Helix

Fieldwise

AGRONOMY NEWS FROM HUTCHINSONS

Crop Production Specialists

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Farm sustainability and technology

Stuart Hill, Hutchinsons Head of Technology and Innovation, reviews the main aims and progress made so far in Project Helix.

The future - new technology, prediction, autonomy, big data, robotics, sensors, ICM, Regen Ag, Carbon, ELMs, sustainability. These words are becoming a regular part of our everyday vocabulary and they do actually fit together, as we head into a new era where agronomy linking integrated farm and crop management will be critical in supporting grower sustainability. This is also why Hutchinsons embarked on **Project Helix**. Linking technology, knowledge and advice to deliver sustainable farming.

We also have to be mindful that each year our climate seems to present another extreme, which is becoming normal, and coupled with Brexit and policy changes over the next few years, on-farm financial pressures are significant.

So how does Helix address these challenges?

To begin with, we have to **understand what the aims and objectives are of the grower** and their farm business. Understanding motivations and those objectives is key to making progress. These are often separated as business and emotional criteria, but often these are one and the same when you look more deeply.

Many growers are now looking to leave a longer term positive environmental legacy to support sustainability. That is a sustainable environment, community and business - they are all inextricably linked. A sustainable all-round business is generally a profitable one.

***Stuart Hill** - Head of Technology & Innovation Hutchinsons*

With Helix, any technology has to provide a benefit in sustainability, productivity or profitability for a given farm situation. Productivity is essentially less time or resource spent producing the same or more, which of course would increase profitability and this is where technology supporting ICM and sustainability plays a pivotal role.

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The majority of development takes place at our Helix national farm with Andrew Pitts in Northamptonshire. These projects are then cascaded out to regional farms such as Tom Jewers who hosts Helix East. These regional farms may also develop specific localised research areas, such as specialist crop projects.

Justification is another key focus. Current and future policy and food chain expectation will be to ensure that the advice and actions delivered on farm are integrated, evidenced and justified - this will simply be a requirement.

So, what is Helix already delivering?

Strategically, **cost of production mapping** is a first beneficial technology. By overlaying **yield maps** with costs of production maps in our **Omnia system** it is possible to identify consistent low and high productivity areas in and across fields.

We can investigate areas of low production and either advise remedial action, such as soils assessments, or, if production is unlikely to be improved, then advise environmental options (ELMs in future) in those areas. Either way, this has to be a measurable, positive financial impact on profitability, something we have demonstrated on the Helix farm in Northamptonshire.

There is the argument that your fixed costs are still the same on less land, but this scenario does give a chance to review the fixed cost base, or increase land area to compensate - another productivity positive.

The **rotational planning tool** launched this year for the agronomists is multi-dimensional and gives a read out of long-term rotational profitability. The tool compares different rotations with associated fixed costs in realistic scenarios, adding in other aspects such as cover crops and environmental schemes.

The skill is not just utilising the tool, it is also understanding the farm business, crop marketing strategy, mechanisation and resource strategy and storage implications to build into the equation. This is an integrated approach to deliver long-term rotation, soils and environmental management.

Soils are key to long term sustainability and there are several projects that include technologies that aim to monitor, measure and provide positive benefit at the end. It is well documented that improving soil biology and structure will deliver many tangible benefits, the ultimate being long-term resilience and output.

Terramap, developed through Helix, is an example of using more remote, more efficient and live testing technologies. This has allowed greater accuracy, with nutrient and soils maps being integrated into **Omnia**. When layered with yield maps, it is possible to begin to understand in-field differences and manage bespoke precision nutrient application.

Reviewing yield distribution within Omnia

When you couple this with soils knowledge it can be immensely powerful. Building soil biology, to recycle and release its own nutrients more fully, will lead to more efficient nutrient and input use. A tangible benefit.

This year Hutchinsons has also launched the **climate tool**, channelled through **Omnia**. This utilises data modelling to predict growth stages of crops. This in turn supports more targeted monitoring and planning of applications and logistics. Pest models are also being developed to work in conjunction with the climate tool, an example being the **BYDV model** already available, which again targets timing and justification of input use.

So, there will be a record of what has been done and the thresholds and reasoning behind that. Of course, these systems need human input and as more information is put into the system then the more accurate it becomes.

More beneficial tools are in development which you will see in the coming months.

The **Helix project** was launched a year ago and is already delivering beneficial technologies. But we must be very clear that technology is not the sole focus. Developing knowledge and advice are key to make the most of the information and ultimately to deliver greater financial and environmental sustainability for growers.

Find out more – visit www.helixfarm.co.uk

Monitoring to Manage

Dr Bob Bulmer
HUTCHINSONS
ENVIRONMENTAL SERVICES MANAGER

Rob Jewers
HUTCHINSONS
CROP NUTRITION SPECIALIST

Tim Kerr
HUTCHINSONS
NUTRITION MANAGER

Data derived from crop analysis provides the opportunity to further fine tune our approach to crop nutrition. **Dr Bob Bulmer**, **Rob Jewers** and **Tim Kerr** highlight some monitoring methods that are proving to be valuable tools in crop management.

Grain Nutrient analysis – Dr Bob Bulmer

With the introduction of batch analysis, a number of laboratories are able to analyse grain samples for all of the essential plant nutrients. Grain analysis is now well established and it has been recently included in the fertiliser manual (RB209) as an accepted method of nutrient testing. Although grain analysis is a retrospective test, it is proving very useful in a number of areas.

We have found this method very effective at identifying nutrition problems. Well managed soils often contain high levels of nutrients, but, due to problems with soil structure, pH and rooting, often the crop cannot access the nutrients it requires.

Grain analysis alongside leaf testing can identify problems with the crop's uptake of nutrients from the soil. Four years of grain testing have highlighted common problems with crop nutrients. 75% of grain samples were deficient in at least one nutrient. The element which was most often deficient was phosphate, then potash, sulphur and nitrogen in that order. The most common micronutrient deficiencies were manganese and zinc.

This is valuable information that can be used to fine tune nutrient programmes. It is also worth checking soil structure, pH and crop roots if nutritional problems have been identified.

Grain analysis along with yield data can also be used to calculate phosphate and potash offtake (see Fig. 1 right). This is especially useful for farms that want to maintain these nutrients at a certain soil index and it will be more accurate than using the standard figures in RB209.

Protein Prediction - Rob Jewers

Achieving accurate protein values in milling wheats is not always easy. Too little nitrogen applied and the crop will not make the milling specification. Conversely, too much N and you risk over-application, giving a cost both financially and also potentially to the environment.

This year we have trialled a very interesting new protein prediction test at our National Helix site in Northamptonshire. The test has been developed by **Hillcourt Farm Research** and samples of whole plants are analysed to give prediction of whether the crop will make milling premium, or whether further nitrogen application is required.

Initial findings from the trial are very encouraging and the test appears to give a very accurate forecast. Six different fertiliser N applications had been applied to a wheat crop, ranging from very low levels, up to typical levels applied for a milling wheat. The prediction test accurately forecast that the lower N samples required further applications and the higher N samples should meet milling specification without further nitrogen.

We shall be using grain analysis at harvest to further confirm the accuracy of the test.

Grain Nutrient analysis – key facts

- Recommended as a routine benchmarking exercise on the farms' main soil types
- Identify nutrition problems and benchmark against other fields and years
- Helps to fine tune fertiliser programmes
- Provides a cross check on soil and leaf nutrient analysis
- Offtakes of phosphate and potash can be calculated to refine nutrient plans.

Linking crop monitoring with crop management - Tim Kerr

Using grain analysis as a benchmarking tool for nutrient content allows us to add an extra level of refinement on top of the broad-brush, soil index-based recommendations within RB209.

The evidence from the British Survey of Fertiliser Practice is clear. On average we simply do not apply enough phosphate to arable crops – with the exception of potatoes, and more than half of the cereal acreage in the UK received no phosphate last year. No great surprise then, when P is showing as below optimum levels in grain analysis more often than not.

Knowing how immobile P is in the soil – and its tendency to become less available over time as it reacts with cations in the soil, means that we can plan to apply phosphate

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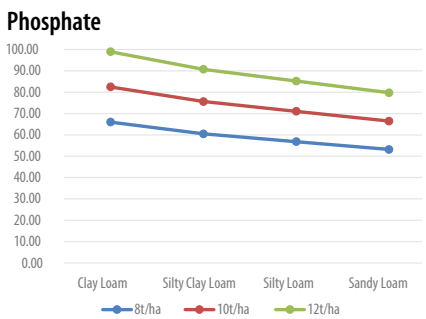
Helix soil zones

Phosphate and Potash offtake kg/ha at different yield levels



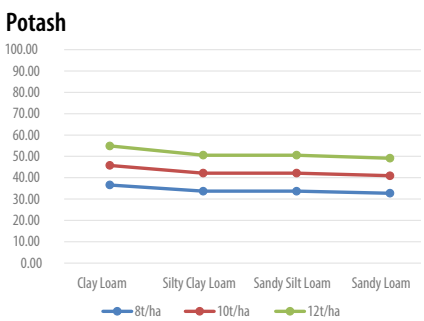


Fig.1 Phosphate and Potash offtake levels in wheat

RB209 Phosphate 10t/ha – 78kg/ha Potash 10t/ha – 56kg/ha

fertiliser at the crucial timing – at planting. The fact is that immature roots only access a fraction of the soil and very quickly exhaust the phosphate that the roots come into contact with. Replenishing the phosphate in the rooting zone is key to sustaining root development and maintaining yield potential. Increasing root biomass not only improves the plant's ability to take up phosphate, but also all essential nutrients and water.

Phosphate starter fertilisers placed around the seed make both agronomic and environmental sense. Phosphate run-off from broadcast fertiliser is eliminated and because the fertiliser is placed where it is needed – the amount of P required to satisfy crop demand is lower than if you spread P fertiliser across the whole field. Many seed drills are now capable of delivering starter fertilisers.

Better understanding of nutrient availability from the soil, rather than the actual nutrient content of a soil allows us to plan targeted applications of fertiliser, but also, importantly, to respond to the season – where climate in particular can influence how much and how quickly nutrients are available to the growing crop.

Monitoring work at our research sites has involved routine tissue tests through the spring. These have been invaluable in highlighting the shortfall of some nutrients, for example magnesium - which any visual assessment would not have picked up.

Tissue tests have enabled the timely use of foliar Mg to maintain chlorophyll production and improve levels of photosynthesis - another example of how crop monitoring can allow us to respond to situations intuitively.

The work continues to see if we can get more useful data from crop analysis to further fine tune our approach to crop nutrition. We are investigating a number of novel monitoring tools at our Helix farms – where **TerraMap** was successfully validated two years ago, and now forms an integral part of our nutrition services.

For more information please speak to your local Hutchinsons agronomist, or contact us: information@hlhltd.co.uk

The big oilseed rape question;

to drill or not to drill

Dick Neale shares his key agronomic practices that will help with the success of the OSR crop.

- **Having adequate seed bed moisture: This is critical.** Drilling windows may vary according to when adequate moisture is available. Being prepared to stop drilling when moisture levels reach a minimum level to maintain growth over the subsequent 7 days, is a vital discipline. This will require a change in mind-set and flexibility in variety choice and seed delivery options.
- **Sowing techniques:** While a number of sowing techniques have proven viable for winter oilseed rape, the area into which seed is placed must provide good seed to soil contact, adequate moisture retention and protection from slugs.
- **Seed rates:** should not be increased beyond 80 seeds/m^2 for either conventional or hybrid varieties. If a higher rate is considered necessary, the seedbed is not good enough.
- **Fertiliser:** Placement N+P fertiliser should be utilised as micro granules, granule DAP or liquid DAP.
- **Variety choice:** Limiting varietal options to specific traits where yield, while important, is not the sole driver.
- **Companion plants** to include buckwheat, vetch, berseem clover or beans can be utilised to maintain soil functionality, suppress weeds and enhance the growth of the rape. Companions should not be considered a viable deterrent for CSFB, or offer a yield improvement within the crop, although the additional biomass does help reduce pigeon grazing. Companions help negate the poor soil biology associations of brassicas.

Questions about this article? Please contact us: information@hlhltd.co.uk

ESTABLISHING THE PLANT IS ONLY HALF THE STORY – REDUCING LARVAE INFESTATION IS THE NEXT BATTLEGROUND

Timing of CSFB larvae infestation and infestation levels are proving difficult to predict, but research is giving us some pointers, says Dick.

- **Earlier sowing offers a longer egg laying period and can result in more larvae per plant**
- **Plants can be impacted by multiple hatches in mild winters**
- **Early, main stem infestations can allow the plant to grow away well in the spring but then mature prematurely with poor seed set and filling in the pod**
- **Later infestations impact stem extension and branching ….with many crops this season reaching no more than waist high**
- **This season we have seen fresh infestations as late as early May in every branch, this has caused previously even crops to become ragged, with poor seed set.**

TerraMap

Providing answers to crop production challenges

60 Acre Sand %

Earlier this spring, images taken from a drone flown over the field where the Hutchinsons Alnwick regional trials are sited, clearly showed up a particular area that was a lighter green than the rest of the field – indicating an area of poorer, thinner crop.

Digital farming manager Lewis McKerrow explains how he used TerraMap to investigate what could be causing this particular area of poorer performing crop.

TerraMap is Hutchinsons revolutionary soil scanning service that provides greater definition and more accurate soil maps than any other system, enabling growers and agronomists to make the most of precision technology.

It does this by providing high definition mapping of all common nutrient properties, pH, soil texture, organic matter and CEC as well as elevation and plant available water. It also measures the levels of P, K, Mg, pH and % of clay, sand, silt, texture and elevation, as well as calcium, manganese, boron, copper, molybdenum, iron, zinc, sulphur, OM, CEC and plant available water.

The results from TerraMap are then used to create maps within **Omnia**.

Mr McKerrow explains: "We ran the scanner over the field and in one pass we had all the information we needed on the soils - all 21 layers! The field was already mapped using Omnia."

"We added into Omnia a satellite biomass (NDVI) map taken on the 8 May– there were clear areas of darker and lighter green too, showing areas of thicker and lighter crop, which correlated with the drone images."

"Over this we added in the sand layer measurements from the TerraMap scanning. We also added in silt and clay maps."

"The results were fascinating – and completely correlated with the NDVI biomass map! In the poorer performing areas of field, there were higher levels of sand and silt and lower amounts of clay in the soil and vice versa in the greener more productive part of the field. "

So how would this be directly impacting crop growth?

"We know that soils with a high sand and silt content and low clay content tend to be drier – but could we prove that this was actually affecting crop growth?"

"Yes! TerraMap provided us with a plant available water map, and the results of this directly correlated with the soil texture maps, NDVI maps and drone images. There was more plant available water in the higher clay percentage areas of the field, but where sand and silt were predominant, there was lower plant available water."

"So we were able to confirm that the poorer performing areas of the field had less plant available water."

"For this exercise we just looked at the textural aspects of the soils and what effects these might be the having on crop production. We intend to take this one step further in the autumn and investigate the nutritional aspects of the field in more detail."

NDVI image overlay within Omnia

Mr McKerrow points out how this approach underlines the importance of being able to use the data that precision technology delivers to improve productivity and ultimately, profitability.

"By identifying the reasons behind areas of fields that are not performing as well as others, growers and agronomists can make informed decisions about how to manage these areas going forward."

"In this situation for example, there are two options," says Lewis. "Evening up the plant populations across the field using variable rate drilling so increasing the seed rate on the poorer area. Alternatively, accept the variation and change the way the crop is managed such as redistributing nitrogen – using less on the poorer area and using more on the better performing parts of the field."

Find out more – please visit our website for more details of TerraMap and to access our other videos from Fieldwise Live: www.hlhltd.co.uk

Data by kind permission of J & R Park

Fieldwise Live explores autumn decisions

With harvest approaching and planning for next season underway, the latest Fieldwise Live videos have provided some timely advice.

For growers still undecided about what variety to grow, several Regional Technology Centres gave updates from their variety trials, showcasing the best options for specific regions, soil types and growing conditions.

Many leading wheat varieties were in big demand given the significantly increased area planned this autumn, said national seeds manager **David Bouch**, who picked out his top wheat choices for 2021 at the Grayingham site in Lincolnshire.

"Current estimates are the wheat crop could approach 2m ha this autumn (nearer 1.5m ha in 2019/20) and may be 2.2m ha, so there's significant crop going in the ground on the back of a season like we've never seen before and hopefully don't see again."

At Fincham in Norfolk, 33 varieties were being trialled this year and agronomist **Peter Riley** picked his highlights for local growers, especially those looking to sow late after roots or veg, and provided tips on what to consider when making choices.

"In this part of the world, bearing in mind we don't have chlorothalonil in 2021, a rough rule I'm suggesting is to consider varieties with Septoria resistance of over 5.5; that's probably more important for the earlier drillings than the later drillings."

In higher-risk areas, such as Herefordshire for example, he suggested increasing that minimum Septoria score to 6.5.

For those considering quality wheats, he reinforced the importance of talking to end users to determine their requirements before making any decision about what to grow.

Hybrid wheats were attracting increasing attention as new varieties came to market, and several options have been trialled around the country, including Fincham.

Dr Bob Bulmer said the late sowing and difficult establishment conditions last autumn and winter appeared to have suited hybrids. "Hybrid vigour has really come to the fore this season."

Mr Riley agreed, adding: "The subject is of great interest because there are new hybrids coming along in the next few years which will make a lot of difference to how we grow wheat in future."

Another area discussed at Grayingham was the research into optimising seed rates and row widths for crop potential by agronomists **Ben Treadgold** and **Alice Cannon**.

Despite the challenging season, there were some interesting observations, said Mr Treadgold.

"As seed rates have gone up, establishment rates have fallen. Although that might sound counter-intuitive…the actual number of plants we've got in plots is higher at the higher seed rates with the lower establishment counts. So, during a poor establishment season, higher seed rates act as a risk-reducer."

Comparisons of 12.5 and 25cm row widths sown at 450 seeds/m^2 had also found noticeably more tillers per plant and taller crops at the wider row widths, due to the extra space for plants to grow, he noted.

"Although there are more plants in the 12.5cm plot, the number of tillers and ears will be far fewer, so we'd expect the wider row spacing but the same seed rate to produce a better yield."

Miss Cannon noted that wider row widths were likely to be more effective on heavier-bodied soils because they generally had better capacity to support increased biomass and tillering. Equally, narrower row widths were proving more successful on lighter soils.

"That said, if you don't marry-up seed rate to row width correctly, you will find the plant won't tiller enough, which allows more weeds to come through, particularly black-grass."

Catch up on these and other videos, including post-harvest soil management and a preview of the Fenland potato demonstration www.hlhltd.co.uk/fieldwiselive