

ISSUE 25 | JANUARY 2024

DIRECT DRILLER

SOILS MAGAZINE

THE FUTURE OF YOUR SOILS

Starting the Regen Journey

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INTRODUCTION

MIKE DONOVAN, EDITOR

Farm risks rise as subsidies fall

The competent and effective manager keeps a weather eye out for storms which threaten their organisation. The 'threats' can be sudden, coming out of nowhere or alternatively events which have been building up for some time. Threats are sufficiently important to be the T part of the highly regarded SWOT business analysis technique. Management books and MBA courses provide lists of threats and dangers, plus the accompanying risk analysis, all which make effective tick boxes.

Real life is different, coming in with a blind side manoeuvre to wrong-foot you.

Farming is a riskier business now than it was just ten years ago, and the risk is far more than weather, disease and pests. The drop in your farm subsidy due to the Sustainable Farming Incentive is, as they say, 'unprecedented' because this is the first time a subsidy like Basic Payment has been withdrawn and replaced with something quite different. But there has been time to consider the consequences. The same may apply to the possible

glyphosate ban. It's a risk which needs addressing as it has been on the table for more than five years. Other risks might have shorter introductions. What if a government decides to impose a ban on diesel powered tractors? (not, I can assure you, something which has been in any way considered... for the moment). Or insist that workers wear respirators?

Effective managers have this constantly in mind - the "what if..." being their constant need to consider, assess and control farm operations. They need to think ahead, yet at the same time look behind for any previous experience and any relevant and useful data. It's one good reason for keeping those farm records - for ever. They are more than history.

Risk is also bound up with farm safety. It involves staff and many others from delivery drivers to walkers on your public footpaths.

The continued toll of serious and fatal farming accidents indicates the urgent need for safety to be addressed. Here's a thought....Hi-vis vests make people visible and their very existence spells out

the farm's commitment to safety. You can get them for around £2 and have the farm name printed on them to advertise your safety concerns.

Weather risks can hit crops and yields, and this year I have heard of many disasters in spring sown crops, especially barley. Drought followed by constant rain reduced yields on some farms to under 4 tonnes/ha. In many instances it's not too clear what the main culprit was, or if there was anything which could have been done. The big question is not so much whether 2024 will be a repeat performance, but what could be done at and before drilling to reduce the effects should the season be repeated.

Seasonal greetings to all, and may your wassailing provide a fruitful 2024!

There's good reason why so many farms are named 'Hope Farm'.



STARTING THE REGEN JOURNEY

WRITTEN BY CHRIS FELLOWS

Do you vividly recall the start of your journey into regenerative farming, can you pinpoint a specific enlightening moment? For some, this revelation is a regularly discussed topic, while for others, it unfolds as a gradual evolution. The changes introduced by SFI (Sustainable Farming Incentive) this year, however, are compelling new farmers to embrace regenerative farming practices, and the driving force behind this shift is unmistakably profit.

The nexus between regenerative farming and profitability has sometimes been deemed controversial, with profit not being the driving ethos of regenerative agriculture. However, for me, prioritising profitable farming is fundamental to all businesses. With that "profit" being balanced over the short

and long term.

The recent paradigm shift, wherein farmers are financially incentivised for conservation practices (instead of area based subsidies), has created a substantial surge in readership for this magazine. Whether in the traditional hard copy format or through digital mediums such as website views and PDF downloads (available free of charge on our website), a burgeoning audience is delving into the intricacies of regenerative practices. Interestingly, this new cohort of farmers won't identify as "Regen Farmers" and probably harbour reservations about such a classification. Acknowledging the potentially divisive nature of the term, there maybe emerges a need for a more inclusive term —perhaps "Commercial Regen"

signifying farmers who pragmatically adopt select regenerative techniques that prove profitable.

Recognising this, we have collaborated with Cereals to establish a dedicated space within the show tailored for farms embarking on or contemplating the start of their regenerative journey. This "Introduction to Regen" segment aims to explain the most lucrative methods to commence the regenerative journey, offering insights into optimising the benefits of SFI payments and leveraging the enduring soil enhancements achievable through the implementation of selected regenerative practices. If this sounds like you, then we look forward to seeing you at Direct Driller @ Cereals on 11th and 12th June 2024.

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WHY A FRENCH FARM HAS TURNED PREDOMINANTLY TO LIVESTOCK

Written by Mike Abram

On a recent BASE-UK trip to France, a visit to Christophe Piou's farm showed how you don't have to follow the herd to be successful

Surrounded by high value vegetable production and arable farms in the Loire Valley is what is now predominantly a livestock farm.

It wasn't always that way. When Christophe Piou started farming in 1999 the farm was an arable farm but gradually over the past 20 years livestock have become an increasing part of the farm.



Christophe Piou

Although from a farming family, prior to 1998, Christophe worked as an accountant for eight years. But after studying agriculture for a year in 1998, he bought a 110ha farm in Saint-Claude-de-Diray, close to Blois to the south of Paris, around 15km away from his father's 140ha farm, which they ran in partnership.

The two had very different soil types. Christophe's farm is on sands, so the main concern is drought, although he has access to irrigation. On his father's farm, which he now runs, the soil is sand overlying clay. Here, excess water particularly in winter is the challenge, as the clay pan underneath stops the water from

draining away.

"The yield potential is very low," Christophe says. "So we had to cover a large area in order to secure an income, meaning we were also doing another 200ha of contract work."

Christophe's accountancy background also meant he approached farming with a financial management perspective. A minimum or zero tillage system was partially adopted, due to the savings in machinery and labour costs, with a trip in 1986 to direct drilling demonstration with his father laying the foundations for the switch.

That was consolidated after meeting Frédéric Thomas, a pioneer in conservation agriculture, in 2001, who farmed around 25km away and was looking for a partner to help on his farm while he was away from home.



Frédéric Thomas

"On our first meeting we took a spade around the farm, and it was the first time I'd been around the field with a spade as a farmer," Christophe admits.

"We discovered a plough pan on

which water was sitting at a depth of 25-30cm, and also a power harrow pan. Both were affecting rooting of the winter crops and a good explanation of the low yield potential."

A comparison with Frédéric's own farm which at that stage was around five years ahead in using conservation agriculture practices further highlighted to Christophe the obvious difference.

He also used every BASE France trip possible to increase his knowledge base both from the farmers and advisers they visited but also the other people on the trip.

"During the next 10 years we increased our soil organic matter content from 0.8 to 2.5%. We went from zero cover crops to 100% cover crops, from 200kg to 2t/ha of earthworms.

"It was working well economically until around 2007 when the wheat price jumped sky high, expenses followed and then the wheat price crashed, making the economics difficult."

But the final straw was in 2016, when 200mm of rain in June caused floods in much of the wheat growing land south east of Paris, including the Loire Valley and most of Christophe's 260ha of crops. "Winter wheat yields were 2t instead of 6t/ha, durum wheat 1t instead of 5t/ha. I lost €200,000 of turnover, and the accountant was not insured.

"Today, I learn, I told myself. If we are able to lose €100,000 in farming, this means if we are smarter, we can make €100,000."

But it has required a pretty big shift in system. Again, the plan had its roots in an earlier BASE France trip – this time to North and South Dakota



Multi-species cover crop

in the US, although ironically it was there, he and Frédéric first heard of a French biochemist and farmer, André Voisin, and his theory of rational grazing. Voisin developed in the 1950s what have effectively become the principles for most modern rotational grazing systems.

“We had to go all the way to the US to hear about a famous French guy we didn’t know, but some of the farmers knew a lot about him and his teaching about how to get grass and cow working well together.”

It became the moment when Christophe knew he had to bring animals back on the farm as he had

lots of food available thanks to the cover crops.

Following that trip he started to look for someone who could manage livestock on his farm, but it took three years until he found someone suitable – Jose, a security guard, who was keen to change careers.

Despite the drawback that Jose knew nothing about sheep, Christophe bought 50 sheep and Frédéric provided 5ha on which to feed the sheep as a one-year trial. It went well and by the time of the 2016 floods Jose had expanded to 150 ewes, plus some of his own land.

The experience gave Christophe the idea that he could develop a system with sheep or cattle outside all year round, which would be more profitable and more resilient. “I went to New Zealand and saw a farm with 400ha with 2000 sheep and some cows, and the farmer was able to make €200,000 net after income tax without any subsidy, and it seemed quite easy. In our system, we have a



Lucerne cover

€100,000 support payment on top.”

From the initial 50 ewes in 2015, he now runs 1400 in total – 400 of which belong to his son, who came back to farm in 2020. “We only grow 100ha of crops out of the 400ha total farmed.”

The sheep enterprise helps organise the rotation. Around 100ha

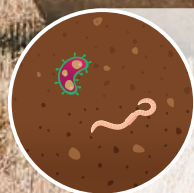
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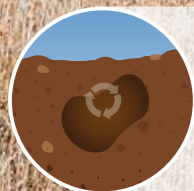
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Sheep grazing multi-species cover crop

of the farm is growing lucerne, which is grazed from April to the end of October.

"Many people think you cannot graze lucerne because of the risk of bloat," Frédéric points out. "But when the animals are used to it and when you manage the animals it is possible."

The drought-tolerance of lucerne with its deep rooting is vital, as summer growth is difficult to achieve in the region with most forage. "Conventional pasture is burned from May to October, but with lucerne, albeit with potentially a little bit of irrigation in the summer, you have production, you have nitrogen, and then organic matter and soil fertility build up."

It's usually in a field for three to five years before it needs replacing, playing an important role in helping to clean up fields when weed problems have arisen, including ryegrass.

"When there is a weed problem instead of trying to grow an arable crop, you grow forage, clean it up and then start again, if you want to," Christophe explains.



Angus Montbeliarde cross cattle

Overwinter the sheep mob-graze multi-species cover crops, typically consisting of species such as chicory, vetch, various radishes, lucerne and plantain. He splits the sheep into mobs of ideally just 50, although some mobs are up to 120. Typically 50 sheep will graze 2,500 sqm in two to three days up to 5,000 sqm in four days before being moved on.

Rotational grazing helps keep the need for wormers to a minimum. "We use no wormers on the ewes. On the young ones after weaning, we use one or two wormers and then analyse the dung to see whether it is necessary."

"It's a big advantage to keep some crops in the rotation because we can put the lambs where we have had no lambing and lower risk of worms. It's important after weaning to keep the lamb away from where there was lambing or the mother and lamb were together."

With around 100 fields in a 25km radius available for grazing, he finds keeping the mob numbers low easier to manage and avoids having to transport groups across the farm. They also keep Christophe's and his son's sheep separate.

Some of the outer perimeter of the farm is now fenced, while temporary wire fencing is used elsewhere. Fencing the entire farm is one challenge Christophe is still facing. "We've got 10km of fence to put in. The next step will be planting hedges around and inside the farm to bring shade to the animals."

Neighbouring farms also provide extra grazing Christophe can take advantage of with French farmers having to grow overwintered cover crops following crops such as wheat and barley before a spring crop.

"It's compulsory by regulation because of nitrates," Frédéric explains.

Around 25-33% of the captured nitrogen might become available to the following crop, dependent on weather and crop, he adds. "If it is dry in the spring, you might get very little back. If it is wet and warm, you will have more and then the rest will flow in the following years."

Grazing will increase the speed of that nutrient return, not the amount.

"Many people will think they increase the fertility with livestock, but no, you're just speeding up the return."

Lambing is outside in September. From the 1,400 ewes he sells 1,400 lambs each year at €100/ lamb net, he says. Remaining lambs are used as replacements and to grow the size of the flock.



Effect of Lucerne lay (left) on following crop

A more recent addition to the farm is the small herd of 30 Montbeliarde x Aberdeen Angus cattle, again kept permanently outside. Males and females were bought weaned at four months and are fattened for two years before slaughter. All meat, either lamb or beef, is sold direct to butchers or consumers, never to retail.

Christophe's son also has both meat chickens and laying hens, again kept outside on pasture in mobile hen houses.

The key to Christophe's system is basing animal production on soil fertility, Frédéric stresses. "One of the biggest mistakes made by many livestock farmers is they are driven too much by the size of the animals and the yield of the meat, but not thinking about the quality of the soil that will produce quality food from quality animals."

"Here, Christophe, thanks to direct drilling, increased the potential of his soil so he can produce a lot more biomass than conventional farmers would do, and then used that soil fertility and quality to change the way he farms animals."

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PRINCIPLES OF CARBON FOOTPRINTING 101

Written by Anna Woodley from Trinity AgTech

The concept of natural capital may seem distant and complex. However, it is a collective asset that everyone involved in agriculture should acknowledge and actively manage. From understanding the value of natural capital, to taking credible actions to reduce carbon footprints, farmers and land managers play a pivotal role in shaping a sustainable future. Here are our essential insights for carbon to help guide you on this inevitable journey.

Calculating a carbon footprint for a farm means assessing the total amount of greenhouse gases produced directly and indirectly from farming activities, usually expressed in equivalent tonnes of carbon dioxide (CO₂e).

Carbon dioxide equivalent (CO₂e) is a yardstick measurement with a global warming potential of 1. Other gases have their potential expressed as the equivalent amount of carbon dioxide, usually expressed in million tonnes of carbon dioxide equivalents. Methane, for example, has a CO₂e 28 times that of carbon dioxide. This means every 1m tonnes of methane released will be equivalent to emissions of 28m tonnes of carbon dioxide.

A carbon footprint calculation considers various sources including:

Direct emissions are emissions produced directly from farming activities. Examples include:

Methane (CH₄) from enteric fermentation in ruminant animals. Nitrous oxide (N₂O) from manure and fertilised soils.

CO₂ from machinery and transport used in farm operations.

Indirect emissions are emissions related to the production of goods and services used in farming. Examples include:

Emissions from the production of fertilisers and pesticides. Emissions from electricity used on the farm.

Emissions from the production of purchased feed.

Carbon sequestration refers to the process by which farms absorb and store carbon, primarily through plants and soil. Certain farming practices can increase carbon storage, effectively offsetting some of the farm's emissions.

The purpose of calculating a farm's carbon footprint is to understand its environmental impact, identify areas for improvement, and implement practices to reduce emissions.

Baseline

The baseline establishes your farm's annual emissions from current practices, which is crucial as any reductions from this point can generate credits. Incorporating historical management information is essential for realistic and credible reporting with Sandy.

Farmers have the option to input a minimum of one year's worth of data, but it is advisable to establish a baseline spanning three to five years for more reliable and conservative carbon credit calculations that account for uncertainties.

Components of a farm's carbon footprint

What is included in a carbon footprint can vary significantly based on the methodologies employed by the carbon footprinting tool and the standards it adheres to. Different tools might consider varied sources of emissions, have unique boundaries of assessment, or use distinct emission factors.

Moreover, the standards or protocols that a tool aligns with, such as the Greenhouse Gas Protocol or ISO 14067, further define the scope and precision of the calculation. Therefore, when evaluating or comparing carbon footprints, it's essential to understand the underlying methodologies and standards.

Carbon standards

Adhering to rigorous standards in the creation of your carbon calculation, ensures the utmost accuracy and credibility in the

assessments. Sandy by Trinity AgTech adheres to the highest standards.

IPCC 2019 Tier 2 and Tier 3 are advanced methods with high data and complexity demands. They're viewed as more accurate if sufficient data is available.

ISO 14064-2 – quantification, monitoring and reporting of activities intended to cause greenhouse gas emissions reductions or removal enhancements.

ISO 14067 – quantification and reporting of the carbon footprint of a product, and the most comprehensive standard for carbon footprint reporting available.

Greenhouse Gas Protocol Land Sector and Removals Guidance standardises how companies measure and report their land-related GHG emissions and removals to accurately reflect their impact on climate. ISO 14067 provides good alignment with this guidance, and SBTi FLAG.

SBTi FLAG provides a standardised method for land-intensive sectors to set science-based targets, addressing the 22% of global emissions from agriculture, forestry, and other land uses.

PAS 2050 assesses the life cycle greenhouse gas emissions of products and services. While it's largely been replaced by ISO 14067 and the GHG Protocol, some retailers still reference it.

Greenhouse Gas Protocol Product Standard – designed to understand, quantify, and manage greenhouse gas emissions.

Farmers have a great chance to boost profits and sustainability by delving into the world of carbon and natural capital. However, picking the right software for measuring and managing natural capital can be confusing. Some people liken the voluntary carbon market to the "Wild West" because they believe it lacks clear rules. They argue that the market's unregulated nature, along with the varying prices and quality of carbon credits, reinforces this idea that there are no set guidelines for the developing carbon and biodiversity markets. But that's a misconception.

The reality is that several standards exist to bring order and credibility to this field. While carbon reporting criteria can vary, there are international standards that ensure the credibility of carbon footprint reporting methods.

All the previously mentioned standards consider emissions and removals from land management, except for one: PAS 2050. PAS 2050

excludes changes in soil carbon content caused by actions such as farming practices and crop types from greenhouse gas (GHG) emissions assessments. Instead, PAS 2050 standards focus on changes in soil carbon resulting from alterations in land use.

Because PAS 2050 doesn't consider emissions and removals caused by farming practices, it becomes challenging for agriculture to achieve net-zero emissions, and companies will struggle to meet their Scope 3 emissions targets.

The PAS 2050 guidelines also exclude the carbon that is stored in plants or trees with a lifespan of 20 years or more. These are plants or trees that have a relatively long life, such as fruit trees. This exclusion applies when these long-lived plants or trees are part of a larger product system but are not products themselves. In other words, if the carbon is stored in these plants or trees and they are not the main products being assessed,

they are excluded from the carbon footprint calculation.

Carbon footprint definitions

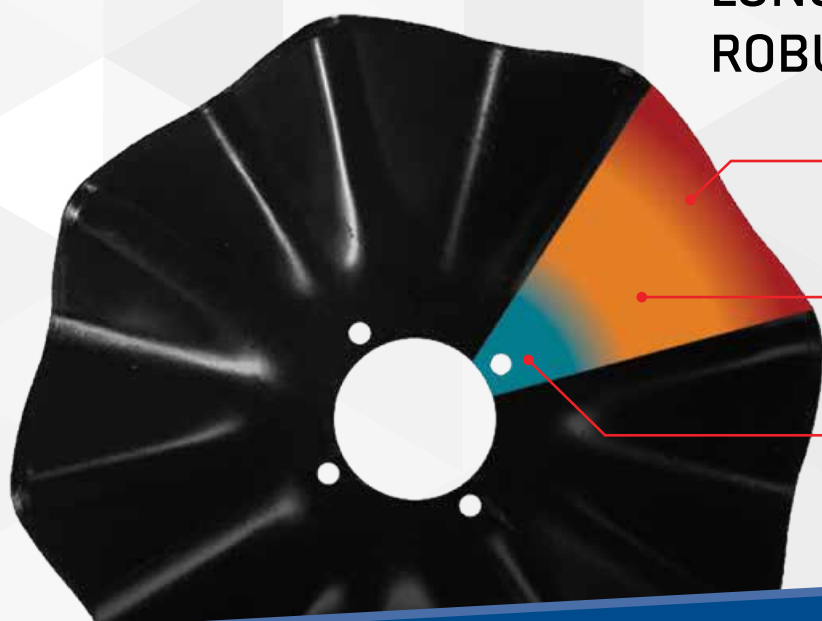
Carbon leakage in farming refers to the unintended consequence where local efforts to reduce carbon emissions might lead to increased emissions elsewhere. For instance, a UK farm might adopt sustainable practices to lessen its carbon footprint, resulting in reduced yields. This decrease can prompt the UK to import more food to meet demand. If these imports come from countries with less sustainable farming practices, the global emissions might simply shift rather than decrease. Additionally, the transportation of imported goods can further contribute to emissions. Thus, while the UK farm's emissions are reduced, the global output could remain unchanged or even rise due to these displaced production dynamics.

Emissions intensity is calculated by dividing the level of greenhouse gas emissions by the total product, for example t CO₂e per tonne.



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Global Warming Potential (GWP) and Global Warming Potential* (GWP*) are both metrics that assess the climate effects of greenhouse gases. GWP, developed by the IPCC, measures the heat-trapping ability of different gases compared to CO₂ over set periods, like 20, 100, or 500 years. It's a standard in climate modelling and policy-making.

GWP*, on the other hand, was created to better represent the impacts of short-lived pollutants like methane, which decrease quickly in the atmosphere. Unlike GWP that focuses on cumulative effects, GWP* considers the rate of emission changes, making it ideal for areas with significant methane emissions. In summary, GWP* offers a more detailed perspective for short-lived gases, guiding targeted mitigation strategies.

Scope 1 emissions are direct emissions controlled by the farm, including those from on-farm fuel use, livestock digestion, and manure management. These are distinct from Scope 2 and Scope 3 emissions, which involve indirect sources and activities beyond the farm's control.

Scope 2 emissions are indirect emissions tied to the farm's electricity, heat, or steam purchases. For instance, if a farm buys electricity from the grid, the emissions linked to how that electricity was generated (e.g., coal, natural gas, renewables) fall under Scope 2 emissions.

Scope 3 emissions are not directly controlled by the farm but result from its activities. They are diverse and often difficult to measure, including emissions from purchased feed production, product transportation, and the use of items like fertilisers and pesticides.

Sandy provides detail on Scope 1, 2 and 3 emissions.

Monetisation

Trinity AgTech remains neutral when it comes to farmers deciding whether to trade carbon credits or not. Our primary goal is to provide farmers with the necessary tools, information, and resources to make informed

decisions that align with their unique agricultural practices and goals. We respect the autonomy of farmers, understanding that the choice to engage in carbon credit trading is a complex one, influenced by various factors. Whether a farmer chooses to participate or not, we remain committed to supporting them in their pursuit of sustainable and environmentally responsible farming practices, emphasising that the decision is ultimately theirs to make.

For those who have made the conscious decision to engage in carbon trading, Trinity AgTech's sister company, Trinity Natural Capital Markets (NCM) can provide a legally sound framework with a commitment to transparency and the exchange of high-quality carbon credits.

Before deciding if carbon credits trading is right for your business, ask yourself – do I know what natural capital assets I have? If I can grow those assets? What are those assets worth? If you can't answer those questions, you should be measuring a baseline and running a set of natural capital accounts and scenario planning.

Understanding scenario planning

Scenario planning is a dynamic process that involves testing various scenarios or hypotheses regarding a farm's carbon footprint. It builds upon the baseline data generated during the optimisation stage, where farmers aim to minimise their carbon footprint. Scenario planning takes this a step further by examining what could be achieved if specific parameters, such as management practices, were adjusted.

Natural Capital Valuation standards:

There are multiple standards and frameworks in natural capital valuation, and Trinity AgTech tries to comply with as many of these standards as possible to create a comprehensive solution that's superior to any single standard. Our approach is rooted in the belief that by integrating multiple standards,

we can provide a robust and reliable framework.

United Nations System of Environmental-Economic Accounting (SEEA) provides a framework for integrating economic and environmental data, which Trinity AgTech has adapted for agricultural use in Sandy's natural capital valuation, making minor language adjustments for farmer accessibility while adhering to global standards.

BSI Natural Capital Accounting for Organizations (BS 8632:2021) is a standard providing guidelines for preparing natural capital accounts, focusing on clear documentation of the accounting process, including scope, data, assumptions, and gaps, to support transparent and informed decisions. It also shapes the output structure, specifying how financial documents like profit and loss accounts and balance sheets should be presented for compliance.

The Taskforce on Nature-related Financial Disclosures (TNFD) provides recommendations for organisations to disclose their interaction with nature, and Sandy's natural capital valuation adopts TNFD's definitions for assets like biomass and ecosystems in its valuation schedules.

Sandy's Natural Capital valuation outputs

Natural Capital asset register

The BS 8632:2021 standard highlights the need for an asset register to list natural assets for valuation. Users choose the valuation's scope and methods to ensure reliable outcomes. After method selection and timeline establishment, the evaluation yields schedules that offer an initial overview followed by detailed insights.

Profit and loss account

The profit and loss account for a given year displays a business's net position by recording income and expenses, including the value of services from a farm's natural assets as defined by the UN SEEA: provisioning, regulating and maintenance, and cultural

services, all categorised distinctly to avoid overlap and ensure their combined value is accurate without needing adjustments.

Balance sheet

The balance sheet provides a snapshot of a business's net worth by detailing what it owns and owes, traditionally focusing on assets rather than flows.

In natural capital accounting, it values assets based on the flows they facilitate, considering long-term effects and costs, like maintaining carbon stocks.

This approach categorises valuations into business and external flows, and accounts for the costs of maintaining natural capital as liabilities, offering a singular valuation of a business's natural capital worth over time, beyond just short-term profit and loss.

Asset valuation

Asset valuation in natural capital accounting determines net value by deducting liabilities from the value of assets, which are categorised according to the Taskforce on Nature-related Financial Disclosures. It quantifies the flows produced by various natural capital assets on a farm and assesses their specific contributions and ratios.

Risk register

The risk register in natural capital valuation gathers intricate data to highlight potential risks and opportunities related to natural capital, aiming to clarify and boost confidence in the valuation process. It is flexible, allowing users to select relevant risks and spotlight opportunities, like identifying societal benefits not currently monetized, such as a farm's carbon sequestration without selling credits.

Measurement, Reporting, and Verification

Monitoring, reporting, and verification (MRV) play a crucial role in carbon footprinting on farms, helping to assess and manage greenhouse gas

emissions effectively. MRV systems, such as Sandy by Trinity AgTech, provide the necessary framework to track emissions, report progress, and ensure transparency in carbon reduction efforts.

Monitoring involves the continuous collection of data on various emission sources within the farm, such as livestock, fertiliser use, energy consumption, and land management practices.

Reporting is the process of documenting and communicating the collected data, emissions, and reduction strategies to stakeholders, including government agencies, consumers, and supply chain partners. Transparent reporting not only enhances accountability but also builds trust among consumers who increasingly seek sustainable products.

Verification is a critical component of MRV, ensuring the accuracy and reliability of reported emissions data. Third-party verifiers or certification schemes often assess a farm's carbon footprint to validate its claims. Verification adds credibility to emission reduction efforts and can open up opportunities for carbon credits or participation in voluntary carbon markets.

Incorporating MRV into farm management is not only about reducing emissions but also improving overall efficiency and sustainability. Farmers can use the data collected to optimise resource use, reduce costs, and enhance productivity. Moreover, MRV systems empower farmers with insights into the environmental impact of their practices, enabling them to adopt more climate-friendly strategies.

Financial and legal transactions

Monitoring, reporting, and verification (MRV) hold paramount importance when farmers enter into financial or legal transactions because they need assurance that they possess an accurate and credible measurement platform for their carbon footprint. MRV not only provides a systematic way to quantify emissions but also

builds trust and reliability, making it an invaluable tool in such transactions.

Farmers are often involved in various financial activities, including loans, investments, and carbon credit trading, where a precise understanding of their carbon footprint is essential.

Financial institutions and investors are increasingly scrutinising the environmental performance of businesses, including farms. Having a robust MRV system in place allows farmers to provide verifiable data that can support their requests for loans, attract sustainable investments, and enhance their overall financial standing.

Similarly, entering into legal agreements, such as contracts or compliance with environmental regulations, necessitates accurate carbon footprint data. Regulatory bodies and legal authorities may require farmers to adhere to emission reduction targets or provide evidence of sustainable practices. MRV ensures that farmers have the data necessary to demonstrate their commitment to environmental responsibilities, mitigating potential legal risks and liabilities.



Anna Wooley, Trinity AgTech



FARMER FOCUS

DAVID WHITE



Thoughts following a difficult autumn.

"How much rain do you get on farm? All of it." is a quote from an American regen farmer whose name escapes me. A comment that we can all relate to this autumn as we watched the millimetres accumulate in our rain gauges with a feeling that we personally were getting ALL of the rain. The quote of course refers to the soil organic matter, water holding potential and good structure, but the percolation rate in a good soil has again shown the ability to aid resilience and retain healthier looking crops.

No question that it's been a difficult autumn with what seems like continuous storms blowing through, can't think how many letters the Met Office will have got through naming them!

Here in the 'dry' east we had 224mm of rainfall in September/October with 167 of that falling in October. Certainly, again the less is more strategy has proved to be the most resilient and here any field that had 'stuff' growing in it has remained relatively dry and drillable. I put 'stuff' as it didn't need to be an expensively seeded catch crop, as volunteer oats provided the perfect



entry for winter beans.

I've been lucky enough to travel extensively of late, not only through East Anglia, the Home Counties and up to Yorkshire but we also drove over 1100 miles on the recent BASE UK trip to France. We did a big loop down the east, across to the Loire region, and back up to the top side of Paris for our final visits. The clear lesson learnt was that any soil that had been moved sat very sad and wet, often with wash-outs on slopes and anything

'alive' and unmoved walked OK. Poor headlands clearly show no respect for the Brexit separation of the UK from Europe and is a common feature. There is of course a limit to what good structure and kind topography can cope with and my low fields do have wet holes and some standing water. These fields will have been meadows back in the 1970s when mixed farms were regarded as inefficient and the push for 'big' production dictated that they were ploughed up. Ooh what a bonanza we had cashing in on decades worth of carbon being released. Also, how strange now that I'm looking at payments that support arable reversion and capital grants for fencing to return them to their former use, what goes around... I'm quite looking forward to being a livestock farmer again even if in the early days being more livestock host than owner. Clearly this trend also has no respect for Brexit with us seeing some great grazing practises in France with livestock taking over arable fields.

Bandwagon or mindset change?

We must remind ourselves livestock integration is one of the 5 Regen Ag principals and whilst many farmers now encouraged by SFI payments may dabble with throwing a few strange





seeds around their farms to qualify for one or another payment acronyms, they will barely be 'conservation grade' never mind regen. We've recently seen the Red Tractor grab for further farming domination with their surprise out-flanking move to impose the Green Commitment Module and grab good practice for the supply chain to capitalise on. Too many middle men see it (regen) as being on trend, something they want to be associated with to grab an easy pound (or carbon kg) or for customer kudos, without A) understanding it or B) being happy to reward those really making a difference to their farms and their soils.

This has highlighted the fact that some kind of definition of what regen ag is, is maybe needed. Lack of understanding and the fact that every new sheet of paper is blank means that we are at risk of more new wheels being invented than

Raleigh ever made. This definition/demonstration of change should be no more difficult than adopting the 5 principals. On top for that you will have to take some risk, try something new, see and measure simply the farm improvement brought by practice change. Share your experience with others so we can learn together. Work with local schools and community so they have opportunity to get on farm, understand the difference and create customer demand.

Fortunately, I'm working with 2 organisations that do understand the difference and are actively working to promote the benefits and bring financial value back to the farmer.

Choose your partners carefully and not let regen ag become just another meaningless slogan.

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DISTINGUISHED SOIL HEALTH PIONEERS TO HEAD UP BASE-UK CONFERENCE

7th & 8th February 2024

Two world-renowned soil health and cover crop experts will be speaking at the BASE-UK conference in February 2024, the farmer organisation has announced.

Brazilian cover crop guru Dr Ademir Calegari, who has over 30 years of experience with no-till across farms of all sizes in South America and beyond is speaking on the first day of the conference as part of a line-up which has both UK and overseas participants, including farmers sharing their learnings.

He is also recognised as having mentored the French regenerative agriculture expert Frédéric Thomas, who spoke at last year's conference and continues to support and inspire BASE-UK members.

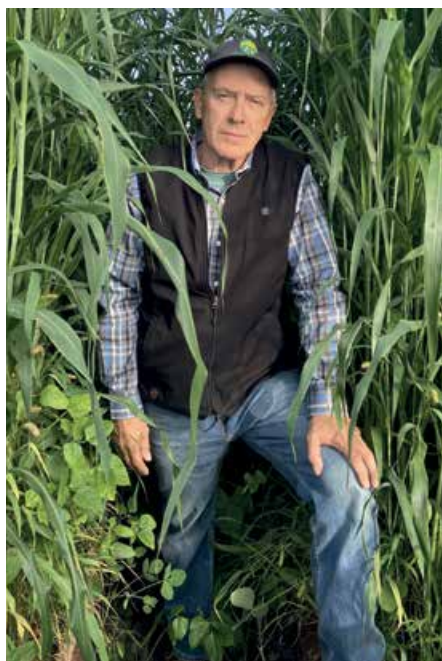
Ademir's distinguished work on cover crops, no-till and crop rotation and their importance to sustainable agriculture will be the basis of his talk. Credited with accelerating the no-till revolution in South America, Ademir's belief that feeding the soil to feed the crop is expected to be a major theme of his presentation.

As Edwin Taylor, chairman of BASE-UK points out, having Ademir at the conference will give farmers the

chance to broaden their knowledge and improve their understanding of how to get the most from their farming system.

"We are thrilled that Ademir will be with us at our conference and very much look forward to hearing what he has to say, so that we can build on what we are doing."

Also speaking is US-based Jay Fuhrer, the founder of the soil health movement and mentor to many of the early adopters, including Gabe Brown. He learnt his knowledge about cover cropping from Ademir Calegari, and is taking part on the second day of the conference.



Jay Fuhrer

With over 40 years of experience in helping farms to build healthy soil and improve soil function, Jay is often associated with the rainfall simulator,

which shows the impact of rain events on differently managed soils.

Now based at Menoken Farm in North Dakota, Jay continues to put his soil health principles into practice.

His view is that these principles are universal – but stresses that how farmers get there and how fast they go is up to them.

His extensive knowledge of how no-till, cover crops and grazing management can benefit soil health and improve the water cycle is in greater demand than ever, says Edwin, who emphasises the challenges that all farming businesses face with climate change.

"This sort of expertise is exactly what we need to share," he says. "Again, we are delighted that Jay is able to join us and we look forward to benefiting from his advice and guidance."

Other speakers at the conference include husband and wife team Alex and Hannah Fraser - Hannah is a Nuffield Scholar who will discuss nutrient density of food. Donna Udall (soon to be known by her newly married name of Davys) will present on Biochar asking – Gimmick or Silver Bullet? BASE-UK members Toby Simpson, Ben Adams, David Purdy will also be joining the program.

There are just a few weeks left for you to book a place at our Annual Conference on Wednesday 7th and Thursday 8th February 2024 – closing date is 15th January 2024. If you would like to attend, please email rebecca@base-uk.co.uk as soon as possible. All details are available on our website www.base-uk.co.uk



Dr Ademir Calegari

Success as BASE-UK Sponsors Members Communication Skills Course

At the end of September 2023, eighteen BASE-UK members attended a Communication Skills Course with Susie Emmett of Green Shoots Productions.

Sponsored by BASE-UK, the course was designed to enable them to pass on their knowledge and experience in farming and the agricultural industry. As a result, we have already seen some members presenting at farm walks, while others are speaking at the Conference. All have said how much they appreciate their newfound presentation skills.

The BASE-UK Committee is considering running this offer again in the future and will notify members when this is available.

BASE-UK Members Meeting at the James Hutton Institute with Jay Fuhrer

On Monday 12th February 2024 BASE-UK is hosting an event by kind invitation from Professor Adrian Newton of the James Hutton Institute. As well as Jay Fuhrer, one of our key speakers from the Conference, the following experts from the James Hutton Institute will also be speaking:

- Roy Neilson on whether our cover crop trial shows any impact on beneficial and/or pathogenic nematodes.
- Tracy Valentine on the Grieve's House long term tillage trial findings and some cover crop work too.
- Tim George on developments in monitoring soil health in Regen Ag systems and an update on the International Barley Hub (IBH).

Other details were still being confirmed as Direct Driller went to press.

Several of our Scottish members work with the Institute and assist with their research. Doug Christie has a close working relationship with Adrian Newton and often undertakes trial work for them.

This event will be for BASE-UK members only and has limited places. Further information will be emailed to members in due course. Speakers are subject to change.

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!

How to join BASE-UK

Membership for BASE-UK is open to anyone with an interest in regenerative agriculture. Over 80% of our members are farmers and we pride ourselves on not dropping below this percentage of farmer members in order to retain the key 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



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AT CEREALS 2024**

“BASE-UK is delighted to be partnering with Direct Driller at Cereals 2024. We will be providing speakers from the vast pool of knowledge that are our members, on starting the regen journey and what mistakes to avoid.”

Edwin Taylor, Chairman.

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WHO OWNS REGEN?

Written by James Warne from Soil First Farming

It is clear that the term 'Regen ag' is now becoming as confused and meaningless as 'min-till'. The question of 'what is Regen' now happens with regular occurrence. Worryingly there now seems to be, in the UK at least, organisations who are keen to control the narrative and take ownership of the term regen for their own aims.

What is regen? What is it we trying to regenerate? The origins of the term are believed to stem from Robert Rodale who was principally referring to regenerating the soil and if we are truthfully honest to ourselves this is the fundamental aim of regen. "It's about the soil, stupid". More recently we have become familiar to the Gabe Brown version of 5 (now 6) principles of regen.

The regeneration of the soil brings immediate benefits to the farmer, and a wide range of other outcomes. These externalities, while mostly positive, and very welcome and necessary, are still secondary to regen's core principle of regenerating the soil.

Does this even matter? Well, yes it does. These externalities are all adding to the confusion voiced by farmers about regen and are being used to take control of the narrative by outside forces. Then chuck in the barrage of governmental policies and agricultural philosophies and it's no wonder that the term regen has

become lost and confused. Regen has become conflated with net-zero, emerging carbon and biodiversity-net-gain markets, pressures and fears over inputs, SFI and ELM, the list is long.

The media is now awash with stories about how some farmers are cutting all inputs to become regen, with no loss of income, while others, and most of the released academic research, shows the exact opposite. What do you believe, or where do you turn?

Now the battle for control of the has begun. In recent weeks I have sat through several seminars where organisations are laying the groundwork for further interpretation of Brown's five principles. Why would they do this if it isn't to exact some form of control? Are we being lined up for another layer of bureaucracy, inspection and certification? Why is this even necessary, surely the guiding principles which underpin the philosophy are clear enough. Or to put it another way; It's not organic; you can use fertilisers; you shouldn't be

employing intensive tillage every year; if you can see the soil, you've failed.

One organisation even mentioned the need to measure the outcomes and ignore the adherence to the principles. The only outcome should be a direct improvement in the quality and functionality of the soil, be that chemical, physical or biological. An increase in carbon storage is a useful indicator but not all soils are going to achieve that.

And what of the externalities, where do they come in? To my mind these are all separate, which all farmers should be striving for. They are all to be commended, some should even be rewarded and need to be rewarded. Regenerating soil should lead to enhanced biodiversity, after all the soil provides the life at the bottom of the terrestrial food chain. Better soil structure allows greater water infiltration rather than run-off, greater aggregate stability and soil organic matter can reduce soil loss and nutrient enrichment of water courses.

What of the wider social interaction and promotion of agriculture within the local community? Again the philosophy facilitates a story which can be told, and should be told but this is not a requirement to be regen, it's simply a nice add-on.

Functioning soil can enable a phased reduction of inputs over time, although I feel the complete removal of them is not sensible or necessary. This contributes to the sustainability and net-zero we are told we must achieve but again it is because of the system, not a requirement of it. Be clear that you can enjoy the best of soil health whilst still using fertilisers and pesticides, there are plenty of examples of farmers that have done so here in the UK.

We need to ensure that the message is clear, no-one owns or defines the system or its outcomes, the principles of the philosophy are enough.



Regen is all about the soil

6,000,000
2,000,000
36
17
2
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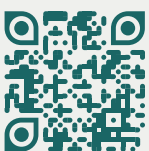
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UNVEILING THE HIDDEN HEROES: THE ECOSYSTEM SERVICES PROVIDED BY ACULEATE WASPS

The natural world, spanning from individual organisms to entire ecosystems, offers a wide range of functions and benefits known as ecosystem services (ESs) that significantly contribute to human well-being. These services can be broadly categorized into four types: regulating services (e.g., ecosystem process regulation), provisioning services (e.g., material outputs from ecosystems), supporting services (e.g., maintenance of other ESs), and cultural services (e.g., educational and recreational roles of ecosystems) (MEA, 2005). Insects, a highly diverse and abundant group in the animal kingdom, play a vital role in providing various ESs, such as pollination and pest control. In particular, bees have received considerable attention for their contributions to ESs, but other insect groups, including wasps, remain understudied despite their potential significance.

Wasps are a diverse group of insects, with over 33,000 described species within the aculeate wasp suborder, excluding parasitoid wasps (Parasitica) and fig wasps. While parasitoid wasps have received attention for their role in pest regulation, the remaining aculeate wasps, both solitary and social, have been relatively neglected in research and their ES contributions are poorly understood. This oversight is concerning as aculeate wasps are globally distributed and represent a significant portion of hymenopteran species richness.

This comprehensive review focuses on shedding light on the ESs provided by aculeate wasps, including both solitary and social species. Despite their abundance and ecological significance, the services they offer have remained poorly defined and undervalued. Several factors underline the importance of studying these wasps:

1. **Global Distribution and Diversity:** Aculeate wasps are widespread and exhibit high species richness, surpassing the combined species count of well-studied insects like bees and ants.
2. **Predatory Potential:** While the predatory roles of aculeate wasps in regulating arthropod populations have been documented

anecdotally, a comprehensive synthesis of empirical data is lacking. Understanding their impact on ecosystems is crucial for conservation efforts and harnessing their ESs.

3. **Pollination:** Aculeate wasps are overlooked as pollinators of ecologically and economically important plants, despite playing a role in pollination networks.
4. **Disservices and Cultural Perception:** The negative aspects of wasps, such as their aggressiveness and stinging behaviour, have dominated their ecological literature, and public perception tends to be unfavourable. Addressing these issues is vital for a more balanced understanding.
5. **Anthropogenic Pressures:** Similar to bees, aculeate wasps face threats from agricultural practices, habitat loss, and climate change, emphasizing the need to assess their ES contributions in a changing environment.

The review identifies ten distinct ways through which aculeate wasps provide ESs, categorized into the four primary areas: regulating services (e.g., pest control through predation), supporting services (e.g., decomposition and seed dispersal), provisioning services (e.g.,

as a source of nutrition and biomedical compounds), and cultural services (e.g., bioindicators and their portrayal in literature and arts).

These findings highlight the potential significance of aculeate wasps in maintaining ecosystem health and their direct and indirect contributions to human well-being. The review offers a valuable resource by collating and synthesizing existing evidence, thereby providing a more comprehensive understanding of the ESs provided by this often overlooked insect group. Given the current concerns about global insect declines, recognising and conserving the services provided by aculeate wasps is essential for both ecological sustainability and human welfare.

Read the full paper here:
<https://onlinelibrary.wiley.com/doi/10.1111/brv.12719> or
scan the QR Code.





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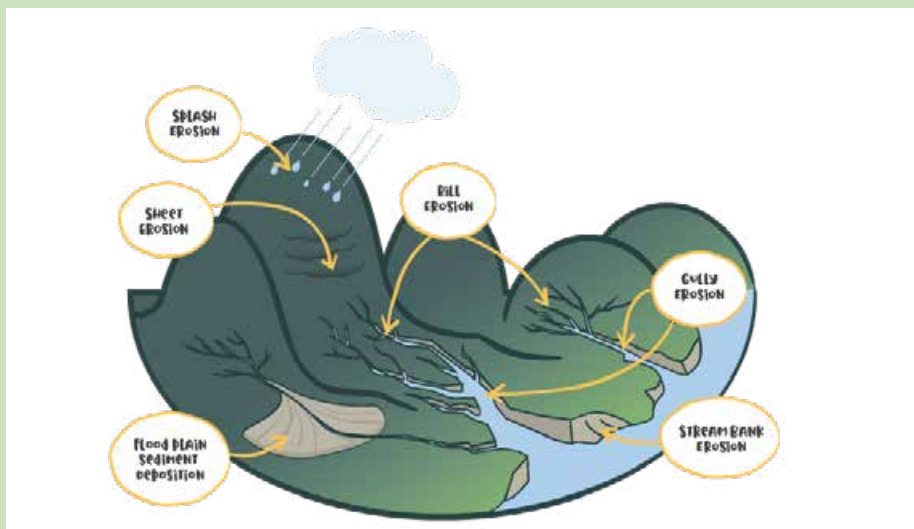
Written by Joe Stanley, Head of Sustainable Farming, at The Allerton Project

I was recently invited to speak at the North of England Farming Conference at Hexham in Northumbria, with a wide brief to cover anything forward-thinking which ticked the box for both environmental and financial sustainability. Weeks in advance I had submitted my presentation which covered a wide spectrum from agroforestry to nutrient use efficiency; SFI to IPM. But on the drive north in the wake of storms Babet and Ciaran, I couldn't help but notice the devastation wrought on arable crops by the torrential rains – devastation, it must be said, more than matched by the state of crops across North-West Europe when I was on the continent the next week.

Upon arriving at the venue, I decided it was more practically useful to junk my planned presentation and instead rapidly throw together some of the information gleaned from 30 years of research at the Allerton Project into soil management, and how growers might build resilience into their land in the face of escalating climate extremes. I hope perhaps that some of that information is useful here.



According to Environment Agency figures dating back to 2019 (before our winters became so consistently challenging) we are thought to lose some 2.9m tonnes of topsoil from England and Wales every year at a direct cost to the economy of around £180m (a mere £62/t!), while over 2m hectares of soil are thought to be at risk of erosion. Globally, 24m tonnes of topsoil are thought to be lost to erosion annually, with an area the size of Greece suffering fresh soil degradation in the same time period. It has been calculated that soil regenerates at the rough rate of one inch per 250-800 years; no doubt most of us are aware that we can lose it much faster than that. Soil is a finite resource.



Land erosion

The factors which influence soil erosion are many and varied; weather, soil type and topography are largely out of our control. Yet there are things which we can influence; crop selection and rotations; cultivation type and direction; drainage; soil cover and soil health. I won't teach the reader to suck eggs by extolling the virtues of

increasingly important factor in the soil loss equation; having been collectively encouraged to push autumn drilling later into October and even November to deal with blackgrass, we're now seeing all manner of problems arise from this approach. Here at the Allerton Project, we are looking at very significant crop loss from seed planted prior to Babet and Ciaran which simply rotted in the ground, while worked down ground all around us is currently flowing into the North Sea. Maize fields are a sea of ruts and mud. Rotational choice is basic, yes, but what has been acceptable and even successful in the past is decreasingly so.



field drainage, but needless to say it's probably the single biggest limiting factor in the productivity of many soils as we enter our fourth decade since drainage grants were discontinued.

Rotations are becoming an

Into this feeds more general arguments about land use; which areas of fields (and even farms) might be better planted with buffer strips, grass leys or trees? Modelling conducted by the Allerton Project shows that afforestation can reduce sediment (and phosphate) loss to water by an average of 75%, while utilising 20m buffer strips in an arable situation can reduce it by some 25%. However, by adopting



Sediment Trap

no-till establishment, reductions of 35% can be seen on average, even in the absence of the other measures. In stacking these different approaches, very significant improvements to soil management can therefore be achieved.

Reduced tillage is key to stopping soil movement before it starts, with the field surface remaining undisturbed and soil particles less prone to dislodgement by rainfall and erosion by surface run off. An added benefit is the higher proportion of crop residues to be found in such systems, which add 'soil armour'. But tramline management is also a key element of good soil management; we've found that some 80% of sediment and phosphate loss can be attributed to the 2% of the field which consists of tramlines.

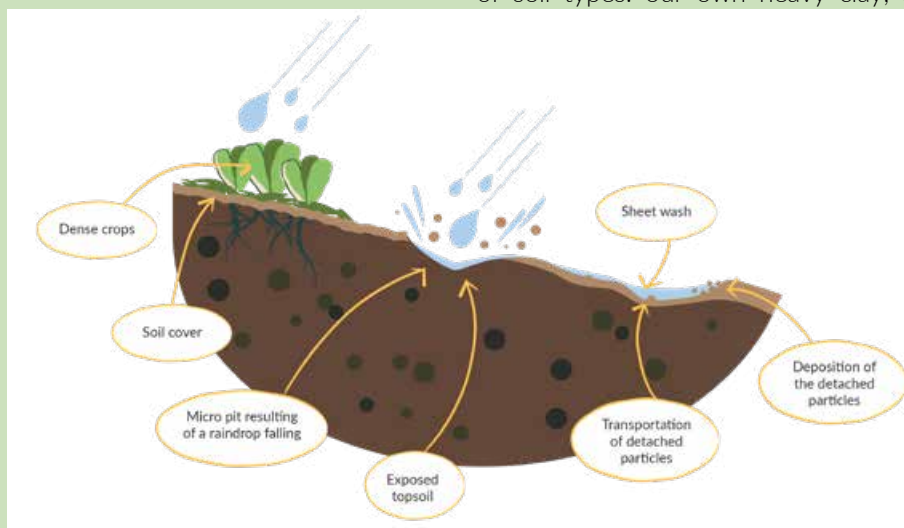
There are many practices which can be employed to reduce tramline erosion, the most effective of which is disruption with a following tine. However, we recognise that this is not practical in a broadacre arable situation, and our data would indicate that contouring (where possible) and use of low ground pressure tyres are the next best options.

If soil does start to move, gets past buffer strips and enters a field ditch, sediment traps are a last line of defence to stop it from leaving the farm, the intention being to intercept sediment-laden water and slow it down, decreasing the energy holding soil particles in suspension and allowing them to settle on the bottom. We have conducted extensive trials with these capital items, on a range of soil types: our own heavy clay; a

medium loam; a sandy loam. Over the course of three years, we measured some 70t of sediment collected on the sandy soil site; some 40t on the medium loam and a mere 1.7t on our own clay site. This demonstrates two things; heavier soils are by their nature more difficult to erode in the first place, but that sediment traps are also very site-specific: although highly effective in situations with larger, coarser and heavier soil particles, they are of very low efficacy in situations with tiny clay particles where days are required to allow them to drop out of suspension, not hours. In clay landscapes, soil must be intercepted before it leaves the field.

Of course, perhaps the most effective – if most difficult to achieve – means to build resilience into soils is to increase levels of organic matter. As previously related in these pages, it has taken us a decade of 'conservation tillage' techniques to increase some of our clay soils by 0.7% SOM; it is not a quick process. But higher levels of SOM demonstrably improve the structure of soil, and thereby its ability to allow rainfall to infiltrate. Higher OM levels also give rise to improved levels of soil biota, including earthworms, which have been shown in some situations to contribute some 80% of the infiltration capacity of cropland soils, largely through the deep vertical channels of anecic worms, too easily disrupted by tillage. And with OM holding up to 10x its own weight in water, it's thought that increasing it by 1% in a standard mineral soil can add an additional 200t of water holding capacity per hectare to a depth of six inches. When the flooding stops and the inevitable spring drought begins, that is a very valuable resource.

Every farm and field is different, with a wide interplay of different factors impacting on optimum soil management between them. But there are fundamental principles of good soil management which are broadly applicable in any situation. The challenge for individual farm businesses, now and in the coming years, is to harness available income streams to assess which land use and soil management techniques are best suited to their situations to safeguard the future of their most valuable asset.



Raindrop impact damage

FARMER FOCUS

ANDREW JACKSON



As we are all aware, this autumn has been especially wet. Although we are not a big farm and most probably, we have a drill capable of sowing twice our area, I would like to report that the principles of direct drilling and regenerative farming do work. We are all sown up (one of the only farmers in the area), and our wheat crops look very respectable. We did trial broadcasting a small seed cover crop blend pre harvest into the standing wheat crop, I thought that this strategy was worth a try because it was looking like it could turn out to be a late wet harvest. The results of the broadcasting have produced variable establishment, and I am not sure about trialling the strategy again because of the seed and contactor costs.

In my previous article I indicated that we were making a plant to create and store foliar nitrogen in thirty tonnes batches, with the ability to add in other products, such as molasses, fish hydrolysate and any nutrients which may have been shown to be deficient following Sap analysis results. Unfortunately, the project got behind schedule and will now have to be implemented next year. One thing that I did forget to mention regarding this project, was that I have been working

closely with the local Catchment Sensitive officer, Julie Jackson from Anglian Water, it is through Julie that I have been able to gain a much-appreciated grant for this project from Anglian Water.

The weather throughout the growing period had its ups and downs, our crops looked very even and well. We had selected and sown a ten-way blend of soft wheats, hoping to gain a soft wheat premium. Interestingly at harvest, one farm met the soft wheat premium and the other ended up with feed quality. If I fail to gain the required soft wheat quality in future years, I may well add some carefully selected hard wheats to the blend to increase the diversity. I had hoped to reduce my reliance on fungicides by using the blend of seed, in conjunction with a reduction in total nitrogen and complimented by using the homemade foliar nitrogen, the latter did not happen, but the wheat blend has been shown to be very robust in a bad Septoria year.

We did a whole field trial with a biological product called Sycon, which was intended to replace our fungicides, the product was applied at T1, T2. The combine yield meter showed no yield difference between the Sycon applied to our cereal blend, and our normal fungicide program. Therefore, we will continue with trialling this product, its rate and timing, next year on a greater scale, hopefully with financial savings to be made along the way. We also trialled the R Leaf product with no variation on the combine yield maps.

Although the wheat crops looked well, a dull July contributed to a reduced bushel weight and the yields were a little disappointing, the last field to be harvest revealed a little surprise. It had a similar cropping history to a field next door; both were first wheats, but the surprise field had a cover crop which had been grazed by sheep about eighteen months prior to harvest and the next-door field had not been grazed. Not a big deal you would think,



but the grazed field yielded 1.2 t/Ha more than the non-grazed field, I look forward to seeing if a trend reappears.

Walking over a second-year grass seed crop before harvest led to the observation that there could have been more seed heads per square metre. We had failed to graze the field in the autumn and a quick calculation with our Barenbrug fieldsmen indicated that the potential yield improvement from grazing off the grass seed, in just that one year, could have nearly funded stock fencing around the whole field. This year we have some grass seed into an OSR stubble, containing a carry-over companion crop of crimson clover, (clover seeds do not appear to be a problem as regards grass seed contamination), the yield of grass seed proved to be much greater when following the OSR and companion crop of clovers. I thought that this year I would repeat the exercise and to hopefully replicate our success, as we all know this autumn has been wet and I lost both of my newly sown grass seed crops to slugs.

I was also informed that the Danish farmers sow their grass seed at a lower seed rate and on wider rows. I asked the question as to whether I could shut off every other coulter for the grass seed and sow clover in between the grass seed rows, (I am on



16.5 cm row spacing). The conclusion was that it was worthy of a trial. I also apply this principle to our OSR and this autumn the OSR has also been sown as a blend. The inclusion of clover into crops could help with SFI companion crop eligibility and provide a grazing opportunity post-Christmas. The grazing on its own accord could reduce the weed burden, improve tillering, add nutrition, reduce fungus diseases and maybe contribute towards improving future wheat yields.



I have followed Andy Cato's work with interest, his thoughts and operation works on similar principles integrating legumes as companions. I believe that legumes are reluctant to hand over their nitrogen unless either, grazed or mowed. At Groundswell I then saw Trevor Tappin's inter-row mower, this is designed to mow between the wheat rows, topping both legumes and weeds. I am not sure to which growth stage the mowing will continue to be beneficial, however if this would be continued into April, then the crop could suffer damage from the tractor operating with the interrow mower.

It dawned on me that an inter row mower could well lend itself to being a self-propelled, light weight, satellite guided robot, with a row crop wheel at each corner, which could be left alone to operate in the field all night. The "Holy Grail" as Andy Cato put it when I conveyed my thoughts to him. Just to put this out there, would a type of crimper with less power requirement than a mower perform a similar job?

I have in the past mentioned forming a local regenerative cluster of like-



minded farmers, this is still very much on the cards and with each meeting, I find more farmers, who are all at different stages of the "journey" who might be interested in joining such a cluster to benefit from informal knowledge transfer. However, events have overtaken my ambitions, in February I attended a Worshipful Company of Farmers Reunion which was hosted by Rob Shepherd.



Amongst other interesting visits, we visited Rob's farm, where he described the setting up of the Environmental Farmers Group (EFG). This is a concept where farmers group together to form environmental clusters which can provide a platform of scale, for trading environmental services with other industries, be it biodiversity, improving

water quality, trading low carbon produce, and potentially trading carbon itself.

There were several presentations about these topics at Groundswell and I learnt that the government will be amending the Environment Act and bringing in new Greening Policies which may stimulate the type of trading that the EFG is being set up to attract. In addition, there will be a new round of government NERF funding to help the formation of regional EFG groups.

Within a couple of months of the Salisbury reunion, farmers in Northern Lincolnshire had been approached by Digby Sowerby from Natural Capital Advisory, who are helping facilitate the Hampshire EFG. Digby's presentations were good, and we decided that there would be enough local interest to form our own regional cluster. I have now become a member of the steering committee which has the intention of gaining 40,000 Ha's of expressions of interest, our hope is to form our own EFG cluster in Northern Lincolnshire. The target will be to be in operation early in 2024 and eventually operate with more than 100,000 Ha's, allowing us to trade at scale with the industries on the Humber Estuary.

Over the previous two years my daughter Anna has been helping with the film "Six Inches of Soil". The film is now complete and will have its debut in an auditorium in Cambridge on December 5th, there will be more viewing opportunities next year, at our



farm, The Pink Pig Farm and John Pawsey's Shimpling Park Farm.

As a result of participating with my daughter Anna in the forthcoming film "Six inches of Soil", we ended up completing a second carbon calculator with the Carbon Calculator Toolkit. This produced a result which said that we were sequestering carbon. Consequently, we were encouraged to enter Soil Farmer of the Year, the results of which were announced at Groundswell. We were fortunate enough to come in the final six, something that I am proud of, we may never have entered this competition, if it had not been for the sequence of events mentioned above.

This year we came through the hottest June across the world, breaking all records and throughout the year, individual country temperature records across the globe are being smashed every week. This has been followed by an extremely wet autumn which has created many problems for the farming industry. Books that I have read inform me that one third of the carbon dioxide in the atmosphere has come from Agriculture and much of that has derived from soil organic matter levels plummeting, causing carbon to leave the soil and enter the atmosphere. Obviously, this has been going on for centuries, however the introduction of mechanisation, together with manmade nitrogen, has caused an acceleration of the global warming in the twentieth century and up to the present day.

I apologise for being an eco-warrior but one of the big drivers for me going down the regen route was the fact that I could help in a small way to change and improve the global warming situation, just like the EFG principle one farmer cannot do this alone. I believe that as a committed regenerative farmer, it is my job to prove that this type of farming can make a profit, deliver environmental benefits and above all, set an example to the farming community that the regenerative system of farming works in a sustainable way and if carried out at scale, we can all do our bit to help combat global warming. We could then proudly announce to our grandchildren that we did something to alleviate the mess that the world is accelerating into. The government may have grasped this concept, and the new SFI encourages farmers to work towards the regenerative principles.

To finish on a happier note, in May I hosted my first music and beer festival, my motivation came from fellow regen

farmer Jonathan Hodgson who together with his brother Matthew have hosted several festivals. I managed to get together five bands, five real ales, two ciders and a lager. Being a bitter drinker, I underestimated the number of lager drinkers attending our festival and by seven pm I was driving to my local pub to buy another barrel of lager. The cider also ran out by 8 pm. The whole event has been a big learning curve, but we did financially break even, and I



intend to host another festival next year. The only complaint was from a person who was reluctant to wait another year for the next festival. It's not every day that you phone a close friend from a blocked lady's toilets and ask him to join you in the middle cubicle, complete with a plunger. We discovered that the cistern was not filling, eventually, we locked the door from the inside, and I clambered over the partition into the neighbouring cubicle, I would like to add that no ladies were interrupted due to my actions.





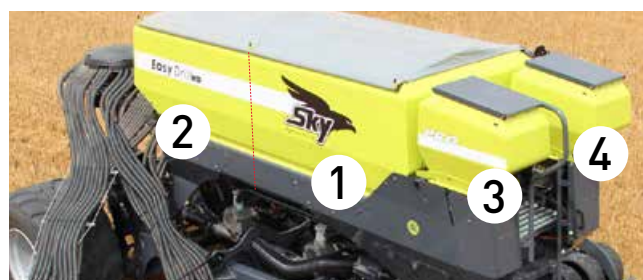
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2 SEPARATE AIR CIRCUITS

SEAWEED IN AGRICULTURE

Written by Dr David Cutress: IBERS, Aberystwyth University.

- Seaweeds have long had suggested benefits for agricultural use
- Research suggests green seaweeds to be beneficial for soil/plant amendments and red seaweeds to have some potential for animal feeds
- To be able to include at meaningful levels, the production and supply chain of seaweeds needs to be researched and developed further

Seaweeds

Seaweeds are algae, specifically, they are macroalgae and despite performing many of the same functions as plants they are not plants. For this reason, you may sometimes see seaweed referred to as non-vascular plants but unlike plants, these species absorb nutrients which they use for photosynthesis directly through their cell walls. They also lack stems, roots, xylems and many other specialised plant structures. The three main groups of seaweeds are green, red and brown and their colours come from the combination of chlorophyll and other accessory photosynthetic pigments found within each species, for example, red seaweeds have phycoerythrin and phycocyanin pigments for absorbing light that reaches deeper into the ocean and the brown seaweeds have the pigment fucoxanthin. Seaweeds have long been utilised by people for many reasons including as a medicinal source with more modern research finding the specific elements within seaweeds that lead to its various functions. Some of the roles of seaweeds in general include;

- Food (healthy low calorie)
- Fertiliser
- Climate change reduction
- Explosives
- Supplementary livestock feed



- Medicine
- Plant biostimulants
- Bioethanol
- Cosmetics
- Bio yarn
- Edible packaging
- Bioremediation
- Dyes
- Gels

But within agriculture, it is the highlighted roles that are of most interest.

Seaweeds and agriculture

The high level of interest in seaweeds and seaweed extracts for use in plant growth and agriculture is clear when we observe that the journal article from 1992 titled 'Seaweed extracts in agriculture and horticulture: a review' has been cited almost 350 times in subsequent papers. But before these scientific perspectives, the benefits of seaweeds were suggested throughout common historic practices of coastal farming communities. This included the grazing of harvested seaweed for livestock as a supplementary food source and the utilisation of beach-cast seaweed as manure and fertiliser for the land, as far back as Roman times. As well as native macroalgae species vital to freshwater and marine ecosystems there is a significant impact surrounding invasive algae. As human activity impacts waterways and marine systems

this often causes eutrophication where the overabundance of nutrients leads to increased algal growth and invasion of non-native species. These increased levels of algae require collection and removal for ecosystems to return to normal and the utilisation of this 'waste' could allow some environmentally focused circularity. Though of course, this circularity is finite if agriculture and other water pollution sources are targeted for reduction and removal in the long run.

Direct fertiliser and land application

Generally, where seaweeds are applied to the land they are applied whole, finely chopped, powdered or in aqueous extract forms.

Benefits

Seaweed (or its extracts) incorporated as a soil supplement or fertiliser is said to have a range of potential uses within arable and horticultural systems. It can effectively be a carbon-neutral fertiliser additive similar to other green manures. Whilst seaweeds are known for being lower in nitrogen (N) and phosphorus (P) they do tend to be higher in potassium (K). Seaweeds directly add plant rate limiting elements into soils but they can also function as plant biostimulants as they contain hormones that trigger increased growth and nutrient uptake efficiencies in plants. Auxins, cytokinins, gibberelins, abscisic acid and ethylene are all found

in seaweeds and they can act upon plant growth, ageing, cell division, germination, and stress management. Whilst there is a lack of meta-analyses of the impacts of different macroalgae application effects on crop yields and nutrient requirements, multiple studies suggest beneficial impacts.

Across the three groups of seaweed,

associated with their levels of sodium (Na+) as well as high calcium (Ca) and alginate levels, which combined, are involved in the seaweed's ability to bioaccumulate heavy metals. This removal of metals can impact pH by removing access to particles from soils which would normally cause increased acidity. Application of seaweed to

plants in soils.

Barriers to use

Seaweed biomass needs more supply chain and market considerations in a lot of instances with direct site-based production and subsequent use ensuring that the material does not ferment and degrade, leading to it becoming just another form of waste

Crop	Positive Impacts	Paper
Marigolds	~40% increase in flower weight 50% less chemical fertiliser required	Sridhar & Rengasamy (2010)
Tomato seedlings	Increased plumule length, radicle length, increased dry weight, increased shoot length and plant height, worked better as soil amendment than foliar spray	Hernández-Herrera et al (2013)
Bean	Increased germination	Carvalho et al (2013)
Broccoli	Increase in antioxidant activity, flavonoids, phenolic and isothiocyanate, increases in stem diameter, leaf area, biomass, enhanced early growth and reduced white blister (<i>Albugo candida</i>)	Mattner et al (2013)
Mung Bean	Increase in total protein, total carbohydrate and, total lipid; increase in shoot and root length	Ashok Kumar et al (2012)
Watermelon	Increase in yield	Abdel-Mawgoud et al (2010)
Onion	Increase in yield and reduced severity of downy mildew	Dogra and Mandradia (2014)

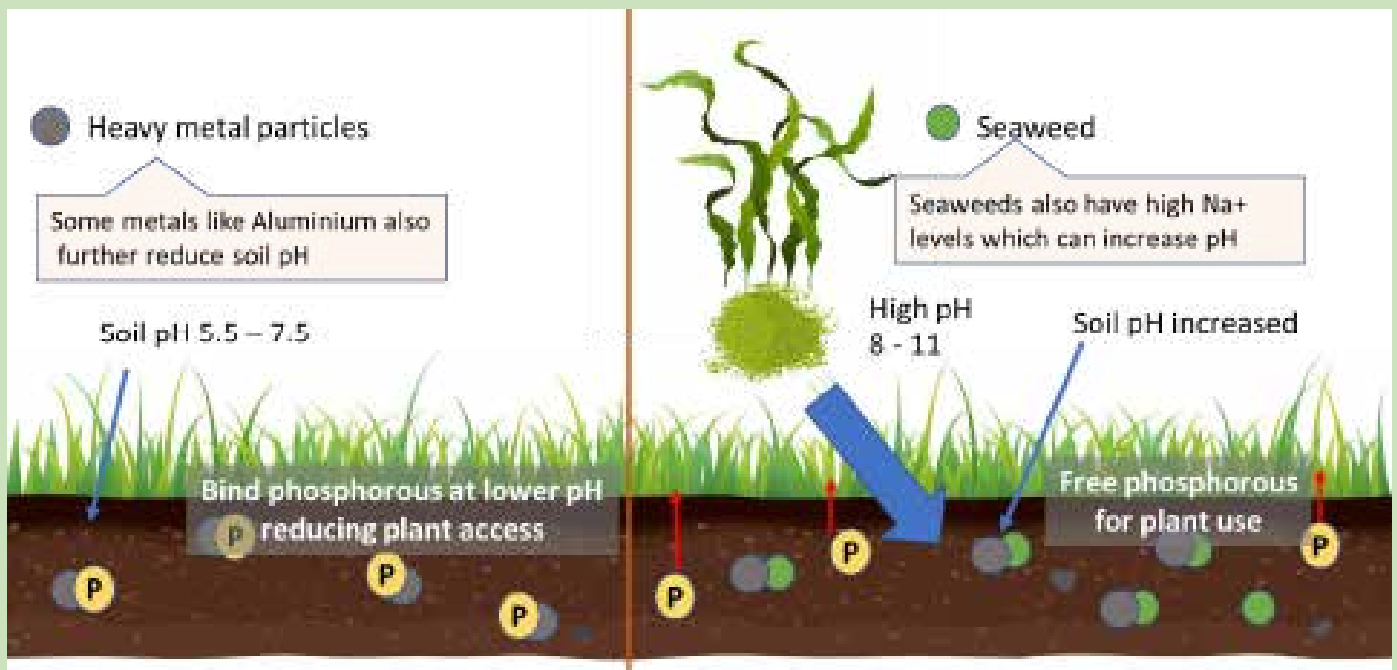
research suggests that green macroalgae have the most promise for soil supplementation as they contain components that can promote the removal of detrimental soil and plant fungi and pathogens (such as moulds and mildews) and drive increased plant defence. They have also been shown to have potential roles in preventing the damage from plant nematode species on crops which could act as a unique organic replacement to soil-applied nematicides.

Seaweed and seaweed products including biochar are known to have a neutral to alkaline pH which through direct application to soils can act to amend soil pH as a liming agent. Other outcomes causing this liming function seen within seaweed trials have been

contaminated degraded lands could also help with the removal of heavy metals such as aluminium (Al) thereby blocking/lowering the ability of Al to bind to plant limiting nutrients like phosphorus. This could in certain systems further help to reduce fertiliser requirements.

Furthermore, one of the properties of commercial seaweed additives that is often quoted is that their alginates have structural impacts on soils, forming complexes that help to absorb water improving water retention, increasing aeration and soil pore functionality and generally improving soil structure. This links with the interest surrounding hydrogel application on soils for unique slow-releasing fertiliser benefits along with improved moisture levels around

that can have detrimental impacts including the release of detrimental gasses such as hydrogen sulphide. One method that can prevent this nutrient wastage and stabilise the beneficial aspects of seaweeds is to use composting. In one set of experiments using green seaweeds composted with sugarcane wastes re-applied to subsequent sugarcane growth, it was found that high seaweed composts led to four times higher aboveground biomass than commercial composts lacking seaweed. Even in studies where insignificant impacts on yield and weight of biomass occurred, it was still noted that benefits in the levels of micro and macro elements (such as boron, iron, copper, zinc, calcium, sulphur and potassium) were seen within the plant



biomass harvested.

Sulphur compounds in high levels in some seaweeds may act in opposition to the liming ability when added to soils if anaerobic conditions are prominent (soils aren't aerated) as this can lead

to 47% weight in some cases) whilst others have beneficial omega-fatty acid levels. This protein level aspect makes them desirable for consideration as an alternative protein source for livestock. When this is combined with

of up to 100% (over short study timeframes) and 98% (over longer 90-day timeframes) have been observed, whilst other studies have noted far less reduction or even, in a few cases, some minor increase in methane level in the short term. These environmental impacts of seaweed as feed are of high interest for future net-zero strategies and as such we are likely to see more research to try and untangle these conflicting results in the future through large-scale trials. Alongside methane impacts other reported feed effects have included live weight gain improvements and dry matter ingestion reductions.

Barriers to use

As noted above in the benefits of seaweed for fertiliser and soil application, seaweeds are very good at accumulating heavy metals, this is true in aquatic environments before harvest also. For this reason, testing and sourcing of seaweeds for livestock ingestion may need considerations to ensure any rations do not lead to impactful levels of adverse metals making their way into the animal's body. Similarly, iodine toxicity for livestock as well as its incorporation into meat and milk may also be a barrier of consideration for the use of seaweed in feeds. High levels of iodine in seaweeds have been noted in one experiment to lead to milk produced with iodine levels as high as 3 mg/L which would make the safe tolerable limit of milk for adults



to microbial oxidation of sulphur to sulphates.

Feed for methane reduction

The other area where seaweeds have received a great deal of attention within agriculture is their suggested roles in livestock feed, with much research and media coverage focusing on their suggested environmental impacts.

Benefits

Seaweeds can be high in protein (up

to the presence of naturally occurring compounds in seaweeds which impact the production of methane it is easy to see the interest. Seaweeds contain bromoform which acts to inhibit the final step in methane formation due to organisms in the rumen, and this is thought to be the main mechanism of action. Red seaweed species are known to have higher bromoform and similarly functional bromochloromethane levels. Across studies methane reductions

around 300 ml a day and for children 1 litre of milk would contain over 15 times the suggested tolerable level. Whilst this is just one study it is enough to indicate that more research may be required.

Another possible barrier to use in livestock is the indication that there is a low level of palatability with seaweed inclusion in feed leading to reduced feed intake issues. Whilst many studies have shown inclusion rates up to 20% in sheep trials the average inclusion rate (across 10+ studies) was 12.8% (but ranged as low as 0.006%). This could be an area where specific extracted compounds from seaweed fare better

macroalgae for agricultural applications, unless excess was produced or methods were improved to separate the agriculturally important compounds from the biofuel beneficial biomass in an environmentally and cost-effective way. Furthermore, making seaweed incorporation feasible on a large scale would require direct seaweed farming across Europe to avoid import issues associated. Several publications have noted that there would likely be impacts on biodiversity associated with seaweed farming at such scales, though, as yet the true nature of impacts is unknown with some studies showing limited impacts and others showing a reduction in fish species biodiversity

could serve other environmental and economic benefits. One way this might benefit is that large-scale beach-cast of seaweeds are often associated with negative implications for tourism due to the appearance and smell during fermentation. As such having mechanisms to collect this seaweed for beneficial agricultural purposes or any other beneficial purposes could go towards boosting the local economies of coastal regions.

The compounds found within seaweeds are already discussed for their direct roles in pathogen control and biocidal activities. But another area of interest is in chemically altering these compounds to have improved effects, with much research suggesting interesting antimicrobial roles following modification. These could ultimately play roles in improving livestock treatment options and reducing the impact of antimicrobial resistances which continue to be of concern to the industry.

Summary

Seaweed's and macroalgae's agricultural use could have a role in circularity, particularly in coastal regions or where farming practices increase eutrophication of nearby water sources and this leads to increased waterway macroalgal growth. Rather than allowing this to impact ecosystems, harvesting it for application back onto agricultural soils or feeds could be beneficial. For soil application, consideration of seaweed supply chains needs evaluating to ensure the logistics and cost (economic and environmental) vs value benefits of the application are fully understood. Furthermore, seaweed appears to work better in healthier soils where strategies are in place to reduce the levels of anaerobic microbial activity. This suggests it would work well in combination with sustainable practices such as cover cropping and silvoarable farming. Macroalgae for livestock feed on the other hand have potential as an alternative protein source with some interesting environmental impacts that need further evaluation in large-scale trials. Green seaweed species show promise for soil application whilst red seaweed species show more promise for livestock use avoiding competition between these two products.



than the whole product itself.

Other Seaweed considerations

A big consideration surrounding seaweed utilisation is its potential value as a replacement for environmentally damaging fossil fuels. Seaweeds offer an interesting option for biomass growth for biofuel production for a few different reasons. Firstly, similar to plant-based biofuel options, seaweeds would be essentially carbon neutral. They also have promising biomass output levels and cost-effectiveness in their growth, but importantly they don't impact land use change and don't compete directly with any agricultural land application. This means that there can be no argument that it would be better to farm something else in place of seaweed due to the food vs fuel argument. This role could, however, be in direct competition for the supply of

due to disturbances. This would require much more targeted experimentation before large-scale supplies could be achieved safely.

Artificial growth and farming of seaweed is a growing area of aquaculture with figures suggesting it accounts for $\geq 27\%$ of total marine aquaculture production. Despite this, it is clear that much more research and development is needed on what species to farm/culture and how best to do this in the UK to have the level of resources for larger-scale incorporation into agriculture. Currently, the vast majority of seaweed farming occurs in Asia making export and import factors a huge consideration. The prospects of seaweed farming are high as these systems of farming don't compete with arable land or freshwater aquaculture and their growth has been linked with carbon mitigation strategies.

Seaweed removal for use in agriculture

IS IT TIME TO MAKE THE MOST OF THE SUSTAINABLE FARMING INCENTIVE?

Knight Frank's Mark Topliff writes why the Sustainable Farming Incentive (SFI) is now worth considering and consultant Andrew Martin provides an example of how arable land can make the most of the scheme.

When the SFI was launched in 2022, it was generally met with a lukewarm reception by farmers and environmental organisations. English Basic Payment Scheme (BPS) payments are working towards their potential cessation by 2027, and most farmers are seeking other sources to fill or mitigate the drop in income. Defra has made changes to the SFI that has made it a more attractive option to explore and help fill the income shortfall.

Why is SFI 2023 worth engaging with?

So, there are several reasons why the 2023 offer is now worth considering.

1. More flexibility – the pick and mix structure allow land managers to select the actions that may fit in with existing practice and rotation or are easy to adjust to and incorporate changes.
2. Higher payment rates – since the start of SFI the payment rates have been criticised, but they have now been increased, and some rates made the same across land types and schemes.
3. Tenant-friendly agreements – you don't need the permission of your landlord to apply for an agreement if you're a tenant farmer, and tenants can have an SFI agreement even if they are on a shorter, rolling tenancy contract.
4. Stacking of options – it's possible to combine with other schemes' options such as Countryside Stewardship and Environmental Stewardship.
5. Management payment – payment of £20 per hectare, up to 50ha in total, for your time managing the scheme.

6. Simple application – A simple online application process and a rolling application window.

7. Paid quarterly – more frequent payments which help with cashflows.

8. You don't lose out – Defra has shown that previous applicants that joined prior to any changes will also benefit from the improved offer.

Defra has also promised further options to be rolled out in 2024 possibly including actions involving agroforestry and water body buffering.

Using the SFI on arable farms

But what does this mean for an arable farm? Andrew Martin of Knight Frank's Agri-consultancy team explores how the SFI actions can be combined to maximise payments, using an example 100 ha block of arable land.

For this 100 ha block of arable land, the options in this example would return an income of £23,349 or £233/ha. This is comparable to the Basic Payment Scheme payment (BPS) pre-tapering, but before any costs involved in the implementation of any of the SFI actions.

The non-rotational areas that take the low fertility and productive areas out of production (see table) would return

an average guaranteed income of £528/ha/year.

Rotational areas	
Winter wheat	39.75 ha
Winter bird food	13.25 ha
Spring barley	18 ha
Field beans	18ha

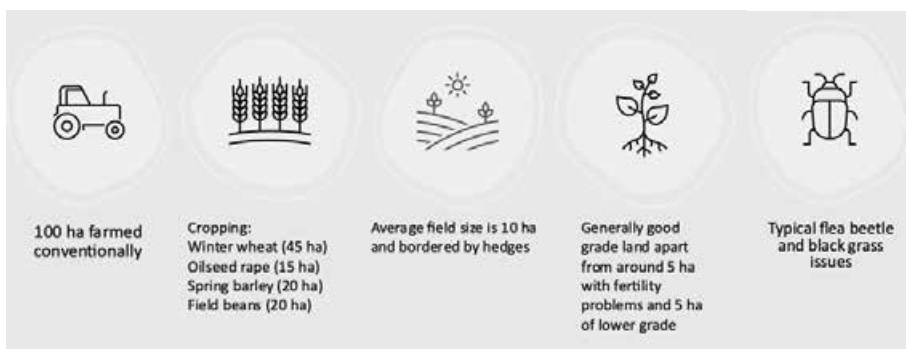
Non-rotational areas	
Legume fallow	5 ha
Grassy corners	1 ha
4m buffer margins	5 ha

Amended crop rotation and areas across the 100 ha block

**note that the legume fallow option can be used rotationally but in this example, it is used to improve the fertility of the 5 ha parcel.*

Typically, the average net margin across a crop rotation similar to that in the example, would be in the region of £200-£250/ha/year before rent and finance costs.

When SFI establishment and maintenance costs are deducted, the fallow and grassy area margins are



Arable land example

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- Leisure and sporting organisations
- Public sector bodies

What do the available grants cover?

Grants cover a wide range of activities from decarbonising supply chains to capital expenditure on plant, machinery and buildings. They can be broadly divided into the following categories:

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- Technology and research
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- Climate change mitigation and net-zero aspirations
- Health and wellbeing
- Flood mitigation
- Biodiversity enhancement
- Afforestation
- Sustainable food production
- Food supply systems and chains
- Heritage, architectural and cultural preservation
- Community projects and levelling up

For further information or to discuss a grant funding opportunity for your business please contact:

Henry Clemons

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Action	Brief description	Reason selected	Area included	
(ha)	Payment received/year (£)			
SAM1	Soil assessment and plan	If not already being done as part of crop assurance, then a reasonably straight forward payment that could have greater benefit	100	675
SAM2	Cover crop	Spring barley's inclusion in the rotation provides an opportunity to have an over winter cover crop	18	2,322
IPM1	Assess integrated pest management and plan	If not already being done as part of crop assurance, then a reasonably straight forward payment that could have greater benefit	100	989
IPM4	No insecticide used	To be used with the spring barley and field beans which requires little insecticide use	36	1,620
AHL2	Winter bird food	Problems with OSR on this farm could mean the break crop is replaced by this rotational action instead	13.25	9,699
AHL3	Grassy field corners and blocks	Many fields have areas that are unproductive or difficult to harvest	1	590
AHL4	4m grass buffer strip	Field edges can be the least productive areas	5	2,225
NUM1	Assess nutrient management and plan	Once set up, a relatively straight forward action to carry out each year	100	589
NUM3	Legume fallow	To help improve the fertility	5	2,965
			Subtotal	21,704
Hedgerows				
HRW1	Assess and record condition	Relatively straight forward action	12,650m	380
HRW2	Manage hedgerows	Payment for an action that would be carried out anyway	12,650m	1,265
			Subtotal	23,349
Including SFI management payment at £20 for the first 50 hectares			Total income	24,349

Possible actions that could be selected in this 100 ha example

likely to be similar if not better than compared to the crops, when spread over the lifetime of the SFI agreement. Andrew explains that: "The range of actions selected in this example could easily be applied to other situations. But the key to this selection is that it could fit in with the existing system and take out or improve the unproductive areas."

"Even though in this arable scenario the SFI payments won't cover the complete loss of the BPS, they will reasonably offset it and certainly more than was offered in the 2022 SFI standards," adds Andrew.

Conclusion

SFI 2023 has improved its offer and flexibility over its initial launch in 2022. It certainly isn't a perfect scheme, and

it will evolve further in the next couple of years. But when considering SFI alone, it can now bring a reasonable income to arable and lowland livestock farms. However, it does require some careful thought to get the best mix of actions and maximise the income potential. True, there are probably many actions that would be a light touch on most farms but making some considered changes to your farming system may further increase the SFI income and potentially benefit your farm's economic and physical performance.

Andrew Martin can be contacted at andrew.martin@knightfrank.com. Further insight and information on Knight Frank's rural services can be found at www.knightfrank.com/rural-matters



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ORGANIC AND REGENERATIVE TOGETHER AT CROPTEC SHOW

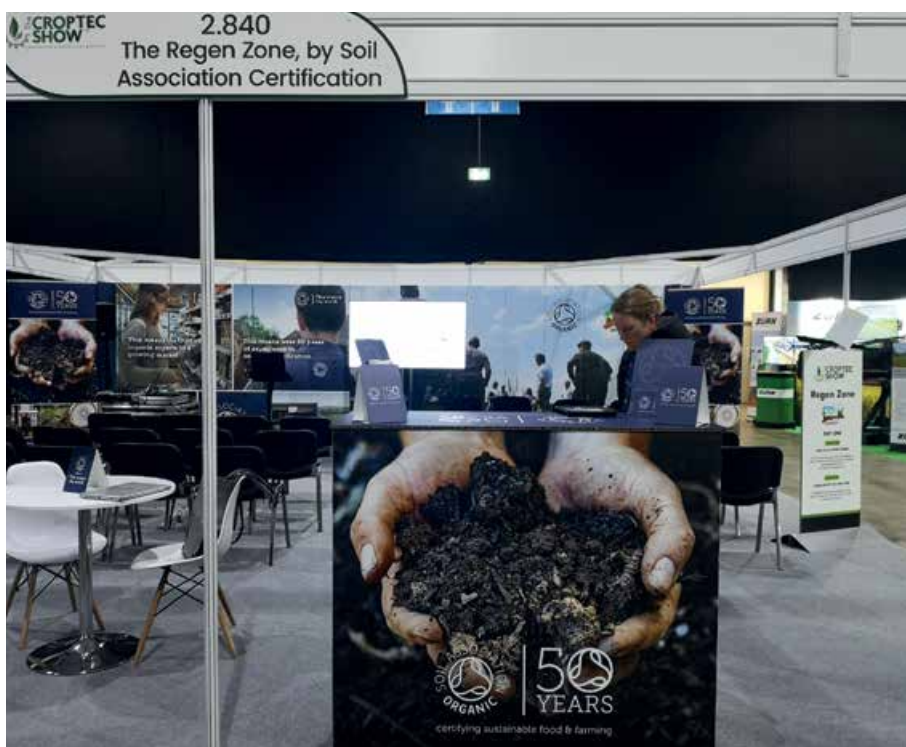
Written by Jerry Alford from the Soil Association

For Soil Association Certification, hosting the Regen Zone at this year's CropTec Show was an opportunity to meet many of the farming community who are embracing regenerative farming and highlight similarities and the benefits farmers can learn from each other.

Regenerative agriculture is an exciting grassroots movement, which is energising a whole new generation of farmers who are keen to be part of the solution to the nature and climate crises. For many existing organic farmers there is a slight feeling of déjà vu with echoes of the organic movement from 70 years ago. There are strong similarities between the principles of regenerative - increasing diversity, ground cover, minimising inputs and protecting soil - and the practices common in organic.

So, what separates organic from regenerative? Ultimately, we think they have the same North Star. It's soil-first farming - which is why we hosted CropTec's Regen Zone. There is much more that unites us than separates us, but a key difference is how we perceive each other, and how consumers and supply chains perceive us.

Organic is a farming system with a legally binding definition, based around a soil first attitude and, as an internationally recognised practice, is based on sound science and decades of experience. For a non-organic farmer who believes in the principles of regenerative, they might see those organic standards and regulations as restrictive and prohibitive. For those within the organic movement, these same standards and regulations are seen as a floor not a ceiling, and a useful tool to help differentiate themselves in the market. But even at the entry level, organic takes a systems-based approach that works within natural cycles - defining organic just by its standards ignores the whole



CropTec 2023

farm system which makes it possible. And organic enables both farmer and consumer to be clear about the standards that the farming system has been working to.

For example, organic farmers must find natural ways to build soil fertility and manage pests and diseases because they're not allowed to fall back on short-cuts such as artificial fertilisers or routine use of antibiotics to maintain soil and animal health respectively. The standards are a baseline - they ensure there is a consistency to what someone can expect, as a minimum, when they see something is certified organic. In reality, many organic farms and

businesses will naturally go above and beyond these baseline standards.

There are areas of differences, agrochemicals and artificial fertilisers are used by some regenerative farmers but are not permitted in organic systems. And minimising cultivations is a priority for regen, but not always easy in an organic context. But we've always known that no farming system is perfect, and one of the positives being seen today is the willingness of both groups of farmers to learn from each other. Living mulches, cover crops, composting, intercropping and increasingly diverse rotations are becoming common in both forms of farming, and are no longer used to



define the farming system.

And we shouldn't seek to rush into a definition. By more simply being guidance, rather than rules, the five regenerative principles allow

flexibility both within innovation and in farming systems. Not everyone has the desire to introduce livestock into their systems and not all regenerative farmers soil allows them to direct drill

every year, but the general trend is to move farming in a more nature and soil friendly direction.

For the Soil Association's team of farming advisors, working with farmers who share a vision of soil-first farming is a great opportunity for increasing the knowledge base in organic whilst highlighting what we have learnt about farming without recourse to artificial inputs. Working with regenerative farmers isn't a means of developing a certification process, but a way of influencing and using the years of experience of success and failure to support the regenerative movement to continue its direction of travel. We are no longer being asked "how do you expect to grow crops without fertilisers and sprays" but "how can I?" – and that makes the regenerative movement an exciting time for all farming, organic or not.

Jerry Alford – Arable and Soils Advisor in the Soil Association's Farming Team which provides advice on nature-friendly farming to any farmer.



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UNDERSTANDING **CARBON EMISSIONS** AND THE **VOLUNTARY CARBON MARKET:** A FARMER'S GUIDE TO A SUSTAINABLE FUTURE

Written by Thomas Gent, UK Market Lead, Agreena

As farmers, you're not just growers of the crops that provide food for us all; you're stewards of the land. In today's evolving agricultural landscape, it's crucial that farmers understand how sustainable farming practices help reduce agriculture's impact on the environment and how this understanding can be translated into financial gains.

To help achieve this understanding, farmers need to familiarise themselves with the concept of carbon emissions, particularly Scope 1, Scope 2 and Scope 3 emissions, and see where their business fits within these scopes, the grain supply chain and the importance of participating in the voluntary carbon market (VCM) in order to clearly see the value of their farming practices.

Scope 1, 2 and 3 emissions: What are they?

It's essential to grasp the concept of carbon emissions scopes so that farmers understand the role they can play in carbon trading via the VCM and the impact this can have on grain supply chains.

Scope 1 emissions: Direct emissions that originate from sources owned or controlled by your farm. For farmers, Scope 1 emissions can include emissions from tractors, on farm machinery and other equipment, as well as emissions from enteric fermentation in livestock.

Scope 2 emissions: Indirect emissions associated with the consumption of purchased electricity, heat or steam.

For many farmers, this primarily involves energy use on the farm, such as electricity for irrigation or heating.

Scope 3 emissions: Indirect emissions that occur as a result of farming activities but are beyond farmers' direct control. They can include emissions from the production of fertilisers, pesticides and fuel used in transportation of your products to market.

Scope 3 is of significant interest to farmers because they sit within the Scope 3 emissions of the food supply chain. As these companies set ambitious targets for reducing emissions, they'll have an increasing interest in the activities taking place on farms, leading to both pressure on farmers to reduce emissions while at the same time presenting opportunities

for farmers to deliver climate friendly products.

The agricultural sector plays a significant role in greenhouse gas emissions, particularly methane (CH₄) from livestock and nitrous oxide (N₂O) from fertiliser use. Understanding the carbon emissions associated with farming practices, including within Scope 1, 2 and 3, is crucial to not only mitigate their impact on the environment, but to enable farmers to explore new income opportunities.

The VCM: A sustainable opportunity

The VCM is where individuals and organisations voluntarily compensate for their carbon emissions by investing in projects that reduce or sequester carbon, allowing market participants to take action against climate change and for the planet to move towards net zero.

How the voluntary carbon market can benefit farmers and impact grain supply chains:

Carbon credits for sustainable farming: By adopting sustainable farming practices that reduce carbon emissions, farmers can generate carbon credits which reflect the amount of carbon dioxide equivalent (CO₂e) emissions reduced or sequestered.

Revenue generation: Farmers can sell these carbon credits in the VCM. Companies and individuals buy these

credits to compensate for their own unavoidable emissions, making farmers a valuable player in the fight against climate change.

Enhanced grain supply chains: As consumers and companies increasingly prioritise sustainability, organisations within grain supply chains are looking to demonstrate that they're reducing their carbon footprint. By participating in the VCM, farmers can position themselves as sustainable suppliers, attracting buyers willing to pay more for climate-friendly farmed products.

How to get started

Assess your farm's carbon emissions: A recognised carbon calculator will help you determine your baseline and will also identify emissions within Scopes 1, 2, and 3 and allow you to pinpoint areas for improvement.

Implement sustainable practices: Adopt more sustainable farming practices that reduce emissions and increase carbon sequestration. This might include no-till or reduced-till farming, cover cropping and efficient energy use.

Monitor and measure: Using a carbon calculator, continuously monitor and measure the impact of your sustainable farming practices on your carbon emissions. This data is essential for accurately quantifying and verifying your carbon credits.

Decide how to market your sustainable impact: There are many options available to you to decide how

to use your new carbon credits. You can keep the credits for as long as you wish, you may trade them yourself or via a broker on the VCM, or you can trade them within the supply chain.

Carbon farming made simple:

The easiest way to follow all of these steps to an auditable and verified standard is to join a carbon programme like AgreenaCarbon. Within a carbon programme, you'll have the opportunity to gain an understanding of the value of your efforts on the farm. This will give you the opportunity to trade your carbon either within the supply chain or via the VCM.

Joining a carbon programme keeps you in the driving seat of your transition and allows you to understand the value your carbon has on your farm. Good carbon programmes should support and incentivise the use of more soil health-focused farming practices.

The future of farming: Sustainability and profitability

The crossover between farming and carbon accounting is going to become increasingly important. Farmers' customers are setting ambitious climate goals that will affect what they buy and value. It's essential that farmers remain in control of this valuable asset and utilise it to finance their transition to a net zero future. The agricultural sector is transforming, offering opportunities for farmers to both contribute to a greener planet and enhance their income.

By understanding and managing Scope 1, 2 and 3 emissions and participating in the VCM, farmers can use this new revenue stream to move towards their own net zero goals and therefore bring value to their products – not only to make their farming practices more sustainable, but also to increase profitability through higher grain prices and new income streams.

The future of farming lies in sustainability. Those farmers who embrace carbon trading, reduce carbon emissions and engage with the VCM will not only play a pivotal role in combating climate change, but also secure a more prosperous and sustainable future for their farming business.



FARMER FOCUS

ANDY HOWARD



Like all farmers I am an eternal optimist and have decided to roll the dice again with another year of cropping. Things will be better next year? Hopefully! This autumn I think we have been lucky down in Kent. I didn't start raining until the 12th of October and the soils were very dry and so have taken the rain well. Since then, we have had nearly 300mm of rain by the end of November, not ideal but the crops got established well and their heads above ground before the ground got too wet. We haven't planted 10ha of Winter Beans, but these 2 fields can wait until the spring.

Our soils this year have not emerged from the latest wet year in good health. On the heaviest land, when I was going around with a spade after harvest the top 20cms had slumped. Roots were going through this layer, but I decided the soil needed some remedial action. I borrowed a neighbour's LDS and subsoiled 90ha of our farm. After having done very little subsoiling in the past, I probably did more in 1 year than the previous 20. I do wonder with the weather patterns being more extreme and the rain being more intense that this may become more "normal". We do have a couple of wheat fields that were herbage seed until harvest 2022 before going to winter beans, these fields are showing more yellowing than others and I think this could be due to the higher trafficking from the herbage seed leading to poorer soil structure, even though these fields yielded 5t/ha of winter beans.



Our cover crops look well, the cover crop species of the year seems to be linseed. Linseed seems to be the dominant species for some reason. One idea, I think is because slugs don't particularly like eating it. The slug pressure seemed to be high in our cover crops this year and where the slug peller on the back of the drill stopped working for a few runs, linseed is about the only plant species to have survived. Anyone who tells me we should keep cover crop

mixes simple and just plant a couple of species, I think are bonkers or don't know what they are talking about! We seem to get a different stand every year even when planting a similar mix, a broad mix spreads your risk.

Recently in the farming press there was an article talking about how spraying silica onto the previous crop and then saving the seed reduces the slug grazing when the saved seed is planted. I think we have seen this in action as all our farm saved seed probably didn't need any slug pellets, where we didn't pellet the wheat, it looks as good as where we did. All our cover crop seed was bought in.

We tried to plant a lot of catch crops this summer but unfortunately our old Autocast system tried to set our combine alight. All the wiring melted but fortunately I saw the smoke and turned everything off pronto. There wasn't time to fix it to make it safe so the rest of the catch crops didn't get planted (see picture). I am coming to the conclusion that Autocasting is better than using an Outcast a few weeks before harvest. If there is enough moisture a few weeks before harvest, you really need to apply slug pellets with the seed, otherwise you just have to sit and watch them chew through the emerging crop. The problem with spreading pellets that near harvest, is that some may get stuck in the wheat ears and end up in the grain lump, so I avoid doing it. With Autocast you can spread with the seed or soon after harvest.

We have numerous trials going on this year. With Kings Crops we have planted plots for companion crops in Wheat and Beans with the SFI in mind. With Wheat we have planted Winter Vetch, Winter Peas, Avalon beans and a mixture of all 3. They all look well. With the Winter Beans we have planted Winter Oats and Winter Vetch (see picture). Even though the Propyzamide has knocked the oats they are still all there. The establishment of the companions this year gives me confidence to apply for SFI with the cover

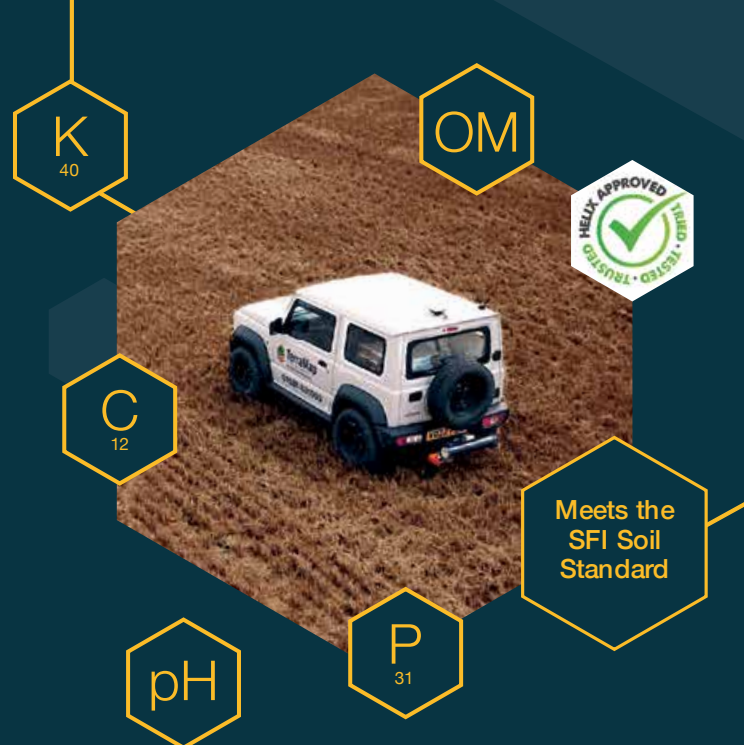




crop and companion crop options. Unfortunately, ATM the computer is saying NO! Any field with an option from our existing Mid-Tier scheme seems to upset the SFI algorithms.

This autumn we have planted a trial examining the effects of compost extract on the growth of wheat. Alongside Kent Wildlife Trust and Reading University we applied to The Co-Op for grant funding, and we were successful. The idea is to investigate over 2 season whether compost extract can help reduce the reliance on Nitrogen fertiliser. An initial check on the effect on rooting 10 days after planting seemed to show a marked difference (see pic – no extract left, extract right). A more in-depth check at the end of November seemed to show little difference, also plant establishment counts between the plots at a first look seemed to show little difference. My gut feeling is the extract will show positive effects in an adverse growing season, this autumn so far on this field has been fairly kind, what happens in the spring will be interesting.

Finally, we have been awarded follow-on funding for our N2 Vision Project that finished 18 months ago. Along with our project partners we will trial the robotic platform along with an algorithm for sensing Nitrogen content of wheat over the next growing season, to refine/develop the system to get it closer to a commercial reality. All in all, plenty to keep me busy over the next year!!



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Covering Soils Day - SFI Options and Soil Health



Grange Machinery at Covering Soils 2023



Horsch Machinery at Covering Soils 2023

We ran the first in a series of Direct Driller days around cover crops, SFI options, agronomy decisions and compaction on the 21st September at TWB Farms in Staffordshire.

It was a great day, with great local food provided by Untamed Grill. We plan to continue these series of days, some based on the trials we planted on this day, others based on different topics in different parts of the country.

For all those who weren't able to attend this first event, we have included write ups of each of the sessions and you can also watch all the videos from the day

HOW UNDERSTANDING MORE ABOUT **ORGANIC MATTER AND SOIL CARBON** CAN BOOST PRODUCTIVITY AND PAYMENTS

Understanding more about organic matter and soil carbon can help growers improve soil health, get more from crop nutrition inputs and build greater overall resilience into their crop production, believes Agrii agronomist Will Francis.

"So many aspects of profitable crop production are affected by the condition of your soil that it's worth spending a bit of time getting to know the type of soil you have, what its organic content is and what management you can focus on to get it working to its full potential," he says.

"Organic matter is basically plant and animal residues at various stages of decomposition with three known pools in the soil depending how far this process has proceeded.

"The first is 'active' organic matter which is made up of recent organic matter inputs and soil organisms such as those from previous crop residues and is not very decomposed such that you can still tell what it is made of.

"Next is 'slow' organic matter which refers to organic compounds derived from the active pool which are slightly more decomposed and identifying the origin of these inputs/organisms is more difficult.

"Finally, 'stable' means fully decomposed organic matter where you can no longer identify the origin inputs and organisms as is the case with humus."

Soils with higher levels of organic matter are generally seen as healthier and more resilient with several benefits resulting from this, he says.

"High organic matter soils tend to store nutrients better and act like a sponge when it comes to water retention as well providing the essential energy for soil biology which is responsible for the decomposition process converting

carbon from 'active' to 'stable' organic matter.

"During this process, the soil biology secretes the sticky substance Glomalin which binds soil particles together, aggregation, and this also improves overall soil structure which, in turn, facilitates greater aeration and water infiltration through the soil profile."

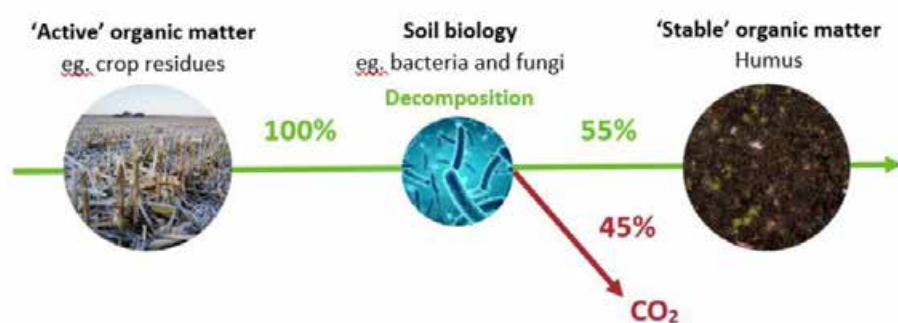
Improving carbon use efficiency and C:N ratio

The soil microflora also feeds on the carbon from the residues/organisms as the organic matter decomposes and the efficiency of this dictates what the overall carbon use efficiency (CUE) of the soil is, Will Francis explains.

"Soils with a higher proportion of larger, more recalcitrant molecules, such as those found in straw for example, have a lower CUE with fungi tending to favour these types of molecules in the decomposition process.

"Simpler molecules with a lower carbon to nitrogen ratio have a correspondingly higher CUE with bacteria more active on these easier to digest molecules. In addition, some microbes are more efficient at decomposing than others and therefore contribute to a higher CUE.

"By considering carbon use efficiency and the carbon to nitrogen ratio (C:N) of crop inputs and their effect on organic matter, growers can also influence the

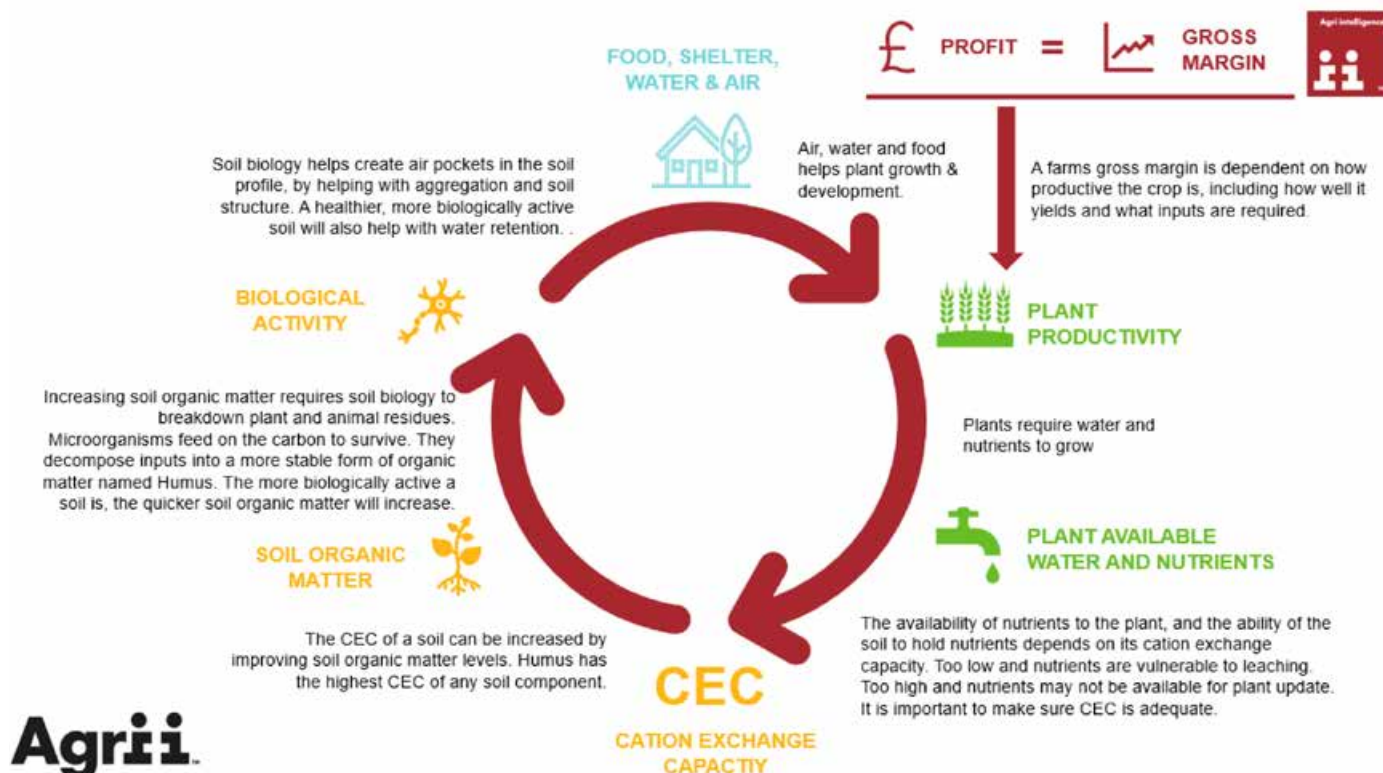


"CUE is the percentage of carbon consumed that is used to make biomass. The higher the number, the more carbon has gone into the soil and the less into the air as CO₂.

"It is an important factor when building soil organic matter and soil health and like nitrogen use efficiency (NUE), high CUE can lead to lower emissions and a faster increase in soil organic matter.

microbial makeup of the soil, particularly the fungi:bacteria ratio and this can have a significant impact on the profitability of crops.

"The C:N ratio is also important for managing NUE, which is a key factor in economic productivity and crop performance and a key consideration when checking soil sample results and deciding on the most appropriate inputs for nutrient management, such as cover



Agrii

crop species, organic amendments and fertilisers.

"The ideal C:N ratio from a soil test is around 12:1, but this differs from the ideal C:N ratio for inputs, as not all the carbon will remain in the soil."

Measuring soil carbon for revenue generation

In the current production climate, there are other benefits to understanding more about soil organic matter and carbon content, he says.

"Soil organic carbon is different from organic matter and it is this which carbon markets tend to look when evaluating

payments.

"Organic carbon is a measurable component of organic matter and it usually assumed to be 50-58% of total organic matter with the other 42-50% deemed to consist of other organic compounds such as hydrogen, oxygen and nitrogen.

"Carbon markets tend to look at the amount of organic carbon in soils in tonnes per hectare (t/ha) to a defined soil depth, usually 0-30cm, 30-60cm and 60cm depths, so it is important to check guidelines with a recognised market before undertaking samples.

Soil carbon tends to be analysed most

commonly using the Dumas method which is favoured by laboratories due to its improved accuracy, he adds.

"The sampling strategy and number of samples taken needs to align with the carbon scheme being joined and this will depend on factors such as soil type, management practices and the potential for change. Samples will usually need to be geo-referenced.

"Fine dry bulk density measurements also need to be taken using a corer. This cannot be taken using a standard soil auger or trowel in the field and remember, only certain labs offer bulk density tests."

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COVERING SOILS DAY

AN INTRODUCTION TO SOIL HEALTH MANAGEMENT

Anglo American exhibited their natural mineral polyhalite fertiliser 'POLY4' and Soil Scientist, Kathryn Bartlett gave a talk on how long-term soil management plans can improve soil fertility.

You will have heard it many times already how fundamental soils are to the wellbeing of our planet. Intrinsically knowing the value of good soil-based understanding, is the foundation of any growing system (excluding of course aquaponics!). Agriculture is recognised more and more as one of the drivers of possible mitigation of climate change, and as an industry with vast hectares of land on which significant gains could be achieved. Farmers are ever more increasingly expected to provide services in keeping with enhancing soil productivity and health. The job remit is massive: produce more and better-quality crops, with limited good quality soil and do that in an environmentally responsible manner. No small ask.

One of the major challenges we face in addressing soil productivity and health is the inherent variability of soils. The UK alone has hundreds of different soils and the landscape variation within field can be significant, affecting the management needs of this land. Therefore, 'one size fits all' solutions will not work, and we must rely on more detailed understanding at an appropriate scale to the management need, this is further hampered by soil data often being held by several institutions and not always readily available depending on your location.

The story is further complicated when we seek clarity on what is 'soil health' and what measurements can conclude this. The Food and Agriculture Organisation of the United Nations Intergovernmental Technical Panel on soils defines it as: 'The ability of the soil to sustain the productivity, diversity, and environmental services of terrestrial systems' which of course means that it is a dynamic concept changing with the anthropogenic drivers on that land.



Soils need to be considered in three dimensions – look beyond the surface at a complex world and intersection between physics, chemistry, and biology. Soil structure and texture regulate pore spaces, aeration, and drainage. Whilst clay particles in your soil regulate the nutrient availability along with soil organic matter which plays many other important roles such as gas exchange and affecting water movement in soils. Not forgetting that soils are one of the most biodiverse terrestrial systems – they are the recycling centre of the earth driving much of the resource we need to provide good quality food. However, with a third of global soils classified as degraded we are at greater risk of reduced production, not only in terms of volume, but in nutritional quality. Fertile productive soils form the basis to achieving this. Therefore, practices that reduce erosion, minimise soil organic carbon loss, correct nutrient imbalances, combat soil acidification, halt and remediate contamination and prevent soil compaction are some of the practical measures we can put in place to combat this.

To add one last complication to the thinking, we need to also consider soil management as a medium to long-term view when we are framing it within the lens of agrifood systems. Soil processes and changes happen over a scale of years and better to watch the long view to truly gain insight as to

the management impacts on any given piece of land.

Whilst there is no single solution to addressing soil fertility problems, we now have many tools on hand to help. Focusing on providing the best physical, chemical, and biological conditions is the key to maintaining a more balanced and resilient soil system in the long term to provide increased functionality.

Things to keep in mind:

- Keeping the soil covered as much as possible to help prevent erosion losses.
- Selecting cover crop mixes with differing plant rooting structures to aid water infiltration and compaction zones.
- Keep soil trafficking to a minimum to avoid soil compaction.
- Where possible try to increase soil organic matter inputs.
- Provide balanced nutrition to ensure no harmful effects on soil pH and chloride levels.
- Regularly monitor your soils (visually and chemically) and keep a record to monitor long term trends.

Kathryn Bartlett is a soil scientist who is working on unpicking the interactions between polyhalite and soils. Building up this understanding of interactions will unlock new and innovative crop nutrient solutions as part of a global need to improve soil health/ performance that enhances crop nutrient use efficiency and land management practices. Kathryn holds a PhD in Soil Microbial Ecology of arable agricultural systems from the National Soils Resources Institute at Silsoe, Cranfield University. She has worked on projects ranging from nutrient cycling in northern peatlands through to helping inform UK soils policy. She is an honorary member of the British Society of Soil Science.



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Strip-Till Preparator

The Preparator has been designed from carefully listening to farmers over the past few seasons who are wanting to perfect their establishment of maize. The layout of our three independent rows of cultivation discs that can be hydraulically adjusted whilst working in harmony with our low disturbance tine and point allows us to create a perfectly cultivated row that is ready for a seed to be planted into. This system is then finished with a zonal Guttler prism roller ring that is the final part of the cultivation pass to breakdown any clods that have flowed through the system as well as consolidating the row in readiness for a planter when the time suits to sew.

One of the unique features that the Preparator offers is the option of applying either granular or liquid fertiliser behind the loosening tine in preparation for seed to be placed into the row.

Low Disturbance Loosener

The LDL has been designed with the need of farming practises moving towards direct drilling or min-till and the requirements that the latest direct drills have to sew into a level and perfectly finished surface. Compaction is commonly found at depths of 6"- 10", the Low Disturbance Loosener will be used to lift at full width and at depths of up to 12". It is used primarily to loosen the soil structure straight after combining and removing the compaction pan. We have witnessed farms start to experience poor crop establishment and growth

due to the compaction generated from machinery traffic, rain fall etc. We offer the central folding machine in 4m along with the wider working widths of 5m & 6m.

6m Low Disturbance Toolbar

Options.....

The 6m LDT offers the ability to lift and lower the cultivating legs and discs within the frame/chassis whilst not interrupting the height of the trailed implement on the rear hitch. This feature allows the machine to be mounted on the tractor and to only be used when required. The operator has complete control on having the loosening legs in or out of work whilst on the move, this allows the leg and disc depth to be altered if required without leaving the cab. One of the key attributes of the machine is that it provides options for the farmer.

'Tight Turn' - Automatic Headland Turning Feature...

The 6m LDT offers a unique system that allows the machine to be converted from 6m working width down to 3m during headland turns. This feature eliminates the need for an extended headland, the wings on the machine automatically lift to a 90 degree position whilst the operator concentrates on performing the turn, this is achieved using one tractor auxiliary service. The wings will then unfold and become a 6m beam again ready for the next pass, a very easy but versatile feature that transforms field operations.

Choose your system...

The 6m LDT has proven to be a very popular machine that is used with a range of trailed implements. Having the ability to lift and lower the cultivating legs when in combination with other implements without affecting the trailed setup makes the machine very versatile and to be frequently used. The LDT adds a loosening system to machines that are already on farm allowing farmers to enhance their current cultivation and drilling system. We offer three widths of Low Disturbance Toolbar in 3m, 4m & 6m

Heavy Duty Track Eradicator

This machine is very popular for farmers that are currently practising or looking to move into CTF however it is aimed at eradicating wheelings in all farming practises. A strong and robust frame that is built with 8m - 12m trailing implements in mind. The versatility and ability in having the loosening legs in/out of work is a key feature of the machine. The front cutting discs are on the same service which means the machine is very easy to operate and can be set up in the headland management screen. The machine replicates the tractor drawbar height, allowing you to lift and lower the wheel eradicator legs whilst on the move, without affecting trailing implement setup.

Set your trailing implement to the optimum working depth and let the Track Eradicator take care of your wheelings.



Strip-Till Preparator

- Available in: 3m, 4m and 6m
- Leg spacing - 0.45, 0.5m, 0.6m, 0.75m & 0.8m spacings
- X2 Hydraulic catching discs (per row) that can be adjusted to enhance/decrease soil flow into the row for the rear offset discs to cultivate dependent on type and thickness of surface residue
- X2 Rear mounted offset wavy discs (per row) that are hydraulically adjustable up/down to determine the finish of the soil condition in the row to enable a good seedbed for planting.
- Option of either Shear Bolt or Hydraulic Reset Protection & Fertiliser application
- 4m & 6m machines are central hydraulic folding frame with a transport width of under 3m

"Look out for the Grange flags on Stand 520 at Lamma 2024"

Prepare the perfect row for your crops.....

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Add complete versatility to your drilling and cultivation processes

- CAT 3 & 4 Linkage Headstock
- X12 Hydraulic adjustable front cutting discs for trash management and to provide minimal disturbance
- X12 Low disturbance loosening legs at 0.5m spacing with a range of 300mm working depth all fitted with Tungsten protected points
- Automatic Headland Turning Feature – hydraulic system that folds the wings from 6m to 3m for the headland turn
- Hydraulic services for trailing secondary implements

GRANGE
MACHINERY

DIRECT AND MIN-TILL DRILLING VERSATILITY

The HORSCH Avatar and Sprinter drill ranges offer direct and min-till drilling with a focus on versatility and productivity.

The Avatar is the direct drilling expert that is flexible, robust and precise. It can be used universally from direct drilling to cultivated soils with up to three individual metered components. The high coulter pressure of up to 350 kg per individual row and maintenance-free bearings ensure a reliable and effective performance. Depth control at the individual coulter and adjustable closing wheels result in precision drilling in a wide range of conditions.

The Sprinter tine drill combines soil preparation, seeding and fertilisation in one pass. The robust design has clear advantages in min-till conditions, with most of the straw residue remaining on the soil surface. Its strong frame design, low draft coulters and large seed hoppers allow high performance and productivity.

Avatar SD with smaller working widths and updates

The Avatar SD is available in 8m, 9m and 10m working widths with the choice of 6300 litre double hopper or 6400 litre triple tank, and the ability to mount a 400 litre MiniDrill too. It is possible to equip the machines with trash wheels to cope smoothly with high amounts of straw.

In 2024, the Avatar 12.25 SD and 12.40 SD can be optioned with a selective hosing. This allows for alternately supplying the seed coulters with two different crops. Thanks to the individual depth control, fine seeds can be placed shallow and coarse seeds

can be placed deep. In addition, double row spacing can be achieved so that, for example, cereals can be sown with a spacing of 25cm and soybeans with 50cm. The Avatar 12.50 SD offers a row spacing of 50cm as an option for the 12m version.

The AutoForce system, well-known from the HORSCH Maestro, was shown on an Avatar 10.25 SD at the Agritechnica 2023 show. Using hydraulic rams, AutoForce is the only system available to continuously adapt coulter pressure while drilling to prevent compaction on light land or reduced sowing depth on heavy land. This produces an even seed placement which helps crop growth. Row cleaners are now available on the 8m to 12m Avatar models with 25cm row spacing.

Avatar SL – all-new mounted model

The all-new Avatar SL is the smallest and most manoeuvrable Avatar seed drill with a mounted 3-point configuration designed for precise sowing in mulch seed conditions. The depth control roller of the SingleDisc coulter ensures a regular depth placement even in uneven conditions. Row spacings of 25cm or 30cm pave the way for mechanical weed control.



The Avatar SL is used in combination with the HORSCH Partner front tank. As an option, there will also be a solo version with an 800 litre seed tank in the

rear. Hydraulic weight transfer achieves a coulter pressure of up to 240kg per coulter, with the weight of the tractor transferred to the seed coulters. This is useful especially in harder conditions and considerably extends the range of use of the machine.

Sprinter 6.25 SL and 12.25 SC tine seed drills

Two new models join the popular Sprinter tine seed drill range; Sprinter 6.25 SL and 12.25 SC. Changing climate conditions are bringing about longer dry periods and cultivation methods need to change to meet the challenge of keeping water in the soil.

The new Sprinter models reduce tillage to a minimum yet work well in high amounts of straw residue, as well as in harder soils. To ensure a perfect seed-soil contact between the grain and seed furrow, the new Sprints are equipped with a tine seed coulter that creates a residue-free seed furrow. Three different tine coulters (110mm WideEdge, 21mm ThinEdge and 12mm UltraThinEdge) enable the farmer to additionally react to various conditions.

The new 6m SL mounted model works in combination with a Partner FT front tank, while the 12m trailed SC model is equipped with a 6300 litre double hopper and is available with a triple tank and additional MiniDrill options. Both feature tines with a 25cm spacing and a 180kg release force.





VERSATILE DRILLING - AVATAR & SPRINTER

The Avatar and Sprinter drill ranges offer direct and min-till drilling with a focus on versatility and productivity. The Avatar is the direct drilling expert that is flexible, robust and precise. The Sprinter combines soil preparation, seeding and fertilisation in one pass. Both can be specified with multiple metered components for uncompromised versatility. [HORSCH.COM](https://www.horsch.com)

AVATAR SD

- SingleDisc seed coulters that are maintenance-free with a long service life
- 25cm row spacing available on 8, 9, 10 & 12m
- 6400 litre double tank system with third and fourth components optional

SPRINTER SC

- 6300 litre double hopper
- 110mm WideEdge, 21mm ThinEdge and 12mm UltraThinEdge tine coulters
- Available with a triple tank and additional MiniDrill options

TOGETHER FOR A HEALTHY AGRICULTURE



RAGT – PUTTING SCIENCE BEHIND COVER CROP VARIETIES

When it comes to growing cash crops, most farmers will spend plenty of time choosing the right varieties with traits that suit a farm's physical and management characteristics.

However, many growers are sold cover crops by species, with little or no additional information to demonstrate their suitability for different enterprises, soils or rotations.

As one of a handful of global cover crop and soil health plant breeders, RAGT believes this needs to adapt and change to help growers get the most from their investment and better meet the needs of agricultural policy, while optimising opportunities within environmental schemes.

RAGT has been deeply involved in

the cover crop/soil health sector for many years. "There are not many other plant breeders in the world with such an extensive portfolio," says David Ramdhian, RAGT UK's head of forage and soil health crops.

"We are currently involved with lots of partners within and beyond the RAGT group, offering more than 47 species in the UK last year.

"But, while the concept is more accepted than a few years ago, there is still an element of muck and mystery about soil health plants.



David Ramdhian

COVER CROPS

think **SUSTAINABILITY** think **RAGT**

- ✓ Offering a wide range of cover crops, facilitating carbon storage
- ✓ Contributes to reduced nematodes pressure
- ✓ Provides higher rates of N fertility in the soil

think **COVER CROPS** think **RAGT**

+ Call us on **01799 533700**,
or visit us at **ragt.uk**



think
SOLUTIONS
think **RAGT**



N-Fix blend

“Our breeding programme is putting much-needed science into the sector, so we can target the right varieties at specific problems in the field to deliver the best results.”

RAGT has established partnerships with ADAS, Harper Adams University and the University of Wageningen in Holland to delve further into the science and has also embarked on a major European joint venture with Bayer looking at carbon capture.

The company also runs demonstration trials at Ickleton in Cambridgeshire. Taking part in AgriWeb Media’s Covering Soils event was an obvious next step.

“We are delighted to be working alongside host farmer Clive Bailie, who is a real cover crop enthusiast,” says David. “The event was a great opportunity to provide new growers with technical information on various cover crop blends and straights from RAGT’s breeding programme.”

At the event Peter-Jan Jongenelen, RAGT’s international cover crop product manager, showed visitors some key products from RAGT’s breeding programme, which includes brassica cover crops, such as mustards, radishes and rocket lettuce, as well as phacelia, legumes and black oats.

“Some of our soil health varieties are used to improve soil structure and to produce a healthier community of soil microorganisms to help provide the ideal

growing medium for cash crops,” Peter-Jan said.

“There is also an increasing focus to manage and suppress soil-borne crop diseases caused by nematodes and soil-borne fungi across a range of rotations. We are also looking to control pests like wireworm and leatherjackets.

“Whatever the aim, we are all the time choosing varieties to ensure we don’t introduce a potential new weed species or disease into the rotation.”

Many cover crops play additional roles in capturing residual nitrogen and other nutrients, eventually making them available to the following cash crop.

Several straight plant stands and a range of mixtures, all sown immediately after oilseed rape, were demonstrated at the event.

RGT N Fix Blend

This nutrient-capturing soil improver includes a late-flowering Ethiopian mustard to prevent seed set, potentially important where other brassicas feature in the rotation.

- Added berseem clover fixes and captures nitrogen and P and K
- Very deep rooting, good restructuring capabilities
- Frost susceptible so suits no-till systems.

RGT Fungi Redux (nematicide radish, berseem clover, phacelia)

Fungi Redux was created to reduce sclerotinia. In trials with Warwick Crop Centre, this mix has had a good reducing effect on sclerotinia in carrot rotations.

- Also very effective at capturing P and K.

RGT Factotum (phacelia), RGT Dracula (oilseed radish) and berseem clover

Contains phacelia, radish and berseem clover, featuring a range of rooting depths to condition and loosen soils as well as fixing nutrients.

- Frost susceptible, so facilitates destruction.

RGT NemaRedux

- Suppresses potato cyst nematodes and beet cyst nematodes as well as free-living nematodes that affect many cash crops, including wheat. Growing roots attract nematodes out of soil and block their life cycle.
- Clubroot-resistant oilseed radish plus rocket lettuce
- Eliminates need for biofumigation.

RGT Biofum Autumn

Ethiopian mustard, oilseed radish and forage rape mix, drilled in September and incorporated ahead of the cash crop in March for biofumigation.

- All inclusions are winter hardy
- Apply small amount of fertiliser if permitted to boost glucosinolate levels.

Amelia and RGT Brons

A very late-flowering brown mustard for longevity to optimise fumigation potential, plus vetch to provide nitrogen to aid establishment and early growth.

RGT Cebelica

Later flowering, high-biomass buckwheat which is under test for repellent effects against leatherjackets and wireworm.

COVERING SOILS DAY

The Tyre & Compaction presentation hosted by Philip Wright & Stephen Lamb was an engaging and well-attended station during the event.

From a tyre perspective, the focus was very much on the Interface – the contact area between soil and tyre, and how by doing some homework, soil compaction could be dramatically reduced. Identifying the most suitable size of tyre for the application, with the aim of selecting the lowest operating pressure tyre within that size, which normally would be VF specification tyre, with many of the guests already benefiting from that fitment.

A demonstration was given to show, how in some cases, it can be more beneficial to go longer in the footprint, rather than just going wider, this is where VF technology can really play its part, by having a longer footprint, within the already committed trackway, as opposed to just going wider.



This followed nicely into an area, which is commonly over-looked, regarding tyre width vs implement width – which controls the – Tyre to Field Percentage Contact. Example a 3m drill with 710's tractor tyres fitted has a Contact Percentage of 47%, that is nearly half your field in Contact with your tyre, and with whatever pressure you are operating at ! Whereas say a 6m Drill with 710's would only have a 24% Contact in your field.

Three main aim areas were illustrated, if not already achieved :-

A – Aim to reduce your axle loads, where possible, to 5 Tonne.

B – Aim to reduce your operating pressure to sub – 12psi.

C – Aim to reduce your Field Contact Percentage – 20%

By being aware of these aims/goals, soil compaction would be greatly reduced.

One additional area covered at the Station, was with all the hard data we have about the cost of establishment, inputs data, crop data, etc. etc. do we actually have a value as to what level of compaction we generate with each application within the field, especially during drilling - the last tyre before the seed goes to work, the answer coming back was very little hard factual data was known.



Yet we all know that compaction is a major player in poor soil health, yield loss and the business's bottom line – yet we seemingly have no really reference point to it, in this data driven world - this got the guests thinking !

The station was however able to offer one value, which could be easily calculated, while not compaction itself, it is the element which develops compaction at the interface, subject to



soil type, density, moisture, etc. that being the Load Applied.

From this calculation, Load Applied values could be mapped from each application within the field, and then with the whole farm on an annual basis. From this captured data, informed decisions can be made, on how to reduce the Load Applied values.

Is it possible to achieve - by reduced applications, doubling up applications, Increasing the working width of an implement &/or reduce the width of tyre, looking for a lower operating pressure, specification of tyre, would all help to mitigate the effects of soil compaction to your business.

Load Applied Field Mapping could possibly be used as part of the Farm's Management Soil Action Plan within SFI.

Load Applied data will be a value offered by OEMs within their field solutions - data capture - in the near future.

Load Applied - Field Mapping - Full Year Cycle

	Tyre Width	W/Width	Distance	Pressure
Combine	800	10.6	X	32
Tractor / Trailer	650	3	X	20
Muckspreading	650	12	X	20
Subsoiler	710	3	X	18
Cultivator	710	3	X	18
Powerharrow	710	6	X	16
Drill	710	6	X	12
Rollers	800	10.3	X	10
S/P Sprayer	650	36	X	12
Fertiliser	650	36	X	12
S/P Sprayer	650	36	X	12
S/P Sprayer	650	36	X	12
Applied Load for Full Year				3250

PHILIP WRIGHT

Reduced or minimum tillage requires soils to be in good condition for an efficient and effective transition from more conventionally tilled situations. Promoting healthy, biologically active and aerobic soil conditions is key to all forms of successful farming, and especially important where such activity, allied to vigorous crop root development and growth, can result in improved levels of soil resilience. Such resilience is becoming ever more important as our weather conditions become more extreme in both the wet and dry sense.

Important factors to consider when transitioning to reduced, or zero tillage:

Soil type is important, along with the status of the soil itself. Biological activity, for example, will have been influenced by past and current cropping and cultivations. Naturally free-draining and self-structuring (calcareous) soils are likely to make a transition faster, and more efficiently than slowly permeable soils with a slumping-prone nature (silt is a key fraction here, especially in clay soils), or those where previous cultivations have been very intensive. Low soil organic matter levels (as a result, or where straw is removed, or no FYM or biosolids have been returned) also imply the need for care when looking to make such a transition. Other factors of critical importance include the following.

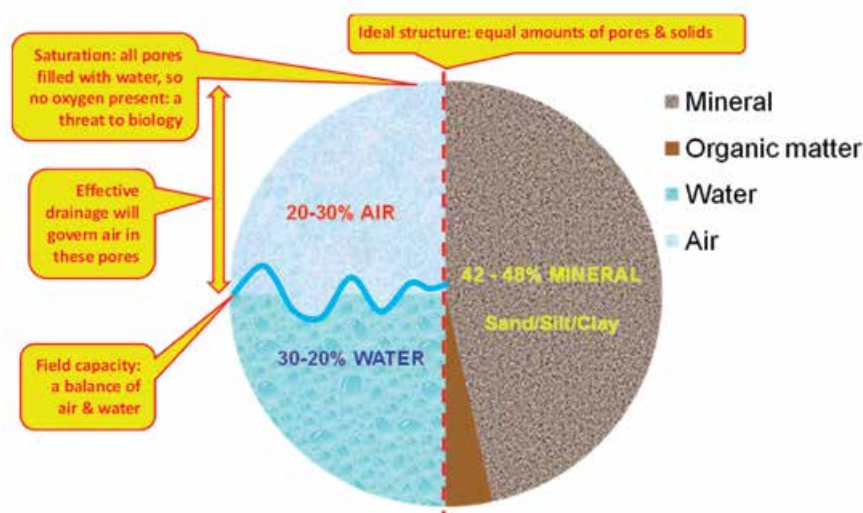
Drainage: Having aerobic soil biology is critical. A rapid return back from saturation to field capacity after high levels of rainfall will help. The capability to pass water through the soil profile efficiently – having a good level of vertically connected pores in a stable, well aggregated structure – is key to unrestricted water passage. Porosity levels also should be roughly 50% of the total soil mass. These pores can then hold onto water and air in balanced amounts, and provide pathways for such, along with plant roots and a home for the soil biology.

A fast return from saturation (all pores full) to 50% full of water at field capacity is driven by stable, resilient soil structure and effective drainage where this is needed for water to leave the field. On heavier soils needing drainage, yield improvements of circa 1 tonne/

Ha of cereals crops is common, once the scheme has bedded in, and soil has begun to repair itself. New schemes are costly, so it is vital to ensure current schemes are functioning to their best before considering further investment:

- Ensure ditches are free of obstructions, and outfalls are clear, and above the bottom of the ditch. This also includes allowing water off the farm holding, onto the next by such means.
- Following heavy rain when soils are already damp, drains should start to run quickly, and slow down equally fast once surplus water has been removed by drainage.
- Mole drainage on appropriate subsoils (at appropriate moisture levels – the soil must be plastic at depth and drier nearer the surface for traction) should supplement under-drainage if indicated on drainage maps. This fissuring action above the mole can also help maintain subsurface structure when it is at appropriate moisture levels.

Other considerations for effective mole drainage include proper mole channel formation – these need time to “cure” so avoid moling immediately before forecast heavy rainfall where soils at depth are near field capacity. Back-fill gravel above drainage pipes also ensures mole channels can vent efficiently and minimises risk of





premature collapse.

Attempting to direct drill poorly drained and poorly structured soils is a recipe for disaster.

Soil Structure: This also determines free root, water, and air passage. Barriers, if found, should be removed so effective rooting (and yield) can result. Soil structure resilience improves with biological and root activity, so significant compromises to yield (and crop rooting) will prolong the transition process, and have negative effects on the business bottom line. The spade is essential here to determine the degree of damage, if present, and actions then needed.

Soil loosening by low disturbance “soil profile stretching” should be considered if this improves rooting, and shallow drainage.

- In many cases, such structuring can be done by a tine based drill – for example when establishing a cover crop. Having the capability to drill seed slightly shallower than loosening depth can be good – as the BTT opener examples seen on Clive's Sprinter drill.
- An option to use a loosener ahead of the drill can also be effective, where needed.
- Such loosening can often be timed ahead of a break crop such as WOSR or beans, allowing its effect to benefit the following first wheat also.

Deeper structure issues are often

confined to known areas (turning headlands, & on less stable soils) where a controlled “stretching” of the profile will usually then allow effective root development and drainage. This process is NOT subsoiling, and can be done by a “sward lifting” approach in conjunction with growing roots through the profile.

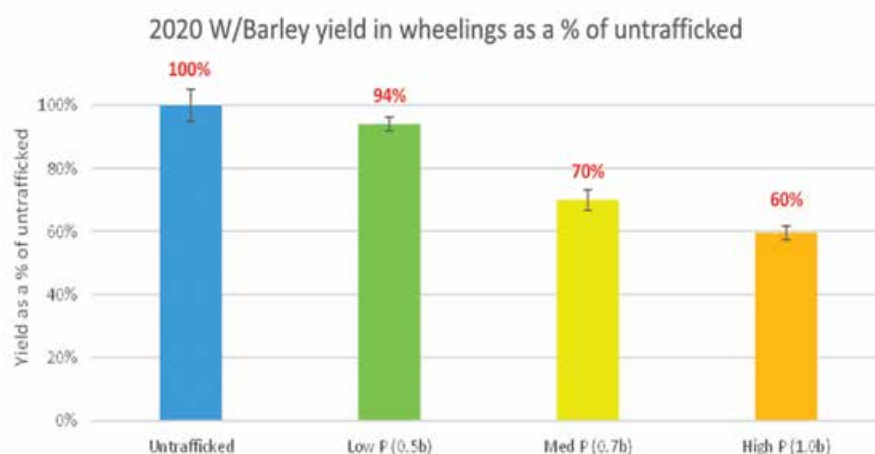
Where this loosening action is needed, ensuring structured “columns” remain between the loosened zones will further stabilise the structure and help maintain the biology present. The benefit to yield in the example previously outlined was just over 1 tonne per hectare of spring barley where the compacted headland was restructured.

Cropping: Growing crops with effective root systems normally drives further, higher yielding crops to then follow. Such crops and roots support positive soil biology, soil resilience, and also sequester Carbon most effectively.

Avoid leaving land fallow and without some form of a growing crop whenever possible will maximise the building of soil resilience.

Prevention before cure: Prevention, or mitigation of trafficking damage helps to minimise unnecessary cultivations, accelerating the transition.

- Controlling and managing traffic limits areas of damage – Controlled Traffic Farming principles apply.
- Minimising axle loads, and ground pressures resulting, is a key factor to consider when transitioning. Many disc based direct drills do not use eradicators, and in any event, keeping ground pressures to levels of 0.7b or below will minimise adverse yield effects in these trafficked zones. Yield effects from ground pressure vary, and can lead to yield reductions of 40% or more, compared to where not trafficked, when drilling direct.



SOIL HEALTH TAKES CENTRE STAGE AT DIRECT DRILLING DEMO

Around 100 farmers from across East Anglia attended a recent demonstration day in Suffolk, where drills from leading manufacturers were put through their paces in a variety of establishment situations.

The event at Street Farm on Ampton Hall Estate, near Bury St Edmunds, was organised by leading agronomy firm Farmacy, and kindly hosted by Strutt & Parker (Farms) Ltd and the Turner family. It provided a stage to discuss the attributes of different machines in a range of situations, from bare stubble to green cover crops. The demonstration also centred on the importance of understanding soil properties to ensure any cultivation, drill, or management strategy was 'fit for purpose'.

"The trial is not about finding out which drill is the best, it's to show some of the areas that we as agronomists and farmers need to be thinking about," said Farmacy agronomist, John Chamberlain.

"With more and more growers looking at, or now practicing, direct drilling, minimal tillage, low disturbance cultivations, cover crops and the like, there are so many permutations when it comes to establishing a crop. Drill technology is also advancing at quite a pace, and buying a new machine is a considerable investment, so we want to explore all of this in more detail to better understand what will - and won't - work in different field situations."

Six drills, six plots

The demonstration centred around a field-scale trial where each of the six drills (see box) was tasked to direct-sow KWS Serafino winter rye into six different seedbeds, which included:

1. Bare rye stubble
2. Low disturbance subsoil (Sumo LDS) and disc (Horsch Joker)
3. Low disturbance subsoil only (Sumo LDS)
4. Standing cover cover crop (MaxiCatchCrop - buckwheat, white mustard, berseem clover)

5. Mown & sprayed off cover crop (MaxiCatchCrop)

6. Ploughed and pressed

Mr Chamberlain said plots would be monitored throughout the season, with plant counts and other assessments conducted over the autumn and winter, before being harvested for forage next year to supply a local biogas plant.

Winter rye was specifically selected for the demonstration due to its sensitivity to drilling depth and pre-emergence herbicides, which should help to highlight any variations in drill performance, he noted.

Making soils work for you

Alongside the drill demonstration, growers also had the opportunity to look beneath the surface of the sandy loam soil at the farm, where Hutchinsons head of soils, Ian Robertson, highlighted the importance of understanding soil chemistry to make soils function better for both crops and machinery.

"A lot of soil structure is driven by chemistry, so understanding that



is key to getting your soil working effectively," he said.

That was clearly illustrated by Terramap high definition soil analysis of the demonstration area ('Keepers Field'), which explained why one part of the field had historically been harder to work than the rest.

"We initially thought it might be because of higher clay content in that area, but Terramap showed that while there were some small variations, the difference in workability was actually more due to the calcium to magnesium ratio," Hutchinsons digital services specialist, James Lane explained.

"There was a much higher magnesium content in the bottom corner of the field, which was making soil in that area tighter, stickier and harder to work."

The same area also recorded higher organic matter, but because the Ca:Mg ratio was out of balance, this had little impact on improving workability. Understanding those interactions meant targeted management measures could be put into place, he added.

Soil chemistry played a major role in the availability and cycling of nutrients too, Mr Robertson continued.

High pH soils, as in Keepers Field for example, were at greater risk of phosphate becoming locked-up in the soil, therefore in such situations, it was



Ian Robertson



“tight” in a direct drilling situation.

When examining the soil profile, Mr Robertson noted a clearly defined surface layer of darker soil, high in organic matter within the top 30 cm, however beneath that, soil was less friable, drier, lighter in appearance, and lacked the same organic matter and worm activity as the upper layer (see image).

“Ideally, we don’t want to see distinct joints between layers of the soil; it should be more of a murky transition as roots and worms help penetrate layers and mix material around. The best way to manage soils in this way is to put as many living roots in there as possible.”

Additionally, roots helped to manage water throughout the profile, as living plants pulled water up from depth, and additional organic matter benefitted water retention - something that was particularly important on lighter, sandier soils, he added.

more effective to use small amounts of placement fertiliser with seed at drilling, rather than a broadcast surface application. All of the drills in the demonstration had the capacity to apply seed and microgranular compounds where required, with versatile hopper and metering systems.

Cover crop benefits

Another area Mr Robertson urged growers to focus on was the use of cover crops to improve soil conditions and “feed” the microbial activity needed to cycle nutrients effectively.

“Every soil has a ‘deep freeze’ of nutrients, and if we get it working well, soil will cycle those more efficiently and into an available form that plants can use.

“Microbial activity is one of the biggest factors influencing nutrient cycling, so it is vital we feed that activity and ‘pull’ nutrients out of the deep freeze by providing green cover throughout the year. It’s about getting soils to cycle nutrients better, not putting more on.”

Analysis of the MaxiCatchCrop that was sown in Keepers Field after this harvest and terminated in the first week of September, revealed that even though it had only been in the ground for a few weeks, the mix had made a significant contribution to nutrient cycling.

Some 17 t/ha of fresh weight had been put on, which contained 77 kg/ha of nitrogen, 946 kg/ha of carbon, and valuable amounts of other macro and micro nutrients. For nitrogen

alone, assuming around one-third of that total was available to the following crop, in monetary terms it was worth around £30/ha, which was a valuable saving, especially on lighter land where nutrient retention from applied fertilisers could be more challenging, Mr Robertson said.

“The carbon benefit from the cover crop is also important. We only measured the above ground biomass, but don’t forget about all of the sugars, carbohydrates and lipids cycling beneath the surface to feed microbial activity.”

The diverse root growth of mixed species cover crops was also a valuable tool for improving soil structure, especially on the high sand content soil, which could be at risk of becoming

The six drills on show at the Farmacy demonstration included:

- Horsch Avatar 6-16SD
- Horsch Sprinter 6ST
- Horizon DSX 60-20
- Mzuri Pro-Til 4T
- John Deere 750A ProSeries Opener
- Vaderstad Proceed (original prototype)



DRILL MANUFACTURERS IN FOCUS...



RELENTLESS RAIN CREATES SIGNIFICANT CHALLENGES



This year's numerous challenges continued into autumn on the Claydon family's arable farm in Suffolk, writes Jeff Claydon, who invented the Opti-Till® direct strip seeding system.

Date: 27 November 2023

What a difference a year makes! I started my last article for Direct Driller, written on 29 August, by suggesting that further agronomic, meteorological, political and economic headwinds would likely continue to test our resolve in the months ahead. They have certainly done that! Between New Year's Day and when we finished harvest, a stop-go affair which promised much but was ultimately unexceptional, the total rainfall amounted to 436mm. The year-to-date figure has now reached 840mm!

What a contrast this autumn had been compared to last, when it was so dry post-harvest that getting weed seeds and volunteers to chit in the hard, parched soils was difficult. Because of this, and in common with many farms throughout the country regardless of the establishment system used, we saw more grassweeds in standing crops, requiring intensive stubble management.

Fortunately, meaningful rain after the combine had done its job created the ideal conditions for our Claydon Straw Harrow, an implement I often compare with a telescopic handler; you don't see the need for one until you have one, then you wonder how you ever managed without it.

We went to work with the Straw Harrow immediately behind the combine and in the following weeks carried out five or six passes across the farm. That knocked the stuffing out of weeds and volunteers, as well as severely limiting the life of any slugs in the chopped straw. On 12 October glyphosate was applied to kill the remaining green material, but almost immediately the heavens opened, dropping 60mm of rain.

The first winter wheat went in on 15 October, albeit under

slightly damp conditions, and over the next three days we established 75 per cent of the planned area using our 6m Claydon Evolution M6 drill. Particularly good progress was made until the door of opportunity was slammed rudely in our face by heavy rain on the night of 18 October. Over the next three days 93mm fell, followed by an average of 10mm every day for the remainder of the month. A further 60mm during the first three days of November simply compounded the problem. It just goes to show that however much you plan Mother Nature always has the last word.

So much rain falling in a short period made the application of post-emergence herbicides more difficult on our very heavy Hanslope series soils, but at least we were able to do it. The task was only possible because the firm, supportive soil structure left behind the Claydon drill allowed our self-propelled sprayer to travel virtually unhindered. However, it remains to be seen whether product efficacy has been impaired.

Buoyant atmosphere at Agritechnica



The busy Claydon stand at Agritechnica 2023

Agritechnica 2023 in Hanover, Germany from 12 to 18 November was the first since 2019, the planned 2021 event having been cancelled due to ongoing Covid-19 restrictions. Attracting over 470,000 visitors, this mind-boggling display of agricultural technology has to be experienced to be believed.

There is significant cost involved in exhibiting at the world's biggest agricultural show, from stand space, stand builders, catering, hotel, to travel and subsistence costs for all the Claydon team, but the investment is certainly worth it in terms of sales, contacts made and market awareness. With my eldest son Oliver at the wheel of his hybrid vehicle we headed to Hanover in an environmentally friendly fashion. Driving from Suffolk to the Channel Tunnel we couldn't help but notice that the whole of southern England looked wet and drab, a theme which would continue in Europe.

Travelling through France, Belgium and Germany things

didn't get much better. Wherever we went 25 per cent of the land appeared to be waterlogged, the emerging crops barely visible above flooded land which resembled paddy fields. Those images left us thinking that this could have severe implications in terms of crop yields and prices in the months ahead. Feed wheat is currently circa £180 per tonne and oilseed rape £360/t, suggesting that no-one is seriously considering how much less farmers across much of Northern Europe might be harvesting in 2024.

Claydon was one of the few British companies exhibiting at Agritechnica and because, collectively, our staff speak many languages we were able to talk to most visitors in their native tongue. Amongst them were some from Bulgaria where, ironically, the weather had been remarkably dry.

The show was buzzing and over seven days the Claydon team welcomed happy customers from all corners of the world, many of whom have been using our Opti-Till® system for many years to successfully establish the widest range of crops quickly and efficiently in all types of terrain, soils and conditions.

Agritechnica 2023 featured a massive choice of equipment dedicated to the apparently simple task of establishing arable crops and it would be possible to spend a vast amount to do that. But why would you, especially at a time when combinable crops prices are significantly below where they should be to support a thriving farming industry?

Avoiding the complexity, excessive weight, high capital cost and substantial on-going running costs of many other methods, Opti-Till® delivers excellent results, very cost-

effectively. Numerous customers to our stand at Agritechnica advised us that they are operating Claydon drills for €3 to €4/ha in wearing metal costs and that is much, much lower than many other systems.

The advantages of Opti-Till® obviously resonated with those wanting a simple, practical approach. We took hundreds of enquiries from farmers in 34 countries, many of whom are looking to change the way they establish their crops, for a host of reasons.

One of the key themes at Agritechnica was in-crop weeding, particularly inter-row hoeing. I recall being very sceptical when, a decade or so ago, my cousin David suggested that we should consider developing an inter-row hoe for use in strip seeded cereal crops. The reduction in herbicides availability and effectiveness are just two reasons behind the success of the Claydon Terra-Blade which we developed. A simple, low-cost implement, it is highly effective at removing weeds between the rows in cereal crops up to and including Growth Stage 31.

I was amazed to see the range of equipment available in this sector but taken aback by the high price tags and complexity of some of it, largely reflecting customer demand for it to be self-steering. Claydon have developed and comprehensively evaluated self-steering inter-row hoes and we appreciate that they may have advantages in certain situations. However, we discounted any commercial development because their much greater complexity means that such products would be much more expensive, cost more to maintain and possibly be less reliable.

It's Wet, Compacted, Water-logged!

10 inches rain is equivalent to over 1000 tns water per acre!!!

HOW MUCH RAIN HAVE YOU HAD SINCE YOU DRILLED?

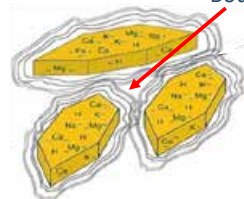
THIS SPRING APPLY HUMIC SC -

SEE OUR EDITORIAL FOR MORE DETAILS :

Before Humic SC



Bound water



- ♦ IMPROVES WATER INFILTRATION
- ♦ OPENS THE SOIL
- ♦ IMPROVES AERATION
- ♦ ENCOURAGES SOIL MICROBIOLOGY
- ♦ LOW COST HUMIC/FULVIC SOIL CONDITIONER

After Humic SC



Spaces for water to move



Soil Fertility Services : 01366 384899

or 07990 511991

Email: info@soilfertilityservices.co.uk



As an experiment, some oilseed rape was drilled in mid-September to see whether it would avoid the flea beetle, but in mid-November some damage was evident and the crop significantly less advanced.

Claydon's goal is to produce simple, effective, cost-efficient equipment which will reliably fulfil its intended purpose for many years. These attributes are becoming increasingly important as farming businesses look to keep machinery for longer to amortise the increasing capital cost over a longer period.

Having used a manually steered 6m Claydon TerraBlade to hoe thousands of hectares of cereals on our own farm over the years I can vouch for the fact that it does the job efficiently, effectively and reliably, with none of the drawbacks of far more costly and complex alternatives. However, there are some customers who would like to see guided self-steering hoes, so our engineers will be looking to offer this option going forward for those prepared to invest the extra cost.

Experimenting with drilling timings

On the return journey from Hanover to Suffolk the countryside was still as wet as it had been when we left. Therefore, it was with some trepidation that on my first day back home I drove around the farm to look at our crops.

Having been incredibly nervous about sowing oilseed rape immediately after harvest following painful experiences with cabbage stem flea beetle damage in recent years, I was pleased to see most of it looking extremely well; let's hope it stays that way!

Cabbage stem flea beetle has caused a small amount of damage, but nothing excessive at present, so we will continue to monitor that situation closely. In the meantime, grassweeds have been taken out with Centurion Max and we await some dry weather to apply Kerb®. Hopefully, the crop will be much cleaner this season, although with oilseed rape currently £360/t it is not particularly viable from a financial standpoint. But what's the alternative as there are no outstanding contenders out there at present?

As an experiment we drilled an area of oilseed rape in mid-September hoping that it would avoid flea beetle attack, but the jury is still out on whether that approach will work. Some damage is evident, it is way behind that which was sown in August and looks very vulnerable.

Another interesting experiment we are trialling is in the Bio sector. There are so many companies experimenting with Bio products and many on offer, from some offering microbes to improve soil health, etc. We are currently using a natural

product that encourages the biome in the soil, providing many health benefits, improving fertility, friability and the ability of the soil to withstand the weather events which we are experiencing. After our first-year trial in 2023 it looks promising, so we will continue to evaluate it in 2024.

This season, largely because wet weather curtailed autumn drilling, we will be growing more spring oats than ever before, but the crop is also significantly less risky than oilseed rape. In preparation we have Straw Harrowed stubbles up to six times to take out germinating volunteers and weeds at the cotyledon stage and any green material will be sprayed off before Christmas. This is important because over-wintering blackgrass seems to have a toxic effect on the soil and subsequently a detrimental effect on crop performance. The land will be left to rest over the winter, then another dose of glyphosate will go on in the spring just before drilling.



The Claydon Straw Harrow again proved its worth this autumn as five or six passes eliminated most volunteers and weeds before glyphosate was applied two weeks before drilling. Given its proven benefits and low operating costs the Straw Harrow represents excellent value, and generally all that's needed is to follow it with a Claydon drill, which also has extremely low running costs.

Catchy weather at harvest meant that field operations inevitably caused some surface compaction, although this was minimal by most standards due to the supportive nature of our direct drilled soils. Importantly, the leading tines on our 6m Claydon Evo drill remove this ahead of the seeding tines, so seed goes into ideal conditions and grows rapidly.

Winter wheat established in October before the onset of relentless rain looks good and is significantly more advanced than where we experimented with slightly deeper drilling to avoid the emerging crop potentially being affected by pre-emergence herbicides. Did we make the wrong decision in doing that and will we need to reconsider whether that approach was correct? Time will tell.

Most of our land is well drained, but I am pleased we took the opportunity presented by ideal weather in early October to mole 40 hectares where water had been slow to get away. That, combined with the effect of the Claydon drill's leading tines, has been enormously beneficial in terms of allowing water to move from the surface down to the laterals. Exceptional rainfall since then has highlighted a few small areas elsewhere where excessive moisture is holding crops back, so we will attend to those next year and have already booked our drainage contractor for the spring.

In my next report I will let you know how our autumn-sown crops are faring following the winter and outline our plans for spring drilling.

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HIGH-PERFORMANCE PREBIOTICS: NUTRIGEO L® AND K1® AT THE HEART OF A SCIENTIFIC PUBLICATION

Nutrigeo L® and K1®, two soil biostimulants marketed by the company Gaïago, have shown, under controlled conditions, an agronomic interest for growing corn in loamy soil. The results of these trials are detailed in an article published on October 24, 2023 in the international scientific journal *Journal of Soil Science and Plant Nutrition*.

The BIOMES (Biomechanisms for Soil Life and Plant Nutrition) joint research and innovation chair between GAIAGO and UniLaSalle - which aims to deepen understanding of the interaction mechanisms of microorganisms, soils and plants - has published the first scientific article showing the effects of two soil biostimulants, Nutrigeo L® and K1®.

The article, entitled "Prebiotics: A Solution for Improving Plant Growth, Soil Health, and Carbon Sequestration?" and written by Dr. Abdel-Rahman ALAHMAD, was published on October 24, 2023.

An observation protocol for short- and medium-term effects on soil and plants

The two soil biostimulants, K1® and NUTRIGEO L®, were evaluated for their effects on loamy soil under controlled conditions on corn crops, in comparison with untreated soil. Analyses were carried out at two harvest dates: three weeks and ten weeks after product application and straw burial. Root growth and development of above-ground maize parts were monitored in this study. The variables studied in the soil samples included bacterial and fungal populations, as well as enzymatic activities in the carbon, nitrogen, sulfur and phosphorus cycles, changes in organic matter and mycorrhization of plant roots.

NUTRIGEO, a partner for fungi and soil organic carbon

Nutrigeo L® confirmed its positive effect on corn growth. In this modality, root weight increased by 30% and above-ground weight by 20%. In particular, Nutrigeo L® increased the abundance of "beneficial" soil microorganisms, including saprophytic and mycorrhizal fungi, which act to decompose organic matter and absorb nutrients.

In the NUTRIGEO L® modality, there was an observed increase in CEC, glomalin content and the quantity of carbon associated with fine soil particles at ten weeks (by 8.4% for organic carbon and 8.9% for total carbon). This experiment confirms the action of the NUTRIGEO L® prebiotic in initiating dynamics favorable to soil carbon storage at ten weeks.

K1, the universal decomposer of organic matter

For its part, K1® has also increased the abundance of fungi and bacteria considered beneficial, with action focused on the decomposition of organic molecules of varying complexity, illustrated by a greater metabolic diversity of the soil bacterial community and a higher level of enzymatic

activity. This decomposition is coupled with an increase in electrical conductivity, CEC and certain nutrients such as assimilable phosphorus.

As with the NUTRIGEO L® modality, the K1® modality produced greater growth in the crops tested.

Continuation of the BIOMES Research and Innovation Chair's work on soil fertility

This pioneering work is one of the first to establish the positive short- and medium-term effects of prebiotics on soil fertility, microbial communities, plant development and the initiation of dynamics and processes conducive to carbon storage.

The BIOMES Chair continues to deepen knowledge on these topics, with future publications in the pipeline.

A mode of action defined under controlled conditions with benefits already observed in the field

GEP - Good Experimental Practices - trials have also been carried out by independent technical centers in the field. These studies were carried out in different French and European regions, under different soil and climate conditions, and on different crops, in order to come up with recommendations for use and obtain approval as a soil conditioner with biostimulant effects on soil and plant.

At the same time, in 2020, Gaïago, in partnership with over 80 French retailers, launched an operation called "La Terre Par Dessus Tout" (The Soil Above All). A total of 1,681 farms across France participated, representing 2003 plots and some 20,000 hectares of farmland. Different soil and climate conditions were incorporated into the demonstration. Observations, based on easy-to-implement, reliable and duplicable indicators of soil structure and organic matter decomposition, validated the effectiveness of NUTRIGEO L® in agricultural distribution, with visual benefits in almost 9 out of 10 cases.

The results obtained by the scientists of the BIOMES research chair have confirmed and illustrated the mode of action of NUTRIGEO L® under controlled conditions, and complemented the results already observed in plots through the national soil fertility operation.

In addition, this prebiotic is the main lever of the Gaïago Carbon program, which enables farmers to accelerate the revitalization of their soils thanks to the income generated by carbon credits. More than 26,000 hectares of 650 farmers in Europe are involved in this program.

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FARMER FOCUS

TOM SEWELL



This summer my eldest 2 children sat their A-Levels and GCSE exams. Both did very well and their grades have earned them places at their chosen University and sixth form to continue their studies. Last year I spent quite a few days taking Emma, my eldest, to University open days. It was fascinating to visit different areas across the country and see where she could spend the next three years of her life (as well a check out the farming en-route!)

I remember doing the same thing many years ago (although it feels much more recently that I started at Harper Adams). Remembering back to my sixth form days and looking through university prospectuses, I was always fascinated by the degree "Disaster Management". I often wonder what would have been in the course and what job you'd end up with?! Well this summer I realised that's the course I should have taken all those years ago!

There's a saying "what doesn't kill you makes you stronger"! Well this year has done just that!

With Emma and James in "exam-mode" from April 'til June we decided to have a very low-key early summer. We had a grainstore floor and apron to lay as well as some drains and landscaping to complete, as well as hay to make so I decided not to attend any shows or festivals this year.

I farm with my parents and my wife Sarah, with Dad and I doing all the practical day-to-day work! From about April time this year (2023) Dad had started complaining of sore feet and was struggling to stand still. His feet continued to deteriorate through the early summer and although he could drive to mow grass or row-up hay he was struggling to move about the yard and was reluctant to do any maintenance, which is quite unlike him. For my whole life he has always been the combine driver! I've never been interested in the job to be honest, preferring to manage the store, load out lorries, and organise everything that's going on.

Dad started the harvest as he's done for the past 50+ years but from day 1 was struggling with his feet and health. One morning I got the call to help him out of bed as he couldn't walk! It took me 20mins with Mum to get him out of bed,



Drilling team stopping to fill up

down the stairs and into the kitchen! 48hrs later he was in intensive care with the nurses preparing a ventilator. He was diagnosed with vasculitis and spent one day short of 12 weeks in hospital! Today I took him to the oncology department for his final infusion of immunosuppressant drugs. The road to recovery will be long but he's now home.

So, my first lesson in disaster management was how to manage harvest (with 75% still to cut) when my combine driver was rushed in to hospital and out of action. Our only other staff member was Lewis, a Harper student, who had limited harvesting experience but who did superbly well having to cope with a sudden change in working conditions.

This is where your friends come into play. In Guy Eckley and Jo Forknall I have 2 of the best farming friends (and neighbours) you could wish for! Interestingly for a little while we have been talking about the potential for collaboration between our three businesses. We all farm within 8 miles of each other with our three farms forming three corners of a triangle. We are all similar aged (ish!) and our farm sizes are all within a few hectares of each other. More importantly we are all trying to farm in a similar way, get on very well and have a similar attitude to life!

I had said to them once that when our combines or our fathers needed replacing we would take a gulp and say "how much?!"

Well now was that time, and it wasn't a joke any more. Guy immediately lent me George (his combine driver) for an afternoon and I reluctantly had to sit on the combine! It was hard work and stressful but somehow we got harvest finished. A self-employed chap called Liam appeared by recommendation from a friend and he joined in as though he had been on the farm for ten years, enthusiastically carting grain, topping some huge summer cover crops and generally being proactively helpful. For a few days both Guy and Jo brought their combines and we cut as a team of three which was actually a lot of fun and very productive. Meanwhile my wife Sarah had sprung into superhero mode and was not only managing the social lives of our 4 children over the summer holidays, running the farm office



Three farmers collaborating really works... and looks cool!



Multi drill set up

and providing meals, she was also visiting dad regularly and feeding Mum every evening, who was now a harvest widow for a completely different reason!

So harvest got finished somehow! Yields were poor following early promise. Proteins were also down which was particularly disappointing but by the end of harvest I was past caring to be honest. From when Dad went into hospital I finished driving the combine on the wheat. Before Jo and Guy came to help we had 6 combine breakdowns in 6 days which seriously tested my patience and had me questioning my career choice on more than one occasion! Special thanks to Neville from Manns Kent who saved us when we were really struggling. Another contact and local agronomist, Andy Pendry, was suddenly available when our 100ha of beans needed harvesting. Having previous combining experience, he effortlessly jumped into the big red combine seat and purred through the beans.

With harvest finished our attention turned to compost spreading and a few bits of field work. The huge benefit of being a no-till farm came into sharp focus here as there was pretty much nothing to do in the fields. A few fields of low disturbance subsoiling with the Sumo LDS for a neighbour polished up the points but that was about it. I also took the decision to ruthlessly cull any operation that wasn't essential. I could see that the yields were reduced, the wheat price reducing and costs at an all time high! This wasn't a year for any luxuries.

With Dad still in hospital as Lewis returned to Harper for his second year, we embarked on a series of breakfast meetings with Jo and Guy taking time to sample the local cafes, golf courses and farm shops to see who's breakfast and coffee was then best! With Guy running a 12m Amazone Condor drill and us running a 12m Horsch Avatar we decided to form a drilling gang. We made a plan of attack which meant planting all the Weald Clay land first before going up on the hill for the land over stone (where I farm) to finish. The thought behind this was that the clay land wanted to be planted earlier as when it gets wet it takes longer to dry out. (or doesn't in many cases).

The plan worked really well with both drills working in the same field on a few occasions. The drill operators George and Harry (who we borrowed from Jo) managed to sync the GPS so that there were no overlaps and no misses. Seeing 24m at a time planted certainly is impressive in Kent fields! Having been disappointed with my Extase this year we have decided to create a blend going forward to hopefully achieve some higher proteins.

As has been the case for a few years now, all seed has been cleaned only, with no seed dressings applied. The first wheats that we have managed to plant into bean, oat and cover crop stubbles have emerged quite slowly but evenly. With the virtually non-stop rain since the middle of October soils went from concrete to too wet very quickly. Sitting here writing this on the 27th November with the drill still on the back of the tractor in the shed I think it's now pretty unlikely that we will plant anything else before the New Year.

The ground destined for second wheat will now most likely be planted with spring oats and we are looking very seriously at using a number of the SFI options as a soil building break crop now. This would mean that the combine, sprayer and drill would all do considerably less work on our farm. It does feel like an admission of failure in farming, but to get a guaranteed margin for a break crop that builds soil and allows for a good clean entry for wheat seems very appealing.



Drill operators Harry and George assessing progress

Now that we're on the run-in to Christmas (2023) our attention has turned to hay & log sales, winter meetings and time in the office and workshop. We are in the process of relocating our workshop to a bigger and better location but this involves sorting through the old workshop and finding things we kept 20 years ago because "they might come in useful one day". Farming on my own, now that Dad is confined to the house, has made me somewhat ruthless in having a good clear-out! It's amazing how little you actually need when there's no cultivations required.

I'm still scratching my head as to the best way of getting bulk seed into the drill when a full-fill is the best part of 5 tons. This year we have had 7 bulk bags split on us. They were all brand new bags and one split when it was hanging over the drill hopper! Fortunately Harry wasn't underneath but my new-found ruthless streak has resulted in every empty bag leaving the farm in a skip! Farm safety is something I simply won't compromise on and we WILL find a way of getting bulk seed into the drill safely, quickly and simply which doesn't break the bank. If anyone has any great ideas that doesn't involve the tele-handler in the field, I'd love to hear from them?

Otherwise I'd like to wish you all a very relaxing Christmas break and a safe and enjoyable 2024.



CLEMSON/MICHELIN STUDY IMPACT OF TYRE PRESSURE ON SOIL COMPACTION IN SOUTH CAROLINA

Written by Denise Attaway from Clemson University, South Carolina

Clemson and Michelin researchers are studying to determine if low-pressure tires can help increase yields in cotton and peanut rotations.

"We know the researchers at Clemson University will make every effort to determine what data and information is going to best serve our regional farmers. Their proven track record and history in the agricultural world make Clemson one of the academic leaders in this type of real-world research."

Martin Crouch, agriculture account executive, Michelin Agriculture

Soil compaction is a major problem that affects plant growth and development, resulting in yield losses of up to 50% on some localized, high-traffic areas of South Carolina farms, such as end-rows.



Kendal Kirk

Some Clemson University and Michelin North America, Inc. researchers believe low-pressure tires can reduce soil

compaction to help increase crop yields for South Carolina farmers.

Kendall Kirk, Clemson Cooperative Extension Service precision agriculture engineer and director of the Clemson University Center for Agricultural Technology (CU-CAT) and Dan Anco, Clemson Extension peanut specialist, are working with Martin Crouch, Michelin Agriculture account executive and Steve Rosen, Michelin Agriculture field engineer, to determine if low-pressure tires can help increase yields in cotton and peanut rotations.

"Cotton and peanuts are two of the major crops grown in South Carolina," Kirk said. "The overall goal of this study is to learn whether there is an economic benefit to implementing low-pressure tire technologies in a cotton-peanut production system."

Soil compaction is caused by continuous wheel or foot traffic that squeezes air from between soil particles causing the soil to become hard, resulting in a decrease of water reaching plants' roots. Information from the National Institute for Food and Agriculture shows most sandy soils in South Carolina have a compacted zone known as a "hardpan" that roots can't penetrate.

Hardpan is usually found at a depth

of 10 to 16 inches and can be 2 to 8 inches thick. This prohibits roots from reaching water and nutrients found in deeper soil.

A Clemson study shows hardpan can reduce crop yields by as much as 50% and make plants more susceptible to drought stress.

Typically, compaction and effects of compaction are more prevalent on end-rows or turn-rows, where machines turn around at the end of a pass, but some degree of compaction occurs everywhere that ground traffic occurs in a field. A reduction in tire pressure reduces soil compaction because the tire footprint or flat plate area – the portion of the tire that touches the surface – increases as the tire is deflated. Because the weight supported by the tire is unchanged and the area over which it distributes this weight is increased, pressure exerted on the soil is reduced.

For this study, researchers are looking at the effects of planting tractors and harvest machinery equipped with Michelin's Ultraflex VF (Very High Flexion) tire technology on yield and related variables in different soil types. At 40 tons loaded, modern cotton pickers are among the heaviest field machines used in major row crop production. The Ultraflex technology is designed



Martin Crouch

to operate at low pressures and adapt to changes in pressure without affecting tire structure.

"Clemson is conducting these

tests in South Carolina, which will provide region-specific information for farmers," Crouch said. "We know Clemson researchers will determine what information is best for the region's farmers. Their proven track record and history in the agricultural world make Clemson one of the academic leaders in this type of real-world research.

"If you want to learn from the leader in cellphone technology, you go to Apple

and if you want to learn from the leader in agriculture you go to Clemson."

A similar study was conducted on wheat by researchers at Harper Adams University in the United Kingdom. Researchers found a 4% increase in yields when machinery equipped with Michelin Ultraflex (IF/VF) radial tires was used, as compared to machinery using standard radial tires. A 2015 study by researchers at the University

HARPER ADAMS UNIVERSITY RESEARCH SUGGESTS RUNNING LOW PRESSURE TYRES CAN **BOOST FARMERS' YIELDS**

Published 27 April 2021

An in-depth international study into the impact of traffic and tillage on soil compaction has found agricultural machinery running low pressure tyres could boost farmers' yields by four per cent.

The study by Harper Adams University academics used one site at its campus in Newport as well as another site in the USA in conjunction with the University of Illinois, working with tractors fitted with low pressure Michelin tyres.

Senior Lecturer in Soil and Water Management at Harper Adams University, Dr Paula Misiewicz, said: "Agricultural vehicles have got heavier and heavier over recent years and the impact that has on the soil can be severe. The aim of our investigation has been to find ways of alleviating compaction."

The study in Illinois was conducted over three years, using 290 hp tractors with Michelin Ultraflex Technology low pressure tyres and standard pressure tyres running in two fields.

Dr Misiewicz added: "The results we saw in Illinois showed quite clearly that Michelin Ultraflex Technology tyres can help farmers to significantly reduce compaction and, in the process, boost their yields by 4 per cent in comparison to standard tyres."

The study on the Harper Adams campus – which ran for nine years - also compared the two Michelin standard and Ultraflex tyre set ups combined with controlled traffic farming together with zero tillage, shallow tillage and deep tillage techniques.

"While there were some benefits of using low pressure Ultraflex Technology tyres in all three systems over the nine years, it was with the deep tillage techniques where it really stood out. Here again we recorded around a 4 per cent yield improvement in comparison to conventional farm tyres," said Dr Misiewicz

Visiting Professor at Harper Adams University, Professor Richard Goodwin, added: "Whilst that improvement might seem small, when you think of it globally, it goes a very long way to help feed the world. Many people are worried about the sustainability of the human race, and if we could get these results for many different crops, it would make a huge impact in sustainability.



Photography credit: Jonathan Gill, Mechatronics and UAS Researcher at Harper Adams University.



Steve Rosen

of Illinois at Urbana-Champaign on corn and soybeans found a 4.3% yield gain using Michelin Ultraflex radial tires versus standard radial tires.

"If similar yield benefits are found in South Carolina cotton and peanut crops, revenue benefits could be as much as \$30 to \$45 per acre," Kirk said.

Michelin Ultraflex radial tires are designed to operate at lower air pressures as compared to standard radial tires. This technology also can be coupled with a Central Tire Inflation System, or CTIS, which equipment operators use to control tire pressure from the cab, such as when changing between field and road travel.

"Operators can decrease tire pressure when they enter a field,"



Clemson University and Michelin researchers are working to determine the effects of low-pressure tires on soil compaction in South Carolina. Pictured are (from left): Steve Rosen and Martin Crouch from Michelin, and Kendall Kirk and Ben Fogle from Clemson.

Rosen said. "Using lower tire pressure in fields increases the tire's footprint to reduce ground pressures in the field, helping improve soil aeration, water infiltration and allowing for better root distribution."

The CTIS is compatible with most agricultural machinery.

This first year of a three-year study is a "team effort," Kirk said. In addition to Kirk and Anco, CU-CAT specialists, and the Michelin representatives,

others helping with this research include trades specialists who work at the Edisto REC Tim Still and Kim Still, the South Carolina Peanut and Cotton boards and cooperating farmers.

"This project is unique in that it has buy-in and support from people in various sectors of agriculture," Kirk said. "It is a model for the type of collaborations we seek to establish through Clemson's Center for Agricultural Technology."

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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!

Mike Donovan

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WHAT IS THE BEST WAY TO MEASURE SOIL CARBON STOCKS?



Field Operator Henry, Somerset, Soil Extraction

A Guide to Choosing a Project Developer for Soil Carbon Revenues

By Dr. Harry Kamilaris

Soil's capacity to remove atmospheric CO₂ and increase stored organic carbon is bringing new commercial opportunities for farmers. However, the market and regulatory landscape is still evolving and different Carbon Project Developers (CPDs) – companies who partner with farmers to create and sell carbon credits – have adopted a variety of different methodologies. The accurate measurement of soil carbon stocks is vital. For farmers, choosing to work with a CPD that will offer the best, long-term income is vital to making the most of this opportunity.

There are two main parts to the role of the CPD. First, they need to support farmers' choice of farming practices to build soil carbon stocks. Second, they need to quantify and verify the increase in soil carbon stock - as reliably as possible. This second part is critical to securing carbon buyers – willing to pay for soil carbon removals – and for the agricultural sector to be recognised for delivering real and substantiated climate benefits.

Success hinges on selecting the right CPD: one who not only understands your needs but who has also mastered the specialism of soil carbon MRV – Monitoring, Reporting, and Verification.

In this guide, we explain the essential components of reliable, transparent and future-proofed MRV, equipping farmers to

ask the right questions and make informed decisions in their journey into monetising soil carbon restoration.

What is Soil Carbon MRV?

Soil carbon MRV is the backbone of any credible carbon project. It involves robust measurement of the amount of organic carbon in farmed soils at the start of your contract, and then verifies the change in quantities of soil carbon stocks at the end. This is used to validate carbon credits that have been issued and paid for over the course of the project. It also provides a guide to the farming practices that are likely to yield the most carbon benefit. As you explore potential partnerships, it's crucial to select a CPD who can demonstrate a fit-for-purpose and comprehensive MRV process that will



ASCA Machine

stand the test of time. This ensures that your carbon credits will be respected and valued by the market as it evolves and offer the best income opportunities from buyers looking for high quality credits they can trust.

Key Considerations for Farmers

1. **Activity vs outcome-based payments:** Some CPDs remunerate farmers for making practice changes (e.g., use of cover-crops) while others make payments based on the soil carbon outcome. In both cases, the CPD still needs to provide robust evidence to validate the carbon benefit being sold to carbon buyers, for your income to be reliable.
2. **Scientific Rigor and Accuracy:** Ensure the developer uses accepted science-based methods to measure soil carbon. This can be direct use of primary data or modelled estimates; both must be demonstrated to give reliable results when measuring change in carbon stocks over time.
3. **Protocol Alignment:** CPDs should adhere to credible MRV protocols. Comprehensive MRV protocols are published by independent registries; to improve integrity, CPDs can align with these to ensure their work meets recognised carbon market standards.
4. **Transparency and Trust:** Look for a developer who values transparency in their processes and communications, especially with carbon buyers. Clear, honest interaction helps you to understand your options and helps carbon buyers have confidence the credits they pay for from your land.
5. **Farmer-Friendly Approach:** The ideal developer understands farming realities and tailors their approach accordingly. The service should be designed with practicality in mind, making the process accessible and manageable for farmers.

Activity vs outcome-based payments

Payments based on 'farm activities' are popular among Carbon Project Developers. It is often easier to validate implementation of farming practices (e.g., farm visits can check cover crops have been planted) than it is to measure the change in carbon in the soil (the outcome). In the near-term it may also be lower risk to farmers because payments do not require proof that a soil carbon benefit has been achieved. However, long-term this approach may be hard to maintain as carbon reporting and carbon markets become more structured and standards are established to avoid greenwashing. An approach that can clearly show measured change, or a well evidenced estimate, may be a safer option over the long term. Remember, once you have made a start with a chosen project developer, it may be hard to switch to a new scheme that requires a practice change to be introduced to qualify for credits.

Scientific Rigor and Accuracy in Measuring Soil Carbon Stocks

Measuring carbon stocks with rigor and accuracy requires expertise that often sits outside the CPD organisation. Using an independent service like Agricarbon, designed explicitly for the purpose of validating carbon credits, brings trust and

value to the carbon buyer, and security of income to the farmer. The use of direct measurement (analysing actual soil samples) is fundamental, even where a modelled estimate is used to allocate carbon payments. 'Ground-truth data' from direct measurement is needed to set the start point and to calibrate models to give a realistic estimate. All credible MRV protocols, from independent carbon registries, require direct measurement at the start of a project and again at least every 5 years, to verify that benefits claimed and paid for are real.

The methodology should include a logical sampling design: the number of samples required and how they are allocated across the measured area. This should include a statistical assessment of whether the sample number will be sufficient to detect change in carbon stocks over the project timeframe and a valid approach to distributing samples to represent the whole measured area. For example, random allocation is a common and recognised approach, while more directed sampling (covering some areas and not others) is being developed by remote sensing companies and should be based on robust evidence (from ground truth data).

Sample collection and analysis should follow detailed standard operating procedures to ensure consistency and quality. Analysis should include measurement of Soil Organic Carbon (%) and Bulk Density (how much soil there is in each field) so that the carbon stock – total tonnes of carbon – can be calculated with confidence.

Agricarbon provides all aspects of the direct measurement process, from sampling design through sample collection, processing and analysis, and calculation of carbon stocks. By focusing exclusively on this vital part of the process, Agricarbon brings independence, deep expertise and consistency to measuring soil carbon to underpin trust in the credits issued and sold by Carbon Project Developers. This, in turn, assures farmers more reliable and higher value carbon farming projects.

Protocol Alignment

All CPDs should be able to show you their MRV protocol (detailed instructions and requirements for robust Monitoring, Reporting, and Verification of carbon benefits). These can be produced by the CPD, but reputable protocols are published by international registries such as VERRA (VM0042 protocol), CAR (Soil Enrichment Protocol) and Gold Standard. A developer aligned with these public protocols demonstrates their commitment to upholding standards in carbon credits and will ultimately have the widest access to carbon buyers. However, actual validation by these registries is costly so many smaller or newer CPDs will align, but not register, their projects. Agricarbon's methods have been designed explicitly to comply with the main public protocols and allow CPDs to get 'Measurement' right for every project. As projects increase in size, formal registration will become increasingly important to ensure the integrity of credits and protect the income to farmers and the reputation of the agricultural sector.

Transparency and Trust

Transparency in processes and communications is a cornerstone of the relationship between farmers and Carbon Project Developers. A developer who values transparency



CarbonForce, Loch Tummel, Scotland

will keep you informed about the methodologies used, the progress of your project, and the carbon benefit of changes you implement on the ground. A developer using consistent methods of direct measurement across numerous projects will also build insights into farming practice impacts on soil carbon stocks and, in future, be able to guide your decisions about the environmental and commercial value of carbon farming approaches.

Farmer-Friendly Approach

Creating carbon credits is a complex and technical processes. Do not underestimate the work that a project developer must

put into getting this right! They also need to translate this into something accessible and manageable for farmers. The breadth of knowledge within a good project developer spans agronomy, climate science, green finance, carbon reporting and carbon markets. Additionally, they must understand the farming context to ensure the project fits seamlessly into regular operations and doesn't affect production. Agricarbon takes the Measurement part of that process and ensures the farmer has to do nothing more than open the farm gate. We usually integrate with the CPD's process, and our data goes directly into their reporting.

Empowering Farmers with the Right Questions

When evaluating CPDs, farmers should feel empowered to ask specific questions to explore the expertise the CPD brings to each project. Questions could include:

- Who buys the carbon credits I generate and what validation do you give them?
- What MRV protocols will you follow and how do they align with internationally recognised standards for the wider carbon market (e.g. VERRA, CAR)?
- Who provides the measurement expertise to ensure robust carbon data underpins my project?

Opening the Gate to Agricarbon

As you consider venturing into soil carbon credits, remember that your choice of CPD will make all the difference. Choosing a developer who is working with Agricarbon means that they are dedicated to your success in the carbon market, grounding your project in the best practice most valued by carbon buyers.

We also work directly with farmers and landowners who are empowering themselves by establishing a baseline of their soil carbon stocks today. An independently sourced baseline from Agricarbon can support a farm business's own net zero ambitions or provide evidence of current soil carbon stocks before making a decision to enter any form of carbon market scheme.

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FARMER FOCUS

DAVID AGLLEN



So it's back down to earth with a bump this year. We have had a run of favourable summers that have helped us succeed with our direct drilling and progress with cover cropping across the farm. Essentially the harvests have been earlier and drier, allowing timely straw baling and cover crop establishment. However, we were back to our more usual harvest timings for 2023, this is more like the conditions we faced when we first ventured down the no-till route. Variable would be the best description of the outcomes then.

We have learnt a lot over the years and, with more appropriate technology and experience, we seem to have upped our game. I think our soil structure has improved to the extent that we can sow sooner after any wet weather, successfully. That said, 12 months ago we were looking at plenty of early sown winter cereals and cover crops with huge canopies being eaten by our newly resident sheep flock. This year we have very little early sown cereals, and the cover crops are not quite as large. Despite this we are still seeing big benefits. During the particularly wet October (I must confess we got off relatively lightly, compared to others further north, with only 250mm for the month). We did have plenty water running out of gateways, but the vast majority of this was running clear, still the odd bit after potatoes that left a lot to be desired, to remind us of what we are missing by not cultivating the whole place.



2022 no-till winter oat crop



RHS pre-grazing, LHS 24hrs grazed and bottom 48hrs grazed

I briefly mentioned our livestock partners, Sheepleep, a livestock business run by Alex Johnston and Rosie Hetherington, a few months back. The deal is that we pay them an annual fee to manage our cattle and grazing in line with our requirements. The benefit to us is a dedicated livestock team and year round access to sheep, but more important is their mindset regarding mob grazing and building a 'cheap to operate' cattle enterprise. An example being that we now mostly walk the cattle around the farm instead of using a trailer and tractor. This has saved a lot of time and money in just 16 months. We even cross the dual carriageway with the much appreciated help from the police who close the road for us for a few minutes. It takes about 2 minutes for 150 cows and calves to cross, instead of a whole day to move them by trailer.

Sheepleep get access to 1200ha to graze and develop their sheep flock in return for a grazing fee. They benefit by having a portion of their income known for the year and having continuous access to a large block of land for their business to operate from. The opportunities for young people to build a business from nothing within agriculture seem to be slim, mostly related to land access issues and plenty established farmers willing to pay more to access what little does come available.

So currently we have 1100 ewes being tugged as they move rapidly across the cover crops in 2 separate mobs. The aim is to keep the ewes on as high a plane of nutrition as possible for the 19 days the tugs are working. They are leaving about a third of the cover crop uneaten. Forcing the ewes to clean up more might reduce the lambing percentage, a risk not worth taking. The ewes will most likely go back over these crops later in the winter to clean up when they can be made to work harder for their feed. Benefits from an arable perspective include the retention of a living root system in the soil for a few more weeks of the year, as well as leaving some extra ground cover for a bit longer, after all we have most of the winter to come yet and with that, plenty precipitation I suspect.

We experimented with some hairy vetch in a few cover crops



2023 no-till Winter oat crop

last winter. I was not convinced that this would survive the winter frosts. I need not have worried. We have added more into some covers this winter to aid diversity for both the soil and the grazing stock. Some of these crops will be cut for silage in May ahead of the kale crop establishment in the same fields. I am hoping the vetch will add something extra to the silage too.

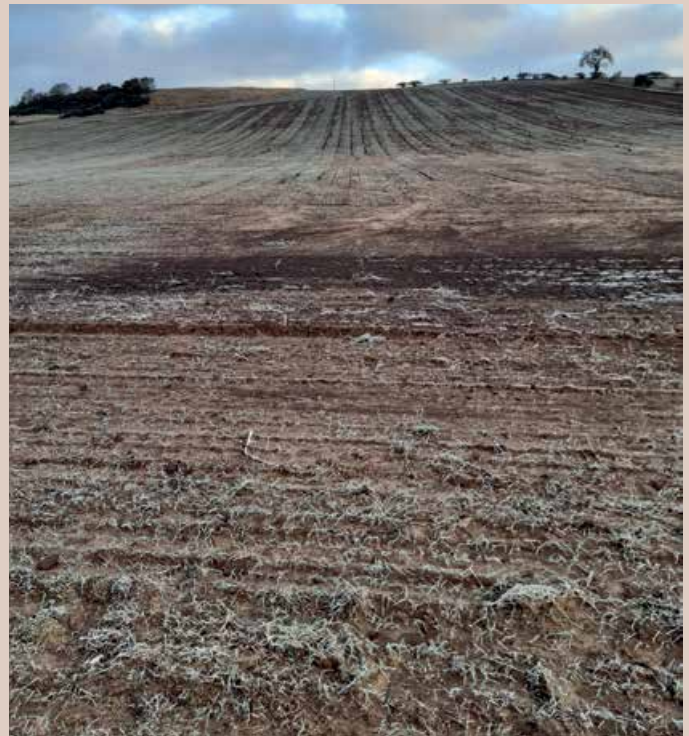
In the constant drive to increase diversity, it was decided we would graze sheep and cattle together this summer. The cows had other ideas. The grass was quite long when this started. The first problem was having to strim grass to get the 3 electric wires set up for the sheep. Then we discovered that the cows pay no attention to the orange electric wire, they are used to a white one, and proceeded to walk right through it. We ended up with sheep and cows all over the field along with the wire that was supposed to contain them. The experiment was given up after a couple days, back to the drawing board for this. Could technology help here with electric collars? Maybe, if they ever become cheap enough.

Despite the very wet October, the cattle made very little mess as they moved round the grazing platform. We had built up large covers that were able to carry the cows and hold them out of the soil on all but the wettest of days. Only a few of the paddocks were left looking a little dirty - they represent only a very small part of the grazing platform and will recover. Perhaps we will have to rest them longer through the spring next year for this. This is just one of the many benefits we are seeing as we adapt the rest periods of the grass to the growth rate. The longer rest period from July onwards allows a thatch to be built up, whilst still producing plenty grazing for the cows. I dread to think what the grazing fields would have looked like if we were still set stocking.

The cows moved onto the kale in November with calves still at

foot. This is a little earlier than we would like. This decision was made to allow all the kale to be eaten up in good time giving us the option of timely establishment of the following spring cereals. Last spring, we held stock on the kale longer than ideal to eat it all up. This was to the considerable detriment to the spring oats that followed. We were too greedy with the cows. This is just one of the compromises we currently face in our system. Keeping livestock cheaply whilst not outstaying their welcome on the arable part of the rotation. 'Grow less kale' some would say, and were I braver, I would agree. I feel anything gained over a year or two might well be wiped out several times over when we do get a winter where we need plenty extra feed. When this occurs, usually everyone is short, so buying in could prove costly in an emergency.

Calves will not be weaned until mid-February. The cows will do the heavy lifting, greatly reducing the challenges on the outwintered calves. By weaning time, the days are longer, and the sun is starting to feel warm again. The stress from weaning shouldn't be so great as the calves are a lot older than many wean. Calving is due to start on 10th April, and, for the first time will be outside, by design. We had better enjoy the quieter winter months now. With spring work hopefully getting going in February, calving, lambing, and turning fattening stock back onto grass in April, we will need to have our wits about us. February is less than 9 weeks away!



The humble spud or the dreaded spud - Potatoes previous crop 2023

I was lucky enough to join the BASE UK trip to France in November. We spent 3 days visiting farms within a 3hr radius of Paris by car. A lot was learned, the knowledge they have of cover crop and extracting the most from them is huge. I can highly recommend this trip to all, as well as BASE UK membership, should the opportunity come around again. The knowledge transfer ability of peer-to-peer learning is huge. It was good to see livestock being seen as part of the cover crop recycling task over there too.

DRILL MANUFACTURERS IN FOCUS...



The Pro-Til iGen 480 fitted with Twin Spring Tine Coulters

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Mzuri, a renowned name in agricultural machinery, proudly introduces its latest innovation – the Pro-Til iGen linkage machine. This new model is strategically designed to provide a cost-effective alternative to the manufacturers premium range all while maintaining the high standards of Mzuri technology that users have come to trust.

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The Pro-Til iGen stands out with its commitment to quality, a hallmark of Mzuri products. The manufacturer is proud to present this latest range which demonstrates a wide range of innovative features, not usually associated with machines in this price range.

Impressive Features

One of the standout features of the Pro-Til iGen is its large 2,200-litre seed tank, pressurized for efficient metering and conveying of seed accurately, even at high forward speeds. This design ensures minimal downtime and an impressive overall output, providing farmers with a reliable and productive seeding solution.



The Pro-Til iGen 300 fitted with independent spring loaded coulters with individual depth wheels

Proven Mzuri Technology

Staying true to the Mzuri Technology blueprint for consistent crop establishment, the Pro-Til iGen features a leading tine, dual reconsolidation and independent coulters. Unique to this machine, the Pro-Til iGen features a full-width packer that ensures accurate depth control, producing a uniform, level seedbed reconsolidated against air pockets.

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A double harrow bar follows to provide a uniform field finish ideally suited to pre-emergence chemistry application.



The Pro-Til iGen is a linkage direct drill built on proven Mzuri Technology

Versatile Wearing Metal

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AN AWARD-WINNING ADVISOR'S PATH TO NO-TILL AGRONOMY

Todd Jex won Arable Advisor of the Year at the Farmers Weekly Awards by being at the forefront of the latest regenerative and no-till farming practices. The award is the culmination of a journey he began almost a decade ago when his eyes were opened to a different way of farming following a visit to a pioneering farmer.

Based in Wiltshire but with clients across Dorset, Wiltshire, Hampshire and the Isle of Wight, Todd works for leading farm advice, technology and supply business Agrii. The proportion of his clients utilising no-till and regenerative practices has increased from the first farm approaching him in 2016 to almost 70% this season.



Todd Jex

Although he did not grow up on a farm, Todd spent a lot of time with his grandfather, who managed a mixed arable and dairy farm on the Dorset – Wiltshire border. Today, his grandfather's approach to farming would be called integrated crop management (ICM), but back then, it was considered just good crop and animal husbandry.

"Rotational ploughing, crop rotations and what he called 'feeding the ground' were essential parts of his philosophy," says Todd. "He was my biggest influence until I went to Harper Adams to study agriculture, agronomy and crop science."

"I did a placement year working in R&D for another agronomy company and spent much of my time working on trials examining black-grass control. From this, I became fascinated by the cultural control options for black-grass

management, like direct drilling or rotational ploughing, and followed it up with a dissertation on the subject."

When Todd joined Agrii's forerunner, Masstock, he helped with trial work alongside training to be an agronomist. Agrii supported his academic and practical training, with Todd completing his BASIS Diploma.

At the start of his career, most farms in the area were practising min-till or rotational ploughing with no direct drilling. Ideas began to form in his mind about how different approaches to farming involving direct drilling might help farmers tackle black-grass.

Everything changed following an introduction to Paul and Oliver Harris. They had been doing some direct drilling with a Claydon machine but wanted to move to a true no-till system using a disc direct drill and were looking for an agronomist to support them with this change.

"The reason for the switch was for black-grass reasons and also improving soil health, which I had not encountered before. They arranged for me to visit Tony Reynolds, who had adopted no-till ten years earlier.

"Even as I was approaching the farm, I noticed how different it was because there was significantly less black-grass on his fields than others I had driven past to get there. Tony was fascinating, enthusiastic, and happy to share his knowledge and experiences.

"I was shown some research a university had been doing on his farm examining soil health and water infiltration rates compared to a neighbour's mil-tilled farm. I couldn't believe what I was watching; Tony's land was absorbing the water as fast as they could pour it, and they stood waiting for the neighbour's to drain.



"That day was a massive influence on me. Combined with my past experiences and the Agrii research I saw, especially at their Stow Longa site, I became increasingly interested in soil health. I began reading books, attending events, and listening to podcasts on the subject. By working with Paul and Oliver Harris on their farm, I could put much of what I learned into practice," explains Todd.

The Harris family held an open day at their farm to show what they had been doing with Todd, which helped some of Todd's other customers go in their direction a year later. This proportion has gradually built up to over two-thirds of his area.

In the future, Todd believes almost all the farmers he deals with will be utilising a direct drill system, and an agronomist's role will become even more involved in all elements of farming. This increased involvement will be balanced by new A.I. and digital technology helping with existing tasks.

"Agronomy is already multi-faceted, but it will be even more so in the future. The agronomist will have to spend more time with farmers advising on aspects of crop production they do not currently do. Things like examining soils for compaction or advising on machinery will become the norm.



"I was delighted to have just made the Arable Advisor of the Year final, knowing that one of my customers had taken the time to nominate me. My colleague Neil Harper was also a finalist. I believe that is the first time any company has had two employees up for the award in the same year.

"I am incredibly proud to have won the award, and so are my family. It is always something I hoped to have a chance to win at some point in my career. I am a finalist for the Young Agronomist of the Year at the National Arable and Grassland Awards in February, which is another exciting opportunity."

Case study: reaping the benefits of a different approach.

George Fraser of A&R Fraser has worked hand-in-hand with Todd to adopt a direct drill system, transforming their farming operation. Their journey began when George's home farm was sown using a Weaving GD direct drill, and cover crops were integrated into the rotation.

A&R Fraser contract farms 3000ac across Wiltshire and Dorset. As well as contract farming, George's brother Jonny runs a successful digestate contracting service for local farmers, and they have a herd of beef cattle. A rotation of winter wheat, spring barley, spring beans, and oilseed rape belies an astonishing performance highlighting what can be achieved through ICM and regenerative practices.

"We first started on our farm to test the system," says George. "We then started suggesting the new approach to our customers because we could see the results. Our landowners were quick to get on board. Now, it has gone from us suggesting it to it being demanded. People say there is a big yield drop-off when you switch, but we have never seen this."

"The main change we have made is to move away from cultivation to a focus on soil health to manage compaction and improve soil structure. We always start by measuring the soil when we bring new land into the system," adds Todd.

The move from min-till and ploughing to direct drilling has drastically cut George's fixed costs. He has calculated that they are 40% lower. George retains a low disturbance subsoiler for primary cultivation when needed, unlike some regenerative farmers who strictly adhere to a no-till system. He believes this can be necessary for up to five years on heavy soils to manage soil compaction.

It is not just fixed costs that have been reduced. The focus on soil health also means they are getting more yield from fewer inputs. Using slurry and digestate, combined with moving to liquid fertiliser and using inhibitors, has halved inorganic nitrogen use.



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FARMER FOCUS

PHIL BRADSHAW



We have had a very busy few months since my last article, with non-farming activities sometimes compromising the day job of farming.

The beans and mustard planted in the spring established well, and we also planted some home-made wild bird seed mix on the old stewardship plots. With a reduction in farmed area last year our Higher-Level Stewardship (HLS) agreement ended in January, but we kept some of the options such as Wild bird Seed plots going until we could start something new.

The mustard suffered from pigeon damage, and a 'Biblical' hailstorm, but recovered well. The beans always looked good, but I feel all crops suffered a little from the lower sunshine levels through Summer 2023 compared to the year before.

Harvest 2023 started with our Winter Barley trial plots which were reasonably good, but only a few hectares. We then moved into second wheat Skyfall which yielded well, at 9.2t/ha, but also had superb quality which has been good with milling premiums so strong.

The first wheat Zyatt was slightly better yielding, and the Extase grown mainly as a first wheat was better still, at just over 10t/ha, with good quality, and some has been sold already with a reasonable premium. The beans scraped 4t/ha which is slightly below average, and way below the 6t/ha we had in 2021.

The re drilled mustard was harvested fairly late in the season, but happily yielded 1.3t/ha which for a first-time grower, and a crop that had a huge run of bad luck, was fairly pleasing.

As usual everything was direct drilled, with just some land loosened where necessary with our old paraplow.

We did another low N trial, with some basic missed tramlines in some first wheat Extase following Oilseed Rape. While most of the field had a typical 120kg/ha of Nitrogen, mostly soil applied, the trial areas had just 6kg/ha of Nitrogen applied late as a foliar spray of Methylated Urea around the T3 timing, and reduced fungicides and growth regulators.

The results gave a fractionally lower yield but with slightly higher protein for the low N area. This is not a replicated professional trial, so it needs noting with caution, but it



highlights the fact that here on this soil, we can cut Nitrogen rates and other inputs down by a significant amount, and hopefully maintain yield and quality.

We did some machinery upgrades this summer, including upgrading our 26-year-old combine harvester for a slightly larger 11-year-old machine, and our 1999 classic John Deere 6910 tractor was sold and replaced with a larger and newer, but still classic 2008 John Deere 7930 in good order which shares all tractor duties with our existing 16-year-old John Deere 7530. The strategy is to do all our farm operations in house, and quickly to allow time for other projects, but with machinery that is not depreciating where possible.



Our wonderful little 3m Weaving GD drill was traded in for a second hand trailed 6m version that had been reconditioned and updated by Weaving and this increase in output has revolutionised crop establishment in autumn 2023. This was very fortunate given the weeks of wet weather, which did





give some challenges, but it was great to quickly cover the land when conditions allowed.

We still have a smaller Sabre tine drill, but the GD is generally our first choice, and I spent some time setting it up with SK Sprayers liquid delivery components, utilising the tank and primary plumbing already on the drill.

This autumn has also seen a slightly refreshed direction for strategy and cropping. With our Landlords deciding not to proceed with the planned new grain store build here, and our Farm Business Tenancy racing towards its end in 5 years, we have taken a view to simplify and reduce our cropping, with a new live Sustainable Farming Incentive (SFI) agreement enabling more 'Countryside Stewardship' style options than our old HLS agreement had, and also some whole field

options rotationally replacing some of our unreliable break crops such as beans.

This means that we can concentrate on a larger percentage of first wheat crops and some Mustard as cash crops, and have less storage challenges, while also freeing up more time for our other projects. We also find ourselves conscious that our FBT here is due to end soon, and our sons have pursued non farming careers, so we are making plans and provisions for impending retirement.

This is amazing, as it seems like yesterday that we started farming on our own account in 1989 with a David Brown 62 hp tractor, 2 furrow Ransomes reversible plough, MF 30 drill and a MF 525 combine bought for £1500 that did 6 harvests for us. While I look back fondly on those days, life and profitability is so much better for us without a plough!



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THE SCORECARD THAT UNEARTHS A SOIL'S SECRETS



A full picture of soil health can be captured by a new 'scorecard'. AHDB technical content manager Jason Pole investigates.

Not everything that matters can be measured. Not everything that can be measured matters. Wise words. Nobody would dispute that soil health matters. Now it can be measured.

The soil health scorecard is the product of a levy-funded partnership that tackled soil biology and soil health. It provides a simple way to measure the physical, chemical and biological condition of soil.

To develop the approach, the partnership identified core soil health assessment indicators that slot in with farm practice, along with the typical benchmark range(s) for each indicator to help reveal if a soil is healthy, getting sick or poorly.

Physical indicator

Visual evaluation of soil structure (VSS): For VSS, a spade-sized block of soil (about 30 cm deep) is levered out, leaving a side undisturbed to show topsoil structure. Assessments involve allocating a soil quality score by following the guidance in AHDB's new 'How to assess soil structure' factsheet (which is laminated for use in the field). Where horizontal layers are identified, the worst-performing (limiting) layer is assessed.

Chemical indicators

pH: A soil's pH affects its chemical (e.g. nutrient availability), biological (e.g. microbial activity) and physical (e.g. clay mineral aggregation) properties. It is easily revealed by an indicator test or laboratory analysis, with pH 6.5 to 7.49 the ideal range. Higher pHs may result in nutrient interaction issues or trace element deficiencies. Lower pHs, especially under 5.5, require immediate investigation and liming plans adjusted.

Extractable nutrients: A laboratory analysis of a representative soil sample can reveal phosphorus, potassium, and magnesium levels. Compared to England and Wales, Scotland has a different approach to nutrient analyses, which is accounted for in the benchmarks.

Biological indicators

Earthworms: Impacted by pH, waterlogging, compaction, tillage, rotation and organic matter, earthworms are an excellent soil health indicator. A spade-sized soil block is used for earthworm counts. In cropped land, 9 or more earthworms is good and 3 or fewer is bad. The AHDB website includes information on how to count earthworms, including ecological groups, and adults and juveniles.

Soil organic matter (SOM): SOM levels depend on many factors, including soil texture, use of organic materials, farming system and environmental factors, such as soil moisture and temperature. This complexity is reflected in the benchmarks, with different values for England and Wales, and Scotland. They also account for soil texture and rainfall region. For organic matter, measuring it periodically (using the same laboratory and method) to determine trends is as important as the absolute value.

Soil assessment tips

Ideally, gather information (observations and samples) for the indicators from representative field zones:

- Every three to five years (at the same point in a crop rotation)
- At the same time of year (warm moist soils in the autumn are often best)
- At least a month after soil disturbance and/or organic material applications

Simply record a centre point for the assessment area and take samples up



to 5m away from it at random points. For VSS and earthworms, take three samples (illustrated by the orange squares). For other indicators, take several samples (illustrated by the blue stars).

Soil health scorecard

Indicator results (values) can be entered into an Excel-based version of the scorecard on the AHDB website. This automatically assigns a soil status for each indicator: continue monitoring ('CM' green), review ('R' amber) and investigate ('I' red).

In addition to the indicator values, the scorecard also uses three site characteristics – UK region, land use and topsoil characteristics – and features 'management notes' for each core indicator and soil status.

The scorecard approach has already been embraced by many AHDB monitor and strategic cereal farmers to:

- Facilitate a routine soil health check
- Identify production constraints
- Evaluate changes to practices

Limavady Monitor Farm



AHDB monitor farmer Alistair Craig

When Limavady Monitor Farm (Carsehall Farm) joined the AHDB network in 2022, Farm Manager Alistair Craig was already on course to harmonise the two sides of the business – a fifty-fifty split between dairy and cereal enterprises.

The farm (in County Londonderry) has around 120 ha of land on the sandy loams associated with Lough Foyle – a

large tract of land reclaimed from the sea – and a further 80 ha on clay loam soils.

Alistair already put the farm's manure to good use, reducing the fertiliser requirements for his arable crops and boosting SOM levels. It was a good start, but he wanted to go further and pinpoint the causes of poor crop performance in some fields.

In mid-November 2022, soil assessments were done at six sites, with scorecards used to help analyse the results. Alistair found VESS particularly informative. No soils were in a poor condition, which was a surprise. For example, sample site 1 was in a field previously used to grow potatoes, which was assumed to be in poor condition.

During the VESS, the field had Alistair's first crop of winter oilseed rape companion cropped with a mixture of spring beans, sunflowers, vetch and buckwheat. The average (across three samples) VESS score was 3, which put the field in 'moderate' condition. It was not as bad as expected, and rooting was far more extensive than feared. The cropping diversity had already started to perform its magic on the hard-worked land.

The field also performed relatively well for other indicators, including the highest earthworm number recorded across the six sampling sites. Most (68%) of these earthworms were young (juvenile), which may indicate that the

population was bouncing back from previous cultivations.

When Alistair saw the extent of the rooting, the high number of earthworms and the positive results from the laboratory analysis, he decided to sow the companion crop mix on a third of the farm in the 2022/23 growing season.

Encouraged by the soil structure assessments, Alistair used VESS on other fields. One was in poor structural condition, with very few pores and roots, after growing potatoes for two years. The field was planted with cereals in autumn 2022, which performed

poorly. Alistair said: "Looking at the soil profile, it was not hard to see why the crop struggled to grow in this field."

It was a cry for help, so Alistair reviewed the rotation to help the field recover. He took the field out of cereals and grew an eight-species cover crop mix, followed by a cash crop in the spring.

Other issues

The scorecard highlighted many areas that required attention (see the table, below), including some indicators that warranted immediate investigation (I) in some fields. For example, some of these red flags were associated with

Attribute	Sample 1 sandy silt loam	Sample 2 sandy loam	Sample 3 sandy loam	Sample 4 sandy loam	Sample 5 sandy loam	Sample 6 sandy silt loam
SOM (%)	6.5 (CM)	3.1 (R)	9.3 (CM)	3.6 (R)	6 (CM)	3.6 (R)
pH	6.9 (CM)	5.9 (R)	7.1 (CM)	7.5 (R)	6.5 (CM)	7.9 (R)
Ext. P (mg/L)	35 (CM)	111 (I)	30 (CM)	35 (CM)	35 (CM)	32 (CM)
Ext. K (mg/L)	193 (CM)	316 (CM)	102 (R)	93 (R)	60 (I)	179 (CM)
Ext. Mg (mg/L)	68 (CM)	82 (CM)	113 (CM)	91 (CM)	263 (CM)	86 (CM)
PMN (mg/kg)	48 (CM)	59 (CM)	84 (CM)	85 (CM)	95 (CM)	65 (CM)
CO ₂ -burst (mg/kg)	132 (R)	99 (I)	154 (R)	132 (R)	148 (CM)	99 (I)
VESS score	3 (R)	2 (CM)	2 (CM)	2.5 (R)	3 (R)	2 (CM)
Earthworms (number/pit)	20 (CM)	3 (I)	12 (R)	4 (I)	8 (R)	9 (R)

Soil assessment results at Linavady Monitor Farm in soil health scorecards. All combinable crops, except sample 3 (permanent pasture). Scorecards also show results for indicators of microbial activity.



Rooting at sample site 1

low earthworm numbers and nutrient levels far beyond the optimum for the soil.

Alistair will continue to routinely review soil health, which will help monitor the impact of the boosted companion crop area. A full soil health scorecard review will also be done in the Monitor Farm's final year.

Use the scorecard

The scorecard, which was funded by AHDB and BBRO, can be used for UK's main cropping and lowland grassland systems. To access the scorecard and instructions, visit ahdb.org.uk/scorecard

FARMER FOCUS

JOHN PAWSEY



To Certify or Not to Certify, that is the Question

I was fascinated by Helen Browning's reply to the leading question in a session at this year's Groundswell (2023) entitled, "Is it time to certify regenerative farming?" Given Helen's position as Chief Executive of the Soil Association and her role as a board member of Soil Association Certification, I was surprised at her answer which was, "No".

Coming from the Queen of all things organic and me being a loyal subject, I was surprised at her reply given our similar organically certified shackles. To qualify her answer she added that regenerative farmers were still, "Feeling their way", that they had, "Fire in their bellies" and that certification might "Stifle innovation".

I brooded on Helen's leniency.



Organic standards have been preserved in aspic over the time we have been farming under the big 'O', so not moving with the times could I suppose lay their rigour bare to the accusation that they do stifle innovation. Over the last few years I have felt that at organic events, my no-pesticide chums have something more akin to a flickering ember in their stomachs rather than a blossoming man's red flower. Nobody wants to be part of a movement that doesn't have new thinking at its core, and an excitement for change in the marrow of it's bones, at least I don't. I am sure that Helen doesn't either.

If I had a penny for every farmer who said when contemplating exiting organic farming, "If I stopped organic farming I wouldn't go back to my old conventional ways, I'd take the best of what I've learnt from organics and use it alongside the best of non-organic methods", I'd have about fifteen pence. But Helen's take on the excitement at that Groundswell session did get me thinking about the possibility throwing my hat into the ring with part of my own farm to try a bit of organic-lite, or regenerative agriculture. Everyone wants to be in with the in-crowd. I know, I'm so shallow.

There is much debate about what regenerative agriculture actually means and everyone seems to be interpreting it differently, so it is difficult to know how to approach it when thinking about what I might be aiming for. So to help me with the conundrum I consulted the oracle, ChatGPT.

I posed the question, "What are the principles of regenerative agriculture?" I used the word 'principles' rather than 'standards' as I tried principles first and got the reply, "Regenerative agriculture does not have universally standardised criteria like organic farming", but we will discuss the pros and cons of 'standardised criteria' later.

The generated reply said this, "Regenerative agriculture principles focus on improving soil health, biodiversity, and overall ecosystem resilience. Key principles include minimising soil disturbance, maximising plant diversity, keeping living roots in the soil, integrating livestock, and prioritising organic matter. These practices aim to enhance soil structure, water retention, and nutrient cycling while promoting sustainable and resilient farming systems."

It all sounded pretty organic. An 'aim' sounded workable too. We didn't quite get there, but we tried kind of thing.

Most of the principles are already fully adopted at Shimpling Park Farm. We have lots of plant diversity with green manures, herbal leys, varietal mixing and multispecies-cropping. There are very few times of the year when there are no living roots in our soil, as in practice we never manage to get rid of 100% of our unintended plants even with cultivations. Post harvest there is always a mat of rare arable weeds (I keep telling myself that they are rare to make me feel better) that always do well in the pre-harvest light of a senescing crop. Sheep were re-installed on the farm in 2014 ticking the livestock box. By default all of the above has resulted in the prioritising of organic matter which has increased on the farm twofold over the last twenty years.

Transitioning from an organic system to my mind would only be enhanced as far as regeneration principles were concerned by less soil disturbance. Having said that, with only appropriate soil movement, I feel that my current system is improving soil health, biodiversity and ecosystem resilience, all three focuses of regenerative principles. My only reason for wanting to move less soil is because of the enormous cost of doing so in terms of power, machinery and labour. It is an ever increasing input.

But I have a dilemma. Less soil disturbance does equal more weeds and not having used any herbicides on the farm since we converted our last field to organic, I couldn't possibly bring myself to use them again. Killing the diversity that we have built up in our fields in terms of plants (you say weeds), the insects that they host and the food chain they in turn support, is not going to be a thing for me. I especially couldn't use glyphosate. It is the ultimate weapon if you are wanting to

eliminate living roots in the soil. There is nothing regenerative about a systemic weed killer.

So, that sticks me right back into the organic camp, their rigorous standards and having to deal with stifled innovation and a dwindling fire.

But do standards stifle innovation? Is my fire really dwindling?

Actually, it's quite the opposite.

Standards, especially ones governed by a legal framework, force you to innovate. They are the mother of invention.



Saying no to herbicides, wanting to do less cultivations and expecting more weeds (see plants above) has certainly made us innovative. In terms of understanding how crop architecture smothers weeds through crop height, leaf shape/shade, early vigour/even germination and multi-species cropping using a range of heights and shapes. Using longer and highly diverse rotations with a range of inter-seasonal sowing dates. "It's not the plough, it's the how" (credit to Tim May #Respect), how low do you need to go? Getting under the skin of weed life cycles, rooting depth and discovering the most appropriate cultivation to deal with the specific issues you've got. Appreciating the damage that any intervention does and knowing how to put it right. Experimenting with grazing crops, cover crops and leys. Balancing what's best for the grazing animal and what's best for the soil. Discovering and trialling/improving/making novel weeding machines. Dealing with the Home Office to try and get your loyal Polish rogueing team back into the UK post Brexit. The list goes on.

The same complexity applies when dealing with pests, diseases and building fertility. There is no silver bullet.

This is not 365 days a year farming. There's no ability to switch to a different part of the farm to start all over again because you've made some mistakes. The choice is de-certify or do better. To innovate. This is creative stuff. This is systems based farming. Its generational. You have to have fire in your belly to make it work.

I mentioned that organic standards have been preserved in aspic since I've been farming. I am not going to pretend that there aren't areas that I think need looking at, but by not changing standards means that our customers know what they are getting. We are constant. It's something that they can trust. They know what the deal is.

Going back to ChatGPT I asked what the difference was between a principle and a standard:

"A standard is a specific and detailed criterion or guideline used as a measure or reference. It serves as a basis for evaluating or comparing things. On the other hand, a principle is a fundamental truth or proposition that serves as the foundation for a system of belief or behaviour. Principles are more general and guide the development of standards. In essence, standards are specific rules or norms derived from broader principles."

Helen Browning might be right at this moment in time but don't be "Feeling your way" for too long.



It is impossible to compare the outcomes of regenerative principles because everyone is doing something completely different and everyone is calling themselves regenerative, and it's a problem. It's a problem for you, because it will associate you with someone less signed up to the cause and it's a problem for your customer because there will be no certainty in what your product promises. They certainly won't pay you any more money unless it you can independently prove it is what you say it is. You might be able to sell yourself as an individual but not as a collective movement.

You have to be able to evaluate the benefits of your system and communicate those benefits to your customer, and you can only do that with certification based on trusted developed standards which mean something. If you can't do that, your customer will lose trust, and then you don't have a business, you've got a hobby.

DRILL PRODUCT IN FOCUS...

DALE DRILLS 12M ECO XL



Joe Adams - Farmer

Joe Adams farms 2200 acres between Daventry and West Hadden in Northamptonshire.

Thrupp Farms Limited are in the 5th year of growing continuous wheat and took delivery of the 12 meter Dale Drill Eco XL in 2021.

Joe explains the reasons for moving away from a traditional plough based system to using the Dale Drill Eco XL and the benefits they have experienced across the farm since starting direct drilling.

'One of the biggest advantages we've found from moving away from ploughing and power harrowing, is the time saving, it took months to plough and prepare the ground'

Moving the farm into continuous wheat cropping meant that there was more work to be undertaken in a limited amount of time.

Being able to drill straight into stubble has not only sped up



the drilling process but saved the farm significant costs in both fuel and wearing parts expenses.

'In two years of ownership the Dale Drill is still on its original points, being a tine drill, we also use it for some light cultivation where necessary, we've yet to spend any money on wearing metal for the drill.'

'In terms of fuel savings, we reduced our diesel usage by 76,000 litres last year' which by anyone's calculations is a huge saving both financially and environmentally.

Running a controlled traffic system, a wider drill helps reduce wheelings. Having tried other tine drills during the purchasing process, the Dale Drill seems to require less horsepower to pull it.



The farm's John Deere 6250R is more than capable of handling the worst of the slopes that the farm has to offer.

'Having trialled 200 acres of plough vs Direct Drilling in 2022 the results were quite interesting, the yield from the ploughed ground was 0.5 ton per acre less than the direct drilled land'

Although Joe thinks this could be slightly influenced by taking all from ploughing, when you add in the costs of ploughing, metal, time and fuel, the overall costs of the Direct Drilling are far less than a plough based system.

Joe is very much an advocate for tines vs disc debate.

'Having looked at both before purchasing the Dale Drill, the main concern of a disc drill is the potential for hair pinning and in wet conditions slot closure, I've seen a lot of ground drilled with disc drills in the wet, that as the ground dries out the slots open up. Yes the tines move a bit more soil, but I feel that helps with nitrogen mineralisation it works well in the wet and there's no risk of hair pinning'

2023 has been an incredibly challenging season, Joe was able to have drilled all of his winter wheat prior to the weather breaking, had they been using the old plough based system, this would unlikely have been the case, all in part to moving over to the Dale Drill.

UNLOCKING PHOSPHATE POTENTIAL

Written by George Hepburn from Aiva

With the amount of rain we have had and the poor crop conditions this year, the availability of phosphate is going to be critical to maintaining yield potential. In this article, we will explore the chemistry behind it and how important biology is to release it.

Not only is phosphate vital for the roots and shoots early on, but it's also needed throughout the growing season. It acts as the engine of the plant, creating energy for many critical processes.

According to the latest science, when Phosphorous is applied as phosphate, the majority of the nutrient is 'locked up' by the anions in the soil. This makes the application of P without a carbon source highly uneconomic, and as the index builds in the soil, the availability to the plant diminishes.

Most soils in the UK have significant reserves of phosphate, somewhere around 3-5000 kg/ha (3-5 tonnes) in the top 6" and more below that if you have the depth of soil.

Phosphate issues have been seen in a soil index of 3, but no issues in the crop or tissue tests on an index of 0. There are even soils with a P index of 6 where foliar P must be applied to get some into the plant. It's crucial to keep an eye on pH to ensure phosphate availability, as evidence shows that it's significantly affected by pH.

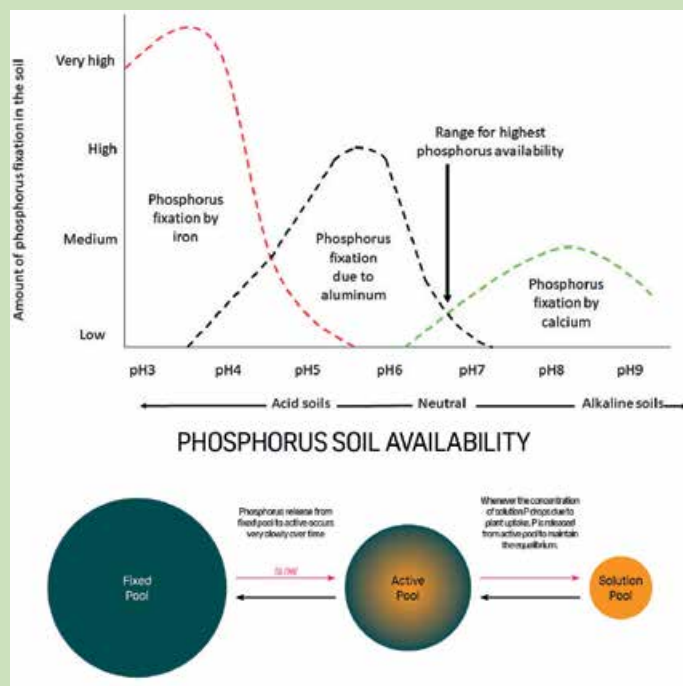
At Aiva, we have the advantage of using a foliar P where the soil pH has no effect at all. The plant is fed directly, bypassing the soil entirely.

When you apply P fertiliser, it's not in a form that the plant can take up. Within hours, or sometimes even minutes, it's complexed with calcium, iron or aluminium and becomes part of your soil reserves. So rather than increasing your plant available P, you now have a bit extra in your bank, but you cannot access it. That's why being able to use a liquid P that has a positive charge as opposed to a triple negative, is much more beneficial and efficient. It means that this P will not lock onto the soil and remains very available to the plant.

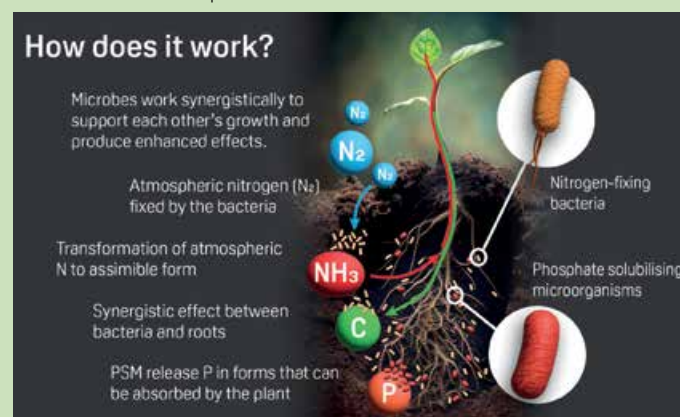
Unlocking your phosphate reserves is possible through soil biology. These microbes solubilise the phosphate and release it to their symbiotic partner. Instead of applying more fertiliser, we need to allow these microbes to thrive by giving them the right conditions. These microbes are aerobic, so having the correct balance in the soil of minerals, air, water and OM (carbon) is paramount. Tight or compacted soils will not release P in the same way, hence the need for fertiliser to bridge this gap.

The microbes need to be fed once they are in the right conditions. Many fertilisers turn these beneficial bugs off. Using a carbon source like humic or fulvic acid, fermented molasses, molasses, seaweed, compost, or FYM can help to stimulate the soil biology and release phosphate that was once locked up in the soil.

Adding microbes can also help release 'locked up' phosphorus and make it plant-available. The AIVA product BIOPLUS T has specific phosphate-solubilising bacteria that work to release Phosphorous from the soil. However, like any biological product, soil conditions, temperature, and moisture need to be right to get the most from the product.



The diagram above shows how Phosphate is stored in the soil. It's held in three pools. Soil reserves (approx. 3-5000 kg/ha), potentially available (500 kg/ha) and plant available (50kg/ha).



If your soils are truly low in phosphate, then an organic input is recommended. FYM, compost, digestate, or sludge all comes with added extras in the form of other nutrients and will stimulate your soil and improve fertility. Unlike traditional 'fertilisers' like TSP and 20-10-10, it's crucial to consider the unit cost of P when deciding. So, get the calculator out and go from there.

DAMAGE LIMITATION AND ROOT SUPPORT FOR FLOODED CROPS

With rainfall totals reaching the highest recorded since the year 2000, many winter crops have been in standing water for prolonged periods. Research indicates that the longer winter crops are exposed to flooded conditions the more significant the impact, as one might anticipate.

According to experts, supporting roots in the early spring months will be crucial to mitigate the flood damage and encourage phosphorus and nitrogen uptake.

Flood damage to winter crops explained

The oxygen deficit caused by flooding can have multiple knock-on effects for winter wheat crops, according to John Haywood at Unium Bioscience. "Effects include impaired root growth (potential death), reduced metabolism, lower nutrient availability and absorption, higher risk of nutrient leaching, shoot growth impairment, compromised tillering and ultimate yield.

"The decrease in Photosynthesis (PS) will cause an increase in Reactive Oxygen Species (ROS). These are the main reason for reducing yields, which when out of balance will potentially cause irreparable cell damage further limiting growth and development and ultimately crop potential," says John.

Malik et al reported reduction in tillers (bread variety) of 24, 45 and 62% depending upon water level below the surface 20, 10 and 0cm. "We can see at is stands we are likely to produce a lot fewer tillers - this also has implications on root production especially for wheat, which has a knock-on impact on leaf area, tillering, reduction in spikelet, grain numbers and grain weight - all the major plant processes," says John.

Effects on the soil

"In terms of impacts on the soil, as the field capacity increases, and the soil becomes more waterlogged more pores become filled and the optimum moves from a 50:50 ratio (soil to air) to a 75:25 which is a reduction of 50% with severe implications on root growth. This impedes gas diffusion," says John.

"Plants tend to prefer nitrogen (N) in the nitrate form but under waterlogged conditions the balance in the soil favours ammonium levels due to a reduction in gas diffusion," explains John.

Effect of transient P stresses on nitrogen uptake, 2-day P stress

The pH of flooded soils tends to move towards neutral which can have implications on the nutrient solubility, soil movement and ultimate bioavailability (plant uptake – levels and rate of uptake). "Therefore, multiple effects can happen and impact growth and development depending upon your starting point.

"As the soil becomes more waterlogged the uptake of P and K is massively reduced, which then compounds the nitrogen stress," he says.

"But all is not lost. It's important to understand these impacts, so that you can take steps to support root growth and nutrient uptake in the late winter/early spring months.

"We know you cannot make a poor crop into a fantastic crop, but you can make a substantial difference with judicious and cost appropriate inputs," adds John.

How can biologicals support flooded roots?

Biologicals have a part to play in general crop health and keeping them in the mix is important, but maximising root growth post waterlogging will aid recovery, as will supplying and making the critical nutrients available, including phosphorus.

"The most important aspect to consider with nutrients such as phosphorus, is availability. For

phosphate, it exists in three pools in the soil but only the inorganic form dissolved in soil water is readily available to the plant," explains Unium's

Oxygen Partial Pressure %	Uptake of P (a)	Uptake of K (a)
20 Field Capacity	100	100
5 Saturation	75	56
0.5 Waterlogged	37	30
		Hopkins 1950
(a) Data represents relative values		

John Haywood.

John says that using the biostimulant Calife Extra acts as a 'scavenging stimulant' on the plant, designed to improve crop rooting and maximise nutrient uptake, whereas Luxor provides phosphate supply through maximising availability and reducing adsorption in the soil.

"The pidolic acid found in the biostimulant, Luxor (L-GPA) helps a crop to make the most of this availability while increasing nitrogen assimilation. Combining this with the calcium phosphite found in Calfite Extra tricks the plant into thinking it's phosphorus deficient, so it increases its uptake," he says.

Calfite Extra

"Calfite Extra from Unium Bioscience is a unique foliar nutrient complex designed to improve crop rooting and maximise nutrient uptake and utilisation from the soil," explains John.

"It essentially improves the crop's phosphorus use efficiency, delivering calcium through the leaf into the plant.

"It will encourage extra rooting, and

uM uptake/g DW roots/min	Sufficient P (+P)	Deficient P (- P)
Ammoniacal N NH₄	1.8 *	0.8 *
Nitrate NO₃	0.9	0.2

Megaheas et al 2000 *Jnl. of Plt Nutrition*, 23(2) 263-273

extra root mass, so it's better able to extract phosphate from the soil," he says.

Luxor

"Luxor is a nutrient biostimulant that increases phosphorus delivery to the plant. It has a unique complex of ortho and polyphosphate in a humic/fulvic complex to maximise plant availability," says John.

"Combined with a plant biostimulant (pidolic acid / L-PGA) to enhance nitrogen use efficiency, it increases photosynthesis and carbon fixation and can be applied close to the seed, in-furrow or as a foliar treatment," says John.

John explains that in combination, the two products support a plant through the early stages of its lifecycle.

"Phosphite creates a healthier root system, more active in terms of exudations which means you improve scavenging and have a better acquisition of soil nutrients especially phosphorus.

"Following the recent high flooding pressure, it's unlikely growers will want

to compromise on cultural controls and IPM best practice, so an application of Calfite Extra and Luxor could help to provide the support that roots will need," he adds.

Supporting roots in spring 2024

Agrovista's technical manager for Scotland, John Murrie, is used to more rainfall than most parts of the UK and says applying biostimulants is a cost-effective way to encourage root biomass and nutrient uptake.

"We've had a very wet autumn and crops are struggling for rooting. It will be very important to get these crops going in the spring."

John explains that interest in Calfite Extra alongside Luxor is increasing year on year on varying crops, winter and spring cereals, vegetables, even grassland. "It can be used on a range of crops and applying it in spring can really help get crops up and running, especially in cold soils.

"It will encourage extra rooting, and extra root mass, so it's better able to extract phosphate from the soil," he says.

"It can easily be added to tank mixes and compared to the cost of phosphate in fertiliser, it makes sense to use Luxor and Calfite," adds John.

With impressive outcomes observed in cereals, oilseed rape, and potatoes, it's evident that these products have become indispensable assets for both

agronomists and farmers.

Cambridge-based arable farmer, Russ McKenzie, has been using Luxor to maximise the availability of P.

"Luxor provides phosphorus either through the soil or the foliage, with both forms complexed with humic and fulvic acid, ensuring the most accessible phosphorus source.

"When combined with Calfite Extra, it stimulates plants to enhance root development and root exudation, significantly increasing phosphorus uptake efficiency," says Russ.

New biological research

Unium is working hard on biogenomics and how their products impact the regulation of genes - up or down. "We know that waterlogging down regulates ROS detoxification, nitrogen and amino acid metabolism, and anything that can upregulate the production of aerenchyma, photosynthesis, root / shoot biomass, chlorophyll content, and germination rates means that the plant is better able to tolerate the stress as it comes," says John Haywood.

"We look forward to sharing this exciting development and how the technologies work and then carefully positioning them at the appropriate time to give the most reliable and robust results. It adds a new dimension to biological research and one we are utilising to its full potential," adds John.

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FARMER FOCUS

JULIAN GOLD

I had an interesting experience last week when out crop walking on a glorious sunny afternoon. I was firstly walking through chest high flowering cover crops which were full of white, yellow and purple flowers, then moved into Oilseed rape crops dwarfed and semi hidden from view by a thick stand of berseem clover companion plants just starting to come into flower.

Suddenly realised that I had butterflies in my stomach along with a slight fizzing sensation, exactly the same bodily reaction that I would get as a teenager if I bumped into a girl I fancied in the school corridor. Strange the effect regenerative agriculture can have... (can't say industrial agriculture ever got me that excited!)

Every year seems to be different re-cover crop germination and growth. With good soil moistures this year was expecting bumper crops but most have been disappointing apart from the early August drilled ones. Later drillings have never got away properly apart from the headlands on some (usually put better headland growth down to the double rolling effect in dry seasons).

Poor cover crops are massively disappointing as it is a missed opportunity to really give soil health a great boost. Especially galling considering we have a relatively high seed cost with our multi species covers and also go some effort to establish them properly. (Drill large seeds first and then broadcast small seeds behind drill with avadex applicator, followed by Cambridge rolling the whole lot in).

As previously mentioned in the last report, we carried out some N efficiency tramline trials for '22-'23 crop year. Results were a bit inconclusive but I can report some summarised results (with the caveat that these should be treated as anecdotal results not replicated ,statistically checked results).

QLF BOOST : (Wheat) Control strip was 190 Kg/Ha N. Boost was applied at various rates on strips that had either 160,170 or 190 Kg/Ha N. All Boost treatments were higher yielding than the control ,with the highest yielding strip being 30L/Ha Boost + 190 N. 60L/Ha Boost + 160 N also yielded above the control.. Trial seems to show that it is possible to



Spot the DSR amongst the Berseem clover



Obligatory combining photo!

increase yield of Wheat by applying Boost or maintain yield by replacing some N with Boost.

Blue N : (Wheat and spring Barley) Blue N was applied to winter wheat strips which had 190 or 170 Kg/Ha N and to Spring barley which had 107 Kg/Ha N. In wheat the Blue N seemed to increase the yield very slightly on both strips compared with the control strip with just 190KG/Ha N. There was no noticeable effect with using the Blue N in Spring Barley.

SR3 : (wheat) SR3 was applied to Strips which had received 170 or 190 Kg/Ha N . SR3 seemed to increase yield very slightly on both treatments compared with control of just 190 KG/Ha N

Amide N : (Wheat) Amide N was applied as a foliar spray (equal to an N rate of 8 Kg/Ha) on strips which had received 170, 180 or 190 Kg/Ha solid N. The Amide N spray appeared to have a slight positive effect .

Have not calculated any cost /Benefit ratios as the trials were not accurate enough to do this confidently but gut feeling is that I need to look at them all again for a second year .

I am excited to try layering Boost + Blue N + SR3 + R-Leaf on top of each other to see if benefits are additive and then assess the cocktail of treatments against various N rates to see if it could be a viable way of maintain yields with less artificial N (Trouble is not sure I have a big enough field to run the trial !)

Cannot really finish my report without commenting on the wet autumn weather.

Our plan had been to do most of the planting with the Horizon disc drill as a way of trying to minimize soil movement and start to make in-roads into reducing our blackgrass burden on the farm.

I had already learnt the lesson last year that disc drills don't work in the wet on silty clay loams but luckily we were able to switch to the 10m Kockerling tine drill when conditions deteriorated and we managed to get everything planted with minimum soil damage.



Waist high flowering clover crop in late November!

Having the ability to switch between disc and tine drills massively de stresses planting operations in a minimal soil movement regen ag system.

We also took advantage of the two drills, trying a new (to us) method of establishing OSR and companion crop on one of our OSR fields this summer. In early August we used the Kockerling to plant our companion crop mix of Buckwheat, Berseem Clover and Fenugreek. We followed this by Cambridge rolling and left it to germinate and grow. 10 days later we drilled the OSR into the growing companion crop using the Horizon disc drill (This caused minimal damage to the companion crop and enabled us to dispense with the need for rolling as the closing press wheels on the Horizon can be pressurised to do a great job firming the soil above the seed. This was not a replicated trial but giving the companion crop a head start did provide a good cover to 'hide' the OSR in its early establishment phase and cabbage stem flea beetle damage was negligible(field was next to a field which had OSR in for harvest '23 and would normally expect damage/crop failures if new season OSR adjacent to previous seasons OSR).



Flowering Berseem clover companion crop

One lesson we did learn this autumn (every day is a school day!) is not to roll behind the disc drill if heavy prolonged rainfall is forecast after drilling.(I realise rolling is not strictly necessary anyway behind a disc drill if slots closed properly but we usually do it anyway to max out effectiveness of pre-emergents against Blackgrass). This year we had a severe crop loss on end headlands on some fields caused by the double rolling effect grinding the soil surface into a fine powder followed by heavy rain causing capping and waterlogging which negatively affected germination of the wheat.

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FARMING CARBON OR FARMING BETTER?

A NUFFIELD PERSPECTIVE

My name is Andrew Sincok and I grew up on my grandparents mixed Dairy, Beef and Arable Farm in Cornwall. My first job on the farm was mucking out an old stable that served as a temporary home for new mothers and their calves. The stable was 3 metres wide, roughly 6 meters long and would only be cleaned out once a year. It was regularly bedded with fresh straw, so by the time it came to mucking out, it would be at least 3 feet deep. The entrance to the stable was too narrow for any machinery, so it would be left to me to clean out by hand while I was on my summer holidays.



I did this for several years until I was strong enough to break two long-handled wooden pitchforks while trying to take too much at once. I was convinced I had outgrown this job and would progress to cleaning out calving pens in the loader tractor. You can imagine my disappointment when Geoff, our local handyman, was asked to weld a metal bar to the fork instead of a wooden handle. I was mortified.

Being the stubborn bugger I am though, I was convinced I could break this one too. Try as I might, I couldn't even get it to bend, let alone break! My Grandad and Uncle would watch me sweating and joke that I would one day receive an award for looking after my pitchfork, just like Trigger did for looking after his broom! What was it, 17 new heads and 14 new handles? Anyway, here I am, almost 30 years later, undertaking a Nuffield Scholarship looking at different Organic Manure management options. I am not sure my younger self would approve.

Although my childhood experience had no bearing on my current Nuffield Farming Scholarship study title, I can appreciate the irony. What I am also aware of, with hindsight, was my complete ignorance in regards to organic manures and their value. This is the real reason why I have chosen to study organic manures and I am hoping that my final report and presentation will remind people of just how valuable they are. When I speak to farmers now, as part of my day job, I always ask which is their best field and is that field the best because historically it has had the most organic manure applied?

The answer is almost always "Yes!". Unsurprisingly, it's usually the field closest to the yard. I believe the value of organic manure was likely realised by the first ever farmer. I am sure the farmer would have noticed that wherever their animals 'did their business' the grass would always grow back quicker and greener. You still see it today. Fields are grazed, cow pats are left and sure enough, little green tufts of grass grow up out of the cow pats quicker than the surrounding area. It would

have been a small leap from realising this and using the cow pats to feed growing vegetables and arable crops. Still today, remote African and Indian communities are using cow pats and urine to create fertilisers.

What caused developed countries to move away from valuing and using organic manures? I believe it started with the availability of cheap synthetic mineral fertilisers, the development of chemical plant protection products and the advances in plant breeding, post WW2 world. Don't get me wrong, these advances helped feed a hungry world and were very welcome but we now know better. Ironically, this progress started what later became known as the 'Green Agricultural Revolution'.

One tonne of fresh cattle manure with 25% dry matter, according to RB209 and the latest AHDB fertiliser prices, contains £16 in Nitrogen, Phosphorus and Potassium (NPK). When you consider the value of Carbon, Magnesium, Zinc, Calcium and all the other trace elements, your one tonne of fresh cattle manure could be worth upwards of £50. During the peak fertiliser prices in 2022, the same one tonne was worth well over £100!

I would go so far as to say that the lack of value placed on organic manures and in some instances the move away from mixed farming has contributed to the degradation of our soils. This is demonstrated perfectly by the organic matter percentages of the predominately arable fields of the east of the UK, compared to the mixed farming and livestock producing west.

By putting a value on your organic manures, what you may have previously considered a by-product, once again has value. That value on paper may be significant, but, the real value of organic manures may not be realised this year





or even next year. Just as you and your farm is now benefitting from the historical applications of organic manures, generations to come will benefit from organic manure applications applied today.

What is the old quote, "If I knew the world was going to end tomorrow, I'd plant a tree today". The principles are the same, organic manures applied today will benefit you, your soils and your

farming enterprise, but not nearly as much as they will benefit the next generation. This is why I value organic manures so much and why I wanted to do a Nuffield Farming Scholarship on the topic. You might not see significant or instant returns from improving or even regenerating your soils, but your children will.

Regular and significant organic manure applications over a number of years will lead to an increase in soil organic matter (SOM) and soil organic carbon (SOC). Combine applications of organic manure with min-till practices, cover crops, herbal leys, mob grazing and cattle grazing and you'll accelerate the

increase in SOM and SOC. This method of farming, and the subsequent increases in SOM and SOC, have been coined 'Carbon Farming'.

This term is one I recently encountered at the annual Nuffield Farming Conference held at Sandy Park in Exeter. For anyone who hasn't been to a Nuffield Conference before, you should. It was such an enjoyable, inspiring, and informative couple of days that I highly recommend attending if you ever get the chance.

There was one particular session that got me thinking more than the others and it relates to carbon farming and my own particular topic. The session was titled "Regeneration and Net Zero," and the scholars presenting were:

- Sam Samith - 'Regenerative agriculture: a shared ambition for the future of farming?'
- Ben Hunt - 'Can you farm carbon?'
- Chris Taylor - 'Do Regenerative farming practices pave the way for UK agriculture to meet Net Zero?'

The presentations are only 12 minutes long, which is hardly enough time to scratch the surface, let alone delve into the details of what is a minimum of 8 weeks of travel and study. In these 12 minutes, Sam, Ben, and Chris all discussed, either directly or indirectly, regenerative agriculture, the increase in SOM / SOC or Carbon Farming. Sam and Ben approached the topic from a natural capital, carbon credits, and barriers to uptake angle, whereas Chris chose to highlight the soil health benefits and improved resilience—resilience being a word I



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noted down from all three presentations.

The point I want to make is that in Sam Smith and Ben Hunt's presentation, they were looking at ways to incentivise farmers for farming carbon. They mentioned some barriers to uptake being the lack of demand, lack of incentives, and lack of information, yet, I cannot help but think that is entirely the wrong way to approach the subject.

At the moment, the narrative is around carbon farming to create credits that can be sold, this benefits other industries that know they will never be able to reach Net Zero. Yes, this brings a significant and much-needed injection of money into agriculture, but what happens next? What happens when you need to use those carbon credits to prove you and your farm have reached Net Zero? You may have increased SOM from 3% to 6%, and you may have sold this carbon to an airline, for example. What happens when you need to prove that you too have reached Net Zero and that carbon is no longer yours?

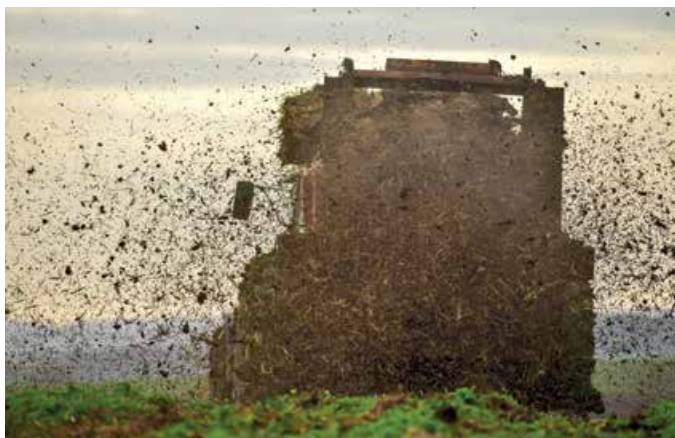
In my opinion, and as Chris Taylor showed in his presentation, carbon farming benefits the soil, the farmer and the next generation. There shouldn't need to be an incentive or provide immediate financial reward to motivate a farmer into farming carbon. The increased water holding capacity, improved soil structure, increased soil fertility, and increased microbial activity, should be all the incentive the farmer needs. If that really isn't enough, maybe the farmer should consider their best field again, why it's the best field, and who is going to be farming that field next.

Every single farmer should forget about farming carbon to sell carbon. Benchmark your SOM and SOC levels today and farm carbon because it's the right thing to do. Farm carbon because it improves soil health and fertility, as well as the resilience of your whole farming enterprise. Save the resulting carbon credits for the day when you're asked to prove that you have reached Net Zero. Do not sell your credits to make a quick buck and definitely don't sell them to make other industries look better at the future expense of our own.

That said, the bit that really interests me is how you go about actually 'farming carbon' and my Nuffield topic of organic manures. Photosynthesis is widely considered as THE way to farm carbon. Ensuring you have living and growing plants in your soil at all times, like a cover crop between rotations, will mean said plant is constantly converting energy from the sun, CO₂ and H₂O into root exudates (liquid carbon), to feed soil biology and essentially sequestering carbon. This, in principle, sounds simple but I said essentially for a reason. The reality is it's anything but simple, the whole process is highly complex and incredibly nuanced. Unfortunately, there is no silver bullet, and, as Gabe Brown would say, it all depends on context!

If you have introduced cover crops into your rotation, you are increasing the amount of carbon you capture through photosynthesis and root exudates. However, if you then plough and apply 250kgs of ammonium nitrate, you will oxidise and 'burn off' a lot of the carbon you have just captured. You'll be farming carbon and then burning carbon.

Almost nothing you do in isolation is going to farm carbon, certainly not to the extent that you can reach Net Zero anyway. The only possible exception to this is a very large application of organic matter. Applying, for example, 100t of Biochar per hectare would probably make a difference, but it's not realistic



or particularly beneficial.

Applications of organic matter or manure are great and I have explained why above, but applications have to be considered carefully or they can have unwanted consequences. This isn't me scaremongering; it's the realities of working with a biological system. Over applications can lead to environmental pollution, nutrient deficiencies, locking up of nutrients / elements, crop contamination as well as compaction and structural damage to the soil from the application itself. There are also questions around the effects on the living organisms within the soil as well. Applying large quantities of liquid slurry can have a negative effect on earth worm populations or fungi for example.

Proceed with caution but make sure you proceed. You are not going to be able to do everything, certainly not all at once, but a small step forward is a step in the right direction. As Emily Padfield, who was also presenting at the Nuffield Conference, quoted, "Do the best you can until you know better. Then when you know better, do better." I think we can all do better.

The Green Revolution suggested that mineral fertilisers, plant breeding and chemical usage was 'the best', however, we now know that building soil health and fertility is better. I want to find out what works, what doesn't and how it can be used in UK Agriculture. My overall aim being to wean us off the artificial chemical inputs and instead build SOM, SOC and improve soil resilience. I want to make sure that the next generation has a best field too.

The truth is, we knew best, and by we I mean the previous generation. They knew they had to build fertility though farming carbon before growing a cereal crop. You just need to read a Newman Turner book to appreciate how much has changed and how far off the path we have strayed. To find new technologies or 'best practice' for organic manure management, my original travel plans included New Zealand, Brazil, North America and Europe. However, what I have recently realised is that I actually need to visit developing countries where I am more likely to discover resourceful yet practical ways of processing and utilising organic manures. Countries and economies that have become lazy though high input use are not places where I will discover resourceful yet practical ways of processing and utilising organic manures.

I am looking to the past to discover a way forward and I cannot wait to share my findings with you. For now though, my parting question to you is this, now that we know better, are we going to do better?

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AHDB NEEDS NEW MONITOR FARMERS IN ENGLAND AND WALES – COULD YOU BE ONE?



What is a Monitor Farm?

With economic pressures mounting, including the end of the Basic Payment Scheme this year, finding new ways to improve performance and profitability is more important than ever for farmers. One way to do this is to pool knowledge with other, similar farming enterprises.

AHDB's Monitor Farm programme brings together groups of like-minded farmers who wish to improve their businesses by sharing performance information and best practice around a nationwide network of host farms.

The concept originated in New Zealand, was adopted in Scotland in 2003 and rolled out to England, Northern Ireland, and Wales in 2014. The programme has two unique principles: it is a farmer-led, farmer-driven project with business efficiency and benchmarking at the heart of its activity. It takes place on commercial farms, providing a hands-on approach to personal and business development. This makes it attractive to other members of the farming community.

A monitor farmer partners with their local AHDB Knowledge Exchange (KE) manager to host four to six meetings each year. These farmer-led meetings provide the opportunity to find and share challenges and solutions, as well as time away from their own farms and the chance to socialise with their peers – something that is also valuable in terms of mental health, particularly during times of stress. Points towards BASIS and NRoSO professional development schemes can also be claimed by those who attend.

During the three years of being a Monitor Farm, every aspect of the business is scrutinised. Whether looking at soil management or machinery policy, cost implications to the farm business always take centre stage.

With a focus on making real developments in their business management, improving productivity, competitiveness and environmental management, Monitor Farms try out innovative ideas, all with the support of AHDB and guidance from industry experts.

What are the qualities that make a great monitor farmer?

A monitor farmer needs to be:

- Willing to speak openly about their business, disclose information and share how they reach decisions
- Open-minded, interested in innovative ideas and happy to embrace change
- Ambitious – keen to set and achieve personal goals
- Sociable – enjoys meeting people and is happy to host events

What does being a monitor farmer involve?

What a monitor farmer does:

- Works closely with their AHDB KE manager
- Sets up a steering group for the monitor farm
- Undertakes baseline assessments
- Submits figures to Farmbench
- Monitors benchmarked figures with their Arable Business Group (ABG)
- Hosts up to six meetings each year
- Brings specialist advice onto the farm, such as expert speakers and consultants
- Supplies updates on farm progress between meetings
- Sets up actions and follows them up to see real progress
- Adopts an evidence-based approach to change, such as carrying out co-ordinated on-farm trials
- Incorporates all aspects of the farm business, including family aims, succession and diversification options

- Helps their steering group and ABG to continue meetings after the Monitor Farm has ended
- Enjoys the social aspect – the Monitor Farm should be professional but also entertaining

The latest Monitor Farm

Jack's ambitions for the next three years are to:

- Stabilise business, securing long-term tenancies and contract farming agreements
- Reduce inorganic inputs and pesticides
- Build organic matter using muck/compost and green matter, putting money from stewardship to use
- Ultimately, produce high-quality, profitable food while being kind to the environment

The first post-launch meeting, on 12 December, examined how to make the most of SFI options. On 6 February, labour and machinery will be reviewed, and in summer 2024 there will be a farm walk.

Alex says that Knowledge Exchange is the backbone of AHDB's offer to levy payers. "The Engagement – or Knowledge Exchange – team is a key part of the service AHDB provides, facilitating farmer-to-farmer learning, carrying out on-farm research and connecting farmers with the best information and expertise. This is enabled by a network of Strategic Farms, Monitor Farms and Arable Business Groups, together with a wealth of other opportunities for levy payers and advisors. The Engagement team is also a key conduit between levy payers and the rest of AHDB, ensuring that there is a two-way exchange of information feeding into everything that we do."

Could you be a monitor farmer? Find out more and apply on our website. You can also hear from Jack and Alex on our Monitor farm podcast.

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FARMERS UNITE OVER TREE PLANTING

Planting trees in the right place at the right time can bring significant benefits to your farm including generating additional income through activities such as harvesting trees for timber, producing wood for fuel and other wood products, selling carbon units, and designing woodland for recreation and leisure use.

Andy Gray, who farms at Elston Farm, Devon, began planting trees in March 2021 to see how they might benefit his soil and livestock. A commercial beef farmer with 67ha, he supplies meat for the catering industry, and has adopted regenerative farming practices to try and improve soil health and productivity.



Andy Gray

He has planted a mixture of trees in rows, so that he can easily access the land with machinery and grazes the livestock around them. In this way they provide shelter and natural forage, while boosting farm diversity and soil health through living roots and carbon sequestration.

"Grazed grassland and selected trees can work together in harmony," he says. "The trees will become the backbone of the farm and at the same time capture carbon, enhance biodiversity and enrich soil health."

In total, Andy has planted 8,500 trees - and firmly believes it will bring a multitude of productivity benefits while aligning with his regenerative farming practices. It also fits in with his business model - as chairman of M C Kelly, he supplies meat to hotels and restaurants across the South West and to the public via The Farm Wilder and The Meat Box Company. And consumers are increasingly interested in natural, environmentally-friendly farming practices that can help the industry to reach net zero.

The England Woodland Creation Offer is a national flagship grant scheme administered by the Forestry Commission. With

expert support from Woodland Creation Officers, it encourages the creation and long-term management of woodland on areas as small as one hectare. It covers standard capital costs up to £10,200/ha, with stackable payments of up to £8,000/ha for projects that support wider benefits to society, nature recovery, and the environment.

There are also regional grants available through Woodland Creation Partners, located across England they offer a range of highly competitive grants and funding.

Michael Flesher at Ghyll House Farm had wanted to plant trees more than 20 years ago, but the process and paperwork at the time made it feel far too challenging. But thanks to the wonderful support from The White Rose Forest team, Michael and his neighbour Jill have successfully planted trees in an area of less productive land.

The woodland creation team can support on all aspects of planning, the application process, design and support with the approvals process.

"The White Rose Forest have been tremendous in leading



Photo credit - White Rose Forest

us forward," says Michael "the key to the progress of all of this is them taking the weight off my back".

Both the England Woodland Creation Offer and Defra's Woodland Creation Partners provide expert support and advice. Armed with local knowledge and expertise, they can advise on application processes, woodland design, tree selection, planting and maintenance.

To find out more about Defra's woodland creation grants and the support available visit www.gov.uk/woodland-creation.



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For more detailed information on the range of grants and support available, visit gov.uk/woodland-creation

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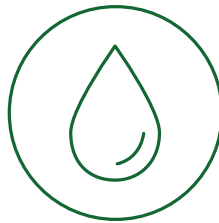
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