

**Crop Production Specialists** 

JANUARY 2024 EXTRA

## Re-evaluating sustainability and Nitrogen

**Tim Kerr** (Hutchinsons Nutrition Manager) highlights the challenges of using Nitrogen sustainably and discusses potential solutions for the future.

#### The estimated 2023 UK wheat harvest is well documented at just over 14 million tonnes.

A lesser-known fact is that 14 million tonnes of wheat will have removed the equivalent of 750,000 tonnes of ammonium nitrate from the "system".

What is removed needs replacing for any system to be sustainable. That nitrogen must come from somewhere... Yet the narrative around nitrogen fertiliser is largely negative, even though it remains an essential part of our food production system.

One of the key challenges we face is that around half the world's food is produced as a direct result of nitrogen applied to crops. The production of this nitrogen fertiliser carries a cost in terms of Greenhouse Gas (GHG) emissions – both in production and from field-scale emissions.

Maybe this is why the rhetoric around nitrogen fertilisers has largely been negative in recent years. The recurring theme is how can we drive down the use of nitrogen fertilisers?

The talk of sustainable extensification may have been overtaken by the need to limit climate change, yet we must produce more food from the same area – redefined here as **Sustainable productivity.** 

## NUTRITION SPECIAL

### How do we go about achieving this in relation to Nitrogen?

Firstly, it is important to recognise the value that nitrogen fertiliser is providing – it is essential to feeding the world.

Recognising this, we can then seek to ensure we use it as efficiently as possible (we can look at this in terms of Nitrogen Use Efficiency). Foliar feeds can be added to the sprayer at conventional fungicide timings

We can also consider ways of substituting nitrogen fertiliser with viable alternatives that can offer economic and environmental benefits.

Finally, what can be done about the environmental impact of the production of nitrogen fertilisers?

Here is a three-point plan of action for sustainable productivity:

- 1. Utilise measurement and interpretation that increases NUE further
- 2. Substitution of a proportion of conventional nitrogen fertilisers with alternatives
- 3. A shift to low carbon fertilisers based on green ammonia.

### 1) Measurement and interpretation

In conventional agriculture the soil provides around half the nitrogen that a crop utilises. Measuring this and managing resources effectively can only be a good thing. The ability to finesse nitrogen recommendations based on real measurements will provide more accurate predictions of soil supply. The residual nitrogen in soils in the UK this spring will be in stark contrast to 2023. It therefore makes sense to respond to this by checking what the soil can supply (using the SMN Plus test).

## 2) Substitution with alternatives

We have also been investigating the possibilities of substituting some of the usual nitrogen fertilisers with novel products that can do the job of the fertiliser factory, in the field.

We have established that the use of methylene urea is a very efficient

way of supplying safe and available nitrogen to an established crop. This is already widely adopted and replacing 40 kg of N with a single application of methylene urea can reduce the GHG emissions by 10%. In addition, this is easily added to the sprayer at conventional fungicide timings – saving a pass through the field with the fertiliser spreader.

Biological products that can fix atmospheric nitrogen are currently being validated and show promise in both proof of concept and field scale trials. This is an exciting area of development with genuine possibilities of substituting up to 40 kg of Nitrogen in a range of crops.

Add to this, genuinely groundbreaking innovative technology to utilise nitrous oxide from the air to provide nitrates for the plant through foliar applications of R-Leaf. Working as a photocatalyst on the leaf it shows real potential to reduce reliance on nitrogen fertilisers whilst also making a major contribution to decarbonising food production – as it is turning a very potent greenhouse gas into fuel for the plant.

One question to tackle is can we use these products together or in sequence to get multiple savings – this is an area we are looking at in this year's field trials.

## 3) Shifting to low carbon fertilisers

We have a very exciting partnership with Yara which will support the transition to the use of organomineral fertilisers and, crucially, nitrogen fertilisers produced from green ammonia.



Essentially 'green ammonia' does not rely on the use of natural gas to create ammonia: - instead water is the source of hydrogen and the energy required for the electrolysis to produce the ammonia is renewable, resulting in a huge reduction in the overall carbon emissions from the production of nitrogen fertilisers. The investment into green ammonia is happening now, and we will only see more of this in the years ahead.

Organo mineral fertilisers (OMF) can recycle organic nutrient sources – but with the addition of mineral fertilisers to improve the cost and efficacy of the fertilisers – OMFs look like they will play an increasingly valuable role in the circular economy of nutrition.

#### Cause for optimism

In conclusion, there are always things we can do to improve – and nitrogen is no exception.

Increasing NUE through good practice will ensure best use of nitrogen fertilisers – and there are options available now to do this.

The science behind substituting a proportion of the nitrogen is improving quickly and green ammonia is on the near horizon.

There is no doubt that balancing mankind's burgeoning need for food and the welfare of the planet we inhabit is a challenge that will require global cooperation and innovation on a scale similar to that of the IT revolution of the last 30 years.

What we at Hutchinsons are already seeing gives plenty of cause for optimism.





## Energy price s drives greater precis

When energy prices hit unprecedented highs in 2022, it provided the impetus for one Cambridgeshire farm to adopt TerraMap digital soil mapping in a bid to further optimise inputs and 'future-proof' the business against economic and environmental challenges.

AG Wright and Son (Farms) Ltd grows 250 ha of potatoes across 1,850 ha of varied soils, from black Fenland around Haddenham in the west, to sandy loams near Newmarket in the east, supplying the fresh pre-pack, and processing for chipping and crisping markets. Around two-thirds of the potato growing area is on rented land.

This variation in soils, and the importance of rented land for potatoes, brings many unknowns in terms of soil type and nutrient status, something farm director Jack Smith and Farmacy agronomist Stefan Williams are keen to address.

"The budget for growing potatoes is tight, so we are always looking for marginal gains that will improve what we do and reduce risk," says Mr Smith.

Indeed, the business prides itself on being productive and efficient, but last year's huge increases in fertiliser, fuel and electricity prices, really focussed the mind on optimising inputs."

"It was the nudge for us to invest more in soil sampling to target our inputs further. We want to do all we can to improve efficiency and manage costs, but it must not be at the expense of quality and yield."

#### Tackling variable K and Mg

Mr Smith decided to begin digitally mapping soils with TerraMap, starting with all of the rented potato area last season.

The system measures variations in four naturally emitted isotopes to build a detailed picture of a range of soil characteristics across the field, from pH, texture and nutrient status, to organic matter content and water holding capacity, explains digital services specialist, James Lane.

Some 800 data points are recorded in every hectare, with results crosschecked against lab analysis of selected soil samples - the location of which is GPS tagged so that repeat sampling can be done in future years to monitor changes.

On the land destined for potatoes, Mr Smith opted for the Standard plus organic matter TerraMap package, which measures 12 criteria, including:

- P, K, Mg, pH
- Sand, silt, clay percentage and texture
- Silt/clay fraction
- Elevation
- Organic matter
- Plant available water

TerraMap data is uploaded to Omnia, where results can be analysed alongside many other 'layers' of management information, as well as knowledge of individual fields, and used to generate variable rate nutrient application plans.

The initial focus for the 2023 season was on potassium and magnesium; two key nutrients that have traditionally been applied at a flat rate in line with standard W-pattern soil sampling and RB209 guidelines but showed some clear variations within certain fields.

In one 8.5 ha rented field, Mr Lane savs TerraMap results showed the potassium (K2O) index varied from index 0.5 to 4. Historically, this field would have received a flat rate of around 580 kg of muriate of potash (MOP) across the whole area. In contrast, the variable application plan generated in Omnia recommended rates varying from 375 kg MOP/ha in areas with the highest index, up to 700 kg MOP/ ha where soil levels were lowest. In total, 4.2 tonnes of product was applied to the field using variable rates, compared with 4.9 t at the flat rate, a 14% saving.



Across the entire potato area, Mr Smith estimates an overall 3-5% saving in MOP use, and a similar reduction in magnesium, all for a relatively small upfront investment.

"It is nice benefit, but saving money on fertiliser is not why we're doing it. Our aim is to achieve a more uniform crop and optimise yield by applying fertiliser exactly where it is needed, not over- or under-treating any areas." Mr Williams believes the crop canopy was visibly more even throughout the growing season, and they may try to quantify this in some way in 2024 by using drone-based green area imaging.

"It costs us around £30/ha for the TerraMapping, which does add up over a few hundred hectares. But when you consider that total 'all-in' growing costs for potatoes are around £10-12,000/ha, it's still a relatively small investment," says Mr Smith.

"Agriculture in general has been very good at producing lots of pretty maps, so the challenge as farmers is what we do with the information, how and where we use it. Admittedly I was a sceptic at first, but, having used TerraMap and Omnia, I am much more confident in the accuracy of

## this technique and the benefits it can offer across the business as a whole."

Omnia also provides an excellent platform for sharing information between anyone that needs access to it, particularly between farmer and agronomist, notes Mr Williams. "As an agronomist, it's really useful to be able to access a lot of information about any field at the click of a button, and compare multiple years. Through the Omnia Scout app, it's also much easier to share observations and information when out field walking."

## **PCN** mapping

Omnia's digital mapping is also playing a role in helping to manage Potato Cyst Nematode (PCN) risk at AG Wright & Son (Farms) Ltd.

The farm employs Agri-Tech Services (UK) Ltd to conduct PCN egg counts, with results provided as a digital PCN map that can be remotely uploaded directly into Omnia (once permission to do so is granted). Fields are split into 1 ha grids, and coloured according to the number of eggs/g, from a 200 g sample taken from 180 individual soil cores.

Mr Williams says this information is essential for planning cropping and targeting where to grow resistant/ tolerant, and susceptible varieties.

#### "Some grids had egg counts of up to 18, which wouldn't be suitable for growing a non-resistant/tolerant variety, such as Maris Piper."

Instead, PCN resistant/tolerant varieties can be targeted at higherrisk areas, and maps also allow nemathorin treatments to be applied exactly where they are needed, something that is increasingly important within nematicide stewardship, he says.

"Unfortunately, our applicator is too old to do variable rates, and we couldn't justify the cost of buying a new machine," says Mr Smith. "However, by giving the operator an iPad with the PCN map on it, he was able to manually turn the applicator on and off as it passed through the different zones."

For more information about TerraMap, please visit our website: https://omniadigital.co.uk/

### AG Wright and Son (Farms) Ltd

- Family-owned business, specialising in cereal and root crop production
- Total cropping extends to 1,850 ha, including 250 ha of potatoes
- Processing and chipping potatoes grown on black fen soils
- Pre-pack crops grown on lighter mineral soils to achieve required skin finish
- Business also offers contracting and farm management services

## Simple to set up

Mr Smith says using TerraMap and Omnia has been relatively straightforward, as has the adaption of the farm's kit to variably apply fertiliser using Omnia Connect.

Reluctant to replace the farm's two existing Kuhn fertiliser spreaders, he was able to purchase all of the equipment required (two GPSenabled iPads, an Omnia Connect WiFi connector, and associated cables) for around £2,000, or just £4 per hectare when divided over 250 ha of potatoes.

Once variable rate plans are created in Omnia, they are easily transferred via the cloud to an iPad in the tractor cab, which sends information to the spreader's control box via the Wifi dongle, explains Mr Lane.

"It's really easy to set up and move between tractors if you need to. It's compatible with a wide range of machines, and gives you access to all of the Omnia information and application plans out in the field."

For any other farmers considering how to make more use of precision technology, Mr Lane recommends starting by identifying exactly what you want to achieve, then look at how you can do that as cost-effectively as possible. "That includes assessing the capability of the equipment you've already got to achieve your goals. Precision farming doesn't need to cost a fortune."

## Fieldwise Answers Managing cover crops over winter

Sheep grazing cover crop

**Alice Cannon**, Agronomist & Regional Technical Support Manager, answers some common questions.

## **Q)** "When and what are my options to terminate my cover crops?"

For heavier ground, a November termination would be most beneficial, to allow weathering over winter and give water time to dissipate down through the soil profile.

Drilling 'on the green' is often the preferred method for optimal soil health but requires the correct machinery to be able to achieve this.

SAM2 (cover crop option in SFI) requires cover over the 'winter months' defined as December, January, and February and therefore termination must occur after these dates. There is a caveat however that allows termination 6 weeks prior to spring drilling. This is particularly important if your cover crops contain cereals, and you intend to establish a following cereal commercial crop. This cover needs to be chemically terminated at least 6-8 weeks prior to drilling to prevent allelopathic effect and temporary N lock up which will negatively impact your following cereal crop and will lead to yield loss.

#### **Termination Options:**

- Glyphosate usually needing 1000g for average-large crops. For very thick crops this may be applied as a split dose to ensure coverage of growth under the main canopy
- Glyphosate + 24D (Kyleo)

   this is my product of choice where there is a large population of radish, phacelia as well as difficult weeds. You will however need to be wary and read the label for following crop restrictions

#### 3. Grazing

- see more comments below

4. Crimp roller – whilst the idea behind this method is sound, I personally don't find it reliable as you need consecutive hard frosts to achieve acceptable results. Chemical applications are often still needed if you are after a complete kill.

#### Q) "How do I Successfully Graze my cover crops?"

Grazing covers is in my view always beneficial if you can manage them correctly, poor management will however lead to yield loss.

The best way to manage sheep grazing is to mob graze, where sheep are stocked at high density for a short period of time to take the cover crop down to about 2.5cm and then the stock are moved to allow regrowth. This grazing method gives a more even graze and distribution of manure/nutrients.

Grazing wet soils is likely to cause surface capping/poaching leading to reduced following crop yields. Sheep benefit the cover crop system by 'managing' the above ground biomass and providing an inoculation of biology in their faeces. Grazing high C: N species such as mustards and cereals can also positively benefit the following crop establishment.

#### Q) "How can cover crops aid my wet headlands/field corners?"

After yet another wet Autumn many fields have been left with suboptimal crops, soils are fragile after all the rain, with some slumping and silt washing through the profile.

Alice Cannon (Hutchinsons Agronomist & Regional Technical Support Manager)

It will be important not to force things which will just compound any problems with the soil. Getting itchy feet and muddling crops in is the worst thing that could happen, with consequences that will be seen in the next year's crop and possibly further into the rotation.

In 2019/20 we created our

**MaxiInterCrop** mix, a 6-way mix designed to bring diversity. It contains native English species as well as C4 species that thrive in drier, warmer conditions and develop fantastic rooting in short time scales as well as fixing a very large amount of carbon. Ideally drilled with moisture in June/ July after any soil remedial work has occurred, if needed.

The main benefit of utilising a mix such as this will be to aid headland/soil recovery, ensuring optimal cropping in Autumn 2024, maintaining your rotation and preventing delayed combining this year if spring crops are stitched into sub-optimal winter crops.

If you have questions about managing winter cover crops and establishing following crops, please contact us: information@hlhltd.co.uk

## Our continued commitment to soil excellence

We are proud to announce that Hutchinsons is once again taking the lead in promoting sustainable agriculture by sponsoring the **Soil Farmer of the Year Competition 2024.** 

Following our successful involvement in the competition since 2021, where we have sponsored the event and contributed as judges, we are excited to continue supporting and celebrating growers who excel in their contribution to soil health.

Soil Farmer of the Year 2023 saw a range of innovative farming practices from low-input systems and cover cropping to diverse swards and biological inoculants. Organised by the Farm Carbon Toolkit and Innovation for Agriculture, we will join the judging panel once again, in the 9th year of this competition. In doing so we aim to inspire a broader community of growers to start looking at their soil health in more detail. The Hutchinsons Soils & Agroecology teams aim to empower growers with the knowledge and tools they need to make informed decisions that will positively impact both their business and the environment. The 2024 Soil Farmer of the Year competition opened for applications on the 5th December which was World Soils Day. As we continue to champion soils excellence, we encourage everyone to support the competition and make an entry if you feel you have done enough to be a soil hero!

Contact us for more details: information@hlhltd.co.uk

# Capturing the value from Agroecology

DATE & TIME:

### Tuesday 23rd Jan. 2024 9am – 2pm

VENUE:

The Belfry Hotel & Resort (The Wishaw Suite) Lichfield Road, Wishaw, Sutton Coldfield, B76 9PR

You are warmly invited to our national Agroecology conference, where for 2024 we will be focussing on capturing the value from agroecological farming systems.

The conference includes speakers from Rothamstead Research, Wildfarmed, McCains, as well as farmers sharing practical experience from the field across the arable and livestock sectors.

We aim to provide attendees with valuable insights into making agroecological farming systems pay both financially and socially.

Agroecology Services



Book NOW to reserve your FREE place. Visit www.hlhltd.co.uk/ event/agroecology-conference/ Or email bookings@hlhltd.co.uk For more information on any of our products or services, please contact your local Hutchinsons agronomist, or contact us at:

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