

ISSUE 23 | OCTOBER 2023

DIRECT DRILLER

SOILS MAGAZINE

THE FUTURE OF YOUR SOILS

Profiting from Regen

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DIRECT DRILLER

MAGAZINE

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EDITORIAL

Editor Mike Donovan
e: editor@farmideas.co.uk

CONTENT MANAGEMENT

Chris Fellows
e: chris@agriwebmedia.co.uk

Clive Bailye
e: clive@agriwebmedia.co.uk

Richard Harding
e: richard@groundswellag.com

GRAPHIC DESIGN

Very Vermilion Ltd.
t: 07745 537299
www.veryvermilion.co.uk

Website: www.directdriller.com

Forum: www.thefarmingforum.co.uk

Twitter: www.twitter.com/directdriller

MEMBERSHIPS

Farm Safety Partnership
BASIS
DairyPro Federation of Small Business

Advertising Enquiries

Mark Hatton
e: mark@thefarmingforum.co.uk
t: 01543 399800

Gareth Jones
gareth@agriwebmedia.co.uk

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INTRODUCTION

MIKE DONOVAN, EDITOR

We all know of farmers who have the knack of getting decisions right, and equally know others who regularly find themselves getting it wrong. Their farms can be outwardly similar, but there's a huge difference in performance. The successful farm business looks and responds to events they see as beneficial, while the strugglers play catch-up and then get it wrong.

Helping farmers move up the efficiency scale is very much part of our role at Direct Driller. From the first issue in 2018 there has been an emphasis on real farmers' experiences and how they have responded to weather and other

events. Rather than reading academics saying "the science says this", much of the contents comes from farmers in the field, which is something now much to the fore in the mainstream farming press. Farmers' experiences are now beginning to be given credence - they do know what they are talking about, on their own land if not wider. Today farm walks and open discussion is more frequently encouraged.

These events could be better pulled together by colleges and universities but this is difficult when these institutions are competing with each other for funding. Cooperation, which includes bringing in information sources such as the journals

I'm involved with, and others, could produce a more structured agricultural research programme that is tailored for farmers rather than academics. The fear of duplication of effort is often overstated.

This thought occurred as I was heading home from the Covering Soils event at Clive Bailley's on 21 Sept. The event provided an excellent transfer of info between the all involved.



ADOPTING REGENERATIVE PRACTICES

WRITTEN BY CHRIS FELLOWS

It's an odd thing to define what a "regenerative farmer" actually is. I generally think, it has more to do with the mindset of change than anything else. Then it becomes a journey and at some point you may meet the criteria of an official definition, if we actually ever get one. But with more information being released about what SFI will (and won't) pay for, it seems that a lot more farmers will be adopting regenerative practices. This in not to say they will be direct drilling, they might still be ploughing or

running power harrow combination drills. But some regen will be added to what they do. As that is what farmers are going to get paid for and the first step to being sustainable, is to be profitable.

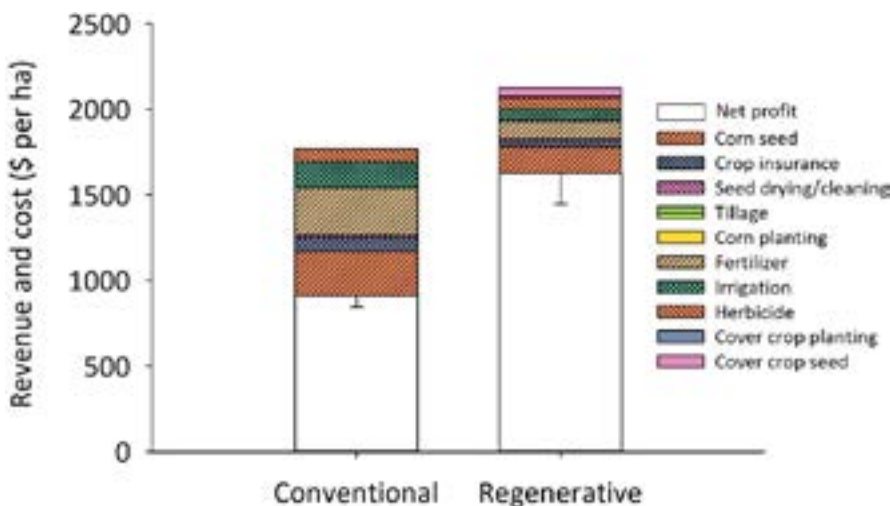
Many farms will therefore be trying to work out how they can profit from regen practices. Some of which will be taking their first steps in regen, others adding to their regen credentials. The distance of your journey to date, depends on how short or long term your view of profitability is. Historically moving to

regen has been a big financial shift for many farms, but with SFI and more frequent payments, that is changing.

Beyond government "subsidies", the real shift will come via market access and we are already seeing examples of this with Wildfarmed, M&S and even the new McCains adverts around regen chips (which kind of make me feel odd inside, as I can't imagine standing in a wet potato field and ever using the word "regen" and potatoes in the same sentence).

However, it seems clear that regen farmers are going to be rewarded with improved market access. Consumers are increasingly seeking sustainably produced, environmentally friendly products. Farmers practicing regenerative agriculture may gain access to premium markets and niche consumer segments willing to pay more for sustainably grown products. Thus, encroaching on the organic market.

Profiting from Regen is something we are going to hear a lot about in the future. The result will be that farmers alter their farming methods to go where the money is, which will not necessarily be where the ecology is best benefited.



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COVERING SOILS EVENT

AT TWB FARMS IN HAMMERWICH

Written by Chris Fellows

The first in Direct Driller's series of "Covering Soils" events took place on 21st September, after the remnants of a storm blew through the farm on the 20th when it had originally been planned. But most of the 100 registered farmers were still able to attend and enjoy the content we had on. Full write up will follow in the next magazine and look out for the video content from the day on our YouTube Channel. You can subscribe here to get a notification when the speakers talks are added.

A few pictures of the day give everyone else an idea of how the day went. Many thanks to RAGT, Poly4, Agreena, Agrii, Horsch, BTT UK, Grange Machinery, Tractair, Farmdeals and speakers Phillip Wright, Wright Solutions and Stephen Lamb for being at the day.

The day was based around the RAGT Cover Crop Trials that Clive Bailye is running on his farm in Hammerwich. The results of which you will be able to follow either in the magazine or at events in the future.



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A MIDWEST TOUR OF INNOVATIVE FARMERS

In June, Mike Abram visited three US farmers disrupting the norm in the Midwest states of Indiana and Ohio

Driving through northern and central Indiana there are a couple of things that strike you immediately – one, how flat it is, and two, how most of the cropping is either soybeans or maize.

In a typical year, corn, as the Americans call it, is planted on 5.5m acres (2.2m ha) in Indiana, with soybeans covering a similar area, but it's a third crop, one much more familiar to us, wheat, which is the reason why I've gone to meet Jason Mauck. He's the first of three farmers I'll visit in a near 1000-mile round-trip from Chicago covering three US states in three days.

Jason is one of a small group of US and Canadian farmers doing something out of the norm. It's not just that he grows winter wheat – although only 410,000 acres (164,000 ha) are grown in the state – but how he does it.

Where it is grown, some growers will double-crop wheat and soybeans – planting short-season soybeans immediately following wheat harvest in July. Ag economists suggest this strategy can produce higher returns than full season soybeans or corn.

But it's not without risk. If the weather turns hot or dry during July and August, the soybeans might not germinate, establish, set seed or grain fill. The system also takes more management – variety choice is important, and some growers don't like the hassle of harvesting wheat in July, a key time for spraying corn or full-season soybeans.

Jason's solution is to try to get the best of both worlds by relay cropping



Jason Mauck in relay wheat and soya beans



Relay wheat and soya (Jason Mauck)

wheat with soybeans. The principle is the same as traditional double-cropping in that both crops are grown in the harvest year, but Jason plants his soybeans into the field with the wheat around the traditional soybean planting time in April.

He does that by planting the wheat in strips in the autumn, leaving a gap to plant the soybeans using a modified bean planter. After some trials, he's settled on planting four rows of wheat on 7.5in spacing in 60in centres, leaving room for two rows of soybeans 20in apart. Seed rates are reduced by as much as 75% depending on whether the field is close enough to his 12,000 wean-to-finish indoor hog unit to apply manure.

The bigger gap between wheat strips encourages the crop to tiller more and grow out laterally to fill the space, Jason told me. "If you give a volunteer wheat plant space it can produce a lot of heads from a single seed, so I'm looking to exploit that to get maybe five to seven wheat heads per seed versus 1.5 heads in a mono crop scenario and create more value per seed."

During spring the centre wheat rows typically grow taller through competition effects, while the side rows

grow laterally to create a half circle crop architecture, not dissimilar to what you see in commercial lavender fields. By harvest the wheat can nearly meet across the gap above the soybeans.

"It's all about managing sunlight and water," he said.

Part of the value of the wheat is it removes excess soil moisture allowing Jason to plant soybeans earlier in April, with the wheat crop also creating a microclimate that protects the beans from late frosts.

In theory, that gains extra days for soybean reproductive bud set and pollination, increasing yields. The danger at planting is if it goes too dry, the wheat can remove too much moisture hurting the development of the bean.

To safely harvest the wheat without damaging the soybeans, he uses Flexifinger pads that snap onto the combine header to compress the soybean crop below the header. Post-harvest the soybeans take advantage of the extra light and space to maximise growth.

"Historically we gain four nodes on the main stem versus narrower

row mono crops, but with lots more branches, branch nodes and longer pod development on each pod site.”

At the time of my visit, wheat harvest was a couple of weeks away in his two relay-cropped fields but catching up with him after harvest one field reached 100 bu/ac (6.7 t/ha) – above the 80 bu/ac (5.4 t/ha) average for Indiana, with the other around 70 bu/ac (4.7 t/ha).

The higher yield, especially, could impact on his soybean yields – every 3-5 bushels of wheat uses around one inch of water, so growing higher yielding wheat can reduce water availability for the soybeans.

But he was hopeful the soybeans, which had grown well post wheat harvest would yield 70 bu/ac (4.7 t/ha) to provide a combined income of around \$1630/ac (£530/ha) on the better yielding wheat field. With growing costs of around \$250/ac (£80/ha) that would provide a gross margin of £450/ha compared with £300/ha for mono crop soy beans yielding 80 bu/ac, he says.

So is there a similar opportunity for relay cropping work in the UK, I wondered? Talking to various growers on my return my initial thoughts that it would be difficult was borne out. It might not seem obvious, but Indiana is on about the same latitude as Madrid, and that makes a huge difference in finding a crop that will mature in time after wheat harvest.

While a couple of growers have or are planning to try something similar with wheat and buckwheat or linseed, in reality the more popular bi-crop or poly-crop systems that are harvested at the same time are more likely to be successful in the UK.

The following day I was on a farm around 180 miles further east in Carroll, Ohio. This was a visit I was somewhat nervous about: I'd contacted this farmer in May to arrange a visit and had a very immediate positive response.

The farmer was David Brandt – commonly known as the “Godfather of soil health” in US regenerative farmer circles, and a man who had a viral social media meme made from his comment that farming “ain't much, but it's honest work”.

Those of you reading who have heard of David will probably know he sadly passed away following a road traffic accident. That was less than two weeks

after I'd emailed to arrange the visit, and obviously I wasn't sure whether his family would still be open to a visit.

But here I was meeting with David's grandson Chris Brandt, who after working closely with David on the farm since 2017, was taking over the day-to-day running of the 400ha farm.

Chris was a joy to interview, mixing a bit of history with very clear explanations about why they were doing various practices.

Like Jason the farm is a little out of the ordinary for the Midwest. David had taken over the farm in 1971, practiced no-till almost from the beginning and introduced cover crops in 1976 – a man well ahead of his time.

Those core soil health improving practices had helped increase soil organic matter levels from just 0.75% in 1971 to 8% on the farm, which grows 40% corn, 40% soybeans and 20% wheat. Soil samples taken in 2009 and 2022 from the same spot in some fields are proudly displayed in the farm office to highlight the improvement.

High biomass multi-species cover crops are grown after wheat ahead of the following season's corn.

High biomass multi-species cover crops grown after wheat in the rotation ahead of corn are the crops that make the difference to organic matters, Chris told me. While David had grown cover crops since 1976, it wasn't until meeting cover crop advocate Steve Groff and North Dakotan farmer Gabe Brown in the early 2000s that he started experimenting with 6-10 species cover



Brandt family farm signs

crop mixes.

“Fields that are now 8% organic matter were only sitting at 3-4% back then,” Chris said. “If you use monocrop covers, whether it's buckwheat, rye, or clover you won't see a strong increase in organic matter.”

The core components of cover crops before corn are now cereal rye, hairy vetch and crimson clover, which have two main purposes – to generate large amounts of biomass to suppress weed growth and shade the soil from the sun, and to fix nitrogen to reduce fertiliser inputs.

Added to those Chris adds species such as sunflowers, pearl millet and flax to promote mycorrhizal fungo development and increase micronutrient content in the topsoil. He's also using some more specialised mixes with Sudan grass, oats and forage radishes and grasses, where the covers are being grazed with sheep – something which was trialled for the first-time last winter.

He reeled off some of the benefits – improvements in soil structure and water

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holding capacity, reducing soil erosion and nutrient loss and allowing quicker access to fields with machinery after rain and increased biological activity, including mycorrhizal fungi helping to bring nutrients to the crop and better utilisation of applied nutrients.

“Generally, in the US, it’s said one pound per acre of nitrogen in a corn field will lead to one bushel per acre of corn. What we see is that one sixth



Chris Brandt in soya

of a pound of nitrogen becomes one bushel of corn, so we’re more effective at getting those nutrients to the plant,” Chris said.

Between corn and soybeans, a simpler cover crop is grown, usually cereal rye. The later harvest of corn precluded much other than cereal species, Chris explained.

Growing a cereal rye cover crop typically generated an increase in soybean yield of 3-5 bu/ac (0.2-0.33 t/ha), while also providing an allelopathic or competition effect against mare’s tail – a difficult weed to control in soybeans.

“Soybeans require 2-4 units of nitrogen for every bushel they produce,



Soil cores

and usually it nodulates to generate two to three of those.

“So the more nitrogen you have in the ground, the lazier the soybeans are, and they won’t nodulate as much, which reduces yield. The theory is the rye takes away nitrogen from the soil and forces the soybeans to nodulate more, increasing the base yield.”

Cereal rye was also an important part of Rick Clark’s approach, back in Indiana. Around two hours south of Chicago, Rick’s system is the most radical of the three farms – in fact probably the most radical of any farm I have set foot on, as he combines no-till and organic systems at scale.

It’s been an 18-year journey to get to this point, he explained. “I have to be careful not to paint a nice rosy picture because going organic with no tillage is extremely difficult. You need patience and a financial position that’s strong because you will have yield setbacks. I’ve experienced all of that.”

A natural storyteller – listen to his podcast FarmGreen for a taste – for 90 minutes almost without drawing breath he told me how he used to cultivate fields until they were black, until one day an unexpected rain event highlighted how that approach could cause soil erosion; how he cut fertilisers after discovering how much nutrients cereal rye cover crops held after not being able to terminate them after drilling corn; and how a researcher named Erin Silva was the inspiration in removing post-emergence herbicides in soybean by crimper-rolling cereal rye covers 45 days after drilling the beans.

But it was how he described his attitude to change that really stayed with me. “I’ve been blessed my whole life with everything,” he began. “I’ve had forefathers that understood the value of buying land. I’ve had forefathers that understood the value of building infrastructure.”

At this point I was wondering where he was going, but then he said: “And I’ve had forefathers that taught me lessons of how to think and be a thinker. It is way more important to be a thinker than it is a farmer, because you’ve got to be able to think about how to get out of situations or to create new situations.”

In telling his story, whether it was rain preventing him from spraying off a cover crop after drilling corn for six weeks

or deciding to go completely organic when he was already maximising the return on investment on the farm by being 100% no-till, 100% cover crops, 100% non-GMO with a 70% reduction in inputs, it was his ability to see the potential in change that seemed a key to his success.

Driving around the farm it was possible to see both the success and some of the weaknesses of his no-till organic approach which relies on high biomass cover crops for around 70% of weed suppression and crop competition for the remainder.

In many areas weed control is good



Rick Clark searching for Milo 2

enough, but in some cereal fields, especially, some concerning areas of both chicory and thistles were evident. That’s where Rick’s ability to think through potential solutions should come into its own again.

“My first swing will be to come in with a milo grain sorghum crop after harvest if we get some rain,” he answered in response to my question about a plan.

“That should help smother the thistles out during the off season, but if we still have them next year I’ll go to alfalfa. Two years of alfalfa, cut five times a year and this will be gone,” he suggested.

So how achievable is no-till organic production in UK conditions? In talking to Rick, my impression was that understandably he, like me and US farming, wasn’t that knowledgeable about the challenges we face in the UK with grassweeds, diseases and pests and our weather, which is no doubt why he stressed that context is important when I asked about replicating his system elsewhere.

“One of the soil health principles is

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Rick Clark in wheat and soya bi-crop

context. Where are you in the world? Our inherent soil here is 3.5-4% organic matter, so we have a lot of fuel in the tank. If you are in an environment that has less than 1% organic matter I doubt if you can take away all inputs and survive. So we have to understand where we are in the world and how far we can push the system. But I think anywhere in the world we could easily achieve a 30% reduction," he suggested.

He also stressed that going the whole hog and being organic wouldn't be for everyone. "You do not have to go organic," he said. "You can still do

non-GMO with a massive reduction in inputs, be regenerative and make a good profit on your farm.

"But I truly believe that if we want to maximise biology and maximise what the principles of soil health say, you have to take everything away. I understand not everyone can do that, and you have to be comfortable. If you're only comfortable with a 40% reduction, then let's figure out how to maximise your farm on 40% reduction of inputs."

Understanding your own mentality and attitudes were also fundamental, he stressed. "Can you take one of your neighbours talking about you? I assume you have the same in England, in the gas station there's a table off to one side. I call that the liar's table. That's where all the lies are talked about, and when you walk in and the table goes quiet and there's no conversation, they are talking about you. So you have to be willing to take on that negativity because there will be a lot."

It made me wonder on the drive back

to Chicago on a very straight road, looking at field after field of corn and soybeans produced in a very conventional manner, about change and what drives it? Is fear the major reason that holds back change in the US and other parts of the world? Or is it government policy, crop insurance, big ag or something completely different?

On the face of the savings Rick claimed he was making – over \$2m/year in fuel, fertiliser and

pesticides – you can't help but wonder why more in his region weren't banging down his door asking him for advice and how he did it. Or why Jason wasn't relay cropping across a bigger area, and



Rick Clark in alfalfa

why more growers weren't double-cropping that way?

But a common thread I've discovered in meeting over the past few years some of the leading lights in North American regenerative agriculture from Rick Clark to Gabe Brown to Blake Vince in Canada and Chris Brandt is that their neighbours aren't in a rush to copy them.




Chicory problem weed (Rick Clark)


Is that the same here? It doesn't feel like perhaps it is. In Norfolk, where I live, there's a group of farmers applying regenerative approaches in north and west Norfolk, for example, or down in Kent there's another cluster who farm not so far away from each other. There will be other similar clusters across the country I'm less familiar with.

But does that mean we are more supportive as a community through organisations such as BASE-UK, the Farming Forum's direct drilling section and indeed this publication, or is there more to it? Or perhaps I'm wrong and on a smaller scale, we're just like the Midwest, where those practicing regen ag seem like relatively small fish in a big pond? What do you think? I'd be interested in your thoughts – abramcommunications@gmail.com

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AGRITECHNICA

Agritechnica, the world's leading agricultural machinery exhibition, takes place in Hanover, Germany, 12-18 November 2023. Agritechnica is the largest venue for arable farmers, anticipating over 400,000 visitors.

UK farmers busy preparing trip to Agritechnica

Now that the bulk of the harvest has been completed, many UK farmers are preparing their trip to Agritechnica taking place in Hanover, Germany, 12-18 November 2023.

Over 6,000 visitors from the UK are expected this year at the world's largest show for farm equipment. UK farmers take advantage of Agritechnica to make investment decisions for agricultural machinery for the farm.

As all the leading farm equipment manufacturers have already registered as exhibitors - among 2,600 expected companies - farmers from the UK can be sure to see the full range of machinery solutions on display.

From tractors to autonomous equipment systems as well as crop protection sprayers to drones, and from combine harvesters to digital assistance systems, Agritechnica presents both the depth and breadth of agricultural machinery.



Exhibitor at Agritechnica

UK farmers plan two full days at Agritechnica

DLG (German Agricultural Society), organiser of Agritechnica, recommends that farmers from the UK plan in three nights in Germany to visit the show for two full days.

Online tickets, which can be booked already now, are the optimal way to avoid queues at the door, leaving more

time to inspect farm equipment close-up.

Many farming groups fly into Frankfurt from the UK and then take the fast train to Hanover.

Martin Williams, arable farmer in Hereford and frequent Agritechnica-goer, is planning to take that route.



Martin Williams

"Agritechnica is a global event that offers farmers an opportunity to see things outside your own zone. At the last Agritechnica, I discovered robotics and automation for the field that I had not seen presented that way before," says Martin Williams.

"Agritechnica shows me where agriculture is going and also what machinery we can use to gain an edge when margins are tight, like right now. My biggest challenge at the moment is staffing. In November, I will therefore be looking for anything that can help solve that problem. Spraying technology is also on top of my shopping list, such as machinery that can identify weed. This is a hot topic right now in my neck of the wood," adds Williams.

Download app for efficient planning

The Agritechnica App offers farmers efficient prior planning. The

downloadable app allows users to save their entry ticket - for easy presentation at the gates - and to bookmark pre-identified exhibitors as well as meetings and events that are presented visually on the exhibition ground map. Appointments can be exported to a personal calendar and the app can be used during the entire Agritechnica.

The app stores technical information electronically from the stands for later viewing.

The "DLG Mixie Points" on each stand contain the exhibitors' equipment specifications, and product information. Scanning the DLG Mixie point QR code using the QR scanner within the app, visitors can retrieve at any time, during and after the trade fair. This eliminates the need to carry brochures and flyers while touring the halls.

Downloadable in Apple App Store and Google Play, the app is also offered as a web version at www.agritechnica.de

Agritechnica innovations presented on 100 acres indoors

Exhibitors are located across 24 halls, each with logical product categories, on over 100 acres of indoor space. The seven-day exhibition expects 400,000 visitors.

With the theme "Green Productivity" denoting how new pioneering concepts ensure agricultural productivity while protecting nature, climate and the environment, Agritechnica's technical programme offers hundreds of interactive presentations, many relevant to no-till farming.

Over 250 candidates in the prestigious Agritechnica Innovation Award scheme will be presenting market-ready world premieres, of which some will be selected for a gold or silver award.

The gold medal at the last Agritechnica, announced online in

2022, was presented to Nexat's "all-in-one system tractor" that handles all work steps, from soil cultivation to sowing, crop protection and harvesting. This innovation, which offers a range of no-till benefits, can be seen at this year's exhibition.

Instead of conventional hauling, the



The Nexat innovation won gold in 2022

implements for tillage and cultivation are carried by the Nexat tractor, leading to increased efficiency compared to tractor and towed implement combinations.

The 14 meter version is designed such that 95 percent of the total field area is never driven on in the envisaged bed mode, resulting in high yield potential with soil and environmental protection.

Silver awards included solutions in all areas of crop cultivation, from systems for automatic dust extraction, compaction prevention and direct injection crop protection to adjustment control technology for auger cutter bar and automatic machine guidance and regulation of tractor's speed and the baler settings. Most of these innovations are presented in November.

Farmers from the UK can find



futuristic concepts among the entries for the DLG Agrifuture Concept Award, which honours innovative concepts that though not yet market-ready offer a glimpse into the far future.

An example is the "Controlled Row Farming", a new arable farming method, in which every crop-cultivation step

is taken in fixed rows, offering yield optimization despite lower use of fertilizers and pesticides. Uniform row spacing of 50 cm - grain in double rows - and a row offset of 25 cm for positive crop rotation effects achieve both yield optimization and maximum efficiency of farms inputs.

The UK's Department for International Trade (DIT) and UK TAG are organising a country pavilion at Agritechnica 2023 and over 60 exhibitors from the UK are expected in Hanover.

Farmers can explore the current exhibitor list at <https://www.agritechnica.com/en/exhibitors-products>, which features exhibiting companies from over 50 countries.



In addition to exhibitors' offerings, Agritechnica will be exploring practical topics in depth, including:

- **Smart farming**
Automation enabling technologies for efficient work in the field
- **NEW: DLG.Prototype.Club**
Teams of software engineers will solve technical challenges set by exhibitors
- **Agrifood start-ups**
Exhibition and networking area for agricultural start-ups.
- **Workshop live**
Technicians demonstrate maintenance and repair work live.
- **Systems & Components**
Suppliers will present components, including engines, drive trains and spare parts.
- **NEW: Inhouse Farming: Feed & Food**
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Agritechnica is organised by the DLG (the German Agricultural Society). With over 30,000 members today, DLG, a politically independent and non-profit society, the DLG strives to increase professional knowledge in agriculture across borders, its objective since the society was formed in 1885.

Drawing on an international network of experts in food and agriculture as well as subsidiary companies in nine countries, the DLG organises over 30 regional arable and livestock exhibitions worldwide.

DRILL MANUFACTURERS IN FOCUS...



DIVERSE RANGE OF KUHN MACHINERY AT TILLAGE LIVE 2023



The lightweight KUHN Megant 602R will demonstrate precision can be achieved without high horsepower.

KUHN Farm Machinery has announced its product line-up for Tillage Live at WH Corbett in Atherstone, Warwickshire.

Working machines will include the Venta 3030 drill combined with the CD 3020 disc cultivator, the Espro 6000R drill, Striger 600R strip till machine, Prolander 6000 with TF 1512 distribution head, Optimer L12000 stubble cultivator, Performer 4000 Select cultivator and the VML Smart Plough.

The working machines will be joined by further products on the KUHN stand including the Megant 602R drill, Maxima RXE maize drill, Cultimer L300T stubble tine cultivator, and the Aero 32.1 pneumatic fertiliser spreader.

Product specialist Edd Fanshawe says:

“Tillage Live is a unique opportunity to see a wide range of KUHN products working, and our team will be on hand to answer questions and provide product information.”

The product selection represents KUHN's breadth of machinery featuring both min-till and conventional tillage machinery choices. Mr Fanshawe suggests that the popularity of shallow cultivators reflects the desire to reduce soil disturbance. However, he says many systems still rely heavily on conventional ploughing methods.

“KUHN has expanded the min-till range in recent years, with wider widths for the Optimer and Prolander. However, we are also focussed on providing new solutions for those seeking to plough more efficiently. The VML Smart Plough is an example of how ploughing precision can be enhanced using GPS and ISOBUS to adjust working width, offset, working depth and levelling.”

The drills on show include the lightweight Megant 602R that can be operated by tractors with as little as 150 horsepower.

The latest Maxima RXE has electric drive and offers precision maize sowing at 10km/h. The 6 metre Espro 6000R will be working at the event to demonstrate how the versatile drill can work after the plough, min-till or directly in residues.

“The KUHN drill range is one of the most comprehensive available, offering diversity for varying farming systems. We will also be demonstrating the 6 metre Prolander with a TF 1512 distribution head, which is suitable for the shallow incorporation of stubble and mixing in a break crop whilst also seeding the following crop in the same pass,” he adds.

PRODUCT FOCUS

KUHN Megant 602R



The KUHN Megant 602R can be specified with an additional tank to sow multiple products in one pass.

KUHN's lightweight Megant drill features new tine coulters, an updated terminal, and the option to add a second hopper. The Megant 602R shares functionality with the previous 600 model, but features half width shut off and can be specified with an additional SH 1120, 110- litre hopper to drill two crops in the same pass.

Due to its lightweight design, the Megant can be operated by tractors with as little as 150 horsepower. Three types of tines can be specified on the Megant, including reversible forward action, straight, and a new narrow 12mm straight tine coulters which reduces soil displacement through improved penetration and also reduces wear on the tine thanks to the addition of carbide plated points.

The 602R has inherited some features from the larger Espro drill, including spring loaded nonstop track eradicators and side markers that are better suited to dry conditions. A new welded 1800 litre hopper capable of holding 1200 kilos of wheat and drilling 60 hectares a day replaces a riveted hopper

on the previous model. The new hopper also includes internal steps to improve access to the distribution head.

The Megant has been fitted with KUHN's VISTAFLOW valves which can be configured and controlled from the terminal. This enables operators to program the flow of seed with the option to save settings for future use. VISTAFLOW also records tramlining configurations such as the working width and wheel track to enable more accurate use of sprayers and fertiliser spreaders which will help to reduce input costs.

KUHN Aero 32.1 mounted pneumatic fertiliser spreader



The mounted KUHN Aero 32.1 is available in 27, 28 and 30 metre working widths, but folds to a compact load on the rear of the tractor.

The KUHN Aero 32.1 pneumatic fertiliser spreader is equipped with a 24-nozzle boom and is available in working widths of 27, 28 or 30 metres. The mounted machine application rate is precise and modular over four sections, and it has an integrated weighing system.

The 3,200 litre hopper (1,900 litres without the extension) and working width of up to 30 metres make the Aero suitable for heavy use operators. It is also easy to operate, with hydraulic booms that are easy to control from the tractor cab and fold to the rear for safety on the road.

Each metering unit is connected to six nozzles which can be switched on or off and be adjusted individually. It is therefore possible to modulate up to four spreading rates and to shut off individual sections, in a single pass.



The KUHN Aero 32.1 features a 24 nozzle boom and can be specified with a 3200 litre hopper.

The Aero 32.1 provides precision application up to the field border. This includes fine, light, or compound fertilisers, such as urea, and bulk mixtures that are usually more difficult to spread over large widths with centrifugal spreaders.

KUHN Prolander with TF 1512 distribution head



KUHN's Prolander is now available with a distribution head and TF1512 front tank to enable the cultivator to plant crops and cover crops and apply fertiliser.

KUHN's Prolander has the versatility to perform multiple cultivation operations, working at speeds of 12km/hour and with a power requirement of just 25–35 horsepower per working width metre. It features five rows of staggered vibrating S tines with progressively increasing spacings to ensure unimpeded trash flow. The robust frame strength allows work in stubble or seedbed and tines can be fitted with 60mm shares (seedbed preparation) or 180mm duck-foot shares (shallow cultivation).



The distribution unit can be controlled with KUHN's ISOBUS CCI terminal or a tractor ISOBUS terminal.

The Prolander comes with a choice of rollers, with the double-U being suited to stubble and general tillage work whilst the tube roller (with the option of levelling harrows) is ideal for fine tilth work on light soils for root crops.

Coupled with KUHN's TF 1512 distribution head, the Prolander can also plant crops, cover crops and apply fertiliser. The front mounted hopper is available with 1500 or 2000 litre capacities and can be controlled with KUHN's ISOBUS CCI terminal or a tractor ISOBUS terminal.

MANAGING COVER CROPS?

Written by James Warne from Soil First Farming

As we look around at the landscape in the early autumn we can see that some early drilled cover crops are now coming into flower. Those planted in late July after the first harvests of OSR or Barley will now have been in the ground for 6-8 wks in some parts of the country. Those planted after wholecrop silage or over-winter stubble stewardship options may have had another 4 weeks of good growing conditions. With the wet and warm summer we have had biomass production will have been large. The soil biology will have been working overtime mineralising organic compounds in the soil providing the cover crop with nitrogen, phosphorus & sulphur.

While the multiple benefits cover crops provide are undisputed, dealing with them can become also pose multiple problems for the physical activity of drilling and the establishment and early growth of the following cash crop.

Let's take a quick look at some of the benefits cover crops can bring to the soil and wider environment. The principle benefit to the farmer is having a living root in the soil. Do not underestimate the importance of this. Soil fertility is all about carbon, in simple terms living roots are at worst maintaining the soil carbon stock, and at best increasing the carbon content. Bare soil is the opposite of this, at best it is maintaining the carbon stock, but most likely the biology will be feeding upon the organic matter it as there is little other food source, releasing carbon as CO₂.

Roots are also providing stability, structure and drainage, important functions which would otherwise have been achieved through cultivation, while the biomass above ground provides protection, mulch and insulation.

While these all sound like a panacea, it's not so straightforward when it comes to dealing with the cover crop prior to drilling the following cash crop.

The basic option is to flail off the cover crop then plough/combi drill the following crop. Simple, straightforward and fulfils our desires of seed into a clean seedbed having buried the trash. If carbon building, soil fertility and soil biology are your primary aims this option is a failure. Any gain in soil carbon will be lost by the action of cultivation and the introduction of large amounts of oxygen into the soil, oxidising organic matter and carbon. While the bacteria in the soil may recover from having been turned upside down and buried to 8 inches quickly, the

fungi most certainly will not. Fungi are relatively slow growing and their filaments are very sensitive to be chopped up and disturbed. It can take years for the them to re-inhabit cultivated soil. And finally the cultivated soil is very susceptible to slumping and erosion by heavy rainfall.

The other option is the drill into the soil unmoved through the cover crop which is every no-tillers desire. The thought of which can be daunting to a beginner, and the risks can be high. When do I destroy the cover crop? Do I have a drill that will cope with large amounts of biomass? Will it look a mess? Will the pre-emergence herbicide still work. And most importantly, yet underestimated, what will all the decaying biomass contribute to the carbon:nitrogen ratio in the soil.

Destroy the cover crop too early and risk it becoming a mulch which stops the soil from drying should the weather turns wet. Allow the drill to get to farm ahead of the sprayer and risk the crop emerging before the cover crop is destroyed. Flail the biomass too close to drilling and it balls

up around the drill. The decaying cover crop, along with possible chopped straw and residues from the previous crop, will have locked up a large proportion of the soil's plant available nutrition, slowing the establishment of the cash crop, and in extreme circumstances preventing emergence all together. The fertilisation of the cover crop needs to be taken seriously to prevent this from happening. It doesn't take much cover crop growth to remove most of the available nutrition, right now there is plenty of stripy cover crop & OSR showing exactly where all the volunteers dropped behind the combine has sucked the nutrition from the soil, combined with lots of chaff and possibly chopped straw.

Get it right however and the benefits can be great, simple cheap crop establishment into a friable soil with good aggregate stability and porosity. The carbon has been captured which improves the functionality and fertility of the soil and can be an ideal medium to drill into.



Above: The effect of low plant available nutrition

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As I write this the sun shines, almost ironically as the cereals are all cut and only the beans remain to be harvested. It has been a very stop start affair from the very start, but not impossible, and easier and more rewarding than many around the UK have experienced.

This is the first harvest where all my crops were sown after only a pass with the straw rake, stubbles sprayed, then drilled with the Mzuri. In the past I have ploughed around 60% of the ground planned for winter and spring barley after wheat. This season I left the plough in the shed and direct drilled my winter and spring barley which all went into Simpsons Malt. I decided to cover all stubbles with the rake last autumn and it helped get a chit in what was a very dry autumn. I still believe that each pass with the rake halves the slug numbers which reduces my pellet use. Usually, 1 application of slug pellets with the drill for osr and wheat following osr. I don't know if any research has been done to prove the reduction with the rake, but it is something I have found over the years. All crops looked well all winter but once again the winter barley seemed to drop a tiller in the wet cool spring here. This led to a thinner crop and an average yield at best, but that did seem to be common across all establishment types in the area. This year I will go at least a week to 10 days earlier sowing my winter barley, Sep. 5th, and again use variable seed rate as it is making the crops noticeably more even. There has been some very flat wheat this year and I had some myself. Rolling direct drilled ground does require some stone picking, my ground isn't very stoney, but I did end up picking a lot of stones from the centre belt stone trap on my convio header this year, reminding me to be more vigilant in future. The flat wheat was sown at variable rate and the light ground receiving the lowest rate but still went down first. I think that tiller numbers in the Dawsum, even at the lower rate were still so high that on a relatively low 188kg of N it still managed to go very flat very early. The head count in some areas was almost 1000/sqm from 150kg/Ha or 330ssqm. The question now is do I go to 140kg/Ha for my low rate when I sow this week? Seems low.

The Diablo spring malting barley was all direct drilled. Most was drilled into overwintered stubble, but some went in after



a poor crop of stubble turnips and some after the spring bean, phacelia, radish and buckwheat winter cover. The cover worked well, I was concerned that it would hold too much moisture in the topsoil for spring sowing, so beans and buckwheat were included as they die off with frost, leaving the radish and phacelia. A friend's sheep grazed the remaining cover which paid for the seed. This did offer a great reminder to my family of our livestock days; we were out on boxing day chasing sheep around next door's osr. After that, what remained was sprayed off and it finally dried enough to sow on the 8th April pushed on by a poor forecast (a reason used a lot this year). The seedbed was mostly in good order, but some heavier areas were definitely compromised, remaining wet and sticky, and looked like they would struggle to establish. Wet weather followed then extreme dry. 5 weeks with no rain, mid-May to mid-June. The crop however, after some spot slug pelleting, came away not too badly, then survived the dry spell amazingly well and better than the ploughed combi drilled barley in the area. Dry topsoil with moisture retained at depth is a massive benefit with my system and that was obvious this spring. I did however think the field would out yield my other barleys as it had always looked stronger and thicker. The final yield was very similar to the other Diablo but the straw crop was easily double the size. This turned out to be a disadvantage as 45mm of rain after cutting meant I had to turn the straw twice before baling. I will try winter cover to spring barley again this year and see if the results differ. I have sown a similar mix again this year, beans down the front leg, phacelia and radish out the coulter. This was sown on Aug. 15th into wheat stubble and will be sprayed off before drilling Diablo spring barley for Simpsons malt. I have some cover crop seed coming from Simpsons for a trial 5 Ha plot to gather some info on effects of winter cover crops on soils and the following spring barley.

Due to a low price, I chopped more than half of my straw this year, that is more than ever, and it has saved a lot of running back over the ground, so helping to keep it level and hopefully putting some OM back. Last year's wheat straw was completely gone come spring which is a sign of a worm activity and a healthy soil.



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The harvest was a good one with WB just below average, OSR on the 3-year average, wheat above average, variable with some very big yields, spring barley below last year's high but unfortunately nitrogen's are high so some deductions may follow and finally the spring beans which are well podded but a good 2 feet shorter than usual. Beans are sprayed off but a good 10 days until cutting as I write. Everything has required drying, not unusual for here but costly all the same. Some OSR was cut at similar moisture to the wheat (which also needed dried, that's a clue) but it is in the shed!



This year's OSR is rowed up and has received its first spray, no insecticide added as the damage was below threshold numbers. I don't sow OSR at variable rate, so I was able to use the map to vary the slug pellets rate instead. I started at full rate on the heavier soil and then worked back from there. I ended up using



less than the flat rate and it seems to be sufficient, IPM in action. Around 80% had chicken muck spread on the stubble prior to sowing and the dry conditions meant very little compaction. I am always very conscious that spreading muck in anything but perfect conditions isn't really a good thing. I am direct drilling my winter barley into wheat stubbles again but this year I have managed to get a reasonable chit of volunteer's and some grass weeds. It was a bad year for brome in this area and I know I will have to plan my spray program to avoid allowing it to become a bigger problem. Raking, chitting and planning spray programs on known areas are now a priority.

I was nominated and entered the FW arable farmer of the year awards and made the final 3 with the winner announced on October the 5th at the dinner. The judges visit in July was very interesting and made me look again at what I do and the many benefits the system has over my old one. One thing that concerned me was I don't really have a lot of machinery to look at. I pointed this out because I obviously see it as a positive and the judges noted that in the past machinery was the first thing they looked at, now the soil and the system were the key things. The whole discussion felt like real recognition, that what the farmers in this magazine practice is slowly becoming, as the magazine joked in its title change, 'Normal Farming'. The judges did also agree it was strange that if I farmed 6 miles south of here (England) I would have qualified over the years, for around 60K of funding for my drill, rake and newly laid concrete. Being in Scotland I can't access any scheme. Arable farming is mostly ignored unless its red tape, EFA or greening. Being honest I don't really want government interference, but that's a lot of money!

The Profitability and Sustainability group, which I am part of, has received another raft of funding (for facilitators not participants) which is good, but it makes me realise that there is money out there and we as farmers must have access to it. It is already being used in our name, so we best get out there!

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HAVE WE UNDERESTIMATED THE IMPORTANCE OF **SOIL HEALTH** AND **CARBON SEQUESTRATION** AND THEIR IMPACT ON BRITISH AGRICULTURE?

asks Thomas Gent, UK Market Lead for Agreena

As part of a British farming family which has worked the land for generations, we have witnessed firsthand the shifts in weather patterns and the challenges they pose to our farming practices.

The threat of climate change is no longer a distant concern; it's an immediate and pressing reality that demands our attention and action. There is no question that our soils are one of the largest carbon sinks on the planet but their degradation due to heavy tillage, the use of fertilisers, etc., has led to ever increasing poor soil health and increased carbon emissions, both of which have a huge impact on British agriculture.

The Changing Climate Landscape

The British weather has always been a topic of conversation, but in recent years, the conversations have shifted from mere small talk to serious discussions around unprecedented weather events.

Erratic rainfall patterns, intense heat waves, and unseasonal frosts have become our new normal.

As farmers, we are acutely aware of how these changes affect our crops, livestock, and crucially, our livelihoods. The increasing unpredictability of the weather makes planning and decision-making incredibly challenging, and has brought to our attention the need for

more climate friendly and resilient farming practices.

Soil Health: The Unsung Hero

One of the most miscalculated aspects of the impact of climate change on British agriculture is soil health. Our soil is the foundation upon which our farms thrive, providing the nutrients necessary for healthy crops and pastures.

The changing climate disrupts the delicate balance between healthy soil

and unhealthy soil.

Increased rainfall leads to soil erosion and nutrient runoff, while prolonged droughts compact the soil and hinder root growth. As a result, our soil suffers, soon becomes unhealthy, less fertile, and as a consequence we face reduced yields and diminished quality of our produce.

Investing in soil health is imperative to enable farmers to successfully adapt to changing weather conditions. This investment should also form part of a



strategy for farmers to help mitigate climate change itself.

Healthy soil acts as a carbon sink, capturing and storing carbon dioxide from the atmosphere. The sequestration of carbon is a key element of environmentally friendly farming and has a key role to play in mitigating climate change.

Carbon Sequestration: A Vital Solution

Carbon sequestration is the process by which carbon dioxide is removed from the atmosphere and stored in natural sinks, such as soil and trees. This process not only reduces greenhouse gas levels in the atmosphere but, the more carbon there is in the soil increases the fertility and the greater the enhancement to the overall ecosystem.

It is easy to see that carbon sequestration is an invaluable tool in the fight against climate change whilst simultaneously bolstering the resilience of our agricultural systems by helping to keep our soil in good health.



Three generations of regenerative agriculture farmers from left to right: Tony, Thomas and Edward Gent

One of the most effective ways to increase carbon sequestration is through regenerative agricultural practices. These practices involve minimising soil disturbance by moving from ploughing to min-till or no-till, planting cover crops, and broadening

crop rotation. By avoiding intensive tillage, carbon is prevented from being released into the atmosphere. Instead, it remains in the soil, contributing to its structure and nutrient content and general health.

An important benefit of this regenerative approach being taken by British farmers is the potential to be rewarded for their climate-friendly efforts through carbon certificates. The issue of these certificates is based on the verified quantity of carbon sequestered in the soil as a result of improved farming practices.

Carbon certificates are a valuable financial asset to be traded within the voluntary carbon market, and are representative of a shift in how farmers and land managers will increasingly be perceived.

Realisation is beginning to dawn that although farming will always be about producing the food we all need to live, farmers are now dynamic participants in the global carbon cycle as they make the transition to regenerative farming



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driving carbon sequestration, resulting in the issue of carbon certificates that will be sold to organisations who want to offset their carbon emissions.

In addition to fostering environmental resilience through regenerative agriculture, the additional revenue from the sale of carbon certificates delivers a valuable new revenue stream for farmers. A revenue stream which can partly help to replace traditional subsidy programmes like the Basic Payment Scheme (BPS).

Aligning potential new revenue streams available from carbon trading, with sustainable land management and regenerative farming, will not only bolster the fight against climate change but also reinforce the economic viability of farming practices that prioritise the health of our planet's most fundamental resource – its soil.

The Need for Support and Education

Adopting and changing to regenerative farming practices, and making a priority of soil health is not without its challenges.

Many farmers are hesitant to adopt new methods. Few people like change and for farmers transitioning to more regenerative farming practices means they have to change the way they have been farming for years! There are also real concerns around the initial costs and uncertainties surrounding the outcomes of such change.

It's here that policymakers and agricultural institutions have a critical role to play. Financial incentives, grants, and access to expert guidance can empower farmers to make the necessary changes.

Furthermore, public awareness campaigns can help consumers understand the importance of supporting sustainable agricultural practices, encouraging a demand for responsibly produced food.

Education is also key. Farmers need access to the latest research, best practices, and to learn of success stories from their peers. Workshops, seminars, and online resources can provide a platform for knowledge exchange and collaboration.



As I kept hearing at this year's Groundswell, discussing and learning from the experience of other farmers can make the transition to regenerative agriculture feel less daunting and more achievable.

The Way Forward

While climate change poses unprecedented challenges to British agriculture, farmers are beginning to understand that it also presents an opportunity to re-evaluate how they farm to lessen the impact of unpredictable weather patterns. They also see that there are environmental and financial benefits to be achieved by making positive changes.

The latest report from the Intergovernmental Panel on Climate Change (IPCC) emphasises the significance of sustainable agriculture as a potent tool in combating carbon emissions.

This is evidence of the change in how farming/agriculture is now being viewed. Awareness is growing as to the important role that responsible, climate friendly land management can play in reducing the impact of climate change. Farmers now offer climate mitigation services.

In future, to ensure this momentum and the awareness of change continues, we farmers should also view ourselves in a new light.

Despite the seemingly endless challenges we face, such as reduced

BPS, higher input costs, high energy costs, etc., to just scratch the surface, we should recognise and promote our powerful position when it comes to mitigating climate change.

As custodians of the land and the precious soil beneath it, we should be looking to practise sustainable, regenerative farming which will put us firmly on the road to carbon sequestration so that carbon farming becomes the norm.

Conclusion

As farmers, we hold a unique position to help overcome the challenge of climate change. Our connection to the land gives us unprecedented insight into its needs and vulnerabilities. By embracing regenerative agriculture, we can build resilient ecosystems that are better equipped to handle extreme weather events while contributing to a healthier planet.

By championing sustainable practices and advocating for supportive government policies, farmers can be leaders in the effort to mitigate the impact of climate change on British agriculture.

The time for underestimating the future challenges of climate change is over. Now is the time to harness our knowledge and passion for farming, to drive regenerative farming practices that work alongside the environment and with nature, to ensure a sustainable future for generations to come.



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DRILL MANUFACTURERS IN FOCUS...



EMPOWERING CHANGE: MZURI LTD LAUNCHES PIONEERING AMBASSADOR PROGRAMME



Connecting Through Experience: From Farmers, For Farmers.

In the ever-evolving landscape of agriculture, the winds of change often blow strongest when carried by the voices of those who have experienced its benefits firsthand. Recognising the power of farmer-to-farmer interactions in reshaping the future of farming practices, Mzuri Ltd has taken a bold step forward by introducing their revolutionary Ambassador Programme. The British drill manufacturer champions an open exchange of insights that will illuminate the benefits of its pioneering system.

At the heart of this programme lies a group of esteemed ambassadors, individuals who are not only experienced end-users of the Mzuri system but are also enthusiastic advocates for its transformative potential. These ambassadors, with their in-depth understanding of the Mzuri system, are poised to engage with farmers across the nation, engaging in candid conversations about the system's unparalleled benefits.

A Gathering of Expertise: From Farmers, For Farmers

Mzuri understands that transitioning from conventional cultivation methods to minimum tillage can be a daunting prospect for many farmers. The company firmly believes that opening the door to farmer-to-farmer conversations provides a unique and invaluable insight into how the Mzuri system can seamlessly integrate into diverse farming systems. These conversations serve as a bridge, enabling farmers to make informed decisions and facilitating a smoother transition to more sustainable practices.

Central to the Mzuri system's success is its ability to enhance farming practices while simultaneously bolstering sustainability. The ambassadors, having witnessed these benefits firsthand, stand as living testament to the system's efficacy. By improving the soil profile and nurturing robust and

healthy plants, the Mzuri system ensures that farms are not just productive but also ecologically resilient. A remarkable outcome of this shift is the reduced reliance on chemical inputs, a win-win for both farmers and the environment.

One of the most striking achievements highlighted by the ambassadors is the system's positive impact on profit margins. The Mzuri system's one-pass approach has led to a significant reduction in fuel usage with one ambassador stating it has saved an impressive 40 litres per hectare. Such substantial savings not only translate to financial gains for farmers but also contribute to a reduced carbon footprint. Additionally, the band placement of fertiliser, a hallmark of the Mzuri system, has demonstrated its capacity to reduce fertiliser requirements, making a considerable dent in operational costs.



The Mzuri System Empowering Sustainable Practices.

Champions of Change: Striving for a sustainable future

The launch of the Ambassador Programme by Mzuri Ltd is a manifesto of change, a movement towards a more sustainable and fruitful future for farming. The collective knowledge and experience of the ambassadors resonate powerfully, serving as beacons of inspiration for their peers. Their stories of transformation offer tangible proof that embracing innovation need not be a leap of faith but rather a well-informed decision backed by peer-to-peer evidence.

As the agriculture industry navigates the complex challenges of our times, initiatives like Mzuri's Ambassador Programme offer a glimpse of the collaborative and progressive spirit that can steer us towards more sustainable horizons. By encouraging open and honest conversations, sharing experiences, and cultivating a network of experienced end users, Mzuri Ltd is sowing the seeds of positive change that promise to yield bountiful harvests for both farmers and the environment.



Farming Champions Shaping the Future of Sustainable Agriculture.

The introduction of the Mzuri Ambassador Programme stands as a resounding testament to the transformative power of peer-to-peer communication. Through experienced end-users sharing their success stories and insights, farmers across the nation will gain the confidence and knowledge they need to transition to more sustainable and efficient practices. Mzuri's commitment to fostering these conversations and empowering farmers with the tools for change exemplifies a company not just focused on innovation, but also on the greater good of the farming community and our planet.

To stay up to date with the latest Mzuri Ambassador announcements, we encourage you to follow Mzuri's vibrant social media channels and regularly visit their website. Keep an eager eye out for updates on the upcoming ambassadors, as they come together to inspire and motivate fellow farmers.

Should you wish to engage directly with an ambassador, Mzuri's dedicated team can be reached at 01905 841 123, and they will be more than happy to facilitate contact with a suitable ambassador.

Keep up to date with the Mzuri Ambassadors!

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Direct drilled crops did better at the Huntingdon trial site largely due to good conditions at the time of sowing

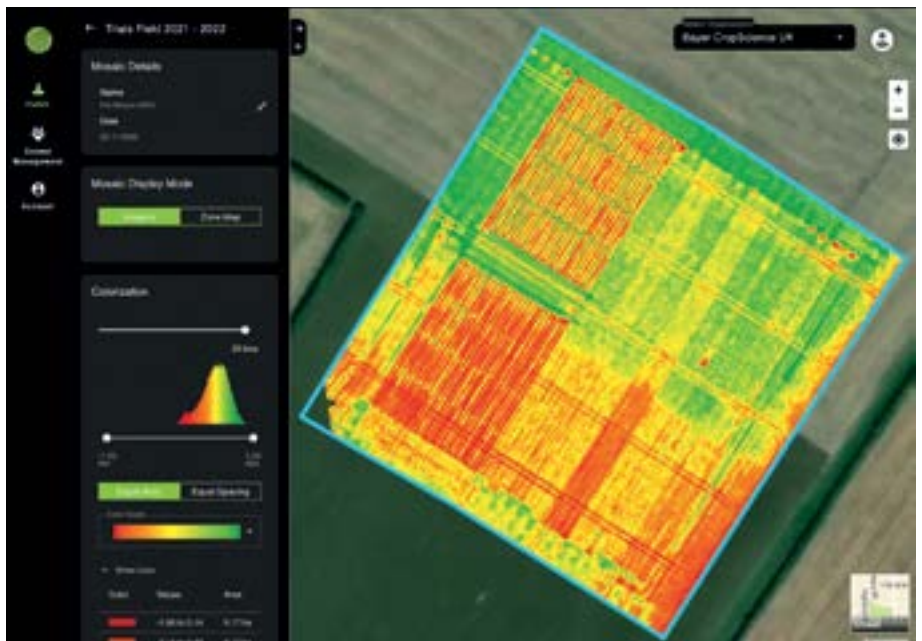
TRIALS SHOW VALUE OF STRONGER VARIETIES IN 'LOWER INPUT' REGIMES

John Miles, Agrii seed technical manager, explains why variety choice is the primary consideration when planning cultivation regime, drilling date and fungicide strategy

Not all varieties perform equally. It may seem an obvious statement to make, but it promotes the bigger question: which will do well on my farm, and which won't? Given the interest in reduced tillage and other lower input forms of production, this seemed a question worthy of investigation.

Through a series of fully replicated trials at farms in Huntingdon, Essex, Kent and Dorset in 2021-22, Agrii investigated the relative performance of wheat varieties under different establishment regimes and crop protection programmes. The objective was to understand the impact on output from direct drilling over deep cultivations and how does this influence disease pressure and, specifically, the opportunity to incorporate biological crop protection agents in place of conventional fungicides.

On the face of it there was little to



The NDVI image reveals the impact of the wet winter on plant biomass in the plots sown after drilling. Picture courtesy of Bayer.

separate either establishment regime. Across all 18 varieties grown side-by-side in Huntingdon and Essex, the average yield under direct drilling and

plough-based regimes were almost identical at 10.6t/ha. But this average hid a wide range in performance and there were clear differences between

Agrii Huntingdon variety establishment trial

	Average yield (t/ha)	Plant count (plants/m ²)	Establishment rate (%)	Ear count (ears/m ²)
Direct drilled	12.4	182	42	447
Plough-based	11.7	187	56	417

Reference: Agrii, 2022

the sites, varieties and regimes. The seed rate for direct drilled plots was raised to 425 seeds per metre compared with the plough at 350. The aim was to achieve the same plant stand in both techniques.

On the Hanslope series clay at the Huntingdon site, direct drilled crops fared best, but the question is why? Ear counts were only slightly better at +7% and while plant counts were similar ahead of the winter. NDVI aerial imagery captured by Bayer in the New Year reveal the impact that the wet weather in January had on plant biomass. The result, where the direct drilled plots outyielded

those sown following the plough, was not entirely unexpected given the biomass differences which remained all season. We believe in this instance the ploughed ground held onto too much moisture, so the plant environment became adverse during February resulting in loss of biomass shown by the NDVI image.

In Essex, also on Hanslope series clay, plant populations and ear counts were similar, but the average yield was lower at 9.17t/ha, down 2.87t/ha on Huntingdon. On this site, the plough-based approach produced the better result. This may in part be due to the establishment challenges the direct

drilled plots faced as a result of large quantities of chaff in the straw swath even though the straw was removed.

This farm has been in continuous wheat for 40 years and damp conditions at drilling and persistent slug activity were evident. Unsurprisingly, the ploughing effectively buried this impediment (trash) giving a uniform crop. Plant and ear counts were not taken from any bare patches, so where establishment is good, it is comparable across systems. Like the Huntingdon site, seed rate adjustments have given similar plant stands and emergence percentages.

The variety performance at both the Essex and Huntingdon sites was also telling. On the higher-yielding Huntingdon site, the varieties standing out for relatively better direct drill versus plough performance were similar to those that stood-out overall. Their direct drilling advantage was, however, much greater here at more than 1 t/ha. Equally, only three varieties performed less well under



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direct drilling.

On the lower yielding Essex site where the direct drilling challenge was greater due to the quantity of surface trash, every variety performed better after ploughing than direct drilling. Those returning the least variation (no more than 0.4t/ha) in comparison with their yield under the plough-based regime were: LG Astronomer, RGT Saki, KWS Zyatt, Crusoe and Gleam.

This is only a single year, so the performance of the different varieties could have as much to do with their relative suitability to the season as to the different regimes. Even so, it appears that where establishment conditions are good, direct drilling can be advantageous for almost all varieties, with some doing especially well.

Where direct drilling establishment conditions are more challenging, it looks like the more vigorous varieties are better able to compensate. This is knowledge growers can use to their advantage when planning cultivation strategies and cropping plans. Growers know when they are likely to push the limits of drilling date, soil type, crop or weed residues or cover crop trash, so can respond accordingly by choosing varieties better suited to these conditions. It is also worth noting that across the trials, there were several varieties that did well regardless. KWS Extase, Gleam, Graham and LG Skyscraper were all consistently among the best performing varieties. They may not be the most best performing when conditions are perfect, but they can be relied on when it matters.

Early versus late drilling

The Dorset trial followed the same protocols as those in Huntingdon and Essex, but investigated the

Agrii Essex variety establishment trial

	Average yield (t/ha)	Plant count (plants/m ²)	Establishment rate (%)	Ear count (ears/m ²)
Direct drilled	8.9	197	46	435
Plough-based	9.5	168	48	446

Reference: Agrii, 2022

Agrii Good and bad performers in the Agrii direct-drilled variety trials

Varieties that yielded at least 0.25t/ha over the trial average		Varieties that yielded at least 0.25t/ha under the trial average	
Huntingdon	Essex	Huntingdon	Essex
Graham	LG Skyscraper	Skyfall	RGT Wolverine
Gleam	Graham	LG Tapestry	Mayflower
LG Skyscraper	KWS Extase	KWS Cranium	LG Typhoon
KWS Extase	Theodore	RGT Silversurfer	
KWS Dawsum	Gleam	Mayflower	
RGT Wolverine	KWS Zyatt	LG Astronomer	
Theodore		LG Typhoon	

Reference: Agrii, 2022

performance of two, high-yielding feed wheats: Gleam and Fitzroy. The findings were much the same: the more robust the variety, the better suited it is to direct drilling.

Across the two regimes – early and late sowing and direct drilling versus after ploughing – both varieties averaged about 12.75t/ha on the light land. The site is well-suited to direct drilling given the high sand content of the soil and is reasonably black-grass-free. This perhaps explains the owner's preference for direct drilling over deep cultivations.

Unsurprisingly, early October drilling gave a yield advantage of almost 2t/ha over drilling almost exactly a month later. And the 2.7t/ha advantage shown by Fitzroy was more than twice that of the 1.1 t/ha of much less disease-resistant, Gleam (see figure 1). This serves as an example of the having a drilling strategy that matches variety choice

to drilling date and establishment regime.

The quirk of the autumn weather also forced a change in plans that served as an opportunity to explore the relative value of disease resistance under each establishment regime. While we were able to direct drill the Dorset ground under the well-established no-till regime at the end of the first week in October, we couldn't sow the ploughed land for a further month. This gave us a golden opportunity to show how delayed drilling influenced Septoria pressure in what turned out to be a dry season.

Across both varieties in the untreated plots, just over 36% of the area of the top three leaves was suffering from Septoria tritici in the earlier-sown crops by mid-June compared with around 26% in the later-sown ones. Reflecting their different levels of Septoria resistance, this varied from 28% and 22% respectively with Fitzroy to 45% and 30% with Gleam.

A robust fungicide programme reduced Septoria levels to an average of 10% and 3% for the earlier and later sowings, improving average variety yields by over 1t/ha.

The difference in both yield and fungicide response between the two varieties in the earlier drilling, higher-Septoria-pressure-slot, was

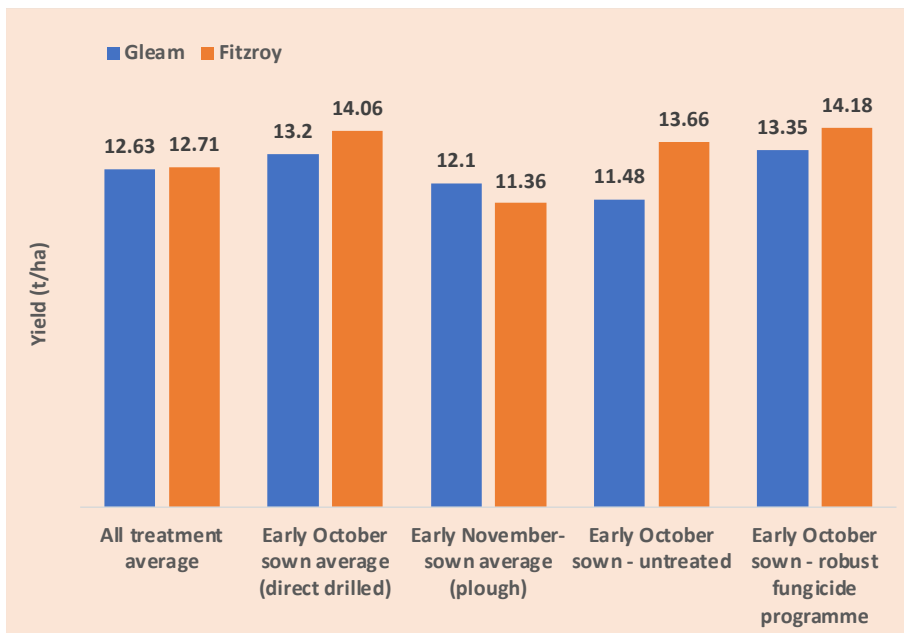


Figure 1: Agrii Dorset establishment trial Reference: Agrii, 2022

most revelling. Under the robust programme, Fitzroy averaged 14.18t/ha – just over 0.5t/ha up on its untreated performance – while, at 13.35t/ha, Gleam gave a response

of fully 1.9t/ha. The yield response of Gleam is impressive, but it also highlights the risks that occur when the level of variety resistance is towards the lower end of suitability

for the situation.

This underlines the value of a variety like Fitzroy with its Septoria – not to mention yellow and brown rust – resistance superiority. Its robustness allowed the variety to take much greater advantage of the extra performance opportunity offered by earlier drilling than Gleam.

Where the regime and conditions allow earlier drilling, there can be little doubt about the extra value of the likes of Fitzroy – not least in providing leeway to cope when even the best laid plans are interrupted.

The opportunity that more robust varieties offer extends beyond drilling date and establishment regime. For growers wishing to incorporate biological products in place of traditional fungicide chemistry the value of stronger varieties was further demonstrated in a large-scale 14-variety trial with a broad range of treatment programmes at a separate Kent site invariably hit by all the main

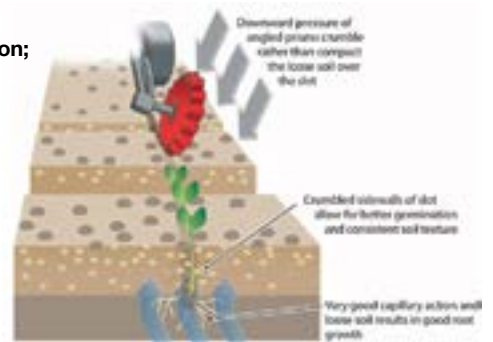
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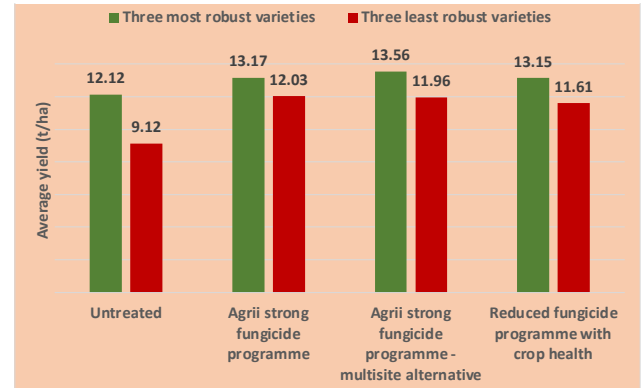


Figure 2: Agrii Kent disease management trials Reference: Agrii, 2022

foliar diseases.

All the programmes involved four treatments at three-weekly intervals in a season in which early disease pressures were relatively low. Despite this, the average response across all varieties to the Agrii strong fungicide programme was over 2t/ha.

This varied from an average of almost 3t/ha for the three varieties with the lowest untreated yields to only 1t/ha for three with the best untreated performance (see figure 2).

At 2022 season costs and crop values, the margin advantage from employing the strong fungicide programme increased from just under £500/ha with the most robust varieties to almost £1000/ha with the least robust.

Replacing multi-site folpet with the biologicals, lodus (laminarin) at T0 and Thiopron (sulphur) at T1 had a slightly negative effect on yield and margins with the least robust varieties. And replacing all the chemistry with biologicals at T0 and T1 in our reduced fungicide with crop health treatment knocked performance even further.

The fact that yields were still well above untreated levels in both cases shows the contribution of the biologicals in the context of the 2022 season and with the backup of robust T2 and T3 chemistry in protecting performance once infection levels increased.

With the more robust varieties, however, there was little loss in performance from the reduced fungicide programme with better crop health and the strong fungicide programme replacing folpet performing better on average than the strong programme alone.

This underlines the greater opportunity growers have for incorporating biological products in place of chemistry in their treatment programme where they have the most robust varieties – providing, of course, early disease pressures are not too high, and they are able to maintain a well-timed programme and are prepared to use fungicides at T2 and T3.

It also reinforces the risk run by those trying to do the same thing with less robust wheats despite favourable early season conditions and a similarly well-timed and robust T2 and T3 programmes.

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HOW **ENHANCED WEATHERING** SUPPORTS A FARMER'S BUSINESS AND THE ENVIRONMENT

Written by Jez Wardman, Agronomist at UNDO

Environmental issues are often hitting the headlines but articles are generally focused on the negative outcomes, creating worries that it's already too late to turn things around. However, I know from experience that farmers, local communities, carbon removal companies and other climate-forward organisations are making a real difference every day, combining innovative technologies with scientific knowledge to save our planet.

UNDO is just one such company working to reverse climate change. We spread locally-sourced crushed basalt rock on agricultural land for free. Basalt has been applied to farmland for hundreds of years due to its benefits for soil fertility, soil biology, crop yield and health. But this mineral-rich volcanic rock also removes carbon dioxide from the atmosphere through a process called enhanced rock weathering (ERW).

Removing CO₂ from the atmosphere is essential to reversing global warming. Even if every country in the world stopped emitting carbon, it will not change the damage that has already been done, it will simply stop it getting progressively worse. Removing carbon by locking up CO₂ as well as reducing our emissions is the only way to reverse climate change.

How does UNDO remove carbon?

We're harnessing the power of nature for a greener future. The geological process of rock weathering removes 1 billion tonnes of CO₂ every year. As rain falls through the atmosphere it combines with CO₂ to form carbonic acid. When this dilute acid lands on our soils, the CO₂ mineralises and is safely stored as solid carbon.

We speed up what nature's been doing for millennia by spreading crushed silicate rocks such as basalt on agricultural land. By increasing the rock's surface area, CO₂ is captured approximately 50,000 times faster than in the natural world. Unlike tree planting, carbon is locked away for 100,000+ years and once the carbon has been removed, this cannot be reversed. Our mission is to spread enough rock by 2025 to permanently remove 1 million tonnes of CO₂.



Healthy soil at our Dumyat trial site in Scotland

Basalt is a nutrient-rich volcanic rock that forms when molten lava cools. We source it as a natural, excess product of the quarrying industry so there is no additional energy used to produce it. Another advantage of basalt rock is that it is the most abundant rock on earth allowing for scalability of operations.

The University of Sheffield has claimed that adding crushed basalt agricultural soils in the UK "could absorb up to 45% of the atmospheric carbon dioxide needed to reach net-zero...[it] could remove between 6-30 million tonnes of carbon dioxide from the atmosphere annually by 2050."

To achieve our ambitious carbon-removal target we actively work in partnership with farmers whose focus is on protecting their land now and for future generations.

How does UNDO work with farmers?

Our basalt is given to farmers for free, increasing profits for rural farming communities. We work with local

contractors to spread the basalt rock on farmland using existing spreading machinery. We test the rock to ensure that it is always safe to be spread on land used for crops and grazing as well



Sensors to monitor the pH, electrical conductivity, soil temperature and soil moisture all of which will demonstrate that weathering is taking place



Enhanced rock weathering visual

as in certified organic farming systems.

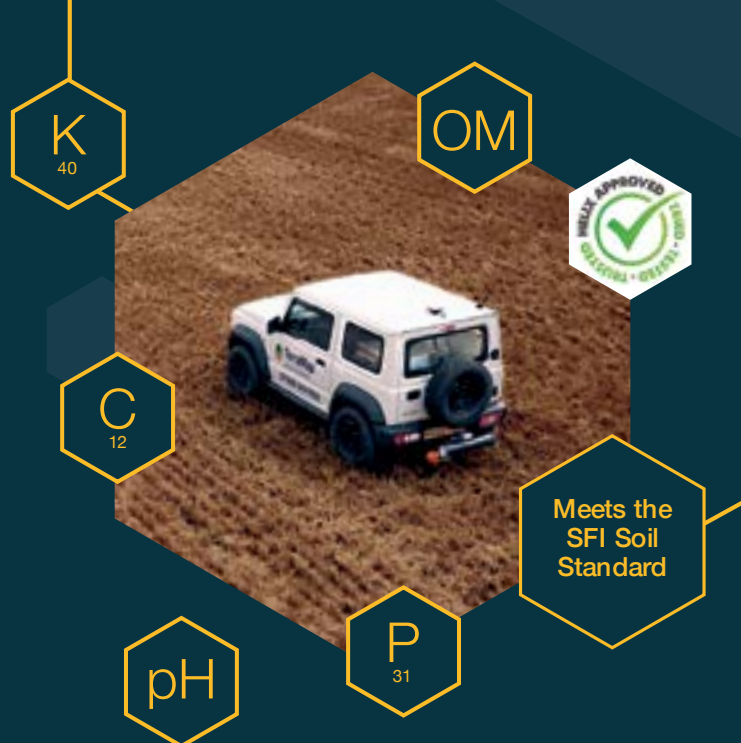
To keep the carbon footprint of the operation as low as possible, we currently only work in local areas close to where suitable rock can be sourced. Currently, we operate in Scotland and Northern England where the main deposits in the UK are located. We will expand as new sources of basalt rock are identified.

Another exciting benefit of basalt rock is that it acts as a natural soil enhancer, helping farmers keep their soil healthy. As John Logan, a farmer from Blairmains, Scotland put it "for farmers, the benefits of UNDO's work are clear: spreading crushed basalt on our fields is good for the soil quality and good for the livestock that grazes here, which is what every farmer wants. It also means that less costly products are needed to maintain the health and pH of our soil. It's free and easy to do as UNDO organise the spreading for us and we're already reaping the rewards."

Why should regenerative farmers care about enhanced rock weathering?

Reducing global warming holds its own benefits for all farmers, but regenerative farmers should be excited about ERW for many more reasons:

- Improves soil health naturally and with minimal disruption
- It's a more permanent method of sequestering carbon than planting trees
- Easily scalable with access to large areas of land
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Overall our operations have a 95% carbon efficiency as use existing farm machinery to spread an existing product on local land. However, it's the agronomic benefits of basalt rock that has the potential to bring even more value for the savvy farmer.

Based on independently conducted small plot trials and expansive split field studies we're building a robust dataset to quantify these benefits. Together with leading research organisations, including James Hutton Institute, SRUC, Scottish Agronomy and Newcastle University we're working to investigate the increase in soil pH, improved nutrient availability, and crop yield. We're working in eight different crops, from cereals and oilseeds to potatoes and grassland. Across these 324 plots in 23 trials, we've collected 814 soil and tissue samples to date with thousands more on the horizon.

How does spreading basalt rock on agricultural land benefit soil health?

The effect of soil pH on nutrient availability is well known. If soil is too acidic, nutrients will become less available to growing crops. To get the most out of any fertiliser inputs, getting soil pH right is the first thing to do. Currently, farmers apply lime to manage soil pH, but we believe basalt rock

may be a credible and perhaps even preferable alternative.

Weathering is a slow process so rather than having an immediate effect that raises soil pH it seems that applying basalt will help to stabilise the soil pH and help to stop it slowly drifting down over time. After applying basalt, the advice is to routinely test the soil pH before deciding if liming is needed. It is likely that either less lime will be required to bring the pH back to target or that liming is required less frequently. It may also be the case that following repeat applications every 3-4 years, the soil pH becomes stabilised and lime is not required. The strategy needs to change to be one of long-term maintenance of soil pH, rather than short-term correction, but spreading basalt every year will likely stabilise soil pH eliminating the need for a liming agent. As we provide basalt rock free of charge and cover the cost of spreading it using local contractors, farmers will certainly save money as well as resources.

By maintaining the soil pH at target there is an improvement in the availability of a wide range of nutrients and micronutrients, benefiting both growing plants and soil microbial activity too.

This mineral-rich volcanic rock also acts as a source of nutrients for your soil. It contains a wide range of nutrients

and minerals including potassium, calcium and magnesium together with micronutrients copper, zinc, iron, manganese and molybdenum in addition to cobalt, selenium and sodium which are important for animal nutrition. As the rock slowly breaks down, these nutrients are passed on to the soil over several years. These nutrients are not a replacement for fertiliser but are certainly a useful contribution.

At UNDO, we are exploring various areas of benefit surrounding basalt rock. One key area of focus is how it might prevent 'hidden hunger'. Farmers often rely on fertilisers and micronutrients to fix any deficiencies in the field that may impact crop quality and yield. But by the time a nutrient deficiency is identified, a certain amount has already been lost. We are investigating the impact basalt may have in preventing this deficiency from occurring in the first place.

As an agronomist, I find enhanced rock weathering a hugely exciting new development for the agriculture industry. It not only has the potential to help reverse climate change but also provides farmers with another sustainable way to farm. It may even help farmers keep control of their costs by reducing reliance on inputs such as lime and nutrients. To be able to advise farmers, we are conducting detailed trials on farming land to explore the nutritional benefits of it.



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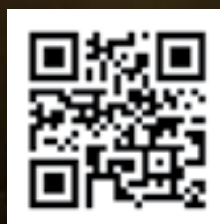
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Another challenging year and one I hope I don't see a repeat of for a few years! February being such a perfect month one would expect to pay the penance in March and sure enough it was a cold wet month with little work being achieved on the land, which for somebody trying to foliar feed crops was a nightmare! I lost some tillers as a result which was very frustrating! Farming is never easy which is probably one of the attractions for me – a new challenge every year. Some fields had more soil applied N this year as a result - Intelligent farming is all about farming in the moment and reacting to what is actually going on, since my intentions are always do what's best for the crop and I never have a blueprint for what I am going to do, as I never know what I am going to be dealing with!



Septoria was a huge problem this year with the weather conditions being perfect for it to thrive and go forward. Thankfully once again no fungicides have been used on any crops; my confidence has grown more in the belief that balanced nutrition does have all the answers. It takes more management on my side, but it is so rewarding to see a crop perfectly healthy, flourishing on maximised nutrition alone, knowing that the produce I have produced will go on to pass that nutrition to a human one day, nourishing the body, promoting healthy protection from disease and contributing to positive mental health.

The Green Farm Collective Open Day conference was a huge success this year. Thanks to all our sponsors without whose help we could not put the conference on. Speakers ranging from the importance of soil health and how it can be achieved, to herbal leys in the role of giving livestock the salad bowl of life! A bowl which would be full of the right nutrition allowing the animal to make its own choices to give its body the nutrition it requires. As humans we always seem to want to control every situation, when in reality all we need to do is provide the right menu and let the individual decide what they want to eat. We then followed the journey right through to human health, with

Patrick Holford being our Keynote speaker talking about the importance of nutrition within mental health, one that is very close to my own heart: I suffered a bout of anxiety/depression a while back and my wife didn't want me to go on drugs, as it was her belief that nutrition can cure all. I made the journey down to the Brain Bio Centre (Patrick Holford) where I got my own body tested to address the imbalances within myself. This was where I got really interested in food and the importance of growing nutrient rich food; the old cliché still rings true: "we are what we eat" and what we eat, influences what we think and feel! From that time, I had the belief that if I got my plants nutritionally balanced, then I would not need to use anywhere near the synthetic inputs. The whole Green Farm Collective Open Day conference was recorded for Green Farm Collective members to watch again at their leisure.

Another new concept for Green Farm Collective members is that we have now written what we believe to be the constitution of Regenerative Agriculture. I am so tired of people jumping on the band wagon when they are doing very little 'Regen' but still want all the glory! This, in my opinion, is very dangerous as it takes away all the work of the many farmers that have made the movement thrive and move forward, repairing the damage that has been done to our wonderful planet on which we live. So, we now have a creditable audit which proves that the produce supplied by Green Farm Collective members is exactly what it says on the tin! This will be sold at a premium to the farmer, who should be rewarded for the way they have produced their food, whose story in the production has a tremendous value in my opinion. It's all about educating the final consumer and how they can play their part in healing the planet on which they inhabit. As I have said many times before, there is NO PLANET B.

The other point I keep making is that as farmers, we have a lot of power if we stand together as one! A big impossible task you may say! Well, I always have the belief that anything is possible, and the world is a small place in





the bigger scheme of things. As the natural capital market is starting to gain more ground along with Carbon, it is my belief that farmers are the heroes of the world since nobody else can heal the planet whilst providing food; so, we should lift our heads and stand proud in that fact! We need to stand together as one and not try to sell cheaper than our neighbour just to get the deal! Natural capital is so precious and valuable; moving forward it's so important that we don't undersell ourselves and devalue it before the market even gets going: Together we are strong.

The Green Farm Collective Open Day conference was also the launch of the Green Innovation Award (£10000). Thanks must go to all sponsors of the Award. The idea has come from Mike Harrington and me wanting an award to give the lucky winner or winners the chance to hopefully

implement an innovative idea that they have always wanted to try, but not had the funds! The idea will be that we follow the winner on their journey making their idea come to fruition and work (hopefully) so that others can learn from the experience. We still have so much to learn and hopefully this fund can play a part in that journey. Entries are open until Christmas 2023, so plenty of time to mull your ideas over! To enter, please scan the code pictured, or get in touch with Green Farm Collective on www.greenfarmcollective.com

Lots of trials have taken place over the last growing period (as ever) from growing crops (wheat/barley) just with amino acids (50kg soil applied N) please see picture the amino acids being on the left of the picture in wheat. I have also run a trial with Mike Harrington, once again comparing nitrogen rates and biological products. Nitrogen has to be in the system from somewhere, be it from the atmosphere, from legumes, or from synthetic inputs; it has to be in the system and it needs to be balanced. It is our best friend and worst enemy all rolled into one, which is why I monitor crops constantly using sap testing to make sure everything is balanced (Intelligent Farming). This then enables me to farm without fungicides, insecticides and growth regs etc. Nitrogen rates varied from 260kg/N/ha to nothing, yields varied from 6.2 t/ha to 9.1 t/ha It was very interesting to see that the best yield came from 160kg of N, not the 260kg as this was just too much for the system to cope with and doing more harm than good. My best yield this year from foliar fed crops was 9.2 t/ha - I just didn't get the water yet again!

I have also done a trial using an inter row mower on my



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Lupins - another superb machine made by TTEngineering (Thanks to Martin Lingham for the lone of the machine - see the pictures). This was done with red clover, the idea being that the clover would be the understory to control any other plants growing and provide extra food for the lupins once I mowed, as the clover would then release its N. All great plans do not always work. Due to the dry June, the clover took more water from the lupins, causing dormancy in the lupins and once the rain did come, the clover subsequently swamped the lupins... disaster! Well, you always learn more when things go wrong in my opinion, so I now know that I can get good ground cover! At the time of drilling my broadcaster gave up the drill as I wanted to broadcast in between rows which would have been a lot better. Instead, I broadcast using the quad bike. Also, seed rates could have been halved. I also tried Kings understory mix which has worked better and there are lupins, but again drilled too thick: much knowledge gained going forward.

I am also running a trial for Wildfarmed where we aim to measure the effects of Glyphosate on soil biology compared to cultivations! Using glyphosate straight and with amendments! Looking forward to seeing how this one goes! A Vermicast trial has been run in my spring barley with @soilnurture.co.uk Worms offer so much! And finally, I will be running a trial with Biochar from Capchar. Com, this is along with others... every day is a learning day!

I have met some fantastic farmers and people over the year at different events I have been speaking at. A couple of



the highlights were The Soil Dependence Day in Ireland organised by Base Ireland, held at Norman Dunnes' farm in Maynooth. On arriving I was greeted by Tommy Tierney as they had just opened the barrel of the Guinness! It's always amazing that once Guinness is involved, time just flies by! The day was very well attended with some other brilliant speakers joining me on stage and below ground for Robbie Byrne in the soil pit - probably where he feels at home.

It was also great to see Philip Reck's name living on in the form of the Soil Farmer of the Year award which went to a well deserving farmer Gareth Culligan. Well done to the organisers for a fantastic event.

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- “ Mike, I hope you and the team are doing well. Thank you for your fantastic work in getting out this essential publication. *Karl Broderick*
- “ Looking forward to another issue. Great magazine thanks for all the effort in putting it together. *Mark McCaughtley*
- “ I really do believe that reading your editorials and financial pages has hugely contributed to our success. Best of luck – you can always call in if you are about anytime. *Adrian Marsh*
- “ Mike and team - congrats and thanks for all the useful and interesting reading through the years - a good job well done... many, many thanks' says *Greg McGovern from Co Cavan*
- “ Keep up the good work. PFI is the only farm mag out of about six we get that I read every word, cover to cover. Excellent" wrote *Mr Knight of Minehead, Som.*
- “ I find your magazine excellent with some terrific ideas, many of which I have used and/or adapted over these past few years. Keep up the good work. *Best regards John Gilgunn*

Hi all

It's encouraging to get these kind words, and yes, Practical Farm Ideas will continue to publish material that helps all readers. Of course we are always looking for those fantastic problem solvers, so, any help in unearthing them is much appreciated!

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I was also very privileged to be asked to speak at Vic-NoTill in Victoria, South Australia, at their Transition 23 Conference. Not the best time to be leaving the farm in July, but everything just worked out fine and as it happened, I could have stayed longer due to the appalling weather we were having here! It was a full-on trip visiting many farms prior to the conference. Starting off in New South Wales at Marrar with Dan Fox, President and Brendan Pattison we had a great couple of days, looking at soil with Col Bowey, Consultant, and Dave Bush, Agronomist. I have seen some of the oldest soils in the world while visiting, but also, as is the case everywhere I go, some tired, abused soils; heavy metals being a big problem. Aluminium being one of the

worst as is often the case here (Aluminium being linked to Alzheimer's). It was also my first introduction to a stubby holder! Having heard about the obligatory stubby holder many times, the Aussies were amused that we don't tend to have them. "They are just to stop your beer getting warm mate...." one told me, "... but you Poms like warm beer don't ya'?" To which I replied, "No mate, we just drink it before it has a chance to get warm!"

Victoria was having a very wet winter while I was visiting, with granite rocky outcrops that just kept on giving more to the mix in the form of heavy metals. Humates and calcium were the prescription, which were getting over the problem well along with foliar feeding. As farmers I always feel we are some of the most versatile adaptable people on the planet, in that we don't give up and always try to have optimism for the coming year. The conference was a 3-day event. I spent the first day in a soil pit hosted at Hugh Macagues' farm Rochester just outside Moama. Hugh also had a fine collection of vintage combines (Headers) and tractors (all Australian of course). The Following day we were at a fine golf club venue where I spoke on stage of my journey and my approach to biological/nutrition fed crops, keeping the plant nutritionally balanced all the way through the growing season. Finally, after much poking and prodding I will be launching my own website this year, to help farmers learn and overcome problems! So watch my X page @parker419 for its launch.

Finally let's hope for a nice Autumn and finish the year stress free and smiling!



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CATCHY HARVEST BRINGS NUMEROUS CHALLENGES



The Claydon farm's 12m Claas Lexion 600 TerraTrac harvesting LG Skyscraper winter wheat on 16 August, part of 100ha in one block following oilseed rape.

Harvest was a real snatch and grab affair with numerous challenges for Jeff Claydon, Suffolk arable farmer and inventor of the Claydon Opti-Till® direct strip seeding system.

Date: 29 August 2023

In my last article for Direct Driller, written 27 May, I reflected on the dramatic contrasts between this season and last, both in terms of the weather and the finances of farming. Those extremes were evident right through to harvest and continue heading into autumn, but despite the numerous challenges as farmers we have little alternative to growing crops. The agronomic, meteorological, political and economic headwinds are likely to further test our resolve in the months ahead, so all we can do is to farm as efficiently as possible.

Between New Year's Day and the end of July last year just 244mm of rain fell. The exceptionally dry conditions resulted in our earliest-ever harvest and the combine ran uninterrupted from the time it cut the first oilseed rape in mid-July until the last of the spring oats fell to its 12m cutter bar at the start of August.

It was a fast, efficient operation, combine, tractors and trailers caused no damage to the soil, while the heat from that great natural dryer in the sky kept grain moisture levels low and costs to a minimum. One downside of the prolonged hot spell was that by mid-August it was too dry to drill oilseed rape and we could not begin stubble management because nothing would germinate.

In complete contrast, during the same period this year total rainfall was 436mm, harvest started 10 days later and by 2 August we'd only managed to combine the oilseed rape and two-thirds of the spring oats.

Having looked so promising at the start our oilseed rape faced an uphill struggle throughout the remainder of the season, a scenario which seems to have been the case on farms across the country regardless of the establishment system used. The decision not to apply slug pellets early was our first mistake and we lost plants as a result. The second was to drill at the end of August just before the cabbage stem flea beetle came through. The third was to not spray off the entire crop as soon as we knew it wasn't heading in the right direction and redrill with spring oats or wheat.

We lost a third of our 61ha of DK Excited to cabbage stem



New chopper blades fitted to the Claas Lexion TerraTrac resulted in a fine mulch of straw which the Claydon Straw Harrow then knocked down onto the soil to provide food for the thriving earth worm population.

flea beetle and slugs, the area being redrilled with spring oats in April. On that which made it through to harvest we applied glyphosate, but the crop was slow to take it up and moisture contents varied from 6% to 12%, delaying combining by a week or so. Pest damage significantly reduced pod numbers and ultimately yields were decimated, the remaining 40ha of oilseed rape yielding just 64 tonnes. It won all the awards for our worst oilseed rape crop ever!

Given how good it had looked in November that was very disheartening. We lived in hope, but after cabbage stem flea beetle massacred the crop, it never recovered. The million-dollar question I asked myself in the aftermath of harvest was 'are we brave enough to drill oilseed rape again this season?'

On the one hand the crop is early to harvest, we can move it out of store quickly which benefits cash-flow, while establishment costs are low. Ultimately growing costs are very high and front loaded, which increases our risk exponentially, so on the face of it at under £400/t the crop doesn't look exciting. On the other hand, with potentially a much smaller



Despite wet weather at harvest the combine left hardly a mark thanks to the good load-bearing structure of the soil.

area being drilled this season what price a tonne of the stuff this time next year?

In what was a very last-minute decision taken purely for agronomic reasons we decided to drill the same area of oilseed rape for 2023/24, although time will tell whether that was the right call. The big unknown is how big an issue cabbage stem flea beetle will be, but we were able to get the crop in the ground by mid-August so it could be okay. What's certain is that we'll be ruthless about terminating it early if problems develop and before incurring the cost of Kerb®.

By way of contrast, the 77ha of Elsoms Lion spring oats drilled with our new 6m Claydon Evolution in excellent conditions during February proved exceptional. Standing tall right through to harvest, they yielded 7t/ha on our benchmark '80-acre' field where the drainage is spot on and gave us more time to control any stubborn weeds before the following crop of wheat went in. In contrast, some areas in the adjacent Mill Lane field where the drainage requires attention yielded just 5.9t/ha, highlighting the importance of getting water away.

Keeping Blackgrass at bay

Last summer, conditions were so dry that weeds and volunteers were very slow to germinate. The warm autumn allowed weeds and volunteers to keep growing and they continued to germinate throughout the winter, so one lesson learned was the value of controlling them before Christmas.

With a week of wet or catchy weather forecast for the second week of August it was too wet to combine our remaining crops or even use the Straw Harrow to start stubble management. I had to console myself knowing that weed seeds and volunteers would start to germinate due to the abundant moisture and be in ideal condition to be taken out when we could get back on the land.

It is impossible to carry out too many passes with the Straw Harrow, as highlighted by the performance of our spring oats. After four or five passes with this fast, cheap-to-operate implement, far fewer weeds remained, and the spring oats were at their very best. Where we did two passes then

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We all know that the key to good plant establishment is not only perfect planting depth control and excellent seed/soil contact but also targeted fertiliser application in the seed row.

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sprayed off green material in the autumn another flush came through in the spring and we had to go in with another dose of glyphosate. Apart from the additional cost the yield after two passes was 2t/ha lower than where we did four.

The experiment proved that it's a bad idea to leave stubbles green over-winter. Over-wintering blackgrass seems to have a toxic effect on the soil and subsequent crops, so it's critical to take them out while still small as they become much harder to remove once established.

Previously I mentioned how using the TerraBlade inter-row hoe had made a considerable difference where it was used in one of our fields where Agrii had a blackgrass trial. The moist soil conditions in spring were less than ideal for using it so I was rather surprised that it took out a significant percentage of the strong blackgrass plants growing between the rows and reduced the number of viable blackgrass seed heads by 60 per cent. It just goes to show how important the TerraBlade is, either when used in conjunction with herbicides or in organic / regenerative farming situations.

Our patchy, uncompetitive oilseed rape allowed grassweeds to proliferate, the problem compounded by the low seed rate and plant numbers characteristic of a hybrid variety letting more light permeate through the crop. Following this with wheat will bring its own challenges, but on heavy ground such as ours what alternative is there?



Spring oats were a star performer, February-drilled Elsoms Lion yielding 7t/ha and a high quality sample.

No records broken

When drilling some of our wheat in mid-October to help combat grassweeds we used considerably higher rates to compensate for the fact that the seeds would have less time to develop. Our 200ha of winter wheat, all LG Skyscraper, subsequently came through the winter in excellent condition and even though by mid-February we'd yet to apply any liquid nitrogen it never looked 'hungry' and retained a lovely deep green colour. At the end of May it still looked fantastic and was full of potential, just as we wanted, but it would be the second week of August before any was harvested, at which point it became clear this would not be a record-breaking harvest, or even come close.

Last year, despite the driest spring/summer in decades and applying up to 25% less nitrogen due to a combination of soaring prices plus restricted availability, our winter wheat



It is impossible to carry out too many passes with the Claydon Straw Harrow, this being the largest 15m version.

averaged over 10t/ha, oilseed rape 4t/ha, and spring oats 6.11t/ha. At the time of writing (18 August) just over half our wheat area has been harvested and averaged 9t/ha, significantly below our long-term figure of just over 10t/ha. With November 23 wheat currently trading at £173/t the shine has certainly come off last year's results.

Partly the lower yield can be attributed to the fact that we cut back on nitrogen, applying 180-190 kgN/ha instead of our normal 240-250 kgN/ha. However, more likely it's due to a combination of things, herbicides being less effective in the cooler, damp conditions, a lack of sunlight throughout the growing season, plus a late flush of blackgrass which took advantage of the moist soils to grow.

Many farms throughout the country, not just those on heavy land, are seeing grassweeds where they've been before, so we will do our best to control them through good stubble management, cultural means and inter-row hoeing, along with other options and tools. The Straw Harrow has done a fantastic job of germinating weeds and volunteers, so we will carry out multiple passes and apply glyphosate pre-drilling.

Good drainage is critical to get the best from our heavy clay soils and the wet weather highlighted any problem areas by attenuating variations in yield. The impact of less-than-optimal drainage was particularly evident in one field where the headland was shaded by trees and lay wet all season. There the combine's yield meter recorded just under 7t/ha, but as we moved away from the lea of the wood it jumped to over 9t/ha, so perhaps we will consider one of the environmental schemes there.

Catchy weather meant that harvesting operations inevitably caused some compaction, although this was minimal by most standards due to the supportive nature of our strip seeded soils. Importantly, the leading tines on our 6m Claydon Evo drill will remove any compaction ahead of the seeding tines so that seed is placed into ideal conditions and grows away rapidly.

In my next report I will go through our complete harvest results and discuss how we got on establishing all the winter crops.



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ON-FARM TRIALS MAKE PROGRESS TOWARDS **WEED** **SEED SOLUTIONS**

Written by Charlotte Cunningham

As growers grapple for grassweed solutions, Direct Driller looks at the results from the first year of on-farm trials investigating a novel way of controlling weed seeds at harvest.

Grassweeds are the bane of any arable farmer's life, with control often an uphill battle when it comes to tackling particularly persistent and resistant weeds.

Low disturbance and no-till systems are thought to be particularly vulnerable to a build-up of grassweeds as the seed shed each year stays in the germination zone, with little means of control other than repeated applications of herbicide. What's more, there's a heavy reliance on glyphosate, raising the prospect of resistance.

In a quest to find new solutions, a group of farmers across the country have been taking part in a new research project into a novel, chemical-free method of controlling tricky grassweeds at harvest.

The project is based around the Redekop seed control unit (SCU) technology – a retrofitted mill which sits at the back of the combine. The mill processes the chaff and is proven to kill up to 98% of weed seeds as they exit, offering growers both a way of reducing reliance on chemistry and a unique opportunity to control weeds at harvest time – something not traditionally done in the UK.

The technology has been used both extensively and successfully across North America and Australia, but the UK project is the first to put it to the test in a maritime climate.

Project background

The trials have been co-ordinated by the British On-Farm Innovation Network (BOFIN) – with test protocols developed by NIAB – on three farms across the UK.

Suffolk farmer, Adam Driver headed up the first year of trials, with an SCU fitted to his Claas Lexion 8800. Adam has a historic challenge with blackgrass building up in chaff lines of his controlled-traffic farming system and hopes the technology



will be able to alleviate some of the burden. "We're farming about 2000ha of combinable crops on a no-till system. Generally, our main weed challenge is blackgrass – we've got massive amounts in this area and have for a long time."

Adam tested the technology alongside Worcestershire farmer Jake Freestone, who has an SCU fitted to his John Deere S790i in a bid to tackle meadow brome, and Warwickshire grower and Velcourt farm manager Ted Holmes, who has been trialling a unit fitted to his New Holland CR9.90 and suffers particularly with Italian ryegrass.

Year one results

Though the data set so far is small and only based on one harvest's worth of results, there were some interesting findings from the first year's trial, says NIAB's Will Smith who designed its monitoring protocols and carried out the analysis on the weeds left standing at harvest.

At Adam's farm, the headline result is that 54% of blackgrass seed was retained in winter wheat. This came as a slight surprise and was a much higher level than previously thought, admits Will.

Brome levels were also significantly reduced thanks to the use of the SCU. "I deliberately planted some winter barley in a field I know has got a lot of brome, and I haven't found much at all," says Adam.

While ryegrass has not typically been an issue at the farm, Adam says this is something he has seen in small amounts this year – opening up another control opportunity for the technology. "Ryegrass is something I really, really do not want here – so I'm hoping that this is something that the seed control unit will just take care of based on what we've seen already."

In Warwickshire, the SCU technology enabled a 60% reduction of Italian ryegrass in winter barley and 44% in spring barley, compared with using the combine alone, which was a really positive result, says Ted.

Data was limited at Jake's farm, though weed burdens in general were lower last year, he says.

Next steps

Building on the results of last year's trials, Adam is leading a project that has been awarded funding from the Defra Farming Innovation Programme, delivered by Innovate UK, to continue the research under Defra's research starter round two competition.

The three farmers from the first year of the trials will be taking part again and will be joined by Keith Challen of Belvoir Farming Company who will have the SCU unit fitted to his Fendt Ideal combine. "It has become obvious that a lot of the grassweeds we're seeing are banded

behind the combine,” says Keith. “So, to be able to control those from the combine makes a lot of sense.”

Further trials will also be taking place looking at the interaction between harvest weed seed control and cultivation strategy, led by Adam. This will involve comparing his normal no-till approach with a light cultivation to see if there is any difference in chit.

Though the effectiveness of the technology as a standalone is well-proven, the results in the field are based upon exposure to weed seed. Therefore, one of the key aims of the study going forward is to collect data on seed shed of UK-specific weed challenges – something which has been fairly limited to date, explains Will. “To use harvest weed seed control strategies, you must have seeds remaining on the heads to target. Therefore, gaining a better understanding of weed seed shed patterns is vital to proper implementation of these techniques.”

As such, the research team, coordinated again by BOFIN, are calling for more farmers to get involved in the project by becoming a ‘Seed Scout’. This involves collecting weed samples, assessing them via one of three simple assigned methods, and then returning the seeds to NIAB for validation. The results of this will form the UK’s first farmer-led survey of grassweeds left standing at harvest. “To accelerate the project even further, we want to collect spatially diverse data about weed seed shed across a range of weed species, in a range of crops,” notes Will.

“Therefore, we’re asking farmers to go out into the field pre-harvest or the day of harvest to collect 20 heads of the weed seed heads they’re particularly concerned with and carry out a short analysis, based on an assigned methodology. This could be counting seed heads or a visual assessment of perceived weed seed shed, for example. These samples will then be sent into us at NIAB to provide further validation and analysis. We don’t anticipate this being overly complicated or time consuming during what we know is already a busy time of year.”

Will is particularly keen that those who direct drill get involved with the project. “There’s a theory that harvest weed seed control can help no-till systems more as it reduces the risk of building up a large, shallow weed seedbank. This is where interaction with Seed Scouts will be key

to tease out and explore elements of a very different approach to controlling grassweeds,” he notes.

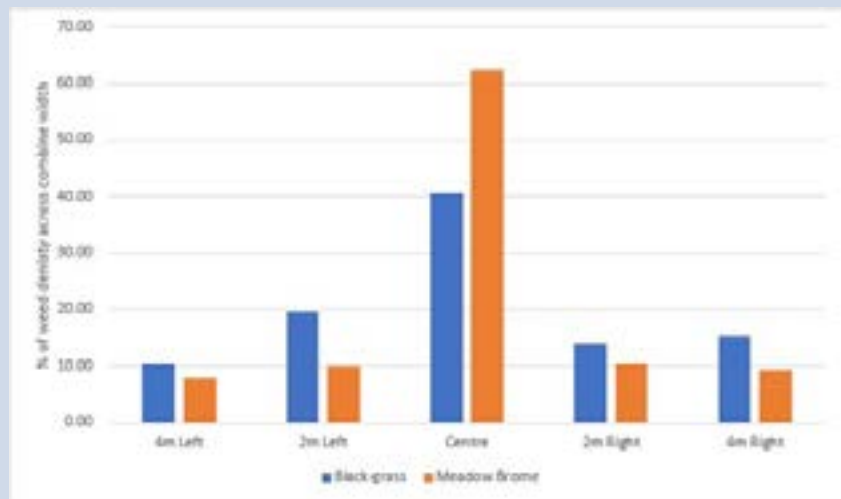
Farmers who sign up will receive an information pack containing a guide to sampling methodology and the weed seed shedding survey to record weed status and management practices. As well as this, the pack also contains 20 small envelopes

for the seed samples and a postage-paid envelope to return to NIAB. “This project and the data collection associated with it has the potential to develop some really unique and novel data which will help not only growers in the UK but also the wider industry, to ensure we’re using the right tools in the right place when it comes to tackling weed management.”

Harvest seed weed control results summary:

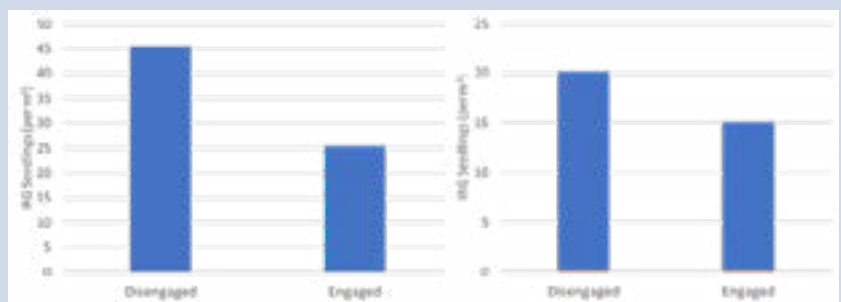
Driver Farms, Suffolk: 54% of blackgrass seed retained in winter wheat, brome populations significantly reduced. Weed counts taken by Will in the field in late October showed that for both blackgrass and meadow brome, germination follows a classic ‘bell curve’, tracking exactly the combine runs in the CTF system.

“Over 60% of the meadow brome and 40% of the blackgrass was found directly behind where the combine had passed, showing it puts the seed into the chaff stream,” he reports. “This is really important in no-till CTF systems because there’s a cumulative effect of this seed rain on the soil surface year after year.”



Source: NIAB, 2022; analysis carried out at Driver Farms, Suffolk, on 6 Oct in winter wheat across the 12m swath width behind the combine following winter wheat. Average of 15 points along a 150m transect.

Velcourt Farms, Warwickshire: 60% Italian ryegrass reduction in winter barley; 44% reduction in spring barley with the SCU technology.




Source: NIAB, 2022, Warwickshire. IRG seed shed into winter barley (left) and spring barley (right), with emerged seedlings counted on 26 October in oilseed rape and winter beans respectively. Note: the spring barley field was subsoiled, which may have introduced more seed from previous years. Figures shown are averages across two strips in each field, with multiple transects taken in each strip.



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CLEANING TIMES REDUCED WITH INNOVATIVE COOLING SYSTEM

As anyone that has operated a combine will know, the worst part of the job is the daily cleaning to prevent pockets of chaff building up around the engine bay and eventually getting too hot.

It's a dusty and time-consuming job to get all the hard-to-reach areas where chaff can accumulate. However, an innovative AirSense cooling system on Fendt's latest Ideal models has significantly reduced a large proportion of the daily cleaning required around the engine bay and exhaust system.

The AirSense system removes the need for a thorough daily clean near the engine thanks to an eight blade, 950mm reversible fan that engages based on engine temperature and time parameters. The total ventilated area is 2.7m², and the regularity of fan engagement means that dust and chaff don't have the chance to build up around the engine, offering extra peace of mind to operators during dusty conditions.

Ant Risdon, combine specialist at Fendt, says the AirSense system has multiple benefits for both operator and machine. "The reduced cleaning times can allow users to get cutting earlier in the day in good conditions, which is helpful in a catchy harvest. A shorter cleaning procedure each day will soon add up over a harvest period, and, for farms with large acreages to cut, could see a considerable time saving at the end.

Inverted air flow

The system enables the fan to invert the air flow, changing it from sucking in air to cool the engine, to blowing air back through the radiators at selected times, to clear any debris build up. It also keeps the intake screen on top of

the radiator free from dust and chaff build up and there is no rotary dust screen required.

It inverts by changing the pitch of the fan's paddles. This is activated by engine temperature or time since the last inversion, and a visible plume of dust is seen rising from the engine bay when engaged. Manual activation is also possible if the operator feels it is required.

"By keeping the engine bay free of debris, combine performance is never restricted as maximum air intake through the radiator is always possible. Coupled to this, the AirSense system significantly extends the life of the air filter, which requires no cleaning during the season from the operator," comments Ant.

The AirSense cooling system is available on all models of Fendt Ideal from the Ideal 7 with its 9.8-litre AGCO Power engine to the largest Ideal 10T, powered by a 16.2-litre six-cylinder engine offering 790hp.

Fendt has also introduced a new over pressurised exhaust box to prevent dust accumulation around the exhaust, to help reduce cleaning times and chaff build up in the hottest areas of the machine. The new AirBox is available on Ideal 8, 9 and 10 combines.

Customer viewpoint

Ben Linington - Flichity Estates

Covering 1,300ha of combinable crops in north Shropshire used to mean regular cleaning of the combine each evening for Ben Linington, estate manager at Flichity Estates. However, after changing his Case Axial Flow 9250 for a Fendt Ideal 10T for this harvest, the time saved through running the AirSense system has allowed him more options at the end of each day as the lengthy cleaning period is no longer required.



The Fendt Ideal 10T runs a 40ft Geringhof header and the AirSense cooling was one of the main attractions to changing brands, especially after the hot summer last year, as Ben describes. "During the heatwave, I was stopping to blow dust off the exhaust system every few hours to prevent any fires. It also took me an hour and a half at the end of each day to blow down the combine and engine bay ready for the next day. The AirSense system was one of the reasons I bought the Ideal, to reduce the time spent with a compressor."

Although this is the Ideal's first season at Flichity, the benefits to running it have been obvious as blowing down now takes 15 minutes with a leaf blower to give the combine a once over, as opposed to 90 minutes before. "It also allows me more time to check over the rest of the machine, a job that ate into the start of each day with the previous machine. The engine bay and exhaust are spotless and I have been surprised at how clean the fan keeps it."

Along with AirSense, another reason for the Ideal purchase was grain quality. "I have never seen such a clean grain sample from a combine, and the cleaning capacity and rotors play a big role in this. Our dealer back-up from Chandlers is also very good," concluded Ben.



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SHREDDING SOME LIGHT ON THE SUBJECT

What is Near Infra-Red Spectrography and how can it benefit the combine at harvest time.

Without a doubt, better information enables you to make better decisions. Information is power, you only have to look to any shopping experience where retailers will try to harvest any personal information presumably in an effort to be able to offer you an opportunity to sell you more. But within agriculture, generating information at harvest time can now provide the building blocks for the decisions that will shape the profitability of the farm for the next year and for years to come.



Yield mapping is a technology that has been around for many years now. However, if you go back fifteen years, a farm's yield maps did little more than provide a novel wallpaper for the farm office. The key to yield mapping becoming a useful activity has been the ability to action the data generated. As farm management packages become more powerful and user-friendly, the ability to output prescriptions to enable variable fertilizer applications or variable rate seed rates have enabled farms to optimize inputs.

There are those, however, who feel that looking at yield in isolation may not give the fullest picture when considering fertilizer applications for following crops and a better indication might well be the quality of the crops harvested, which in turn may give a better clue of the use of nutrients – including inorganic fertilizers.

While crop quality has historically been

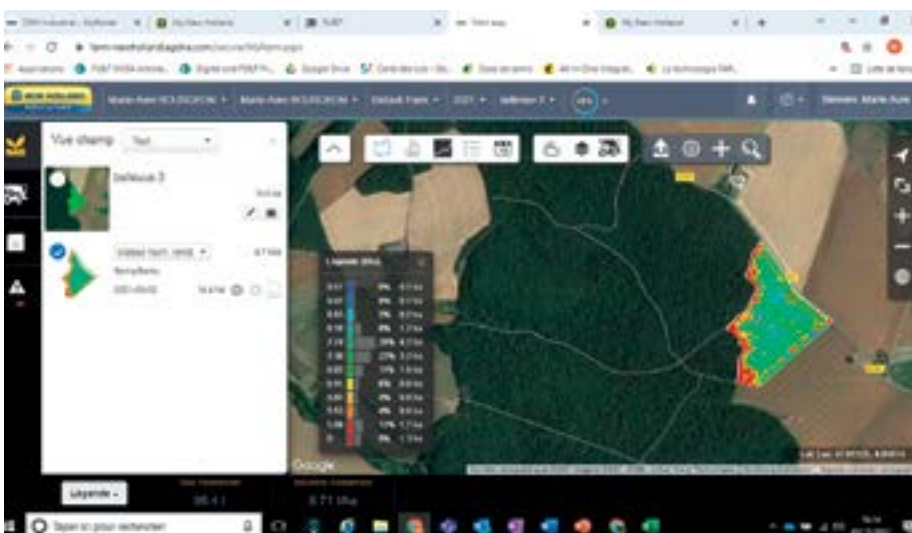


in the bailiwick of the grain merchant, a relatively new technology has now become available to the farmer – Near Infra-Red Spectroscopy (NIR).

NIR uses a light source to shine at a passing crop, and the reflected light is then interpreted to be able to determine the composition of the crop in real time. While the technology has traditionally been seen used in forager applications, where the knowledge of the nutritional composition of forage was an invaluable tool in establishing effective food rations not just for livestock but also to give

those running Anaerobic Digestion plants a more scientific means of balancing gas production. That very same technology is also now available to New Holland combine operators in a factory fitted option for 2024.

The sensor uses different crop 'curves' to allow for the different responses as a result of different crops or even varieties. While three curves are included with the base sensor, more calibration curves can be added at a later date as needs and requirements change.



Mounted onto the lower part of the clean grain elevator, the combine NIR sensor scans all the grain on its journey to the grain-tank, given the farm protein information and moisture in cereals as well as oil content when harvesting oil seed rape.

The information can be displayed on the IntelliView IV monitor in the cab and then is incorporated into a layer on the yield map, where, with further interpretation, it can help shape future fertilizer and seed applications.



An interesting use of real time NIR data come from Australia where the adoption of the NIR sensors is further along than we can see in Europe. Rather than use the data solely as a basis for nutrient applications, combine operators in Australia use the data to be able to segregate grain of different quality.

With clearly defined quality criteria for grain, the farm can then subsequently blend different grain proteins in order to get everything 'over the line' for a quality premium. While not many farms in the UK have the facilities to segregate grain in this manner, it may be considered that as this information was never previously available to the farms, the need has never previously arisen. With some already segregating grain for moisture – it is only a small step to separate out crop on another criteria.

One useful aspect of the NIR sensor on a combine is that it is not confined to the combine when the combine is put away for the winter.

The sensor that is used on the combine is the same sensor that is used on a forager as well as being able to be used in a slurry application – either on the output from the slurry lagoon or even on the slurry tanker itself. All that is required to change from measuring grain to forage to slurry is the mounting kit and the dedicated curve for the material being measured. The sensor itself is the same.

Being able to consolidate the crop quality information within mapping opens up a world of possibilities to the modern farm. Where margins are tight and the cost of inputs is often the deciding factor between profit and loss, having the information at your fingertips to be able to make better decisions may well prove to be the difference. Crop quality information alongside traditional yield information, may prove to be the missing link that raises the usefulness of mapping beyond wallpaper for the farm office.

An aerial photograph of a tractor pulling a slurry tanker in a field. The tanker is applying a substance to the soil. A red arrow points from the text 'The perfect tank partner' to the tanker. The text 'All. Year. Long.' is written in white at the bottom of the image.

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THE NATIONAL MUSEUM OF RURAL LIFE IN SCOTLAND

The National Museum of Rural Life in Scotland stands as a captivating testament to the country's agricultural heritage, offering arable farmers a remarkable journey through time and a deep dive into the evolution of their craft. Nestled amidst the picturesque Scottish countryside, this museum serves as a vibrant tapestry of rural life, resonating with arable farmers who have played a pivotal role in shaping Scotland's agrarian landscape.

For arable farmers, the museum provides a unique opportunity to trace the lineage of farming practices that have sustained the nation for generations. Exhibits featuring 12 meticulously restored vintage combine harvesters evoke a sense of nostalgia while highlighting the transformation of labour-intensive methods into the mechanised processes that drive modern agriculture.

As well as the combines, one of the museum's prime attractions is its collection of historical crop varieties, which resonates deeply with arable farmers. From heirloom grains to ancient cereal crops, these exhibits showcase the genetic diversity that underpins the sector's resilience. Farmers can immerse themselves in the stories of these crops, gaining insights into their adaptability and historical significance, thus fostering a renewed

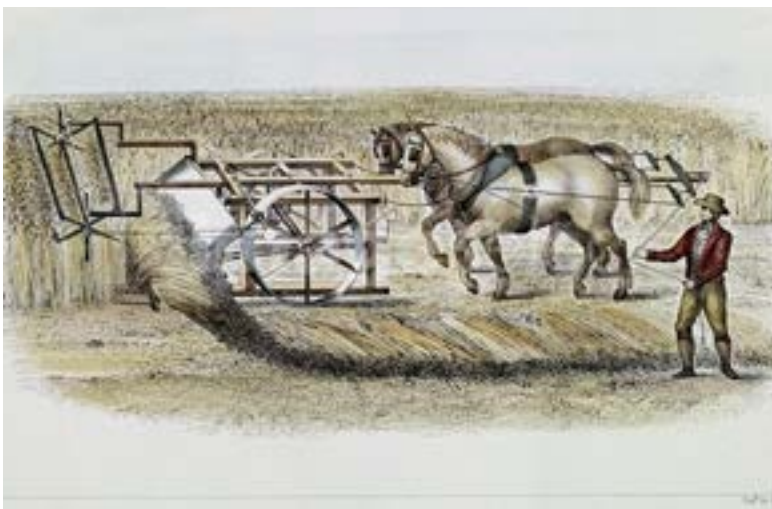
appreciation for the rich agricultural tapestry they contribute to.

The National Museum of Rural Life is well worth a visit for arable farmers. It celebrates heritage, showcases the evolution of farming, fosters connections among farming communities, and inspires sustainable practices for the future. We are going to briefly cover some of the combines there to see.

PATRICK BELL'S REAPING MACHINE

In 1827 in Scotland, the Reverend Patrick Bell designed one of the first successful reaping machines. It used a row of shears to cut the stalks at their base, pushed onto the blades by the revolving reel out in front - a principle that is still used in combine harvesters today.

Modern harvesters do the whole job automatically: you simply drive them through a field of crops and they cut, thresh, and clean the grains all by themselves using rotating blades, wheels, sieves, and elevators. The grain collects in a tank inside the combine harvester, while the chaff spurts from a big exit pipe at the back and falls back down onto the field.



Above left: Patrick Bell's reaping machine by George Heriot Swanston [Public domain], via Wikimedia Commons.

Above right: Original model of the Reverend Patrick Bell's reaping machine, built by him in 1827. Following trials, ten full-size machines were used in east-central Scotland, with others exported to the US, Australia and Poland. On display in National Museum of Scotland in the Scotland Transformed gallery.

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HOLT CATERPILLAR 38 COMBINE, USA, 1928-1929

Dimensions: 7.6 m length x 3.2 m width x 3.8 m height main frame with canopy

Cutter dimensions: 6.2 m length x 3.1 m width x 2.5 m height

In total 1600 model 38s were manufactured, of which 14 were exported outside the USA. It was suited to work with short straw crops on the large prairies in USA but needed a team of 40 horses to pull it! However, the machine was not suited to the agricultural terrain in Europe.

The importer in Britain at the time, a company called Clayton Shuttleworth, looked into the problem and developed their own harvester in response.



CLAYTON SHUTTLEWORTH COMBINE HARVESTER AND CUTTER BAR, LINCOLN, 1931-1932

Dimensions: 7.8 m length x 4.1 m width x 3.6 m height

Dimensions of cutter bar: 9 m length x 3.2 m width x 2.5 m height

The first European-built combine harvester was made by Clayton Shuttleworth in 1931. It has a wider drum suited to European crops and ground conditions. It is a trailed combine, pulled by a tractor rather than self-propelled.

Our Clayton Shuttleworth model was one of the first successful combine harvesters in Scotland. It was transported by train to Dunbar and then pulled to Whittinghame Mains or Traprain Law, where it worked most of the time. It was purchased for £580 at the time. It started life as a 'bagger': the thrashed crop was fed into sacks which were then tossed on the ground to be uplifted later. It was converted to a bulk tank in 1958 and last used in the mid-1960s.

During the Second World War it was painted in camouflage livery and was subsequently nicknamed 'Jessie'. This could have been in memory of Jessie, a local girl for whom the town clock of East Linton is known, but this is not proven.



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UNVEILING THE UNDERGROUND TREASURE: THE MARVELS OF MYCORRHIZAL MYCELIUM IN BRITISH AGRICULTURE

In the ever-evolving landscape of British agriculture, the pursuit of sustainable and eco-friendly practices has become a top priority. Amidst this journey, the spotlight has turned to the intriguing world of mycorrhizal mycelium. These remarkable fungi form a unique partnership with plant roots, offering a multitude of benefits for both soil health and crop productivity. In this article, we delve into the wonders of mycorrhizal mycelium and explore how harnessing their potential can revolutionise farming practices. With insights from ground-breaking research conducted by scientists like Hawkins, Kiers, Sheldrake, and others, we will shed light on the invaluable role of mycorrhizal mycelium as a global carbon pool.

The Marvels of Mycorrhizal Mycelium:

Mycorrhizal mycelium operates as a dynamic underground network, serving as a vital bridge between plants and the soil. As plants provide carbohydrates to the fungi, they reciprocate by extending their hyphal strands, expertly exploring vast stretches of soil in search of essential nutrients and water. This intricate network of mycelium allows plants to access nutrients that might otherwise remain out of reach, ultimately leading to improved nutrient uptake efficiency—a key element

for the future of modern farming, reducing nutrient losses in soils and their environmental consequences while addressing crop nutrition needs more effectively.

Enhanced Nutrient Uptake and Soil Health:

Through their extensive hyphal network, mycorrhizal mycelium captures crucial elements such as phosphorus, nitrogen, and micronutrients, thereby enhancing overall plant health. The result? Higher crop yields and increased resilience against environmental stresses, such as drought and disease.

Glomalin: The Soil-Building Compound:

Furthermore, mycorrhizal mycelium plays a vital role in enhancing soil structure through the formation of aggregates that foster improved aeration and water infiltration. Alongside mycorrhizal mycelium, glomalin, a glycoprotein produced by arbuscular mycorrhizal fungi, also contributes to this process, enhancing soil structure and boosting its carbon storage capacity. Acting as a natural glue, glomalin binds soil particles together, creating stable aggregates crucial for soil stability and resilience against erosion.

Carbon Sequestration and Climate Mitigation:

If we stand back for a moment and consider the role of these tiny fungi globally we can see that they exist as one of man's best hope to redress global warming. Research by Hawkins, Kiers, Sheldrake and others confirms the profound impact of mycorrhizal mycelium on soil health and nutrient uptake. Their findings reveal that global plant communities allocate 3.93 Gt CO₂e per year to arbuscular mycorrhizal fungi, 9.07 Gt CO₂e per year to ectomycorrhizal fungi, and 0.12 Gt CO₂e per year to ericoid mycorrhizal fungi. Based on this estimate, a staggering 13.12 Gt of CO₂e (approximately 36% of current annual CO₂ emissions from fossil fuels) fixed by terrestrial plants is allocated to the underground mycelium of mycorrhizal fungi annually.

Understanding Farmers' Needs:

For British farmers, the need for fertile soil that consistently delivers essential nutrients to crops while enduring the unpredictable British climate is paramount. Sustainable farming is about striking a balance—reducing dependence on heavy chemical inputs, minimising soil erosion, and preserving the soil's long-term health. Achieving this equilibrium is not only crucial for safeguarding future agricultural productivity but also for protecting the very environment that sustains us and contributing towards climate mitigation.

How to support mycorrhizal network in soils:

1. Minimise Deep Ploughing:

Deep ploughing can disrupt the delicate fungal structure formed by mycorrhizal fungi in the soil. By adopting reduced tillage or no-till practices, farmers can preserve the mycorrhizal networks and ensure their continued growth and effectiveness.

2. Intercrop with Host Plants:

In situations where farmers are planting non-associating crops that do not naturally form symbiotic relationships with mycorrhizal fungi e.g. Brassicaceae, they can consider intercropping with host plants like clover which is an excellent host for mycorrhizal fungi and sustain the fungal community below ground.

3. Introduce Mycorrhizal Fungi through Cover Crops:

The most effective way to intervene in the process of building mycorrhizal fungi communities in soils is by introducing them using specially treated cover crops after harvesting, once in a crop rotation. These legume-based cover crops are inoculated with mycorrhizal fungi. This method is particularly beneficial for rejuvenating soils and promoting mycorrhizal colonisation in areas lacking these fungi.

Conclusion:

Modern British farming practices are finally recognising the untapped potential of mycorrhizal fungi in our soils. As regenerative farming becomes an integral part of every farmer's thinking, it is becoming increasingly clear that farming efforts must shift towards building biology as well as managing crops to foster resilience and functional soils.

By reducing heavy chemical inputs, minimising deep ploughing, and considering intercropping with mycorrhizal fungi associating plants, we can nurture the growth of these remarkable soil allies. Furthermore, introducing mycorrhizal fungi through treated cover crops can accelerate the build-up process and promote long-term soil health and fertility. To see and learn more about this remarkable fungi, visit SMART ROTATIONS by PlantWorks Ltd, the UK's only mass producer of Mycorrhizal fungi, at CROPTEC stand 1.446.

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ADVANCING NITROUS OXIDE EMISSION CALCULATIONS:

TRINITY'S TIER 3 EVIDENCE-BASED METHODOLOGY FOR AGRICULTURAL SOILS

Precision in calculating emissions and sequestration in agricultural soils is crucial for the carbon footprint of crops, grass, and livestock, and for the valuation of natural capital. Dr Alasdair Sykes, Trinity AgTech's managing director of sustainability, explores the latest advances in quantifying and understanding nitrous oxide emissions.

According to industry reports, in 2019 nitrous oxide (N₂O) emissions from fertilisers accounted for 31% of the UK's agricultural sectors' greenhouse gas footprint. Agriculture was responsible for a significant 68% of the UK's total nitrous oxide emissions. N₂O is released when both synthetic and organic nitrogen fertilisers are applied, and from the breakdown of crop residues, soil organic matter turnover, and nitrogen-fixing plants like legumes. Livestock systems also play a role; the management of manure is another avenue through which N₂O finds its way into the atmosphere.

Emissions from crop residues

The management of crop residues has a vital role to play in greenhouse gas emissions, notably nitrous oxide (N₂O) emissions. Every field and crop are unique, which means the emissions from residues can differ. These differences arise from factors such as the type of crop, its yield, the amount of nitrogen applied, and the field's location, with the local climate and soil wetness playing crucial roles.

How do crop residues release gases? It's all about the activity of tiny microbes in the soil. When crop residues are left on the field, bacteria in the soil convert organic bound nitrogen to nitrate — a process called nitrification. Denitrification, on the other hand, doesn't always take place. If plants absorb the nitrate first denitrification never occurs in significant amounts. Denitrification occurs when the soil is wet, and nitrate is present. When it's very wet, almost all the nitrate turns into nitrogen gas. However, in moderately wet conditions, the conversion isn't complete, leading to the production of nitrous oxide. This makes it challenging to predict the amount of nitrous oxide produced compared to nitrogen gas.

Both straw and manure introduce nitrogen and carbon to the soil. This introduction is a cue for the soil to start the N₂O emission process. But it's not just about the emissions. With nitrogen, there's an influx of organic carbon in the amendments, which can result in soil carbon sequestration. This aspect is crucial because if a carbon footprinting tool overlooks the carbon sequestration potential of residues, it's missing out on the benefits.

Farmers need a holistic view, one that considers both the emissions and sequestration. Tools like Sandy provide just that. Dr Alasdair Sykes, managing director of sustainability at Trinity AgTech, explains, "It's essential not just to focus on emissions but to understand the full picture. Sandy's approach ensures that both aspects are considered, giving

farmers a true representation."

Unravelling N₂O emissions: a guide to existing methods and guidelines

Navigating the sources and quantities of N₂O emissions from agricultural soils is no straightforward task. In-field measurements offer immediate data but may not always be accurate. Variability within a field can lead to unrepresentative samples. Errors can arise from tool calibration, human mistakes, or recent events like weather or tillage.

Historically, many guidelines, notably the Intergovernmental Panel on Climate Change (IPCC) (2006) Tier 1, have approached this complex issue by focusing mainly on the amount of nitrogen used. "The model's framework segments emissions into direct emissions, those from leaching, and those from fertiliser volatilisation," explains Dr Alasdair Sykes. "However, a significant oversight is its lack of differentiation between various soil types and weather scenarios, and it doesn't consider nuances such as the impact of saturated soils due to poor drainage."

There's a prevailing sentiment that the IPCC (2006) guidelines miss the mark. "These guidelines don't necessarily reflect the true emissions observed in the field and tend to oversimplify the various strategies farmers implement to manage these emissions. The guidelines don't include options such as urease inhibitors, nitrification inhibitors, or controlled release fertiliser — the only available option is less fertiliser" Dr Sykes remarks.

In their 2019 revision, the guidelines have expanded to distinguish between organic manure and different synthetic fertilisers, also considering the moisture content of soils. Yet, Dr Sykes points out that, "While the 2019 update does build on the previous model, it still largely adheres to the original emission-factor based approach, which limits the potential to capture differences and details in management."

Considering alternative models, like the UK Tier 2 methodology, Dr Sykes notes that, "It aims for a more detailed understanding of emissions by examining factors such as soil texture and rainfall patterns. However, it has its own set of challenges, especially when it comes to actual field-level carbon accounting. The model doesn't fully account for the emissions resulting from agricultural management practices and may anticipate emissions even without nitrogen application."

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Finally, he addresses other models available in scientific literature, explaining, "There are a couple of primary schools of thought in research – empirical models based directly on observable data and theoretical, or process-based, models. From a farmer's perspective, who want a precise carbon footprint calculation, these models have not been shown to outperform the IPCC 2019 approach." And the theoretical ones? "It can be done, but a significant challenge when trying to use process-based models is that they require a lot of data."

Callout: What do we mean by tiers?

Tiers refer to the classification system for the kind of data used in emissions calculations, as established by the IPCC. Tier 1 represents basic, mostly modelled data with minimal local input, while Tier 3 signifies more complex models often using local data and perhaps region- and technology-specific emissions factors.

Trinity's advances in N2O emissions methodology

Over the past decade, we've seen improvements in understanding and managing N2O emissions. Dr Alasdair Sykes explains, "Trinity's commitment has always been to keep pace with evolving science. This drive led us to establish a comprehensive database of nitrous oxide field trials, each carefully chosen from many peer-reviewed studies." Every piece of data underwent thorough review, backed by Trinity's renowned scientific board.

Using this valuable data, Trinity began an ambitious task. Dr Sykes elaborates, "We aimed to craft an evidence-based methodology capable of predicting N2O emissions from agricultural soils. This wasn't just about creating another model, but about building on previous efforts to provide farmers with actionable insights."

Highlighting the unique features of Trinity's Tier 3 nitrous oxide methodology, Dr Sykes explains:

- Nitrogen application rate: "Understanding the precise rate of nitrogen application is fundamental. Our model is meticulously designed to focus on induced emissions, making it an indispensable tool in carbon footprint calculations."
- Type of nitrogen: "Different nitrogen sources can drastically affect emissions. We've ensured our model can distinguish between them effectively."
- Emissions reduction technologies: "Farmers are adopting technologies to curb emissions and none of the previous models include them. Trinity's model is the first time that these technologies have been included."
- Cropping system: "Emissions vary across crops and grasslands. Our methodology respects this nuance."
- Soil moisture: "Unlike basic models that label soils as 'dry' or 'wet', ours dives deeper, offering a continuous measure of soil water content."
- Soil organic carbon: "We recognise the critical interplay between nitrogen and carbon. Our model is a testament to that understanding."
- Soil pH: "Soil pH can be a game-changer. Its inclusion in our model isn't an afterthought, but a conscious choice, reflecting its significance."

A model that stands up to scrutiny

But Trinity didn't stop at model creation. Dr Sykes shares, "We rigorously tested our approach using our vast database. It's great, but not surprising, to see the Trinity Tier 3 methodology outshine both the IPCC and UK Tier 2 methods in accuracy and predictability."

And the results speak for themselves. Compared to other models, Trinity's model does better in explaining the variability in observed seasonal emissions. It explains 55% more than the UK Tier 2 method and 57% more than both the IPCC (2019/2006) methods.

In conclusion, Dr Sykes assures, "With the Trinity model, farmers now have a state-of-the-art, evidence-backed tool. It's not just about understanding emissions but about taking meaningful, data-informed actions in the fields."

The next step

Sustainability in farming isn't simply about recognising your farm's carbon footprint, it's a proactive journey of constant evolution and action. A key step in this journey is Sandy's optimisation feature.

"Understanding the details of each field and crop is paramount to achieve sustainable agriculture," comments Dr Alasdair Sykes. "Sandy's optimisation module doesn't just provide data; it offers actionable insights tailored to each farmer's unique scenario."

One of the challenges in farming is managing the balance of nutrients in the soil. This balance is not only essential for a successful yield but is also crucial in minimising harmful emissions such as nitrous oxide. Dr Sykes elaborates, "The integration of biochar, an innovative solution that aids in both carbon sequestration and soil health, is a testament to Sandy's forward-thinking approach. Our dedicated biochar module helps farmers aiming to reconcile productivity with environmental responsibility."

Beyond biochar, Sandy's optimisation feature champions a holistic approach, guiding farmers through strategies ranging from reduced fertiliser usage, cover crops implementation, to the exploration of nitrification inhibitors. Each of these strategies aligns with the overarching goal of reducing the carbon footprint while boosting yield and soil health.

"Modern challenges require modern solutions. By offering techniques like replacing synthetic fertilisers, enhancing nitrogen use efficiency, and introducing controlled release fertilisers, we're ensuring that farmers aren't just reacting to environmental challenges. They're leading the charge in innovative, sustainable farming," Dr Sykes concludes.

What does this mean for farming?

Farming's future isn't just about understanding and recording our footprint – it's about proactively reshaping it. With Trinity's Tier 3 methodology, farmers have a scientifically rigorous, data-driven tool that stands out in its precision and adaptability across various agricultural landscapes. Paired with Sandy's innovative optimisation module, which provides tangible, actionable insights, farmers are no longer in a mere reactive mode. Equipped with the latest in technology and research, farmers are at the forefront, championing sustainable practices that balance their natural capital and productivity.

Callout: What is Sandy?

- Award-winning navigator software for measuring, managing, and optimising natural capital.
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- Created for all farms, of all sizes, everywhere.

To book a demo or find out more about Sandy visit: www.trinityagtech.com

Beyond emissions: unlocking the benefits of on-farm practices through natural capital valuation

The evolution of farming goes beyond calculating greenhouse emissions such as nitrous oxide.

When farmers plant cover crops to enhance soil health and curb erosion, they should be able to capture their value in carbon sequestration, supporting pollinators and biological pest control, contributions of soil organic matter to yield improvements, and superior sediment and nitrate retention.

Similarly, when deciding on future crop rotations, it's essential to assess all the benefits of better rotations, including improved soil quality, increased biodiversity, and enhanced water protection.

For farmers considering a rotational grazing system to bolster pasture health and decrease soil compaction, all benefits should be valued including the increase in grazed biomass, enriched livestock provisioning services, and the climate regulation advantages from carbon sequestration in the soil.

Valuing natural capital in this way – as a fundamental asset to a farm – is central to transforming agriculture's economic and environmental landscape.

Charting a new course: the Natural Capital Century

The Natural Capital Century marks a shift where natural capital, including resources like land and biodiversity, becomes a driving force in economic and environmental progress. This change is urgently needed, as current practices in UK agriculture pose risks to farmers, rural communities, and the environment.

Who is the Trinity Natural Capital Pro Council?

Trinity Natural Capital Pro Council is a new organisation of institutions that transcends traditional boundaries to bring together expertise in rural economics, legal affairs, and financial services.

The Council's founding institutions, who all align with the vision of the Natural Capital Century, are Chavereys, Fisher German, Knight Frank, Mills & Reeve, Oxbury Bank, Royal Agricultural Society of England, Saffery Champness, Scottish Land & Estates, and Trinity Natural Capital Group.

How Trinity Natural Capital Pro Council facilitates agriculture's transition to the Natural Capital Century

The Council has developed a natural capital valuation framework within Sandy by Trinity AgTech, which combines science, technology, and finance. This new approach connects economic possibilities with practical application, helping farmers, landowners, and the industry move towards a sustainable and successful future.

The framework offers insights on carbon, biodiversity, water protection, soil erosion, and agroforestry, all while adhering to the latest standards for credibility and reliability. This means using IPCC 2019 methodologies or newer, tools and services which are also ISO14064-2 and ISO14067 accredited and compliant, as well as fully compliant with both GHG Protocol and SBTi FLAG. The natural capital valuation framework aligns with the United Nations System of Environmental-Economic Accounting and the BSI Natural Capital Accounting Standards for Organizations (BS 8632:2021).

What is the purpose of the natural capital valuation framework?

Farmers are taking various measures to enhance the natural environment of their farms. By introducing wildflowers and hedgerows, they aim to bolster biodiversity. The Natural Capital Valuation framework emphasises this by highlighting the value of pollination from wildflowers, the crop provisioning potential due to reduced erosion, and the climate regulation from carbon in hedges.

Another strategy used is planting trees, which not only offers shade and acts as windbreaks but also attracts pollinators. The framework showcases the multiple benefits of this move, such as potential wood provisioning, carbon sequestration, improved pollination, natural pest control, and even recreational and aesthetic values.

As farmers seek to understand how their natural assets fare over time, the framework serves as a vital tool. It gives them a means to monitor natural capital flows on their farm, evaluate how these can benefit their business directly, and offers predictions on the asset's valuation trajectory over time.

Farmers use the natural capital valuation framework to communicate their farm's natural asset value to lenders and buyers. This tool allows them to highlight the worth of their natural capital, the benefits derived, and the added value from their management practices over a business year.

Trinity Natural Capital Pro Council

Trinity Natural Capital Pro Council is dedicated to developing reliable analytics and a framework for assessing and valuing natural capital, following established standards for best practices.

The Council invites stakeholders who share their vision to contribute and join their mission.

To find out more or to express your interest in becoming Trinity Natural Capital Pro Council member, visit trinityncpc.com.

SECURING SUSTAINABILITY

Written by Sarah Ferrie from Interagro

A move to biological seed treatments has helped a Borders grower move away from chemical alternatives in a bid to help secure long-term business sustainability and improve soil health.

Though sustainability has become a buzzword in farming over recent years, for many growers making strategic decisions across their operations to promote long-term viability is an integral part of their ethos. This may mean looking at establishment techniques, chemical inputs and what alternative tools are in the armoury.

Biologicals and biostimulants are among those alternative tools that have gained a huge amount of traction over recent years, with large amounts of research and development going into products to prove they're more than just 'muck and magic'.

So are biostimulants the next logical step on the industry journey to sustainability? David Fuller-Shapcott thinks so. Farming 369ha in the Scottish Borders near Roxburghshire, David has spent the past few years looking at how to refine and improve his business. This has included being part of the YEN network, which saw him win the bronze award for best percentage of potential yield in oilseed rape in 2019 and another oilseed rape bronze award for yield in 2022.

"We're farming mostly heavy clay, high magnesium soils which are very sticky when wet but like concrete when dry," says David. "I've been focusing on soil health for a while, but now we're trying to nuance that – refine that focus – to improve the proportion of soil fungi, which is one of the main reasons I'm not very keen on putting fungicidal seed dressings on the crop. Though I've been told they have no effect, I have difficulty believing that a fungicide in the soil doesn't influence fungi populations."

It's this reason that one of David's main goals for the farm is to reduce his dependence on chemicals. "To enable this, we need to make sure that the

seed we plant is healthy – everything starts with the seed. One of the things that chemicals have bought in the past is rooting benefits, but I'm looking at what else is out there to provide the same advantages."

Alternative options

This is where biostimulants have proved to be a good alternative option, with David particularly finding success from using Newton – an organic plant-based biostimulant treatment from Interagro which is claimed to aid both crop establishment and to build healthier, stronger plants which are more resilient in the face of stress factors such as drought. "One of the main ingredients within Newton is signalling peptides," explains Interagro's technical manager, Stuart Sutherland. "These peptides are essentially signalling messengers for plants to modify their hormonal balance to reduce stress and enhance quality and quantity production parts in plants."

But what does this mean practically for farmers? Stuart says the high loading of peptides within Newton means incorporation can help with regulation of both plant growth and development which in turn can lead to faster seed germination and emergence.

This has been proven in a number of independent trials over recent years,

he adds. "These trials have shown that by including Newton, growers can not only speed up crop emergence by several days but can also help build tolerance against stress by triggering key defence mechanisms and even reduce the reliance on synthetic fertilisers by increasing rooting ability."

Tried and tested

David tested Newton for the first time two years ago, putting it up against Kick Off – a phosphate-based seed treatment designed to help boost rooting – incorporated with a fungicide. "I trialled it in a field of spring barley, sowing 56m wide strips and comparing paired tramlines of Newton with paired tramlines of Kick Off.

"I then asked the agronomist to see if he could find any difference," recalls David. "I told him where the breaks were in the tramlines, but not what the products were, and he could not find a single difference between the fungicide and Kick Off tramlines and where Newton was used alone.

"What we took from that is that Newton was bringing a fair bit to the party in terms of how it benefited crop performance, and also reducing my seed costs as a consequence. We took this through to combine yield at harvest over a weighbridge and found no statistical difference in yield either, so now I just use Newton alone. I don't bother with Kick Off or SPDs in the spring – Newton does it all."

This season, all of David's spring barley was sown with Newton only and he's looking to do some Newton-only autumn sowing later this year. "My spring barley has all been direct drilled for the first time this year with the Newton and it got away fine – I've not suffered with any moisture stress which a lot of spring barley in the area



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David Fuller-Shapcott
Farm Manager, Scottish Borders



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has. Generally speaking, it looks well.

“With my YEN hat on, it’s very clear that we need to be enhancing rooting to maximise output – rooting is imperative to both water and nutrient capture – and as a treatment, Newton ticks that box well. Using it means my nitrogen use efficiency has improved because rooting and water capture has got better, therefore I’ve not been suffering in these dry springs we’ve been having recently.”

David notes that he sees the spring being a particularly beneficial timing for the application of Newton. “These dry springs seem to be getting more common, so I think Newton will have a really big role to play prior to this window to help bolster plant resilience.”

Future plans

Looking to the future, sustainability is the goal. “Short-term, this means focusing on getting direct drilling to work for us which is difficult in Scotland, on water-retentive soils and weather patterns like we’ve been having,” explains David. “Long-term, I want to be in a position where we

are – or fairly close to being – net zero and we’re recognised for that. I think that’s a key part of this, being recognised that what we can do as farmers makes us part of the solution and not the problem.

“Biologicals will be a key component in achieving this – they’re absolutely part of the IPM approach to how we grow crops. We’re losing chemicals, either regulatory or efficacy wise, at an alarming rate and we’ve got to get on the front foot and understand what we can do to improve the way we’re growing crops.

“Newton is a piece of the jigsaw, with a number of tabs on that piece, which fit into a lot of other aspects of

crop production – which is where we need to be if we’re aiming to achieve true resilience.”

NEWTON FAQs

- Composition: vegetable-derived peptides
- Recommended crops: cereals, peas, beans
- Recommended rate: 1 litre/tonne of seed
- Compatibility: Compatible with chemical and nutritional seed dressings
- Application: Can be applied to seed via a conventional seed treater or mobile
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HOW BEING IN THE BLACK CAN HELP KEEP YOU GREEN

Profitable businesses are best placed to help the planet. Knight Frank's Mark Topliff speaks to consultants Simon Britton and Andrew Martin to discuss the five standout traits of the most successful farmers they have worked with.



Farming businesses that perform at the top 25% level financially are more capable of riding out volatile markets and more likely to invest in environmental schemes. Net margins for farms in the top quartile average around 25% to 30%, regardless of farm size, according to Defra's Farm Business Survey. They also receive more in agri-environmental payments. By contrast, the bottom 25% of farms typically make a loss and take a lower income from environmental schemes. Commodity market volatility, (see chart), will test the resilience of any farm. But successful businesses show characteristics that enable them to keep performing, remain profitable and continue to invest in their infrastructure and the local environment.

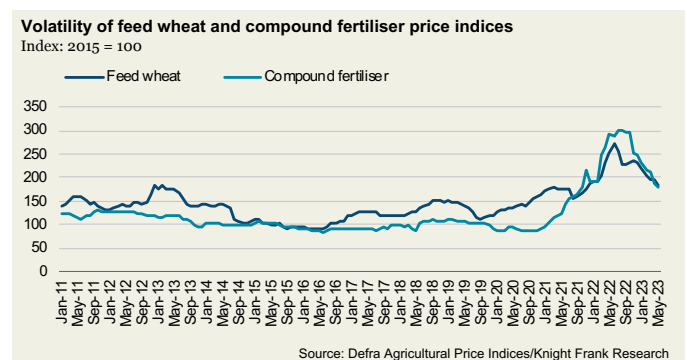
According to Simon, high-flying farming businesses "understand their business at every level and are able to focus on details. This means that they can change 100 things by 1% and not just one thing by 100%." However, that doesn't necessarily mean pushing for higher yields is the most successful long-term business strategy, as Andrew knows from personal experience. "It was hard trying to take an arable farm producing good yields to one achieving excellent yields," he says.

Going for high input and high output didn't always work – so he decided to change tack. "This came down to the financial awareness and knowledge of my own business and understanding how the margin was structured," he reveals. "Reducing inputs and using a different wheat variety on some fields proved to be better for margins and the local environment."

It can be challenging to make this journey alone. "Surround

yourself with the best people," is the advice from Andrew, who made changes with his farm in order to do just that.

"Whether that's the people you employ or trusted advisers. High-performing farms will help employees upskill themselves, involve them in decision-making and communicate with advisors regularly. Non-traditional communication channels, such as social media and messaging apps, are being used by topflight farms, but it's also about regular communication and open-mindedness," says Simon.



For Andrew, it's also important to take a proactive approach to learning, for example, through a Worshipful Company of Farmers course or a Nuffield Scholarship. "If you're fortunate enough to get the opportunity to go and study other businesses in the UK or around the world, it's invaluable," he says. "And all those people generally make a good success of their businesses afterwards."

Another key attribute of the top 25% of farms is their

knowledge of the markets they are selling into. This includes why prices move and how to get the best price for what they produce. "It's about knowing how these markets will affect margins and then the impact on your marketing decisions," stresses Andrew.

Don't rest on your laurels, advises Simon. "You have to regularly challenge what you're doing because it may have to change if the market has changed, whether you're a cereal grower or a red meat producer. Rural Britain is changing, and doing what you have always done will not be an option for those aiming to be in the top 25%."

Knight Frank's top five traits of high-performing farming businesses

ATTENTION TO DETAIL

Farms in the top 25% know that focusing on the details of the business drives so many other facets of farm management. They challenge everything they do and do not take anything for granted.

PEOPLE MANAGEMENT

A proactive, inclusive, and communicative approach will achieve a highly motivated and focused workforce. High-performing farms have better retention, recruitment, and staff performance.

OPEN MINDED

Top-performing businesses have a mindset to try or research new things. This goes hand in hand with a willingness and desire to continue to adapt and evolve. Communicating with peers who challenge and expand their thinking is also common.

FINANCIAL AWARENESS

High-performing businesses know where they are financially and where they aim to be. They will benchmark internally and externally, keep management accounts and budgets, and know their cost of production.

MARKET UNDERSTANDING - Top quartile farms understand the markets they produce for but, just as important, how those markets affect their business – helping drive better marketing decisions.

If you would like to speak to Simon and Andrew, they can be contacted at simon.britton@knightfrank.com and andrew.britton@knightfrank.com. Further insight and case studies on regenerative farming, natural capital, Biodiversity Net Gain and other environmental schemes and legislation can be found in The Rural Report 23/24 at www.knightfrank.com/rural-matters.

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f i t

FARMER FOCUS

CLIVE BAILLYE



Sustainable Farm Incentive, my experience and future plan

We joined SFI pilot at the first possible opportunity, our previous entry level scheme consisting of little more than 3m margins, that never really added an awful lot to local biodiversity, had expired 2 years earlier. Countryside stewardship was the natural replacement, it was competitive, and options limited in ways that I felt would both restrict its potential benefit to environment whilst excessively complicating logistics of our rotation and operations. Ultimately, we purposely held back on entering a contract until we felt more clarity existed around the new ELMS schemes that Michael Gove had just announced were coming fearing that an existing stewardship agreement might end up limiting our access to whatever ELMS offered in the future.

When announced, SFI Pilot was only open to farms not already in stewardship so our decision to sit things out and wait seemed well measured. I was excited to get involved, hopeful that as well as reward the improvements to soil, biodiversity and environment made here from investing and, with us already practising the kind of sustainable farming methods it grabbed headlines outlining, it would also maybe provide solutions to some of the problems we faced, replace the rapidly depreciating BPS payment and just maybe provide the support needed to help us take things up a step to the next level of efficiency, productivity and environmental gain.

My excitement however was met with disappointment, even though our existing practices made compliance with many of the new standards very easy, it offered limited opportunities for either business or environment that I could see. The payment, even for the "advanced" levels we could achieve were nothing to get excited about and certainly fell short of the BPS level of financial support UK farmers have become used to.

Despite the disappointment we still joined, pilot was an opportunity for farmers to feedback and hopefully be part of building a better solution. I have been really impressed by just how much the team at DEFRA seem to have listened and engaged with farmers directly to aid delivery of the best scheme they can offer. They have used feedback and discussion on The Farming Forum and other social media platforms alongside countless farm visits and discussion with groups and individuals to shape what certainly looks like a much better SFI23 offer than what we saw in pilot.

Limitations of the SFI Pilot propelled us to reconsider Countryside Stewardship, with the non-competitive nature offer providing a better fit for our farming operation. This decision necessitated leaving the SFI Pilot and then re-joining the actual SFI, a cumbersome process highlighting the lingering bureaucracy in the application system.



Through harvest year 2023 we established several countryside stewardship options that are already yielding significant benefit. Options like AB8 and AB9 are extremely tangible and look spectacular – flowering through the summer months and providing amazing, diverse habitat for pollinators ahead of the winter feed they will offer farmland birds. They are already being noticed and appreciated by neighbouring residents. It's been lovely to receive so many positive comments and in less than a year and these options are without doubt already adding to local biodiversity.

Whilst income from our non-rotational stewardship options covers income forgone on less productive land such as field corners and margins it falls short of compensating the gross margin of cereal cash crops. Something I have felt historically has been missing from both CS and SFI are options that could potentially provide a viable alternative to increasingly high risk and low margin break crops such as OSR, beans and Linseed whilst encouraging wider adoption of the winter and summer cover crops we have seen are so beneficial to both soil and environment.

Often referred to as "wish crops" (either wishing you hadn't planted them or wishing you planted more) the viability and reliability of these crops has become a challenge for many farmers in recent years.

OSR seems increasingly difficult to establish. Our approach here has been to use high rates of farm saved seed along with cheap companions like beans and linseed to limit our risk against pests such as CSFB over which we have no realistic ability to control. It's been a reasonably successful approach, although aspirations of once possible 5t/ha crops seem distant memory even when luck is on side.

Likewise, beans are an extremely weather dependent crop with yield variation here as much as 8t-1t/ha purely dependent upon spring and summer rainfall. Neither crop can be grown to frequently either without build-up of pathogen such as club root or nematode. Climate and

pest issues aside, the truth is over the last 50 years our soils are just starting to get a little tired of growing these same break crops so often.

Diversity is the single most important aspect of a sustainable farming system, so we have tried alternative break crops including linseed, oats, peas, lupins, millet and even soya. Although all have served valuable agronomic purpose, none have consistently performed and often struggled to find reliable and viable markets and gross margin.

SFI 23 offers options such as AHL2 and NUM3 that finally offer risk free rotational options that compete with break crops gross margins whilst offering the environmental gain the scheme has been designed to provide. It's clear however that you must think laterally with SFI - it's not prescriptive like we have been used to in the past, it's all about achieving aims, not being told what to do. I think that's rather refreshing and why I'm such a fan of this scheme. Finally it seems to acknowledge that maybe farmers know how to achieve aims best.

History makes it hard to trust however, a theme clear to see in post on The Farming Forum. There is a lot of irony seeing farmers who for years have told DEFRA to let them get on with things as they know their farm best now asking for detail on how? what? and when? Exactly how



they should achieve standard aims, the answer of "it's up to you" received with a great deal of understandable scepticism.

Defra don't seem to want to administer SFI with a stick, it feels to me like we are being trusted to do what we think is best and they are aiming for more of a "carrot" approach, policing standards with help and advice rather than retrospective penalties, I hope my assessment of this is correct and trust can be built on both sides to really make this new scheme bring sustainability to farms and environment whilst really delivering the natural capital and public goods to the tax payers who fund this.

The SFI23 scheme is quite simple to apply for and the quarterly payments welcome for cashflow, the complications of compatibility with existing stewardship schemes although well explained in the handbook does add complexity and things would be a lot simpler if existing CS agreements could be rolled into SFI, something that I am told DEFRA are working towards. The printable handbook

was something I asked Janet Hughes direct for in front of an audience at this years Cereals event and appeared a week later really is very helpful reference when planning options, they really do seem to listen to feedback!

My plan is now to de risk using AHL2 as our break in a wheat/barley/AHL2 rotation. Dropping the unreliable high risk OSR and Bean break crops we current grow in favour of the certainty of a AHL2 £732/ha payment. Established direct and quickly after winter barley I think carefully selected species should achieve the standards first aim of feeding farmland birds in winter months. It can be terminated in March / April providing a great opportunity to get on top of grassweed issues, then the area would have a multispecies flowering mix established through summer to achieve the second aim of pollinator habitat. The cost of effectively establishing a crop twice in a AHL2 year would be somewhat mitigated by the improvements to soil health and fertility that I know summer cover crops can bring resulting in significant increase in yields of following wheat and barley crops grown with less dependence on synthetic inputs.

The benefits that pulses bring to my soils will not disappear however as I plan to companion crop both my wheat and barley cash crops with beans, peas and phacelia attracting the IPM3 payment on top of the IPM4 we will receive by not using insecticides, something we have been able to do without for the last 15yrs now anyway.

Add in the payments on offer for IPM1 (pest management plan) and SAM1 (soil assessment and plans) the hedgerow and tree options HRW1,2 & 3 and it all starts to look a lot more exciting that the disappointing pilot ever did even before the soon to be announced payment for Direct drilling and precision farming standards are announced (rumoured to be announced soon). With CS payments from my AB8 and AB9 margins and corners, commercial carbon market sales plus a couple years of 50% BPS rate still to come allowing capital investment in further innovation and change I feel DEFRA have this right as an offering to arable farmers and it lays a pathway for an exciting new future of farming where output from food production sits alongside output from natural capital that will truly transform biodiversity and environment for the better.



DRILL MANUFACTURER IN FOCUS...

HORSCH SOLUS – THE SOWING METHOD OF THE FUTURE? POTENTIALS AND LIMITS

Future topics in the seeding sector are mainly centred around placement precision. HORSCH is working on a new seed drill to meet current and future requirements. Philipp Horsch explains the features and potential of the new narrow seed drill Solus, what the limits might be and whether this drill will be suitable for the UK.



According to Philipp Horsch, the Solus has the potential to become an important form of sowing in the future.

One of the future topics that plays a major role in the sector of seeding is precision, i.e. depth, standing area and embedding of the seed. HORSCH has been dealing with and improving these points intensively for many years. Over the years,

a better and better placement level of cereals and rape seed has been achieved with disc coupler technology. In the course of time, new challenges have emerged, such as the reduction targets in chemical crop care, the discontinuation of chemistry and the changing climatic framework conditions are things we have to react to.

“The most precise coupler technology we have at our disposal today is the single grain row of our Maestro line”, Philipp Horsch summarises. The precision comes from the combination of a double disc coupler with a lateral depth control at the point where the seed is placed. “We can maintain the depth much better and more constantly if two control wheels do not run behind the row, but directly at the seed disc”, he explains the principle. Moreover, the regular consolidation effect of the two lateral depth control wheels on the left, the right and below the seed furrow creates a perfect, even germination zone for the seed. This and the better depth control are two essential factors for the regular and safe emergence we know from maize seed drills.

To benefit from the precision of a single grain unit, larger row spacings are required. With the Pronto DC row spacings of 15 cm were established. “But for narrow sowing with single grain units, we are talking about row spacings starting at 22.5 cm. The experiences of the past years showed that a larger row spacing works in many regions from an agronomic point of view and that the yields do not decrease. In this respect, we feed on a lot of knowledge”, Philipp Horsch explains.

Beginnings

17 years ago, HORSCH started to deal more intensively with

the topic of singulation. The first system that was built at that time was an overpressure system with a flexible shoot line and a perforated disc. The objective was to singulate and to apply small seeds like cereals and rape as well as the traditional row seed maize, soya, beets and sunflowers. This was when HORSCH started to work with overpressure and shoot systems.

“However, during the development process we decided to start with a mechanical system for the singulation of only maize and sunflowers which at that time we bought from an American manufacturer”, Philipp Horsch describes the development path.

At the same time, HORSCH started to develop and launch the SingularSystem. The core of the development is a metering device that uses centrifugal force to singulate cereals, especially rape and wheat, with a high frequency. To guarantee an optimum embedding of the seed the well-proven TurboDisc double disc coupler was extended by a drop tube, a skid and a catching roller. “We gathered a lot of experience with the SingularSystem which we now benefit from in our new project. We are especially working on the coupler technology so that we are less dependent on perfect seedbed conditions!”

The next big step was the development of the current single grain metering device. HORSCH developed a vacuum and an overpressure metering device on a technically very similar basis. The AirVac and AirSpeed technology is based on the idea of realising utmost precision with a very low adjustment effort on the one hand and highest possible flexibility with regard to crops on the other hand. “Today we can meter all current single grain crops with utmost precision as well as in addition rape, wheat, rye and barley”, Philipp Horsch specifies the success. “However, due to their considerably higher seed sizes the last crops only make sense with the AirSpeed metering system. Overpressure allows for transporting significantly higher grain frequencies precisely into the seed furrow.”

First tests

About four years ago, HORSCH carried out first tests with the AirSpeed metering device on the Avatar. They had already gathered a lot of experience in the range of 25 cm row spacing, but with a single disc coupler. Disillusionment came quickly: It was not possible to catch the grains precisely enough behind the single disc coupler as the furrow was not homogeneous enough. The reason was that there was a disc on one side and a skid on the other side. Thus, it was not possible to shoot the grains precisely enough right to the centre below the catching roller.

HORSCH was not satisfied and made further efforts in this direction. “Already at that time, we started to develop a narrow seed body for maize and soybeans for the Chinese market”, Philipp Horsch states. “A slim unit that allowed for row spacings

smaller than 25 cm. It has been used as standard in China since 2019.“

Sustainability

The next step was to place the AirSpeed metering device on the slim Maestro body and build a machine with a coulter spacing of 22.5 cm. “This follows a logic, decades of logic. New side topics constantly spur the whole matter”, Philipp Horsch says. The wide row with evenly developed plants and a more regular plant distribution in the standing area in the row can be useful for several future topics at the same time.

Among others mechanical weed control. With wider rows the space between the rows is more easy to hoe. The share of rows per metre working width is less and so is the area that cannot be hoed today. If, in the future, you want to hoe in the row, it can be realised more easily from a technical point of view provided



This is still a construction drawing, but a first prototype of the Solus is already being built.

that the plant spacings are regular resp. the space between the plants can be predicted with utmost probability. Camera technology and AI can, thus, provide significantly better results.

An improved aeration of the rows and shorter periods of wet leaves allow for achieving healthier plant populations – an essential point with regard to the reduction of chemical crop care.

In addition, there is the option for a more precise nutrient supply of the plant. Moreover, the band application of herbicides involves further potential for reducing chemical crop care measures.

All in all, it is, of course, always about the clever use of yield reserves in arable farming. If we manage to establish regular, optimally placed populations, this will certainly be another key to higher resp. stable yields.

“Last summer we started to carry out first tests in Germany with all-over sowing”, Philipp Horsch explains. The first tests with a 6 m 3-point tool were very promising. “The new narrow seed body works. Of course, there is some need for adjustment, but basically it works”, Philipp Horsch confirms.

Solus – large area machine

The name for the new HORSCH large area product is Solus. “With this machine, we want to meet the requirements of the farmers”, Philipp Horsch explains. At the moment a 10.6 m wide, 47-row prototype of the Solus is being built. This year in autumn, the first tests are to be carried out with sowing wheat, rape, rye and barley. Beans and beet will follow next spring. Based on the experience gathered in these tests HORSCH will decide how to

proceed with this line and what has to be adapted.

With the combination of the narrow seed body and the AirSpeed shoot metering device HORSCH is taking a new path that is based on the experiences and components of the past years. The central questions are if this method has what it takes to become a new trend in sowing, where the limits of the machine are and for which conditions it is suitable. “We are dealing intensively with these questions”, Philipp Horsch explains. “You always have to question the whole matter critically”, he emphasises. Late sowing or wet soils for example, can be restrictions for this method. There will again and again be situations where the parallelogram-controlled seed unit will reach its limits.

Potentials and limits

In certain regions and arable conditions, the machine will work very well, in others less so. Because of the weight of the Solus, wet regions are particularly challenging. At good times, it will be possible to work in a highly precise way, but there will also be times when you will need an alternative. “Actually, even machines that we already have today are occasionally too heavy,” Philipp Horsch adds.

On the other hand, he sees great potential in dry regions. With the Solus line, sowing depth for example can be regulated more easily than with the Pronto. This is a huge advantage, especially in view of the future and the changing weather conditions. This guarantees an ideal use of resources such as water or nutrients.

Which markets will be the appropriate ones for the Solus line, remains to be seen. “We know the potentials. And we also know the limits”, Philipp Horsch explains. “We must not be so naïve and claim that this machine is equally suitable for all regions and conditions. But we have to take the specific requirements and conditions of the respective regions into account”. However, he is convinced that the Solus and the combination of narrow seeding and the AirSpeed system has the potential to become an “important form of sowing in the future”. Especially with the changing framework conditions in mind. But it will remain a challenge to react to volatility.



First tests showed that the narrow seed body basically works.

In November, at this year’s Agritechnica, the narrow seeding topic as well as the new sowing method with the combination of narrow sowing and the advantages of the AirSpeed metering device which is based on many years of experience and development will be presented at the HORSCH stand.

SOIL FARMER OF THE YEAR

FARM WALKS ANNOUNCED

Written by Emma Adams on behalf of The Farm Carbon Toolkit

At Farm Carbon Toolkit we are delighted to announce the dates for the farm walks hosted by our fantastic Soil Farmer of the Year 2023 winners. The competition this year was stronger than ever and captured the diversity of UK agriculture with the standard of applicants ever increasing. Each farm walk promises to showcase the great practices that are happening on farms which are a testament to the ideals set by the competition.

The Soil Farmer of the Year competition has been running since 2015, providing a platform for individuals and businesses to demonstrate how soil management can build environmental and economic resilience. The competition aims to recognise, promote and champion farmers who are passionate about safeguarding their soils and demonstrates how despite the vast variation across the agricultural sector, sustainable management can be universal.



The 2023 Soil Farmers of the Year (from left to right): Bronagh O'Kane - 3rd Place, Stuart Johnson - 1st Place and Richard Anthony - 2nd Place.

This year's competition was conducted in association with Innovation for Agriculture and kindly sponsored once more by Hutchinsons and Cotswold Seeds. Our task was to find farmers and growers who are engaged with, and passionate about managing their soils in a way that supports productive agriculture, reduces greenhouse gas emissions, and builds soil health, organic matter and carbon. Each year, the judging process includes a written application, an online interview with the judging panel and an in-person farm walk whereby

applicants demonstrate their farming system and how soil management is central to their process.

The results of the competition were announced at Groundswell: The Regenerative Agricultural Show and Conference in a panel session with the winning farmers to discuss their approach to soil health and regenerative management strategies.

The full list of winners, finalists and highly commended farms can be found below:

1st Place: Stuart Johnson, West Wharmley Farm, Hexham

2nd Place: Richard Anthony, R&L Anthony Ltd, Bridgend

3rd Place: Bronagh O'Kane, Drumard Farm, Cookstown

Finalists:

Debbie Wilkins, Norton Court Farm, Gloucestershire

Andrew Jackson, Holme Hall Farm, Lincolnshire

Ed Horton, Poulton Fields Farm, Gloucestershire

Highly Commended:

Jonathan Hodgson, Great Newsome Farm, East Yorkshire

Jonathan Sansome, Woodfield Farm, Worcestershire

Will Oliver, Swepstone Fields Farm, Leicestershire

Robert Neave, The Manor, Lincolnshire

The top three farmers are invited to hold farm walks which are open to the wider farming community to practically demonstrate and discuss how their approaches have focused on soil health and land management. Booking for these walks is essential, with a link found on the Farm Carbon Toolkit website on the Events page or via searching Eventbrite for 'Soil Farmer of the Year'.

4th October 2023 – Stuart Johnson, Hexham

11th October 2023 – Bronagh O'Kane, Cookstown

23rd November 2023 – Richard Antony, Bridgend

Soil Farmer of the Year - Stuart Johnson

Stuart has been transforming his farm over the last 10 years to reduce inputs, improve soil health and livestock productivity. Moving to a strip-tillage system and mob grazing platform has provided financial success alongside a more resilient business. Stuart has now eliminated fertiliser on his grassland and fungicides in the arable crops, instead utilising an integrated system with the livestock and compost teas to grow what is needed on the farm. The farm is currently in a seven year rotation of a five year legume/herb mix followed by a two-year arable break with full grass grazing for the sheep and cattle meaning that there is no need to buy in additional supplementary feed over the summer months.

Second Place - Richard Anthony

Soil management is central to operations at R&L Anthony Ltd. Based near Bridgend in South Wales. The arable farming operation has grown to encompass a vast variety of soil types and conditions, with the associated challenges of staying profitable whilst minimising environmental impact. The rotation encompasses combinable crops alongside forage production, utilising cover crops and integrated management to maximise soil health and carbon capture. Richard hosts a vast selection of trials at the farm, including different varieties of cover crops and the national trial list for combinable cropping; cover and companion crops are central to the arable operation, used to improve drainage, scavenge nutrients and reduce fuel usage through improving soil structure. Through continuously refining the management system Richard has halved fungicide use, eliminated insecticides and hugely reduced the fertiliser requirement through managing the soil to keep the biology working.

Third Place - Bronagh O'Kane

Having come back to the farm in 2020, Bronagh has begun a journey to transform the soil. Historically the farm has supported continental cattle breeds with a high reliance on imported feed, Bronagh has transitioned to more traditional breeds managed on grasslands. Utilising a small pasture grazing system she has increased the grazing period by 4 weeks and soils are more resilient to the extremes of dry and wet weather. Bronagh has started producing her own vermicast and composting to improve soil biology, focusing on natural inputs and a softer approach with foliar fertilisers where needed to manage historically compact and imbalanced soils. The walk will provide the opportunity to discuss and demonstrate the practices undertaken at the farm and the ongoing challenges and successes that Bronagh sees in her system.

For more information, visit farmcarbontoolkit.org.uk/soil-farmer-of-the-year



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FARMER FOCUS

PHIL ROWBOTTOM



A year in farming is a long time, and blimey what a difference a year makes! 2022 and 2023 could not have been different in terms of weather!

This year had the hallmarks of the previous two years, a relatively dry winter and spring looking as if it would continue the trend, and then it rained!

I'll admit the rain in June was welcome on our light sandy land, it gave the crops a late dose of water which they missed out on last season when they started to die off in the heat rather than ripen.

One of the biggest benefits we've found from direct drilling, is the increase in soil organic matter and improved soil structure, enabling us to better pick the opportunities for fertiliser and spraying work as the ground carries the machinery weight much better than conventional cultivation systems allow.

Growing a mixture of 1st wheats for milling after Oil seed rape and second wheats gives a 1 in 3 year rotation.

Like for many other farmers, oil seed rape continues to be a challenging crop to establish and take through to a successful harvest. I often wonder why we persevere with it. Direct drilling has reduced the establishment costs and this year we plan to try a companion crop to entice the cabbage stem flea beetle away from the seedlings.



The majority of the OSR looked patchy for much of the winter, I took the decision to take out an area of around 5 acres as it just didn't grow early on in the year, we later decided to plant a cover crop of buckwheat in the spring in the whole field, it's possibly the best crop on the farm, given the increase of cover crop seed costs, we seriously considered combining it for the seed, oddly my combine contractor wasn't so keen, not sure if it was the fact it was 5ft tall or how green the plant was!

Given how the crop looked earlier in the year, by June it was looking a lot healthier.



Harvest finally got underway on the 1st of August, which is around the 'normal' time, 2021/22 were earlier due to the heat we experienced which burnt crops off.

The 100 acres of OSR averaged 1.4t to the acre, which is an all time record high for the crop since we've grown it here. I've yet to sit down and work out the exact costs, but will happily share once I have, that might determine how much the risk vs reward I'm prepared to continue with every year, its a good break crop and rotation is key to all systems not just direct drilling.

Wheat harvest began on the 9th of August with Skyfall milling wheat, the wheat looked good all year and the hope was that they would yield equally as well.

We contract out our combining and this year a newer Claas Lexion 760 was all set up for Yield mapping, something we've never had the ability to do with previous machines.



There's still some work to do to get the best from the data from the combine, Sky drill and the tractor, if the technology allows us to trim seed rates and input application rates, there has to be benefits not only on costs but environmental as well.

The Sky drill now has section control working on it, this should reduce overlapping on headlands and a reduction in seed requirement.

The milling wheat averaged 9.4t/ha with the 2nd wheats averaging 9.1t/ha. The combine yield mapping showed areas of over 12t/ha.

Interestingly, the worst performing wheat crop was the ground that had been used for the ploughing match last year, it yielded an average of 8.9t/ha, not a huge difference from the other 2nd wheat but it took significantly more metal, fuel and time to create a seedbed. Pictures taken in January show just how different the ground conditions were between two fields, pretty easy to determine which was the direct drilled ground!



The chopper and spreader achieves a much more even and wider spread than the previous one, so much it's pretty much negated the requirement of the straw rake this year other than to try and promote a chit to the stubbles, using it to scratch the surface and mix seeds with a bit of soil seems to work.

At the time of writing we planting a cover crop mixture of buckwheat, vetch, radish, linseed, phacelia and clover into OSR stubble at a rate of 30kg/ha before the milling wheat, at a cost of towards £7,000 for the seed, let's hope it grows!

The grain store is full with ours and neighbours' crops, the dryer has finally stopped running and the results from the milling wheat samples are back, 12.9 % protein, 79 bushel weight and between 220-280 hagberg, we just need the price to go up a bit now!

2023 has been a better overall yielding harvest, up on the last 5 years average, with improved quality. Without doubt soil health has improved, dig anywhere on the farm and you get lots and lots of worms, the soil looks and smells different and there's much more wildlife about the farm, I suspect down to having ground cover of some sort all year round.

2024 OSR is about to go in the ground with a 'Beetle buster' companion crop of buckwheat and Fenugreek to tempt the CSFB, providing we don't get too much more rain, autumn drilling should be relatively straight forward, but just as we started this piece, a lot can change during a year in farming.



We don't bale anything here, the straw is too valuable a by product to let off the farm and it also reduces the extra traffic caused by baling, we aren't fully controlled traffic but the tramlines will be staying put this year and try our hardest to keep trailers on the headlands and tramlines where possible.

EXPLORING SOIL BIOLOGY'S PIVOTAL ROLE IN AGRICULTURE AND SUSTAINABILITY

In the realm of sustainable agriculture, the significance of soil biology in crop nutrition cannot be overstated. Soil is not just dirt; it is a dynamic living matrix that acts as the foundation for plant growth, serving as a reservoir for essential nutrients, water, and providing a habitat for a myriad of diverse microorganisms. The intricate interplay between nutrition and soil biology is a constantly evolving subject that holds the key to enhancing crop yields, improving food quality, and mitigating environmental impacts.

At the heart of soil biology's role in nutrition is the soil microbiome – a complex and diverse community of bacteria, fungi, archaea, and other microorganisms that inhabit the soil. These microorganisms play a pivotal role in nutrient cycling and availability, shaping the health and productivity of our agricultural ecosystems.

Modern agriculture has witnessed a surge in innovative practices that harness the power of soil biology to optimise nutrient availability while simultaneously reducing the need for synthetic fertilisers and minimising environmental impact. Some noteworthy approaches include:

1. **Biofertilisers:** Biofertilisers contain beneficial microorganisms like nitrogen-fixing bacteria and mycorrhizal fungi. These microorganisms work in harmony with the soil microbiome to enhance nutrient availability and reduce reliance on chemical fertilisers, contributing to soil health and long-term sustainability.
2. **Microbial Inoculants:** These are specific strains of microorganisms introduced into the soil to promote nutrient cycling, disease suppression, and overall plant growth. By adding plant growth promoting bacteria and fungi, microbial inoculants support sustainable crop production and reduce the need for agrochemical inputs.
3. **Precision Agriculture:** In the age of digital agriculture, advanced sensors, data analytics, and



automation are being employed to monitor soil conditions in real-time. This allows for precise nutrient application and irrigation management, optimising resource utilisation and minimising waste.

4. **Crop Rotation and Cover Cropping:** Implementing diverse crop rotations and cover cropping practices can have profound effects on the soil microbiome. These practices promote a healthier and more diverse microbial community, improving nutrient cycling, soil structure, and overall soil health.

A Transformative Solution for UK Growers

Gaiago, a forward-thinking soil specialist, has introduced a revolutionary product tailored to the needs of UK growers – Free N100. This innovative solution is

now certified for use in both organic and conventional farming*, offering a straightforward remedy to some of the pressing challenges faced by modern agriculture.

Free N100 contains Azobacter Chroococum, a remarkable microbe that doesn't leach, rendering it exempt from inclusion in fertiliser calculations. Scientific studies have consistently shown that Free N100 provides nitrogen precisely when crops require it, making this timely nutrient delivery a game-changer for growers seeking both productivity and sustainability.

Trials conducted across a spectrum of crops including wheat, barley, rape, maize, sunflower, and sugar beet consistently demonstrate that Free N100 allows growers to maintain yields while reducing their dependence on nitrogen fertiliser usage. Notably, in Maize trials over the past 9 years Free



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N100 has consistently averaged in excess of 0.66 t/ha over control.

Gaiago's innovative solution reflects their commitment to restoring and reinforcing the mineral and biological equilibrium of all soils while addressing three key dimensions of performance:

Agronomic Performance:

- Compensates for the limited bioavailability of alternative nitrogen sources.



N100 has consistently averaged in excess of 0.66 t/ha over control.

Gaiago's innovative solution reflects their commitment to restoring and reinforcing the mineral and biological equilibrium of all soils while addressing three key dimensions of performance:

Agronomic Performance:

- Compensates for the limited bioavailability of alternative nitrogen sources.
- Provides self-sustaining and robust nutrition.
- Mitigates the risk of nitrogen deficiency.
- Promotes root growth, ensuring the viability of initial growth stages.

Economic Performance:

- Enhances yields across various crop categories, including field crops, specialty crops, and industrial crops.
- Safeguards protein levels, maintaining the quality of agricultural products.
- Offers the potential to reduce fertilisation while preserving yield levels, resulting in cost savings for growers.

Ecological Performance:

- Represents a natural source of non-volatile and non-leachable nitrogen, minimising environmental impact.
- Suited for sensitive and

protected regions, supporting sustainable practices in ecologically fragile areas.

- Contributes to lower greenhouse gas emissions throughout the production and utilisation cycle, aligning with broader environmental sustainability goals.

In conclusion, the connection between nutrition-based soil biology and sustainable agriculture is a critical facet of modern farming practices. Understanding the intricate details between soil microorganisms and nutrient cycling processes allows us to optimise crop production while mitigating environmental impacts. As we continue to explore and uncover the complexities of soil biology, the future of agriculture holds promise in fostering healthier soils, increasing crop yields, and creating a more sustainable and resilient food system.

For more information about Gaiago and its range of soil revitalising products visit <https://www.gaiago.eu/> or visit us at the CropTec Show on the 29th & 30th November - stand no 500, we look forward to seeing you there.

*Probiotic solution for use in organic farming in accordance with (EU) regulations. Gaiago's commitment to sustainability extends to both organic and conventional farming methods.



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As we know, a farmer's greatest asset is their soil. Soil provides the basis and infrastructure in which healthy, high-yielding crops can be grown. With the base aggregate hosting the soil water and air that we need to sustain soil life, we need a soil structure that is able to hold onto soil-borne nutrients and water and so is able to breathe, exchanging CO₂ from the air and releasing oxygen as part of the growth cycle. A porous structure enables high levels of surface water to be infiltrated rather than generating run off and erosion issues and that open structure also makes for good root development thus making sure that the plant is adequately fed and watered to achieve its maximum potential. Some soils are naturally self-structuring with the natural drying and wetting process generating fissures and cracks into which the roots can get down to that moisture. Soils benefit from an increased organic content which helps feed the soil biology to promote healthy soils and a better growing environment as well as improving friability. Any increase in organic matter levels also help give the soil resilience enabling it to cope with traffic problems caused by subsequent drilling and crop care operations. Some soils, which are prone to slumping due to their fine particle sizes, might need some physical intervention to provide drainage in the form of a mechanical cultivation, but this needs to be thought through before engaging in any recreational tillage.

The increasing use of cover crops in the autumn, either as a bridge between harvest and autumn drilling, or as a means of keeping a living crop in the ground overwinter, has become an increasingly important part of the armoury in the fight against grass weeds as well as helping improve organic matter levels and boosting soil biodiversity. The ISOBUS-controlled, GreenDrill 501 catch crop seeder can be used here as part of the cultivator in order to establish those all important covers.

Generating a stale seedbed that stimulates as much regrowth



CatrosXL3003_X-Cutter_Case_d0_kw_P8116561_d1_210929

of volunteers and weed seeds as possible and yet leave a weather-proof finish that can, in these days of delayed drilling dates, withstand any adverse weather that it might face in the weeks before drilling, is the ideal scenario. Running

through harvest residues directly after combining with the Cobra shallow tine cultivator at 3 – 5 cm deep can ensure as much seed/soil contact as possible for those volunteers and weeds. The six rows of tines on a 16.6 cm spacing ensure sufficient surface movement - and even a full width cut when equipped with the 220 mm duckfoot share. The Crushboard behind the tines leaves a level finish for the rear roller to add some reconsolidation. Alternatively, the Catros X-Cutter, with its 480 mm wavy discs, will also move the soil surface yet at a depth of 2 – 8 cm and so also leave that safe finish. With the prevalence of cover cropping, the front knife roller, where required, crushes and bruises any green material helping to start the rotting process and opening up any shiny stalk to any contact herbicide application.

For deeper soil loosening, or as a means of incorporating surface trash with its intensive mixing effect, the Ceus disc and tine cultivator is ideal. The front-running 'Catros' disc element is followed by a four stagger tine element which is able to work down to depths of 30cm or so. Again, behind the tine element, runs a set of levelling discs and a double packer roller. The tines and discs can be used independently of each other thus making the Ceus a flexible soil tillage tool.

Quick and timely soil tillage is the key, so to ensure that your soils get given that perfect bill of health then make the cultivation programme as flexible as possible; dig down to see what is required, how deep are the issues and then only work as deep as necessary to alleviate those problems. Working soils less intensively will preserve soil moisture and remember, optimising organic matter incorporation starts with the combine harvester.



FARMER FOCUS

BEN MARTIN



Its hot, very hot! The last few days here on the Cambs / Suffolk boarder have been blazed in 30+ degree days, summer has arrived at last and I have been able to enjoy it safe in the knowledge that harvest is done and dusted for another year.

Writing this today, sat in a lovely little coffee shop, is a perfect excuse for me to reflect over the past 8 months since my last DD article. A lot has happened, in our personal and professional lives. My previous article was really well received, thank you to everyone who reached out to me – the power of written words never fails to amaze me!

Turning 40yrs old, moving house (during harvest!!) and my little girls 3rd birthday were all big milestones for me and my family. Moving house was particularly testing and mentally emotional, we have been so lucky to find a beautiful new home where our new landlord is a conservation farmer. There are wonderful flower margins going down our drive and we have fields at our gateway that are a wonderful array of cover crops right now and will be Wildfarmed crops next spring - Just perfect!

I have really thrown myself into farm meetings, events and field walks over the past 6 months. Socially it was just what I needed, to reconnect with many old faces and to establish new relationships with some fascinating people and businesses. Some highlights included –

A visit, on a cold Feb morning, to John Pawsey's wonderful Shimpling Park Farm was a fantastic way of starting the farm visits for 2023. Every time I get the opportunity to visit John's business, I come away fully inspired by what is going on there. John has a wicked sense of humour; I love the way he pokes fun at himself (and others) and is always so honest about his successes and failures. I thought it was interesting how John took time to talk about his team and what he has done, and continues to do, to get that team established and to flourish.

In May I was lucky to be able to visit Andy Cato's WildFarmed HQ at Colleymore farm, with a fantastic group from BASE UK. WHAT A DAY!! The sun was shining, Andy and his team were amazing hosts and the information shared was just mind-blowing. I don't think I have ever been on a farm walk where everyone was so engaged and focused on what we saw and heard. Andy and his Wildfarmed team have created something special in my opinion and it was a privilege to be able to see his crops and hear from the WF team about all things marketing, production and consumer requirements.

Groundswell Festival wrapped things up for me before I turned my attention to 2023 harvest. What a wonderful 24hrs I had this year at this truly unique farming event. I hadn't been for a couple of years and the obvious increase in size was a bit of an eye opener, but that didn't seem to affect the quality of the festival experience for me. As with many things in life, I like to take any opportunity I get to learn new things, so with that in mind I sat in on a couple of fascinating lectures about direct

sales and marketing, and Silvopasture. In the evening I caught up with an old friend I hadn't seen from school (20yrs ago), it was just amazing to catch up with her over a cider in a such a unique setting. This event seems to of created a real chalk and cheese type feedback from many people, some that feel it has become too festival like....I find that really odd to be honest. For me, I think it is great that an event exists that has created this social / learning experience that enables people to really dial in on some fascinating topics during the day and then to unwind and socialise in the evening. My only regret was just camping 1 night, next year I will really make a 3 day event of it!

With my thoughts now on harvest, I had a brilliant opportunity to help a friend out over harvest on his farm. The first harvest for me since 2014, where I was properly back on machinery and not bogged down in the management element of it all. And I enjoyed it so much! Now harvest is done I am off to help another friend with the drilling season, another one of the jobs I use to really enjoy a lot and one that I am really excited to get stuck into again.

Getting back on machinery and working with some great farmers this year (from early spring to now) has really made me fall back in love with farming again to be honest. As a farm manager, the job can be extremely isolating at times – I have vowed going forward that I will only be surrounding myself with positive people, inside and outside of the industry. We all know that feeling of being around people that are of similar mindset to you, or at least where you want to be, you feel inspired and more motivated to get more out of life. This is why I have turned my full focus on establishing myself as a strategic farm manager, a coach and mentor. I want to help more people and businesses, utilising my farm management experiences and knowledge in lots of useful ways that I know can be really helpful.

Really focusing on myself over the past 10 months has been life changing to be honest. I have had the opportunity to be more present with my little girl and wife, which has given me a new perspective on things. I have never walked so much either, my daily dog walks are now integral in my morning routine. Getting a health and fitness coach (<https://www.fatherfitpt.com>) to help me reach new highs has been the best investment I have ever made, and I am about to invest in myself again with a business coach to help me really get things moving forward on that front too.

I appreciate harvest was hardwork for the majority this season, but I hope it was a safe one and one that can now be reflected on with a level of satisfaction. I wish everyone well for the upcoming drilling season and hope to see many of you at various events this autumn and winter.

Take care.

Ben

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MY NUFFIELD JOURNEY

by Randal Angus NSch

Before my Nuffield Farming Scholarship journey, I was fortunate enough to be given the chance to visit Argentina in 2014 on a Young Farmer's study tour as part of a group of 15 enthusiastic young Scots. We gained a unique insight into an agricultural colossus on a "once in a lifetime" trip, which was a thoroughly enjoyable and unforgettable experience.

This trip was also the first time I was able to see a proper no-till system in action. I was completely blown away by the simplicity of the system. Growing two crops a year that were direct drilled into the previous crop stubble with a drill that was capable of drilling ten, twenty or thirty-inch spacings, so cereals, soya and maize could all be planted with the one machine. The driver for this was the need to reduce tillage due to its detrimental effect on the fertile Argentine soils caused by erosion when farming in a tropical and sub-tropical South American climate.



My first encounter of no-till establishment in Argentina in 2014

The ageing and primitive articulated tractor pulling its Argentinian-built six-meter drill was not only sowing seeds in the Argentine Pampas. It also sowed a seed in my mind about the future for crop establishment some seven and a half thousand miles away back home in the far north of Scotland.

My fascination for improving crop production was also fuelled by a nine-month working holiday to New Zealand. Throughout my time working with agricultural contractors there, I gained exposure to all manners of different crop establishment techniques. This included crops such as maize, which I had no experience working with as the northern latitude that I hail from doesn't favour crops that need such warmth and sunlight.

I had followed the journey of people such as Tom Sewell NSch and Jake Freestone NSch, who had documented their progression to no-till in various magazine articles on the back of their Nuffield Farming Scholarships. I was also among the first subscribers to Direct Driller and still have a copy of Issue 1 in my possession, albeit in a location that has escaped my memory! However, some 12 years after my trip to New Zealand and nine years after going to Argentina, I still find myself looking for yet further understanding as we remain steadfast in our reliance on a plough and power harrow-based system for crop establishment.

For those not familiar with my part of the world, I farm on the very northern most edge of mainland Britain in

the county of Caithness which sits roughly as close to the Arctic Circle as it does to London. Caithness was once the gateway to Europe for the Vikings and the Nordic heritage is still evident today, with the two main towns of Wick and Thurso owing their identity to Norse patronage. When the Vikings came, they also brought their expertise in fishing and farming, which would be the mainstay of the county up to the 19th century when quarrying then exported Caithness flagstone around the world.

Laterally, the dawn of the atomic age would usher in a transformation in the area, with the building of the experimental "Fast Breeder" nuclear reactors at Dounreay in the 1950s. It was roughly around this time that mechanisation was greatly accelerated in agriculture, and farms became bigger but required less labour. Many former farm workers took on new careers in the nuclear industry, an industry in which I have been involved myself, having done a mechanical engineering apprenticeship after leaving school.

For those of us left still farming in this part of the world, we still work the same soils first farmed by the Norsemen. I often find myself thinking as I run up and down the field with the plough that over a thousand years ago someone was trying to do something not entirely dissimilar to what I am doing today.

History lessons aside, I want to remain on this thought for this article as the main buzz today is around "sustainability". There is no doubt that we will all have to improve what we do and strive for better environmental compatibility across society moving forward. But I believe that agriculture wrongly comes under pretty intensive flack at times. This is particularly so in the modern era of media reach where information is misconstrued to suit the advocate's ends. "Farmers must improve their sustainability," cries the head of ESG at Bit-coin mining - well wait a minute pal, we've been doing this since Jesus was a boy and you are doing something that doesn't make any sense AND you have only been doing it for about ten minutes! Who do you think is better versed on the matter here?



Input use efficiency is key – An NIR sensor is used to variably apply crop inputs, aided by GPS technology to control the sprayer on a crop of spring oats. This has taken a bit of adaptation as the algorithm is designed for wheat.



The power of modern diggers allows us to get to the source of the water, which was not accessible to our forebearers.

The topics of sustainability and regenerative agriculture go hand in hand, after all, why would you want to sustain or maintain when you can improve? By the letter of the law in its true definition I am not a “regenerative” farmer as I pass through the fields with the plough which goes against the principles of “movement”.

However, I would like to make the case that farming practices that leave the land in a measurably improved state over time must surely be the most straightforward and simple definition of what could be regarded as regenerative.

In our area, livestock farming is the prevalent form of farming, albeit with many mixed farms producing grain either for livestock feed or selling a surplus for milling or malting. However, this last decade has seen a movement away from

livestock towards more arable production. Spring cropping of barley and oats has been the main practice with most of the harvest taking place in September, with the straw being baled and cleared off the fields for livestock housing in the winter months.

This far north the growing season is short, with the cool, damp maritime climate meaning moisture removal is a greater problem than moisture retention. The need to remove straw and apply muck to stubbles and the addition of some years of harvesting in very wet conditions, mean ploughing is the favoured practice. Aeration and inversion of the soil are critically important for increasing soil temperature and removing excessive soil moisture for spring drilling.

The advent of the Kverneland auto-reset leaf spring was a transformative technology in the north of Scotland as this was the first machine that could handle the stones. The Norwegian-born plough brought yet more Viking influence to our land! The heat treatment of the steel is similar to that of a sword, allowing the machine to bend and flex rather than break in the stony soils. This has transformed the land and has facilitated a rapid growth in farming. In this part of the world, not only is ploughing the dominant practice, but 95% of it is done by one brand of plough.

In the 1970s extensive drainage and liming were carried out under government grants, this drained a lot of poor-quality soils and improved the production capabilities of a lot of land. However, in the modern era, many of these drains are

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not adequate to meet the rising flow of groundwater that accumulates with the more extreme and variable weather that we are experiencing.

Another mechanical marvel to benefit us has been the development of the modern excavator. The sheer hydraulic power of modern machines can deliver a fearsome break out force to rip through the ridges of rock to bleed the groundwater away through a large bore drainage pipe. This is encased in two-inch clean gravel from the depth of the drain right to subsoil level. As a result, wet or marshy ground which was only poor grazing ground, can be transformed by modern drainage techniques and transform a field into productive arable land.

In some cases, I have seen over 200 years of drainage fail to fix a problem. Stone drains, clay tiles and 1970s plastic coil pipes have all failed to bear fruit as they all have the same problem of being unable to reach the source of the problem lying in the hard rock below. Now though, we dig right through it with the movement of our fingertips. Whilst not as snazzy as the title of being a "Regen Farmer", performing good agricultural land husbandry by creating drainage, applying lime, using crop rotations and conserving soil health make a significant impression when done right.

You must surely have earned the right to call yourself a "Regen Farmer" when you have not merely improved the land but moreover, you've completely transformed it. The mixed farming system is the original circular system, with soil health and crop yields being key indicators of the impact of what you are doing. With soil carbon content up at nine percent, there may be some room for improvement, but things are certainly not horrific at the moment.

For me, the concept of "Regen Farming" is about the ideas rather than the ideology, especially as farming requires a greater degree of flexibility than most other industries. The plough will continue to remain an important tool in the toolbox, but I am not opposed to a move away from it as it is a very slow and time-consuming job. The question will be how we can achieve this in our part of the world?

To me, the success of min-till or no-till relies heavily on successful cover crop production. This poses a question: How do you grow two crops in a part of the world where the growing season and the climate make it a struggle enough just to grow one main crop?

There has been a resurgence in winter cropping over the last few years as varieties have improved greatly and weather patterns have proven to be favourable for growing the crop. Perhaps a rotation of a spring crop followed by a winter crop followed by a cover crop could be an option. The warmer temperatures of summertime and better soil conditions would be more favourable towards some reduced tillage practice. But again, this will involve a lot of trial and error to work in our growing conditions.

The other side of the coin for "Regen Ag" comes in the form of carbon sequestration. Again, in my pursuit of knowledge, I have been following the development of this field for some time, back to the days before it was trendy or anything other than a niche idea. When I decided to pursue a Nuffield Scholarship, this was the topic that I decided I



I was very grateful to have been hosted by Michael Horsch for a Nuffield visit. The discussion - Where are we going in the future as farmers? Hopefully to a version of farming that is much better than where we are now...

would study to discover how we can sequester, quantify, verify, and then sell this carbon.

The journey to "Net Zero" is going to be a long one and the Government has already started to renege on its commitments, notably the pushback on the ban of the sale of petrol and diesel cars from 2030 to 2035. To be honest this would have to be expected as simply throwing targets out there without any solutions as to how we achieve these goals is going to be a repeating theme as we progress. The opportunity here comes in the form of farmers being the solution to many of these problems. Be it food, fibre, energy, carbon or natural capital, the farmer will have the answers, and great gains will need to be made in time to unlock the opportunity that lies beneath our feet.

At the moment, there is a lot of emphasis on carbon sequestration, but to my mind, one area which should be the starting point is input use efficiency. The biggest source of emissions on farm comes from fuel and fertiliser. Reducing these is not always a win because if your crop yield reduces, your carbon footprint will actually increase due to your output falling. Optimising the use of inputs is an old chestnut, however whilst we always aspire to chase 'value' over 'cost', moving forward the ability to further utilise technology to help us optimise and analyse will probably see a significant uptake, particularly when input costs rise.

In time some of this technology will also help us to record and quantify our soil carbon. If we are paid to carry out regenerative practices, then this will be vital record-keeping to demonstrate that a practice has been carried out. We should also be considering the value of this data, not only to ourselves but also to third parties. Ensuring that we know how this data is being used - and who can access and use it - is important, as it could have a financial value and we could be giving away for free unknowingly.

I recently listened to a well-timed podcast just before writing this article by Andrew Dewing of Dewing Grain. Despite being a grain merchant in Norfolk which is at the complete opposite end of the country to me, I listen regularly for the market updates to get a handle on where the grain trade is at. There is often a chat about various topics or interesting people, and I am relatively familiar with Norfolk as I went there for our 2021/2022 Nuffield Contemporary Scholar Conference. Episode 253 of the Dewing Grain Podcast is worth a listen as I think it is a good discussion around

regenerative farming at present.

As part of my Scholarship studies, I made my first overseas trip to Germany in the summer of last year and met many great and interesting people. The highlight of my trip was to be fortunate enough to spend a day in the company of Micheal Horsch at the Horsch company headquarters in Schwandorf.

We discussed many of the topics surrounding farming right now, and indeed some of the things I have touched on in this article including carbon, direct drilling, and input inflation as well as how the short to longer-term future for farming might look. Before the day was rounded off with a beer and a barbecue, Michael was keen to show me the information gathered from a benchmarking group of German farmers of which he is a part. There was lots and lots of data here but the key point that Michael was keen to stress was the more reliance you have on 'digitalisation' the lower your profit is likely to be. By secluding yourself to the office you remove yourself from the reality of what is actually happening in the

field. The best farmers in this group we not only consistently the best, but they made their own judgments based on what they had seen in the field.

In this modern era, which is incredibly complicated and volatile, and now increasingly technical, there is still no substitute for boots on the ground. I had also expanded my woes over the ploughing situation with him and said to him; "Michael, what I need you to build me is a new cultivator which does the job of a plough but is not a plough!" Watch this space perhaps? Agritechinca 2023 is just around the corner...

Nearly 40 Scholars will present their findings at the 2023 Nuffield Farming 'Super Conference' held 14-16th November at Sandy Park in Exeter. The event also includes a pre-conference visit to nearby Wastenage Farms, and tickets are not exclusive to Nuffield Scholars - ALL are welcome and encouraged to attend. Ticketing details, and a full list of presenting Scholars can be found at the QR code or on www.nuffieldscholar.org



BASE-UK is an independent, nationwide, farmer-led knowledge exchange organisation, encouraging members to make agriculture more sustainable by using conservation systems - no-till; cover cropping; integrating livestock; diversifying rotations; using less invasive, cost-effective establishments. Growing Confidence for a Decade!

We have had a busy spring and summer of webinars, visits, and farm walks. This included visits to Rothamsted Research, Wildfarmed, Dyson Farming, Agrovista's Lamport Project and several member farms. Reviews of some of these are available on our website. Thanks to all our members and colleagues for their time and expertise at these events.

The committee are working towards planning an active winter (if any member would like to host a farm walk, please contact Rebecca) including a trip to visit Frederic Thomas and BASE France farmers in November as well as the Annual Conference next year. The Conference will be a week earlier than normal as it would otherwise clash with St Valentine's Day. Please put **Wednesday 7th and Thursday 8th February 2024** into your diary and keep an eye open for details in your email box.

At the end of September 18 members will be attending a Public Speaking/Communication Skills Course with Susie Emmett of Green Shoots Productions sponsored by BASE-UK to enable them to pass on their knowledge and experience. We look forward to seeing them at a future event or farm walk with their new presentation skills in place.

Membership is open to anyone with over 80% of our members being farmers. We do not drop below 80% farmer membership in order to retain the farmer led knowledge within the group. If you would like to know more about us or how to join BASE-UK, please visit our website: www.base-uk.co.uk email Rebecca@base-uk.co.uk or visit us at the Croptec Show at Stoneleigh Showground on 29th and 30th November in Hall 2, stand 234.

If you would like to know more about how to join BASE-UK, please visit our website: www.base-uk.co.uk or email Rebecca@base-uk.co.uk

GENERATING REVENUE FROM SOIL CARBON

Agricarbon has developed a scientifically robust and cost-effective method of measuring soil carbon to produce carbon credits which meet international protocols and are of high value to buyers and farmers alike. The company is working with Regenerate Outcomes, which supports farms' transition to regenerative agriculture through mentoring from leading regenerative farmers and by selling environmental outcomes to create additional revenue.

The benefits of increasing the amount of carbon in your soil are clear; improved soil, plant and animal health, greater productivity and resilient farm businesses to name just a few.

However, soil organic carbon (or SOC) also creates the opportunity to generate additional income via the sale of carbon credits.

Regenerate Outcomes is working with farmers across the country to sponsor a long-term regenerative farming mentoring programme, as well as verification services related to soil carbon and other verifiable environmental outcomes.

Farms which join the Regenerate Outcomes programme receive long-term, one-to-one support from Understanding Ag, a leading professional mentoring agency in regenerative farming, led by farmers Gabe Brown, Dr Allen Williams and Shane New and supported by 3LM, the UK Savory Network hub.

Farmers join a 30-year agreement with Regenerate Outcomes who work with Agricarbon to baseline and monitor soil carbon stocks every five years. Soil carbon increases are verified following the world-leading Verra Carbon Standard.

"It is essential that the carbon baselining and monitoring for these credits is of the highest integrity possible and compliant with recognised carbon market protocols, to ensure the long-term value of the credits and maximise returns for our farmers," said Regenerate

Outcomes Director Tom Dillon.

"This is why we choose to work with Agricarbon, who can carry out these soil carbon surveys while balancing quality assurance with cost efficiency."



Agricarbon soil core

Agricarbon provides robust evidence for soil carbon gains, defined by requirements set out in high-standard carbon credit protocols. This focus on quality means that the income generated by Regenerate Outcomes is expected to be reliable in the long term as the credits will remain attractive to carbon buyers in the years ahead.

"The real driver for founding Agricarbon was to unlock as much value as possible from soil carbon for farmers to fund their transition to regenerative farming," says co-founder Annie Leeson.

"It's a process that farmers can trust. The reason they can trust it is because carbon buyers trust it. It's been designed explicitly to meet the required standards."

Agricarbon has built an industrial scale robotic soil processing facility, which

mechanises the testing process.

"This massively reduces the cost of processing each sample which means you can take enough samples to create reliable and statistically sound baselines and measurements of changes over time," said Annie

"Our automation and robotics also bring greater accuracy to the analysis. Testing can be unpredictable and variable if it's done by human beings across different laboratories. Typically, the margin of error you would expect would be about 20 per cent across most labs. Agricarbon's margin of error is far lower.

"Our automated soil processing technology also measures bulk density for every single sample. Measuring bulk density - which allows us to calculate how much soil you have got - is vital to converting the percentage of organic carbon in that soil into an accurate measure of the total tonnage of carbon."

Regenerate Outcomes plans to sell its first batch of verified carbon credits in 2024/25.

"We believe that regenerative agriculture is the way forward for British farmers to build resilient businesses, increase productivity and farm in a way which increases biodiversity and water quality," said Tom.

"The integrity of Agricarbon's testing process is essential in ensuring we can create a long-term, sustainable income for farmers alongside the many other benefits it brings."

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FUTURE PROOF FARMING



MAKING THE MOST OF ORGANIC MATERIALS TO REDUCE FERTILISER BILLS

Written by Lizzie Sagoo from ADAS

Earlier this month, ADAS, Rothamsted and Bangor University welcomed over 250 delegates from 25 countries to the 18th International RAMIRAN conference in Cambridge. The theme of this year's RAMIRAN was maximising the utilisation of organic fertilisers against a background of changing regulation and increasing pressure on the environment and food production.

Following on from the conference, our soils and nutrients team have outlined key learnings for growers looking to maximise the value of the nutrients contained in organic materials:

1. Know the nutrient content

Accurate information on the nutrient content is essential for making the best use of organic materials. 'Standard' or 'typical' figures are available in Section 2 of AHDB Nutrient Management Guide (RB209). These are average figures based on the analysis of a large number of samples. However, the nutrient content of organic materials will vary depending on factors, such as livestock feed composition, variable use of bedding, storage period and for slurries dilution by rainwater.

If possible, get a laboratory analysis of organic material. A laboratory analysis should include dry matter, total nitrogen (N), Phosphorus (P), Potassium (K), Sodium (S), Magnesium (Mg) and Ammonium-N. For poultry manures, also include uric acid N.

2. Minimise nitrogen losses

Wherever possible, applications of organic materials should be managed to minimise nitrogen (N) losses to the environment. The risk of N loss is greatest following the application of high readily available N materials such as livestock slurries, poultry manures and digestate.

Minimise the risk of nitrate leaching losses by applying high readily available N materials in the spring/summer rather than

the autumn/winter period. If applying in the autumn, spread to crops with an autumn N requirement such as oilseed rape and grass. Reduce ammonia volatilisation losses by applying slurries or digestate with bandspread or shallow injection rather than broadcast equipment, or by incorporating organic materials soon after application.

3. Know your application rate, and spread accurately and evenly

To calculate the application rate, you need to know the capacity of the spreader and number of 'loads' spread over the field area. Or alternately for slurries, apply using a pump with a known output. For solid materials, the best way to assess the capacity of the spreader is to weigh it empty and then full.

Make sure the organic material is spread accurately and evenly. For broadcast spreaders, this means overlapping the bouts to get an even application across the field. Generally overlap the bouts by about half (this means the bout width is about half of the spreading width).

It is recommended to check your application rate and evenness of spread at least annually. However, data from Defra Farm Practice Survey indicates that only 35% of farms that spread manures using farm equipment adequately calibrate their spreaders. Half of farms that spread manures never calibrate their manure spreaders.

4. Build your farm nutrient management plan

Management strategies that minimise environmental N losses can maximise crop N recovery and increase the fertiliser N replacement value of the manure. This reduces the need for manufactured fertiliser application to meet crop requirements. In order to realise the value of manure applications, it is important to accurately predict the crop available N supply and reduce inorganic fertiliser use accordingly.

Section 2 of the AHDB Nutrient Management Guide includes guidance on crop available N supply from organic materials. Alternatively, farmers can use the MANNER-NPK software. MANNER-NPK (MANure Nutrient Evaluation Routine) is a decision support tool to quantify manure crop available N supply and is available to download for free from www.planet4farmers.co.uk.

5. Pay attention to phosphate and potash supply

Although much of the focus of manure management is on minimising the N losses to maximise N available to the crop, in the majority of cases, phosphate and potash supply is worth more than the N value. A typical 50 m³/ha spring application of cattle slurry will supply 46 kg/ha crop available N, 60 kg/ha P₂O₅ and 125 kg/ha K₂O, and is potentially worth up to £135/ha in saved fertiliser costs (see below table).

In order to make the most of the phosphate and potash in manures, farmers are encouraged to target applications to fields where the soil is low in phosphate and potash, and as a replacement for inorganic phosphate and potash fertiliser.

Value of nutrients applied by different organic materials

Organic material	Application rate (t or m ³ /ha)	Available N	Total Phosphate	Total Potassium Oxide	Value £/ha
Cattle farmyard manure	40	24	128	376	410
Pig farmyard manure	40	28	240	320	482
Cattle slurry 6% dry matter	50	52	60	125	198
Pig slurry 4% dry matter	50	99	75	110	249
Poultry manure 60% dry matter	8	90	136	168	339
Digested biosolids	20	44	220	12	263

- Nutrient application rate based on 'typical' figures in AHDB Nutrient Management Guide (RB209)
- Crop available N assumes spring surface application, incorporated within 24 hours (solids manures) or applied with a trailing hose (slurries)
- Fertiliser value based on current fertiliser prices of £350/t Ammonium Nitrate (AN) (£1.01/kg N), £440/t Triple Super Phosphate (TSP) (£0.96/kg P₂O₅) and £420/t Muriate of Potash (MOP) (£0.70/kg K₂O)

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HARNESSING THE POWER OF RAINWATER AND REDUCING RELIANCE ON MAINS WATER

It is often said that the most important natural resources for farming are water, air and soil. Quite rightly, much attention has focussed on soil, being a farmer's most valuable natural resource. However, the challenge of mains water shortages for farms looms on the horizon and farms need to adapt and take action to mitigate against future mains water scarcity.

“Rainwater is a natural resource that costs nothing but holds immense value, and one of the most promising and eco-conscious methods for farms to reduce their environmental impact is harvesting rainwater.” said Roger Labett, Business Development Manager for Enduramaxx, the UK's leading manufacturer of rotationally moulded, plastic rainwater harvesting tanks, “Why rely on expensive and chemically treated mains water when nature provides a bountiful source of fresh, untreated water from the skies?”

Rainwater harvesting brings a multitude of benefits to farmers:

Reduce carbon footprint

By harvesting rainwater, farms can reduce their reliance on chemically treated mains water. This indirectly contributes to a lower carbon footprint, as the energy intensive water treatment process generates significant carbon emissions. Rainwater harvesting reduces both the treatment process's environmental impact as well as the emissions generated.

Reduce water bills

Rainwater harvesting systems are a one-time investment that can yield long-term financial benefits, as farms will save money on water bills and associated sewage costs that are linked to mains

water usage.

Reduce the use of additives and conditioners

Naturally occurring rainwater is soft, has a neutral pH and lacks the mineral content typically found in mains water. Using soft rainwater in sprayers will help to prevent nozzles from clogging up and the need for chemical softening additives and conditioners. This is particularly significant as hard water can diminish the efficacy of certain herbicides, like Glyphosate.

Reduce the strain on mains water

Rainwater harvesting alleviates the pressure on mains water sources. By using rainwater instead of mains water, farms can decrease the strain on local water sources and indirectly reduce their own carbon footprint, contributing to the overall sustainability of farming operations, whilst helping to protect the environment for future generations.

Reduce reliance on mains water

Treated rainwater serves as an excellent source of drinking water for livestock. This ensures that even during dry spells, livestock have access to a reliable source of water, promoting animal welfare.

Reduce localised flooding

Capturing rainwater will also help to keep farm yards cleaner and less muddy. Moreover, they ease the strain on stormwater systems during heavy downpours, reducing the risk of localised flooding.

Enhance environmental footprint

Rainwater harvesting showcases a farmer's commitment to sustainable practices, it is more than just eco-friendly; its smart, efficient and beneficial to your



farm, machinery and livestock and, we expect that in the future, regulatory compliance. By visibly demonstrating a commitment to sustainability farms will enhance their reputation and marketability.

What next?

If you are keen to make a positive impact on the environment while reaping the practical benefits of rainwater harvesting you're on the right path. Transitioning to rainwater harvesting not only benefits your farm but also contributes to a more sustainable and resilient agricultural sector.

Enduramaxx offers a range of tanks in various shapes and sizes to suit



your farm's specific needs. To learn more about how rainwater harvesting can benefit your farm, please contact Enduramaxx directly 01778 309847 or

get in touch with your farm buying group or agricultural dealer. Alternatively, Enduramaxx can connect you with an approved installer in your area.

How big a rainwater harvesting tank do I need?

To determine the appropriate system for your requirements, Enduramaxx have a handy tank size calculator on their website (<https://enduramaxx.co.uk/rainwater-calculator-water-catchment-calculator/>) Alternatively,

Roof area (footprint) m² x annual rainfall in m³.

Assume annual rainfall is 0.65m³ (650ml) and shed roof catchment area is 450m² (e.g.15m x 30m)

450m² x 650ml = 292.5 (m³), divided by 12 = 24.375 or 24,375 litres per month average.

Enduramaxx recommend storing an average of two to three months' worth of rainfall (bear in mind you may get three months' worth in your wettest month) and so, in the above example would recommend 3 x 25,000L tanks linked together in series.

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UNEARTHING INSIGHTS: NAVIGATING COMPACTION CHALLENGES IN THE TRANSITION TO CONSERVATION AGRICULTURE

Written by Joe Stanley from the Allerton Project

It's well established, including by our own research (in part discussed in June's article on our pioneering Conservation Agriculture trial), that a move to reduced tillage or direct drilling (DD) can generally be considered beneficial for the triumvirate of farm economics, soil health and environmental sustainability. With financial margins inexorably tightening, increasing recognition of the degradation visited on our farm's most vital asset in recent decades, and increased public and political demands for natural capital recovery in the farmed landscape, reduced tillage and DD tick many boxes.

However, experiences abound of overly-rapid transitions to such systems which have met with initial setbacks, with farms simply shipping in existing equipment and making the transition from intensive tillage in a single season. Sometimes in combination with a poor planting season, this has often led to very poor establishment and soil conditions with a resultant sapping of enthusiasm – or even wholesale reversion to the previous system.

Here at the Allerton Project, we sit atop pretty consistent heavy Hanslope-Denchworth series silty clay loams. Although in some ways it's been great to adopt a conservation agriculture system over the previous twenty or so years (with drastically improved workrates and reduced fuel usage from pounding clods into submission), such soils also provide their own specific challenges in a DD system, not the least of which is the risk of compaction.

Compaction is a form of soil degradation with detrimental effects on agricultural productivity through reduced crop growth, increased soil erosion and nutrient depletion. It can also lead to increased emissions of nitrous oxide (N₂O) as anaerobically active denitrifying bacteria in damp/wet compacted soils convert available nitrate from fertiliser into this highly warming greenhouse gas, with a carbon dioxide equivalent (CO₂e) of 298. Agriculture is responsible for some 75% of UK emissions of N₂O.

In 2018 we set out to investigate the potential impact of moving

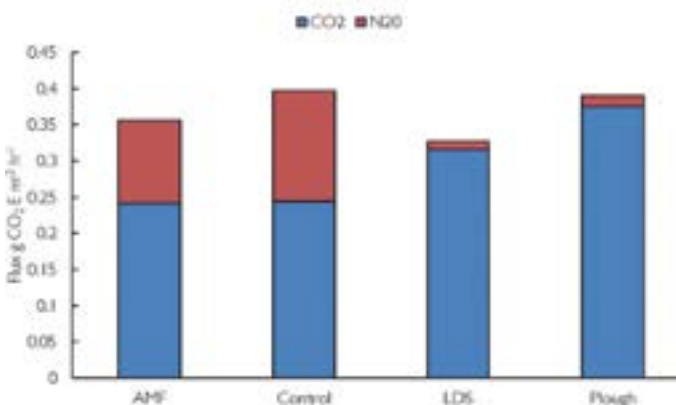


to a DD system as part of SoilCare, an EU-funded project which allowed farmers in our local area to prioritise research they considered particularly useful to them; compaction in a DD system was at the top of the list.

We set up a replicated experiment with three replicates per treatment in winter barley (2018) followed by winter beans (2019). The field was intentionally compacted by driving a tractor at right angles to the tramlines (can you imagine?!) We compared direct drilling directly into the compaction with a number of compaction alleviation methods; ploughing, a pass with a low-disturbance subsoiler (LDS) and application of a mycorrhizal (AMF) inoculant, which wasn't expected to influence soil physical characteristics but could improve crop nutrient uptake through the fungal strands. All were established with a Dale EcoDrill.

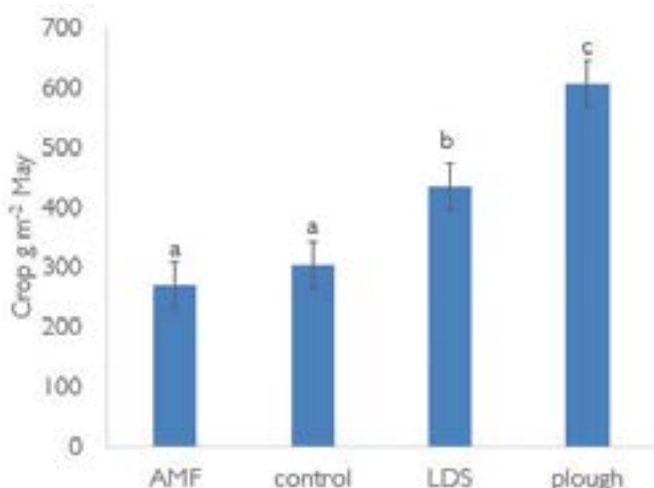
In wet winter soils we recorded N₂O emissions 10 times higher in the compacted control than in the ploughed plots, and 15 times higher than in the LDS plots. During the summer, with dry soil conditions, comparative N₂O levels flattened out between the treatments. This therefore bore out the hypothesis that compacted soils can be at significant risk of becoming a major source of emissions in the move to a DD system, despite best intentions from a soil organic matter loss/carbon dioxide (CO₂) emissions point of view.

Indeed; we discovered that CO₂ losses from the two 'disturbed' treatments (subsoiled/ploughed) were significantly higher across



the year than in the DD/AMF plots with microbes finding more available oxygen to help metabolise the soil organic matter, as would be expected. (Respiration was highest in the summer months – by around 130% – across all plots, but the significant differences in emissions were concentrated in the winter months immediately following cultivations). Indeed, CO₂ emissions from the plough plot were some 132% higher than from the control.

We also measured crop biomass and yield across the different treatments. In the winter barley crop in year one, biomass in the cultivated plots was significantly higher than in the DD and AMF plots (although this difference did not proceed to the bean crop in year two). Indeed, the plough biomass averaged some 600g/m² in May 2018, alongside around 400g/m² for the LDS versus around 300g/m² for both undisturbed plots. At harvest, this translated into a yield of 8.15t/ha in the ploughed plots versus 7.99t/ha for the LDS, 6.64t/ha for the AMF and 6.58t/ha for the DD. Although this seems substantial to me as a mere farmer, our research team assures me that the 1.5t/ha differential is not 'statistically significant', but is indicative of the difference between the treatments.



We also measured earthworm numbers and water infiltration across the field; as might be expected, earthworm numbers were significantly higher in the non-cultivated plots (and especially in the AMF plots in 2018) but water infiltration was again not 'statistically significantly different' across the piece – though it was higher in the cultivated areas.

As a whole, this research demonstrates that in soils liable to compaction particular care must be taken in the transition to a DD system. On emissions, when total CO₂ and N₂O outgasings were compared and adjusted for CO₂e, we discovered that the climate impact was least in the plots managed with an LDS, whilst emissions from the DD and ploughed plots were about even. However, if reduced fuel use was also taken into account in the DD plot (about 50% lower) then that would improve the picture for the non-cultivated control.

At the Allerton Project, this research has helped to inform the management of our soils. Although we direct drill as a policy, we also conduct regular monitoring of our soil health and structure and utilise our LDS where required to ameliorate compaction. This is especially important given that we do not operate a controlled-traffic system, and also operate a straw-for-muck deal in parts of the rotation which produces inevitable trafficking. Harvests such as that of 2023 also pose an issue for soil compaction, with increasingly variable and extreme weather

patterns posing an increasing risk for soil travelability and health.

As part of other long-term trials on the farm, we have recorded the often-noted issues around soil structure in the transition from conventional tillage to reduced tillage and direct drilling; some of our VESS scores decline in quality in the early years, before the process of 'self-structuring' begins to take effect as organic matter levels and biology increase. It's especially in this transitional period that care must be taken to avoid and alleviate compaction, through living roots if possible but mechanically if required. Indeed, we do utilise the plough within our normal rotation when agronomically justified; for us this is usually as a means of combatting blackgrass as part of a comprehensive integrated pest management strategy. Research as part of other long-term trials at Allerton has demonstrated that infrequent use of inversion tillage does not have the negative implications for soil health which might be feared.

The final piece of the jigsaw with regard to our compaction experiment was to run the financial numbers on the 2018 harvest. Although income/ha was highest on the ploughed ground, when adjusted for margin after cultivation and machinery costs (assuming lower kit requirements in a DD system) the LDS plots came out on top with a margin of £763/ha versus £700/ha for the ploughed, £591/ha for the AMF and £582/ha for the DD. What we must bear in mind with these results is that the DD control was heavily compacted; in optimum conditions we would expect (and can demonstrate from other research projects) that the DD would financially outperform the plough system; this data demonstrates the importance of mechanical compaction alleviation for profitability. It would seem that the AMF treatment had limited overall impact on most metrics measured, but again needs to be viewed in the context of challenging compacted conditions.



The value of much of the research we conduct at the Allerton Project is to convert many farms' anecdotal experience into solid data via rigorous scientific analysis, and to then make that research easily accessible and digestible for farmers on the ground. Although it might come as little surprise to learn that compaction is bad for crop production, this piece of work attaches numbers to that assumption, as well as setting it in the wider context of soil emissions. It was also curious to note that the clear results in much of year one did not necessarily translate into year two, where there was no significant difference in yield between the various treatments in the following bean crop.

Our understanding of soil science is still far from complete, and this work has filled one more small gap in our understanding on the road to sustainable farming.

DRILL MANUFACTURER IN FOCUS...

HORIZON

SPX STRIP-TILL CULTIVATOR AND PPX PLANTER

Will Coward is a farmer and contractor from Wiltshire, maize planting makes up around 750 acres of the contracting business alongside umbilical slurry spreading and baling being the bulk of the contracting operation.

The farming side of the business centres around a 360 head of Aberdeen Angus sucker herd.

Keen to explore the benefits of regenerative farming practices, three years ago Will took the decision to understand how strip-till cultivation could reduce ploughing and heavy cultivation to establish maize crops in line with the min-till practices they were already following on the farm.

Cover crop planting has become a bigger part of the contracting business due to catchment sensitive schemes subsidised by Wessex water locally. As Duchy of Cornwall tenant's, they are working hard to push conservation and regenerative best practice and methods.

The challenge of growing Maize crops over the last few seasons, with wet springs was the prompt to look at different options of crop establishment.

The move from the traditional plough, subsoil and power harrow started when looking at the options for changing an ageing mounted drill.

A demo of an 8 row Horizon SPX Strip-Till cultivator quickly proved the benefits of not moving all of the soil, as the traditional methods did, fuel and time savings were instant, as much as two thirds reduced in fuel alone.

The features on the SPX Strip-Till cultivator Will particularly like were the pneumatically controlled row cleaners and consolidation, which can both be altered from the cab.

The option of being able to fit a spring tine (Vibrotine kit) in place of the Tungsten carbide wear legs was also a big selling point, the plan is to trail Strip-Till in the autumn for next year maize planting and run the Vibrotine through in the spring.

It also highlighted some of the options around drills, having tried an 8 row trailed drill on fully cultivated ground, it quickly became apparent it wasn't completely accurate in following the strip-till cultivator.

With the Horizon SPX being a tool bar mounted, three point linkage implement, getting a trailed drill to follow accurately on curves / headlands proved more than a challenge.

The solution was all too obvious, the Horizon PPX Planter had been designed to work directly in tandem with the Horizon SPX Strip-Till Cultivator, it also offered another very distinct advantage, the option of a liquid fertiliser tank and system specifically designed to work on the drill, working in very competitive area for maize drilling, it also offered something other contractors weren't able to.

The PPX Planter has been designed to perfectly place seed into the optimal growing environment even in the most challenging environments. High volumes of crop residue, hard no-till stubbles or uneven strip till seedbeds are just some of the challenges that the PPX can comfortably handle. The PPX won't only perform in these challenging scenarios, it will also capture live data and make automated adjustments to ensure the optimal growing environment is achieved for every seed.

Supplied by local Dealers Redlynch Tractors, the first crop of maize was planted on the 11th of May 2023 with the new drill, Installed by Charlie Eaton from Horizon, Will was immediately impressed with how easy it was possible to control and manage the drill settings from the cab with the 20/20 screen, with accurate seed placement, both depth and spacing being paramount, the ability to be able to change the settings was something that Will saw as a benefit to the purchasing the PPX drill, even being able to see soil temperature on the screen was a real benefit to planting timings.

With its first planting season behind it, Will considers one of Horizons strongest attributes being its people. " It was nice to know that someone was on the end of a phone on a Saturday if I was having trouble, a quick phone call answered my questions"

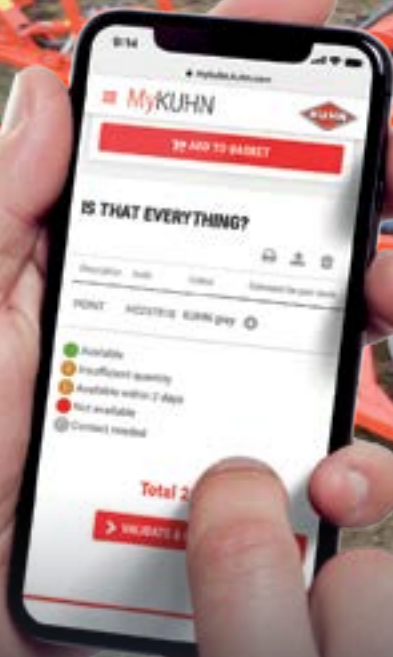
With crops looking better than they did last year and harvest only just around the corner, Will's already looking at planting cover crops on land destined for maize next season, who said maize can't be part of regen farming?

For more information on Horizon Agriculture's products www.horizonagriculture.com



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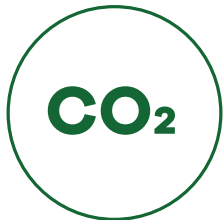
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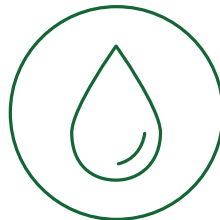
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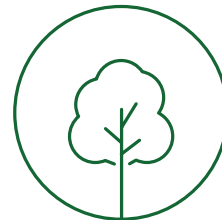
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