works, which we will know in around eight months’ time, 7.5tCO₂e/t.

Project developing cost-effective regen potatoes

A three-year Innovate UK-funded research programme is aiming to develop cost-effective low input farming methods for the potato sector.

Led by Dyson Farming Research, Transformative Reduced Inputs Potatoes (TRIP) is an integrated research programme investigating innovative plant nutrition approaches, reduced and no-tillage methods, low input potato varieties and developing new integrated pest management methods.

All aspects of the project were demonstrated in trials plots at the Potato Days UK event, with Emerald Research focusing on its OptiYield soil analysis, combined with foliar nutrition to reduce fertiliser inputs from 180kgN/ha to just 30kgN/ha. It’s also investigating the potential for reducing pesticidal seed treatments with microbial and biostimulants.

Further plots showcased new breeding lines selected by Bangor University for late blight resistance and other low input requirements using conventional breeding methods, while Dyson Farming Research plots investigated the potential for potato production with minimal cultivation by growing the crop under a mulch.

That’s the project’s most extreme example, said Dyson Farming Research’s Christine Jones. “We’re also looking at removing different cultivation operations. It’s probably a more practical way of reducing cultivations.”

Nitrous oxide emissions from the soil are being measured by a prototype free-standing device that can be easily set up and used in the field. Developed by Light Science Technologies it gives the project the ability to compare low input and conventional treatments for greenhouse gas emissions.



According to Dyson Farming's Dan Cross, understanding who values reaching net zero is crucial.

"That takes us halfway without doing anything like banning destoning, only using hydrogen-powered tractors, going organic or using very low nitrogen rates – a recipe for low yields and growers bailing out of potatoes.

"Whereas the project has identified practical steps that will get us halfway there. It'll cost a premium, albeit relatively small though," he noted.

During the following debate, Dan Cross, managing director of Dyson Farming, stressed that understanding who values reaching net zero is crucial. "Are we trying to achieve targets driven by supermarkets or the government, or is there a genuine belief in the population that net zero potatoes or food is beneficial?

"At what point are you willing to pay

a premium of 10-20%? In the short-term at least, there's a cost to making transitions even when making the logical, sensible ones Mark is suggesting."

Crop-based targets are potentially meaningless in comparison with whole-farm calculations and could create future risks for the industry, he added, suggesting they could be used to drive down production of root crops in the UK if targets weren't achieved.

"The likelihood of our national diet changing significantly to not consume root crops is pretty slim, which would mean we'd just offshore some carbon emissions. So I slightly disagree with Mark's optimism. We have to be hopeful and positive and take action, but also be realistic in what we suggest is possible," he concluded. ■

Haute cout-ultm

Destroying potato haulm at the end of the season has become significantly more challenging following the ban of various desiccants such as diquat. But start-up company, Fibe, is hoping to make use of the haulm by turning it into a sustainable textile fibre for the fashion industry.

Fashion is the second most polluting industry in the world after oil and gas, explained David Prior Hope, chief technology officer of Fibe. "This is somewhat due to cotton – a crop which is grown on a land area equivalent to Germany globally each year, using hundreds of trillions of litres of water."

Growing consumer awareness is starting to see increased demand for sustainable fashion, with major brands investing and making targets, added David. "By 2030, it's expected that 88% of textile fibres will be from sustainable materials."

Despite the growing demand for eco cotton alternatives, replacements which meet the same quality often fall short in scalability, affordability or sustainability, he said. "To address this, we have to look for readily available feedstocks at mass scale."

As such, David and his three co-founders, all former Imperial College students, considered agricultural co-products. "Crops that have a co-product have a much lower carbon footprint compared with conventional textile crops," he explained. "And they're more affordable than crops grown solely for textiles."

Potatoes and its haulm stood out, he said. "As well as being the third most important staple food crop in the world, potatoes are local everywhere and with perennial

challenges and constraints, there's an appetite for sustainability and innovation."

With around 300,000t of potato haulm discarded or destroyed annually in the UK, and around 150M tonnes globally, Fibe considers it to be the largest untapped agricultural co-product in the world. Furthermore, it's one which has been considered a nuisance by growers in the face of the diquat ban, points out David.

"With our patent-pending technology we can convert this 150M tonne opportunity into 70% of the world's natural clothing demand. It'll enable growers to not only produce a staple food, but also a feedstock for cotton-like fibres with no additional land, using 99% less water and producing 82% less CO₂e."

Fibe is in the early stages of developing its technology, having passed a key technical milestone of creating the world's first yarn made from potato stem fibre, highlighted David. But many challenges remain, not least how to harvest the haulm without damaging tubers or creating unnecessary hassle for the grower.

"Up until now we've harvested by hand, but with a goal of being able to harvest the equivalent of up to 100% of the UK's potato haulm by 2030, we've partnered with Grimme to develop a prototype method of automating harvesting as part of an Innovate UK project," said David.

He added that the process should fit in with current haulm destruction practices, with trials this season providing a proof of concept for the machine.

Fibe is also working with NIAB to investigate how agronomic practices such as plant spacing, nitrogen and varietal determinacy,



Crops that have a co-product have a much lower carbon footprint compared with conventional textile crops, explained Fibe's David Prior Hope. Photo: Mike Abram.

affect canopy growth and structure and in turn the fibre from the potato stem.

"Potato haulm from across the country has given suitable fibres but there are variations in cost and quality," said David.

Next steps involve setting up a pilot production facility, ideally close to a grower group already using growing practices which are optimal for fibre production as well as for tubers, he continued. "We have a clear roadmap for scaling up and hope to see the first clothes made from this fibre in the coming years," concluded David.