

Nutrition Manager)

# Fieldvise AGRONOMY NEWS FROM

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## Nitrogen fertiliser supply in focus

Against a backdrop of reduced domestic fertiliser production, **Tim Kerr** (Hutchinsons Nutrition Manager) highlights the challenges of using Nitrogen efficiently and sustainably.

The face of our domestic fertiliser industry looks very different since the recent closure of CF's fertiliser production facility at Ince. This change has serious implications for the security of our domestic fertiliser supplies - which inevitably contributes significantly to our food security.

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The irrefutable fact is that fertilisers are responsible for around half of the food that we produce. Many countries see their fertiliser production capacity as a valuable strategic asset supporting food security – we have not done so. The closure of Ince removes around 1 million tonnes of fertiliser – potentially 25% of the total GB fertiliser market.

Reducing domestic fertiliser production capacity by 1 million tonnes increases the demand for imported fertilisers. We are already accustomed to importing over half of our fertiliser requirements, but the increased burden on imports is likely to stretch the infrastructure required to meet the demand. The product that is most likely to fill the gap created by the Ince closure is urea. It is only 12 months ago that an outright ban on the use of urea was under serious consideration – the reason being that volatilisation of ammonia from urea makes a major contribution to overall emissions. Assuming that more urea is used because of a lack of availability of AN, this will only serve to highlight the inherent inefficiency risks involved with using urea.

#### **Reducing Nitrogen**

One phrase we hear a lot is the desire to reduce our reliance on synthetic Nitrogen fertilisers.

For example - as part of the EU Green deal, the Farm to Fork strategy commits to reducing the use of fertilisers by at least 20% by 2030.

There is a huge challenge facing us if we are to meet the demands of a growing population – as the area we can grow food on is finite. According to FAO statistics the global crop land area per capita had reduced from 0.45 ha per person in 1961 to 0.21ha by 2016 and by 2050 it is set to be below 0.19ha.

**Crop Production Specialists** 

More people – more food needed as a result – less area per capita – does reducing fertiliser make economic, or indeed moral sense?

It is important to understand that Nitrogen is a key component of crop yield and quality.

Any crop will remove significant quantities of Nitrogen, irrespective of whether synthetic fertiliser is applied or not.

We use Nitrogen fertiliser to bridge the gap between what the soil can supply and what the crop requires.

Therefore, if we can improve the efficiency of the Nitrogen – both from the soil and that which is applied, we can, by default, reduce our reliance on synthetic Nitrogen fertilisers.



Applying liquid fertiliser at our Helix National farm.

#### > The use of foliar Nitrogen

is one clear and easy way that we can reduce our reliance on conventional Nitrogen fertilisers.

Increased NUE – as high as you can achieve – is possible with some foliar N products. Bypassing the soil avoids the Nitrogen getting wrapped up in the complex soil N cycle – and going through the leaf overcomes the need for soil moisture to firstly dissolve and then transport Nitrogen to the roots. With no significant risk of leaching or volatilisation, these products can help reduce N losses from the system. This can translate to a reduction in the carbon footprint of the crops we use it on.

The ability to tank-mix the Foliar N can avoid the need for an extra pass through the field - affording more savings and further reducing the carbon footprint - which has already been reduced if you increase the NUE and apply less Nitrogen. The foliar N products described contain high concentrations of methylene urea – a source of sustained, safe Nitrogen release which does not rely on external factors for plants to utilise it.

Typically, we are replacing 35-40kg of N fertiliser with one application of 20 litres of methylene urea products.

Not all foliar N products are the same – we see consistent results from foliar N containing a high concentration of methylene urea - long chain polymers which release N over a period of weeks, without supplying a flush of Nitrogen that can lead to physiological damage like scorch.

#### Improving NUE to reduce our Nitrogen fertiliser requirements.

#### Why do we need to reduce our reliance on synthetic Nitrogen fertilisers?

Even if net zero remains elusive – moving in the right direction must be a good thing – and in most crops the biggest impact on greenhouse gas emissions is the contribution that comes from the Nitrogen fertilisers we apply – why? Because of our heavy reliance on the Haber-Bosch process that produces the greenhouse gas  $CO_2$  as a biproduct of ammonia production.

Understanding that Nitrogen is a necessary component of food production – but something that we have the potential to improve how well we use it (improving NUE) - can help steer us along the path we face with high Nitrogen prices and the prospect of challenges around actual supply.

The correct use of methylene urea foliar products affords the opportunity for a reduction in overall Nitrogen fertiliser usage of 15-20%. That, in itself, is a considerable step in bridging the gap being created by the Ince factory closure.

Questions about this article? Please contact us: information@hlhltd.co.uk Brian Barker of E J Barker & Sons



## Gold service delves deeper into tackling soil variability

The start of the cropping year is an ideal time to assess soils to tailor management decisions over the next 12 months, and the launch of **TerraMap Gold** marks a step forward in our ability to analyse and map soils with even greater precision.

The combination of TerraMap's high-definition gamma ray scanning of key soil properties, with Hutchinsons' comprehensive Gold analysis, gives growers and agronomists access to the most accurate and repeatable soil mapping service available.

It offers a unique understanding of how and why soil performs the way it does, and highlights in-field variations with clear digital maps. Analysing the data through Omnia, further allows tailored management plans and variable application maps to be created quickly and easily.

"If you're looking to make significant changes that affect the soil, such as reducing cultivations, or cutting fertiliser rates, you have to earn the right to do so," Hutchinsons Head of Soils, Ian Robertson says.

"TerraMap Gold lets you fully understand the soil's building blocks and why it behaves in a certain way. That performance may be good, or bad, but knowing exactly what is happening beneath the surface is the starting point for more effective decisions around cultivation strategy, organic matter applications, liming, or the amount and type fertiliser to apply."

Mr Robertson says soil health is often considered on a macro-scale, but understanding soil chemistry and the microscopic interactions is key to ensuring physical and biological properties work effectively.

Employing the Gold soil sampling on top of TerraMap lets growers

accurately measure soil variations in a raft of areas, such as biological activity, carbon:nitrogen ratios, available and unavailable nutrition, and structural variations caused by its chemical makeup. TerraMap's gamma-ray detection technology and algorithms are backed up by geo-referenced physical soil samples that together can accurately map more than 30 soil parameters within an individual field (see box).

"If you've got variable soils, it allows you to understand where those variations are and make some really impactful decisions," Technical Manager, Dick Neale adds. "That may include variable rate nutrition, or for applying lime for pH adjustment, or to correct soil structural issues through targeted use of something like gypsum."

This is a big advance from traditional soil testing based on homogenised core samples collected across the field, where sampling is less precise, limiting the accuracy of results and how they can be used, he notes.

#### Delving into detail

One key feature of TerraMap Gold is its ability to measure nutrient reserves and plant-available levels of macro elements, Mr Robertson notes. These sometimes differ significantly due to nutrient interactions within the soil, so understanding this helps manage soils and tailor fertiliser plans.

Being able to measure buffer pH is also useful, as this differs from normal water pH, providing an indicator of how much reserve acidity is in the soil, or the likely resting pH of the soil. Buffer pH influences cycling of nutrients, such as phosphorus, so understanding it allows plans to be implemented that optimise crop utilisation.

Mr Neale says pH variations are commonly detected by TerraMap scanning, and results can improve the understanding of pH and calcium content.

"For example, an alkaline soil with a pH of high 6 to 7+ does not necessarily have enough calcium. Soil pH is driven by a raft of nutrient and microbial interactions."

Many growers recognise the role of applying calcium carbonate (chalk) on low pH soils to help neutralise acidity by displacing hydrogen ions, but the soil structure benefits from applying calcium in other forms to higher pH soils can be less well understood.

"Even in high pH soils, calcium content may be naturally too low which is affecting the structural components of the soil. A lack of calcium means clay particles do not flocculate, while higher magnesium means it will sit damp and wet. Applying calcium in gypsum form increases the calcium in the soil, allowing clay to flocculate and remove the excess magnesium from the seedbed area without affecting pH [see case study right].

"One big benefit of having TerraMap Gold analysis done is in allowing us to have these sorts of conversations with growers."

#### Brian Barker, Stowmarket

Suffolk farmer Brian Barker has been focussing on soil health for many years at the 513 ha family-owned partnership near Stowmarket.

The farm is predominantly on medium to heavy-bodied clay soil, and Mr Barker has long recognised the importance of understanding the soil's chemical, physical and biological properties to get the most out of it through efficient and sustainable management practices.

Regular soil testing using the standard Gold test has been key to improving his understanding of soil conditions and has helped facilitate the adoption of strip tillage, direct drilling and cover cropping.

He wants to take this understanding further by working with Farmacy agronomist Toby Clack to map the whole area with TerraMap Gold. One-third of the farm was mapped this spring, and the remainder will be done over the next two years to build a comprehensive picture of soil properties and plan management strategies using Omnia.

#### Understanding variations

Mr Barker is particularly interested in better understanding how the relationship between the quantity of different elements affects nutrient availability and other soil properties; information that will help tailor fertiliser strategies through the season.

"Given the price of fertiliser, we have to be confident every pound spent is worthwhile. Doing something just because that's what we've always done isn't an option," Mr Barker says.

Standard soil testing has previously shown significant variations in the indices of certain nutrients, notably phosphate and potassium, with no obvious reason why. Phosphate, for example, varied from index 4 to 1 within one field.

"We therefore used TerraMap Gold to investigate what was going on," Mr Clack explains.

Results showed that while P and K indices were variable, levels of available nutrients looked quite different and did not necessarily correspond with the variations in the P or K index.



"It suggests nutrients were present in places, but were getting locked up in the soil, making them unavailable to plants. We looked to see what might be causing this, starting with calcium and magnesium."

Magnesium and calcium levels were both relatively high in places, indicating they could be affecting phosphate availability and causing other structural issues.

"In areas where we've identified high calcium to be the issue, we will limit using nutritional products that are likely to get locked up by calcium, such as triple superphosphate, instead focussing more on using starter fertilisers in spring and autumn-sown crops."

Where high magnesium is reducing workability of the clay soil, gypsum is being variably applied to improve the calcium/magnesium ratio, without affecting soil pH, thereby increasing the availability of other nutrients and improving structure.

"Unlike calcium carbonate, gypsum (calcium sulphate) is already acidified by the sulphur within it, so the neutralising ability of the calcium has already been balanced by the acidity of the sulphur," explains Mr Neale. "This allows the calcium to be purely used to shift magnesium off cation exchange sites without influencing pH."

Mr Clack notes a further benefit of the TerraMap Gold mapping has been to clarify whether liming is needed in certain areas. Soil testing by a liming contractor suggested some areas may benefit from lime, however TerraMap Gold analysis shows a close correlation between the standard pH (6.2-8) and the buffer pH (7.1-7.4), indicating no need for liming.

"TerraMap Gold lets the farmer and agronomist easily see the relationships between different soil properties, pinpoint where issues are, and develop plans to resolve them. Analysing information through Omnia makes it easy to dig into detail and develop recommendations and digital work plans for the whole farm," Mr Clack concludes.

# What's included in TerraMap Gold?

- Active (water) pH
- Buffer pH
- Soil texture
- Organic matter
- Organic carbon
- P, K & Mg indices
- Boron, Manganese, Iron, Copper, Zinc, Molybdenum (total), Cobalt, Chloride and Sulphur (sulphate)
- Total reserves of P, K, Mg, Ca, Na, S and Mo
- Exchangeable cations (Ca, Mg, K, Na, H)
- Cation exchange capacity

See https://omniadigital.co.uk/ our-services/terra-map/

For more information, or to book TerraMapping please contact us: soils@hlhltd.co.uk



# Birds-eye view of pollinator potential

Early results from a unique project suggest there is potential for farmers to use aerial imagery to map nectar-rich floral habitats and plan effective management of these valuable resources.



**Hannah Joy** (Hutchinsons Environmental Services Specialst)

The work by Hutchinsonssponsored PhD student Sarah Barnsley used multispectral images collected from a manned aircraft to assess the availability of five key flower species within hedgerow and wildflower margins at the Northamptonshire Helix farm.

Images were taken in March, May and July 2019, coinciding with the flowering of blackthorn, hawthorn, red campion, bramble, and common knapweed, using cameras with resolutions of 7cm and 3cm per pixel. This was 'ground truthed' with field assessments.

At both resolutions, it was possible to accurately show areas of flowering plants, and in some cases, distinguish individual species, notably blackthorn and bramble. Identifying other species proved more challenging, especially where flowering occurred at the same time, with a similar appearance or colour. Hawthorn accuracy, for example, was lower because cow parsley was flowering in margins at the same time.

Follow-up work is therefore investigating whether flowers of similar colours can be accurately classified separately from one another, and how the area classified as a particular flower species translates into numbers of flowers on the ground.

#### Picking out colours

Digitally mapping in such detail may be some way off though, and in the meantime, Ms Barnsley believes simpler assessments of flower availability still offer very valuable information for farmers.

One option being investigated is to group flower species by colour, giving a simple measure of the diversity of flower and pollinator communities, and potentially allowing the abundance of pollinator species to be estimated, she explains.

"Flowers develop different traits that attract different pollinators, so a diversity of flower colours is potentially providing a diversity of resources for different species within the pollinator community. Hoverflies, for example, like yellow flowers, and bees are known to like purple flowers."

Previous research has shown that across Britain, 22 flowering plant species provide 90% of the nectar supply.

"If you know there's a lot of flowers, there's a good chance you'll be supporting many of those 22 species," comments Hutchinsons Environmental Services Specialist, Hannah Joy. "The research may not yet be absolute, but it doesn't need to be."

Indeed, resampling the imagery to lower 10 cm and 15 cm resolutions, suggests it is still possible to accurately identify clusters of similarly coloured flowers on the ground, potentially providing a more cost-effective way of delivering useful information for farmers in future, Ms Barnsley notes.

Monitoring images taken at different stages through the season and over multiple years will help identify gaps in pollinator resources across the farm, and show how existing resources are changing over time, she adds. This may help decisions, such as when to re-seed flower-rich margins, or where to place new stewardship options.

"If you want to make the biggest impact on your farm, you could target measures where there is currently nothing," Ms Joy adds.

Ms Barnsley concludes: "Pollinators are really important from an arable perspective. Three-quarters of crops globally rely on pollinators, yet Great Britain saw a 33% decline in numbers between 1980 and 2013.

"Increasing the proportion of flower and nectar availability is a relatively simple measure, which means that at the very least we can prevent lack of food being a factor limiting the pollinator community."

Keep up to date with this and other Helix farm projects by visiting our dedicated website: www.helixfarm.co.uk

## Agroecology conference builds sustainable farming

Next month, Hutchinsons is hosting its inaugural Agroecology conference, giving farmers the chance to discover how to make the most of regenerative farming practices to benefit the environment and the bottom line.

#### Agroecology Making the Transition

will address many of the core regenerative agriculture principles, which Head of Agroecology, Ed Brown, believes form the basis of good agronomy in a rapidly changing industry.

Rising costs, changes to farm support, and increasingly extreme weather events, have hastened the need to build more resilient production systems that harness natural processes and reduce the need for artificial inputs.



"The days of 'high input, high output at all costs' agriculture are numbered. The focus is much more about taking a holistic approach to farming and agronomy." Hutchinsons is helping farmers do this with the launch of its new Agroecology service, and November's conference will be packed with practical advice about sustainable farming practices.

"Whether you're a farmer that has already moved to a more resilient farming model, or are just starting out, the conference should have something for everyone."

Speakers include Knight Frank's Tom Heathcote, who is passionate about regenerative farming, and has helped a number of businesses transition to more sustainable farming systems, making him ideally placed to offer advice on business structuring and finance. Soil health is widely recognised as a cornerstone of sustainable farming systems, so Hutchinsons Ian Robertson will explain the

importance of understanding your soil before making any significant structural or operational changes.

Internationally-renowned independent researcher and regen consultant, Joel Williams, will also be present to offer a technical insight into his latest research.

Two farmer speakers, at different stages of their agroecology journeys, will be there too. Ben Taylor-Davies, aka "regen Ben", will share his experiences from years of adopting regenerative practices on the farm at Ross-on-Wye, while Harry Heath, who hosts the Helix Agroecology farm, will explain how he has tackled soil health issues on the Shropshire pig and arable farm.

"For us, we've gone through that early phase where we recognised our soils weren't in the best of health, with significant slumping and erosion," says Mr Heath. "We were massively over-cultivating, and with subsoiling in particular, we found the more we did, the more we had to do, to artificially create structure.

"But we are now well down the implementation phase, having converted to direct drilling five years ago."

Cover and catch crops, grazed off by sheep or pigs, are integral to the rotation, improving natural structure through a diversity of root structures, while also feeding soil biology.

"Soil health and microbiology are always at the forefront of our decision making process," Mr Heath adds. "The symbiosis that exists between the microbiology and the plant is vital and making sure we maximise that is integral to agroecology.

"But the key is to be openminded. To get off the conventional treadmill, you have to think differently, recognise it's not all about the crop and continually question everything you do."

### **Conference details**

The Hutchinsons Agroecology conference will take place on 8<sup>th</sup> November at The Belfry, Sutton Coldfield, West Midlands. To book your place and find more information, please go to hlhltd.co.uk/ event 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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