



Combining technology and agronomy to improve profitability

We take a closer look at the new Helix Technology Development Farm and some of the areas under scrutiny to improve future profitability.



Andrew Pitts
HELIX NATIONAL TECHNOLOGY FARM



Michael Shemilt
HUTCHINSONS AGRONOMIST

Andrew and William Pitts farm 809ha of arable land at Mears Ashby and Whiston in Northamptonshire. They are the second generation of the Pitts family to farm this land and firmly believe that in order for the farm to be viable for future generations they must be productive, efficient and ultimately profitable.

"We are a one unit size operation and that means one sprayer and one combine. It's about keeping it simple and supports the advice from leading accountancy firms that one unit size farms are the most profitable and the most resilient," says Andrew.

To ensure that we have a farm in the future, we need to be constantly looking at what we are doing, how we are doing it and if it can be done any better, he says.

"It's about managing out risk – we know that over the next 7 years we will lose subsidies as we know them, so we need to be looking now at making up this difference so that we are more resilient".

So how are we going to do this? he asks.

"The technology revolution is here and we need to ensure that these technologies are relevant and applicable to use. The relationship with our agronomist will need to adapt to this and I see a future when we will spend much less time field walking and instead rely on technologies to feed us the necessary crop data, so we can spend more time on strategic discussions about the farm and sustainability."

This is why Andrew and William are hosting the Hutchinsons national Helix Project. The first of its kind, the Helix project will assess how technologies can be successfully linked with knowledge on a farm scale level and measured not only on yield performance, but also productivity, efficiency and the farm environment.

Key areas of innovation and technology will focus on sensors and prediction software, soil management and analysis, to environmental aspects such as surveillance and predictive systems, nutrition and input technologies.

Hutchinsons agronomist **Michael Shemilt** will be working alongside Andrew and William, testing and managing the technologies on trial to better understand how they work and their value in a farm scale situation.

All the data will go into a central hub – Omnia and, in doing so, keeps everything in one place, keeping it as straightforward as possible.

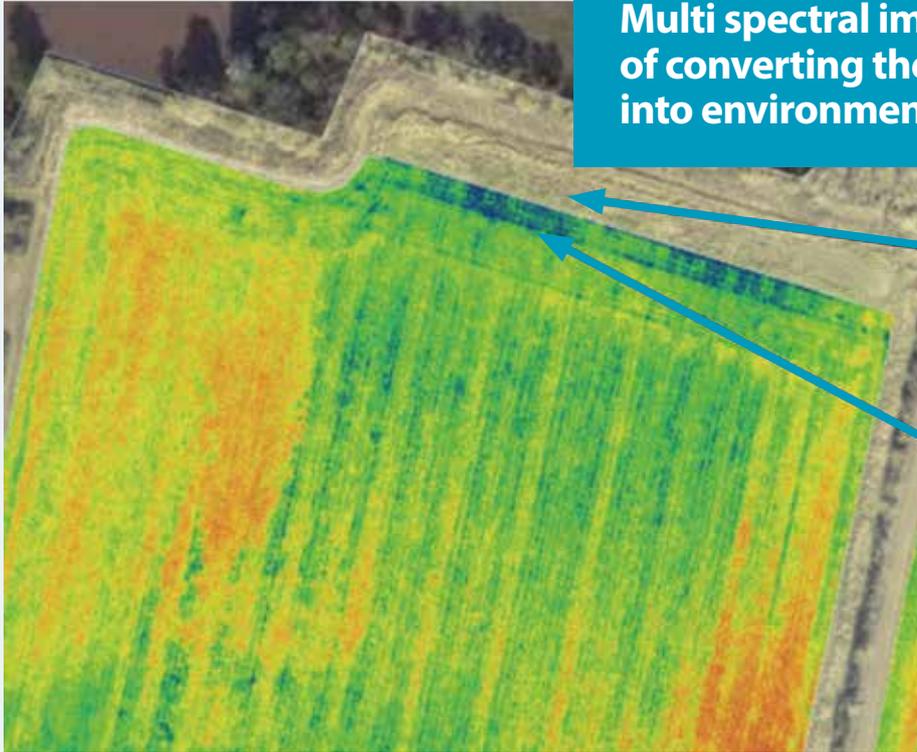
Moat Farm • Whiston • Northants

Cropping: wheat, barley, beans, oats and OSR

1 full time employee
who helps with all farm operations



Multi spectral imagery shows the benefit of converting the low yielding headland into environmental stewardship:



Benefits:

- Old headland compaction issue identified from previous yield maps
- Headland converted to stewardship and used for turning only
- New headland showing significant biomass benefit.

Imagery Courtesy of Spectrum Aviation

Andrew Pitts is already using this approach of combining technologies and agronomy through Omnia to make his farm more profitable.

Looking at his yield maps, Andrew had one 10ha field that highlighted the headlands and compacted margins around the edge of the field were bringing the overall yields of the field down to 8.24t/ha – which is what you would expect, says Andrew (See image above).

“Using Omnia, we put this yield data into the yield performance and cost of production tools – and based on a wheat

price of £150/t and operational costs of 1,200 £/ha we were only making £4/tonne and an overall field profit of £363”

“So we needed to address this.”

“By taking out of production the areas that only yielded 4-6t/ha, the average yield of the field went up to 8.61t/ha, and with operational costs and wheat prices staying the same, the profit per tonne went up to £11, bringing the overall field profit up to £828.”

“We decided to take it one step further and also removed the areas of the field

only yielding 6-8t/ha, leaving 80% of the field in production. Yields rose to 8.97t/ha, making a profit of £16/tonne and a much more acceptable field profit of £1,170.”

Andrew pointed out that by placing the non productive 20% of the field into an environmental scheme for which he would be paid, then this would further increase profitability.

Follow future developments at the Helix National Technology Development Farm on our website: www.hlhtd.co.uk

“How do I manage the increased number of beet volunteers in cereals, which are emerging early?”

Darryl Shailes
(Root Crop Technical Manager) replies...

This winter more wheat has followed sugar beet, with minimal cultivations – this in turn has led to a greater amount of beet volunteers from ‘tops’. This is a concern for managing BMV and BYV viruses in this year’s beet crop, as the volunteers could act as reservoirs for aphids and also viruses. Without the protection of ‘neonic’ seed dressings, it is important that beet volunteers are managed in all situations on the farm. Currently we only have one insecticide application



**Fieldwise
Answers**

in the crop and with the BBRO reporting a high risk this year (see BBRO – Advisory Bulletin No.2), then it is important to get quick and thorough control of these volunteers.

Traditionally we will have mainly used ALS/SU chemistry, but this can be a slow kill in adverse conditions, so the addition of a hormone herbicide should be considered to speed up the knockdown of these volunteers, making them less attractive to aphids or potential reservoirs for viruses.

“Can you clarify the adjustments I can make to nitrogen applications according to yield potential?”

Tim Kerr (Fertiliser Manager) explains...

Fieldwise Answers



Tim Kerr
FERTILISER MANAGER



In the latest version of RB209 – The Nutrient management guide – nitrogen recommendations were updated for Winter wheat, winter barley and spring barley to include adjustments for expected yield.

The changes were made in light of evidence of a direct correlation between crop nitrogen demand (the total amount of nitrogen taken up by the crop) and yield.

The standard recommendations are based on the following yields: -

Winter Wheat	8 tonnes
Winter Barley	6.5 tonnes
Spring Barley	5.5 tonnes

Where previous experience indicates that higher yields can be expected, the increase in recommendation for all the above crops is **10 kg of Nitrogen per 0.5 tonne /hectare of extra yield.**

The adjustments are allowed up to a maximum of: -

Winter Wheat	13 tonnes
Winter Barley	11 tonnes
Spring Barley	9 tonnes

In tabular form the allowed adjustments for Winter wheat are: -

YIELD (TONNES)	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
ADJUSTMENT	0	10kg	20kg	30kg	40kg	50kg	60kg	70kg	80kg	90kg	100kg

Hence at SNS index 1 on a medium soil, with expected yield of 10 tonnes the suggested recommendation is 220 kgs + 40 kgs = 260 kgs.

This **does not include** the extra N that is allowable for wheat grown for milling.

An extra 40 kgs of N is permissible in these circumstances – but this would be expected to be applied to boost protein – either as a later application of bagged N or as a foliar application at milky ripe.

As for timing – and apologies if this is too late for this spring – our suggestion would be to split any extra nitrogen between the first two applications – based on a 3-way split. The assumption being that to retain the higher yield potential will require more N to maintain tiller numbers and potential grain sites.

Winter barley adjustments: -

YIELD (TONNES)	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
N ADJUSTMENT	0	10kg	20kg	30kg	40kg	50kg	60kg	70kg	80kg	90kg

We are seeing yields in excess of 10 tonnes per hectare – particularly with some of the hybrid varieties – so these figures will be important.

Hence at SNS index 1 on a medium soil with expected yield of 10 tonnes per ha, the suggested recommendation is 170kgs + 70kgs = 240 kgs

Similarly, to wheat – the suggested timing of any extra N would be by Growth stage 31.

The risk of lodging should be carefully managed as nitrogen rates increase.

Spring barley adjustments: -

YIELD (TONNES)	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0
N ADJUSTMENT	0	10kg	20kg	30kg	40kg	50kg	60kg	70kg

Care should be taken – and advice sought – for malting varieties.

These adjustments for cereal N applications were all new in the updated RB209.

However, there were already established adjustments for **winter sown oilseed rape** – which remain unchanged.

The standard recommendations are based on 3.5 tonnes per ha. There is an allowable increase of 30 kgs per 0.5 tonnes of increased yield expectation over the standard yield.

YIELD (TONNES)	3.5	4.0	4.5	5.0
N ADJUSTMENT	0	30kg	60kg	90kg

All the above should be discussed with a FACTS qualified advisor – it is important that extra applications are justifiable.

It is also worth noting, that there are similar adjustments for reduced applications of nitrogen in the case of lower than standard yield expectations.

If you have a question or challenge about crop production issues you are facing on your own farm, please email us: information@hlhlt.co.uk and put 'Fieldwise Answers' in the title.

Black-grass trials show value of competitive crops

New Hutchinsons trials in Oxfordshire are showing how crop competition can make a valuable contribution to black-grass control within an integrated strategy.



Mollington drill demonstration March 2019, right Toby Kellie, Hutchinsons Agronomist



It is the fourth year of trials at the Mollington black-grass centre near Banbury, where weed populations have fallen from 1,500 plants/m² to 50 plants/m², by focusing on cultivations, soil health and rotation.

The dramatic reduction in black-grass pressure has allowed winter wheat to be reintroduced to the site for the first time in four years and Hutchinsons agronomist Toby Kellie is investigating how wheat can be managed to suppress black-grass, through drill choice, variety and seed rate.

Growers saw this work first-hand at an open day on 14 March, where Mr Kellie and Hutchinsons seed business development consultant David Neale highlighted early findings from plots that will be monitored through to harvest.

Drill comparison

In one field, three drills were used to sow Skyfall at 450 seeds/m² last October, allowing comparisons of machine characteristics. These included a Weaving GD 8000T, a Sky EasyDrill HD and the farm's Vaderstad Rapid. The latter was preceded by one pass with a custom-built Surface cultivator as the Vaderstad could not direct-drill well enough to be a fair comparison.

Mr Kellie highlighted a clear correlation between soil disturbance at drilling and resulting black-grass pressure, with the Weaving drill causing least soil movement and lowest black-grass germination. The Vaderstad/ Surface technique moved most soil and was rated worst for black-grass.

However, extra soil disturbance to create a tilth in the clay loam had clear benefits for crop establishment, which was highest in the Vaderstad plot (69% and average 2.3 tillers/plant) and lowest (57% and 1.2 tillers per plant) in the Weaving trial.

"One drill isn't necessarily better than the other, but working characteristics are worth considering. No-disturbance direct drilling has a place, providing it's not at the expense of crop establishment. There's a balance between creating conditions for good establishment without stimulating too much black-grass.

Due to the dry autumn, we didn't cultivate a month prior to drilling as per our strategy, but this would have created a better tilth for the Weaving to perform better."

Cultivating the Vaderstad plot so close to drilling put it under greater black-grass pressure, which was exacerbated by not being able to apply residual herbicides until post-emergence, he added.

Fortunately, favourable conditions in late autumn/ early winter meant residuals worked "immensely well" and negated this pressure, but he acknowledged other years could have been different.

Variety choice and seed rate

A separate field after potatoes hosted a trial comparing four wheats; Crispin, Skyscraper, Sundance and Costello, at two seed rates (400 and 500 seeds/m²).

Although black-grass risk was higher, given significant soil movement in the preceding crop, excellent residual herbicide performance reduced weed pressure across all plots, Mr Kellie noted.

However, early observations suggested Crispin, sown at 400 seeds/m², had performed better for establishment vigour, tillering and black-grass suppression, Mr Neale said.

"Speed of establishment, and tillering in autumn and spring, are key to maximising crop competition, as the quicker crops prevent light getting to black-grass, the less impact it has on yield.

Crispin is the go-to variety from what we've seen so far, with 91% establishment, 364 plants/m² in autumn and 981 tillers/m² in spring."

Skyscraper also tillered well, although lower establishment meant less early crop competition. The variety's extra height could help smother black-grass later though, he noted.

Mr Neale reminded growers that differences between varieties and seed lots meant it was crucial to drill by seed number rather than weight.

"At the same seed numbers, you can easily get 50kg/ha difference in physical seed weight per hectare. This is critical in planning the right variety for drill date and tillering structure. We can easily provide our growers with this information."

Information about our regional trials sites and the dates of summer open days for growers will appear on our website: www.hlhtd.co.uk

Biostimulants and yield improvement

Dr Bob Bulmer (Hutchinsons Trials Manager) discusses the increasing grower interest in biostimulants and enhanced nutrition to boost crop performance.

There was a noticeable change at last year's Yield Enhancement Network (YEN) conference during the farmer panel sessions on oilseed rape and winter wheat. In previous years, these talks have revolved around the use and timing of conventional chemistry, fungicides and plant growth regulators. There was a marked shift in emphasis during the discussion towards biostimulants and nutrition. This has also been apparent in the Yen Yield Testing project, where two of the Farmer Testing Groups (FIGS) are looking at crop momentum with a particular emphasis on biostimulants - another group are investigating amino acids.

The surge in interest in this area has been mainly influenced by the realisation that if we are going to reliably produce consistently high yielding crops in the future, we need to explore this subject to find novel treatments that improve plant growth and development and build on good practice in other areas, for example soil management. There is a biological hypothesis referred to as the Red Queen hypothesis which springs to mind. This proposes that organisms must constantly adapt and evolve to survive while pitted against ever-evolving opposing organisms in a constantly changing environment. The phenomenon's name is derived from a statement that the Red Queen made to Alice in Lewis Carroll's 'Through the Looking -Glass':

"Now, here, you see, it takes all the running you can do, to keep in the same place."

Rather reminiscent of trying to grow high yielding wheat, while battling pests and diseases in adverse climatic conditions.

Biostimulants are not a panacea for all ills and they will be of very little benefit if there are fundamental problems with the crop, for instance soil compaction, or the number of ears per meter is too low. But if the basics are right, they do

present an opportunity to positively influence plant growth by improving rooting, extending the period of light capture, or reducing the impact of environmental stresses.

Boosting root growth

An 11t/ha crop with a harvest index of 50% will typically produce 18.7t/ha of biomass. This amount of above ground biomass is supported by only 1 t/ha of roots. From this it is apparent that a healthy efficient canopy is heavily reliant on a proportionately smaller root system to provide the nutrients and water required.

Biostimulant treatments at the right growth stage can have a positive influence on root growth, as this growth room study demonstrates (see Fig.1). The combination of Calibra Carbo and Phorce seems to produce a better effect on root growth compared to the component parts. Phorce is a phosphite compound - this group have a proven track record of improving root growth. Calibra Carbo contains a number of compounds which influence plant growth positively, including amino acids. All of these treatments improve shoot growth as well as root growth.

Effect of foliar biostimulants on early root growth in winter wheat

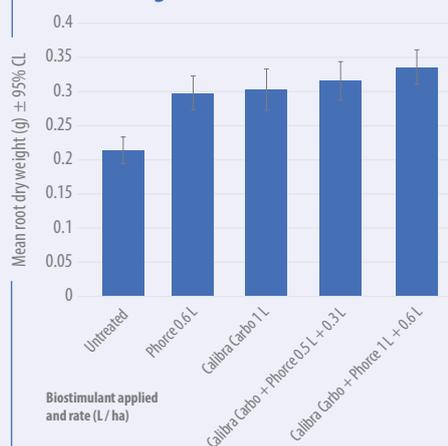


Figure 1 – The effect of foliar biostimulants on early root growth in winter wheat.

Biostimulants seem to be most effective when they are used in sequence or combination (the crop momentum approach), but in some cases single treatments can be very effective.

Flag leaf stage

The flag leaf stage is a key growth stage. At this growth stage the crop has only produced 40% of the above ground biomass and biostimulant treatments that influence either canopy health, or longevity, can have an important impact on yield. Figure 2 shows the yield response from a single application of Bridgeway, an amino acid based biostimulant. This treatment yielded 0.5t/ha more than the control and it was statistically significant.

Effect of Bridgeway on wheat yield



Figure 2 – The effect of a single application of Bridgeway on wheat yield.

Conventional chemistry effects

Conventional chemistry, particularly the strobilurin fungicides, can also have growth promoting effects, prolonging canopy longevity and also promoting the uptake of nitrogen. In the absence of disease, they have been demonstrated to lift yield by 0.25t/ha. They are also very effective fungicides for yellow rust control.

In conclusion, more reliable biostimulant products are becoming available and our understanding of what they do and how to use them to best effect is also improving.



CEREALS CHALLENGE

2019

Students tackle spring cropping Cereals Challenge

Students from around the country are competing in the 2019 Cereals Challenge to see which team can grow the best "virtual" crop of spring barley to manage problematic black-grass.

It is the 10th anniversary of the competition, organised by crop production specialists Hutchinsons and farm business management company Velcourt, that aims to encourage a new generation of farmers and agronomists into the industry.

Teams taking part this year are Writtle University College, Newcastle University, the Royal Agricultural University, Riseholme College, and Harper Adams University.

Teams must manage their virtual plot as realistically as possible, taking full responsibility for all aspects of crop management, from cultivation choice to fungicide strategy through the season, as though it were a real crop.

There is a strong environmental focus too, with an additional award and prize money for the team that demonstrates the strongest awareness of environmental protection and integrated pest management (IPM) principles.

The Cereals Challenge provides the ideal opportunity to put academic theory into practice, giving vital hands-on experience to any student pursuing a career in agronomy or arable farming, Hutchinsons services leader Matt Ward said at the launch.

The Challenge

To help record and analyse crop management information, all teams have been given access to the Omnia precision farming system for the first time this year.

The system allows them to analyse multiple layers of field data, from soil characteristics and nutrition, to weed pressure and yield potential of the

heavy land site, and develop plans to manage in-field variations, through techniques such as variable seed rates.

Teams will be set specific tasks through the season and given regular video updates from Hutchinsons's technical manager Dick Neale and Velcourt's Matt Cobbald, who will jointly tailor the challenges to reflect actual conditions as the season unfolds.

Establishment planning

The opening task of the Cereals Challenge focussed on establishment, with students asked to plan their approach to seedbed preparation, variety choice, drill choice, drilling date, seed rate, and pre- and post-emergence herbicides.

Each team took a slightly different approach, although it was defending champions RAU, led by Agriculture student Lucy Hando, that took the bold decision to put a low-yielding part of the field close to a watercourse into a grass buffer strip, after using Omnia to analyse field performance and seedbed condition maps.

The rest of the field will be sown early with RGT Planet, using variable seed rates to achieve their target average plant stand of 325 plants/m².

Writtle College, captained by Harry Jackson, went for the highest target plant population of 375 plants/m² in an attempt to maximise the "smothering effect" from their crop of direct-drilled Sienna spring malt distilling barley.

"We'll go with a higher seed rate on turning headlands, where we know establishment will be lower and also where weed pressure is higher."

Black-grass control before drilling, combined with crop suppression of the weed, were priorities for the Harper Adams team, led by Dan Hawes. They opted for the latest drilling date of 1 April, hoping to control more black-grass before the crop of Laureate barley was sown.

"We will treat seed with Turbo [nutrient] dressing to get the crop up and away quickly and hit any emerging weeds early and hard. It will be more expensive, but hopefully worth it if we can reduce the amount of black-grass seed returned for the following crop."

The winning team will be announced on the Hutchinsons stand at the Cereals Event on 12 June. There will be a trophy and total prize money of £1,000 for the winners, plus £500 for the College or University they represent.

An additional prize of £400 will go to the winning team of the environmental part of the competition, plus £100 for their College or University.

Follow progress from all teams taking part in the 2019 Cereals Challenge and view video updates from the plots on Twitter using #CerealsChallenge2019 or visit www.hlhlt.co.uk/cerealschallenge.html

For more information on any of our products or services please contact your local Hutchinsons agronomist or contact us at:

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