Fieldwise
AGRONOMY NEWS FROM HUTCHINSONS
MARCH / APRIL 2016

Context & perspectives for UK agriculture

Hutchinsons held their annual conference for their agronomists this year in early February. In these challenging times with low crop prices and a difficult political environment for crop inputs, it was important for the agronomists to reflect on the context and the perspectives for UK agriculture.

The keynote speaker was Sir Peter Kendall, Chairman of the AHDB, talking about the future of British Farming. Before looking to the future, Sir Peter started with some reflections on the huge progress in British farming over the last 20 years. Starting from the BSE and Foot and Mouth outbreaks, he spoke about the government position of that time, which saw agriculture as a risk industry potentially jeopardising both the economy (with the cost of managing such episodes) and the environment. There was a clear political feeling that the UK "didn't need to produce food anymore".

Since then, however, **so much has happened to change this political position**, with the food price spikes and with the analysis of the national requirement for a greater degree of food and energy self-sufficiency. So now we have cranes building laboratories at Rothamsted as part of a £20Mn investment strategy, and we have the AgriTech programme investing £160Mn to ensure greater application of Research and Development activities in the academic institutions.

We are indeed in a new era for successful British farming.

However, Sir Peter was conscious that this government investment needs to be mirrored by industry investment to show the **self-determination of a sector spending its money wisely in support of its growers** and showing that it can turn around the recent decline in output growth. Therefore the AHDB has been restructured to bring cohesion and consistency of approach across the 6 core activities. This restructuring and focus should enable us to **champion success** and show how **British farming can be the best**. This will require a resolute determination to meet customer requirements, but also to interpret and manage market volatility. Here Sir Peter was clear that farmers should not look to Government to intervene, but that they need to be well-informed in the decisions they take.

Sir Peter concluded by referring us back to the Oxford Farming Conference report from 2015, where research conclusions showed that the best farmers relentlessly compare their performance against their peers, they focus on business and management skills and they adopt new technologies.

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New Seed Manager joins Hutchinsons

David Bouch joins Hutchinsons on 1st March 2016, bringing additional expertise to an already experienced and successful seed team. David has a track record spanning across 17 years of specialising in seed sales and also in the role of national seed manager.

David is a former student of Riseholme Agricultural College. He began working on farm as an arable specialist in Norfolk having gained his BASIS FSTS qualification, and then developed his career further with a specific focus on seed. A Lincolnshire lad born and bred, he still lives in his native county, close to the southern boundary.

The Seed Manager (designate) role at Hutchinsons will provide David with a great opportunity, assisting the business to adapt and deliver the exciting new crop developments which lie ahead in the coming years.

>>> Another external speaker was **Mark Lynas**. He is a British author, journalist and environmental activist who focuses on climate change. He is a contributor to many newspapers and magazines, with a focus on controversial topics such as climate change and nuclear power. He is also concerned about land use issues, and about food production. Indeed Mark used to work as a dedicated anti GM activist.

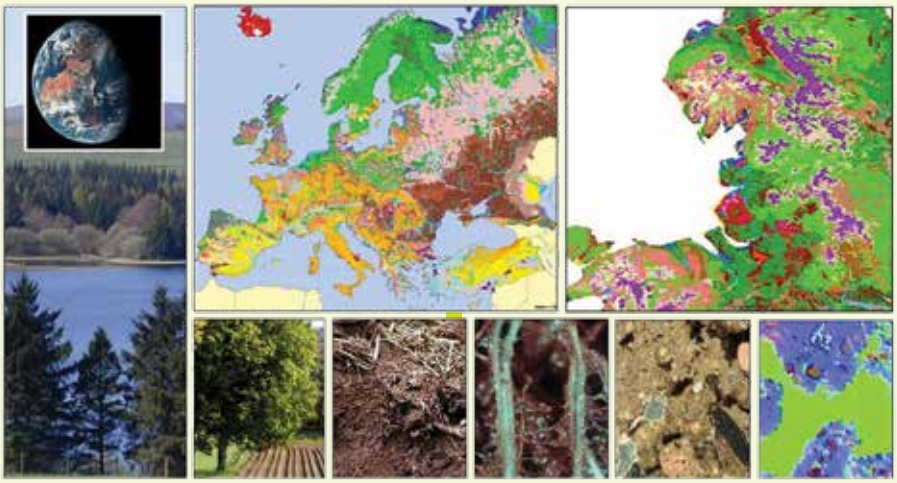
However, in a January 2013 lecture to the Oxford Farming Conference, Mark detailed his conversion from an organizer of the anti-GMO food movement in Europe to becoming a supporter of the technology. He admitted, "In 2008 I was still penning screeds in the Guardian attacking the science of GM – even though I had done no academic research on the topic - and had a pretty limited personal understanding. I don't think I'd ever read a peer-reviewed paper on biotechnology or plant science." Mark criticized organizations with which he was previously associated, for ignoring scientific facts about genetically modified crop safety and benefits because it conflicted with their ideologies and stated he "was completely wrong to oppose GMOs."

Mark urged politicians, activists and the general public to try to understand the science behind new technologies. For example, concerning the perceptions of the safety of GM crops, only 37% of the general public considered them safe for consumption, whilst the vast majority of scientific researchers did believe them to be safe.

Please do ask your agronomist about these interesting and thought provoking presentations.

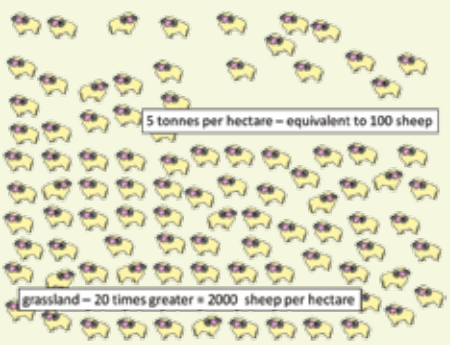
Life In Earth

– a biological basis of Soil Health



As 2015 was the year of the soil, Hutchinsons invited Professor Karl Ritz from Nottingham University to their annual agronomists' conference. Karl started his presentation with a reminder of the **importance of soil as a resource**. Soil is not just a structured porous medium which is itself an adaptive interactive system, but it is above all a habitat. If we look at what comprises soil we find minerals, organic matter, organisms, gases, water, solutes and colloids.

As an illustration of this, Karl pointed out that a handful of soil from a potato field in Perthshire was likely to contain about 0.5 g of fresh biomass, essentially microbial. If you do some simple mathematics that would lead to five tons of fresh biomass per hectare, which itself would be the equivalent of 100 sheep. Furthermore, if you were to analyse 1 hectare of grassland this amount of microbial biomass would increase significantly to a total weight equivalent to 2000 sheep per hectare. Our challenge as agronomists and farmers is to harness all the good from this huge volume of biomass.



Karl went on to remind the audience that this is just a measure of the volume, but if we also look at the biodiversity in that same handful of the soil, there are 10,000 species of bacteria and fungi, 100 different species of protozoa and nematodes, 100 species of insects, arachnids, molluscs and worms. **This tremendous wealth helps to drive the key biological and physical processes in the soil**, and as the **breadth of the biodiversity** increases, this reinforces the resilience of soil, allowing us to develop further potential for adaptation to changes in the environment. We are warned that there is likely to be a change in weather with warmer, wetter winters and drier summers. This will require increased resilience of the soil which is associated with a broader level of biodiversity.

As Karl went on to point out, a broad level of biodiversity is also important as the different species do not inhabit a food chain as we commonly see with mammals, but this is a complicated interconnected system, more like a food web. This interconnectivity ensures that the soil is providing all of the energy required for the crops to grow.

Karl then moved on to the question of **soil structure**. He reminded us of how fundamental the soil structure is to the functioning of the soil. He pointed out that ironically the most important part of the soil is the gaps that there are in the soil.

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Fieldwise Nutrition
– efficient fertiliser utilisation

Tim Kerr (Hutchinsons Fertiliser Manager) looks at ways to improve the application of fertiliser and the key differences between compound and blended fertilisers.

There are many good reasons we should be striving to improve the efficiency with which fertilisers are utilised by the crops that they are applied to, not least from an economic perspective.

Macronutrients (NPKS) are generally the largest variable cost. Ensuring we apply adequate amounts of each is fundamental in getting the optimum yield response. It is often the absence of one or more nutrients that adversely affect the uptake of another nutrient.

One prime example is sulphur – without sufficient sulphur, nitrogen cannot be utilised effectively. Not only will a shortage of available sulphur result in a lower NUE (Nutrient Use Efficiency) but it can lead to greater risk of Nitrogen losses from the soil – as the plant is unable to assimilate it.

Equally crops need sufficient ***available*** Phosphate and Potash in order to function and grow to their potential. More PK fertilisers are now applied in the spring months rather than the autumn – but beware:

you may also be applying pointless limestone filler as well….

Ditch the filler

One way that UK farming could do itself a favour is to eliminate filler from fertiliser.

Filler is inert and bereft of agronomic value – yet blends, such as 0-24-24 contain nearly 10% - this is by no means free and blenders, hauliers and farmers end up handling more product for the sake of it. Often these fillers are limestone chips which can cause unnecessary wear and tear on spreaders.

So ditch the filler - buy fertilisers formulated without it and do yourself and the industry a favour. It is more cost effective, more efficient and more environmentally responsible.

Spreadability

Twice in recent weeks we have been asked to supply “SP5” fertilisers. The SP (Spread Pattern) rating system is sadly no longer with us: in its day it was a means of indicating to farmers

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>>> Obviously the wormholes and root holes which are in well-structured soils will allow good rooting for the plant but will also allow water storage. In work at Nottingham University, Karl indicated that a 10% increase in the porosity of the soil, thanks to good structure, will ensure storage of one litre of additional water per square metre at the depth of 1 cm.

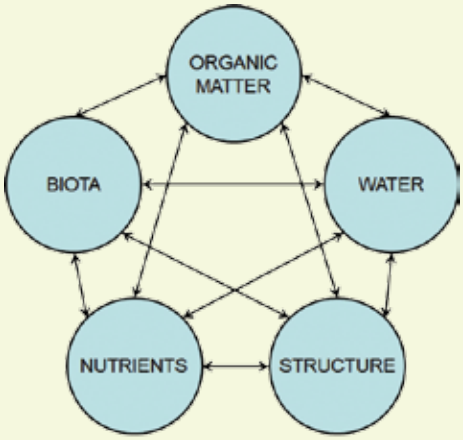
This brought Karl onto his next point which was the importance of **maintaining this soil structure**. This inevitably means not ploughing. Further support for not ploughing comes from the impact of earthworms. Reports from the Netherlands have analysed 130 different scientific papers to establish the impact of earthworms both on soil structure and crop yield.

The meta-analysis of all these papers showed that a population of 400 worms per square metre (16 worms per spade full) we should expect to see a 25% increase in crop yield compared to soils with lower levels of worm counts.

The last part of Karl’s presentation was about limiting the spread of disease in the soil and again the importance of high-levels of biodiversity in your soil. In a study carried out at Nottingham University the conclusion showed that an increase in soil biodiversity will reduce the spread of Fusarium.

In conclusion Karl reminded us of the five important elements in maintaining soil health: firstly the importance of **good structure**, secondly the need for **high levels of organic matter**, with good capacity for **water retention**, high levels of biota to ensure **the biodiversity** in the soil and appropriate level of nutrients.

Karl reminded agronomists to conduct measures of each of these five indicators, which all contribute to good levels of soil health.



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>>> that if they used an SP5 rated product that they could expect it to spread consistently and accurately over widths up to 24m provided the equipment used was appropriate, properly calibrated and well maintained.

The SP rating system was introduced in the mid-1990s and ran for over 10 years. At the time of this scheme being introduced it was difficult to know what product specification you could expect- and fertiliser was regularly introduced from a number of new sources. More information on specific fertilisers is now available via the internet and the technology in fertiliser spreaders has improved tremendously in recent years– spreader manufacturers provide easy to use settings for most fertilisers in use.

However, these settings are just a guide as the SP rating was only a guide – and the all-important phrase was "provided the equipment used was appropriate, properly calibrated and well maintained."

Even if you are in possession of a brand new fertiliser spreader and have bought the best quality fertiliser available, it is still recommended to calibrate the spreader regularly – from new.

National Spreader testing scheme

In November 2015 the National Spreader Testing scheme was launched by the AEA (Agricultural Engineers Association) – it sits alongside the proven scheme for sprayers – providing protocols to ensure spreaders are tested to the same exacting standard.

You can find out more about the scheme at http://www.nsts.org.uk

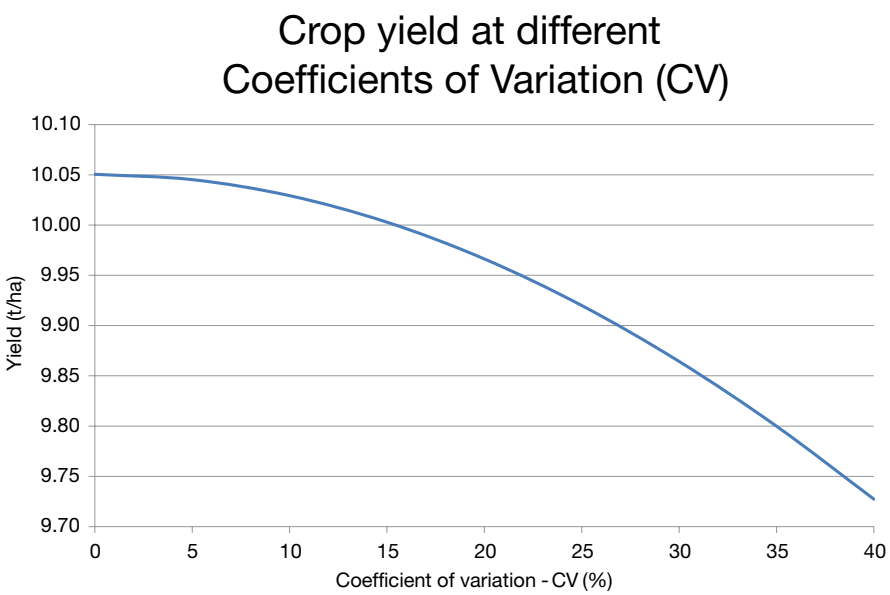
The typical cost for a spreader calibration is £250 – yet it is likely that 8 out of 10 spreaders will not have been calibrated this year... and some will never have been calibrated in their lifetime.

Don't wait to see striping like this…

A spreader working with a Coefficient of Variation (CV) of 15- 20% will result in **unseen** inefficiencies. The yield response will be proportionate to the actual amount of fertiliser delivered – particularly nitrogen and sulphur.

Visible striping normally requires a CV in excess of 20%, and spreaders are frequently tested with much worse results than this before calibration.

The graph below (Ref: 1) expresses how yield is adversely affected by the accuracy of application. Whenever the subject of yield plateaus is brought up, it should be remembered that if we were better at getting fertiliser spreaders regularly checked and calibrated, we can make a tangible difference to both yield and nutrient use efficiency.



Ref: I Richards (Ecopt) – Crop Yield at different coefficients of variation (CV)

Compound or blend?

Firstly, to deal with semantics – *a blend is a compound*. A compound fertiliser is any mixture of more than one straight fertiliser- hence it can be any *compound* mixture of nutrients.

Therefore – taking 0-24-24 as an example – this is a blend of triple superphosphate, Muriate of potash, and not forgetting…unnecessary filler.

True granular compounds are where the constituent nutrients are granulated into each fertiliser particle. This has obvious advantages in being sure there is no segregation of individual constituents and each granule will have the same analysis and spreading characteristics.

Blended 20-10-10

Granular compound 20-10-10

(Source: Yara)

There can be an extra cost to true granular compounds which has to be borne in mind, but assuming this is a small premium, then it is advisable to opt for a true granular compound where possible.

It must be said, however, that there are many circumstances when it is not possible to get a true granular compound to fit the bill. Blended fertilisers are made to order in small batches and can be produced in an infinite number of variations, whereas true granular compounds are restricted to a limited number of analyses. Exceptions to this rule are liquid and suspension fertilisers – which can be bespoke mixes and would be classed as true compound fertilisers – in that every drop would contain the same nutrients.

To conclude by repeating a previous point; a properly size matched blend (where the individual fertiliser components are matched in size) should spread accurately "provided the equipment used is appropriate, properly calibrated and well maintained".

The Additional Benefits of Fungicides

It has been known for many years that certain fungicides have attributes over and above disease control alone, but more modern active ingredients offer even greater benefits which could significantly improve yield potential. In this article **Dr David Ellerton**, Hutchinsons Technical Development Director, highlights some of these effects.

In the 1980s and 1990s it was discovered that certain triazole fungicides had beneficial growth regulatory effects on particular crops, including cereals and oilseed rape. However, with the emergence of the strobilurin fungicides azoxystrobin and kresoxim-methyl in the late 1990s, a number of other attributes came to the fore, including greater green leaf retention at the end of the season and enhanced scavenging for soil nutrients. These features were shown to offer yield benefits even in the absence of significant disease. This trend continued with the latest generation of SDHI fungicides, and future additions to our fungicide armoury look set to follow a similar pattern.

Benefits of early treatment

The continuing emergence of mutations of key fungal pathogens such as Septoria tritici, reducing the effectiveness of some of our most active fungicide modes of action, has highlighted the importance of adopting the correct fungicide strategy with regard to disease control. In particular, controlling disease at early stages by maintaining protectant rather than curative fungicidal action has been found to be vital in keeping on top of the damaging effects of disease infection.

This early application has also been found to be useful in optimising the physiological benefits of some of our key fungicide active ingredients. Trials have proven a number of potential direct impacts on crops, in addition to any fungicidal activity (see figure 1).

Fungicides – Possible Physiological Effects

1. Improved root growth	Water
2. Increased water extraction	
3. Improved water use efficiency	
4. Improved stomatal control	
5. Increased Chlorophyll	Light
6. Increased Green Leaf Area (GLA)	
7. Increased photosynthesis	
8. Improved GLA retention	
9. Improved nitrogen use efficiency	Nutrients
10. Reduced Stress	Heat/Frost

Figure 1: Possible physiological impacts of fungicides on crops.

These effects often impact directly on a plant's ability to optimise utilisation of the key resources needed for crop growth and yield i.e. water, light and nutrition, as well as helping the crop to cope with stress factors such as extremes of temperature and drought conditions.

Certain active ingredients have been proven to increase root length and density within the soil, enabling plants to extract more moisture and nutrients from their surroundings, particularly useful when crops are grown in poor, drought prone soils. Increased root growth can also lead to better crop establishment and greater top growth.

In turn, it has been shown that higher levels of chlorophyll as well as an increased green leaf area can be achieved by applying key fungicides to crops such as cereals early in the spring, while later applications can maintain green leaf area longer, particularly crucial during the grain fill period in June and July. The process of photosynthesis can also be enhanced directly by fungicide application. All of these are in addition to the benefits gained from control of diseases which significantly reduce the plants ability to intercept light and convert the sun's energy into yield.

2014/15 Record Yields

Record wheat yields in the 2014/15 season were down to a number of factors, but high sunshine levels in the spring and summer are believed to have been a crucial factor in enabling crops to achieve a high yield potential (see Figure 2). Use of fungicides impacting on plant photosynthesis, both physiologically and through control of disease such as Septoria and rusts, would have enabled plants to take full advantage of these increased light levels and so push forward yield levels.

England – Weather Patterns 2014/15, Sunshine

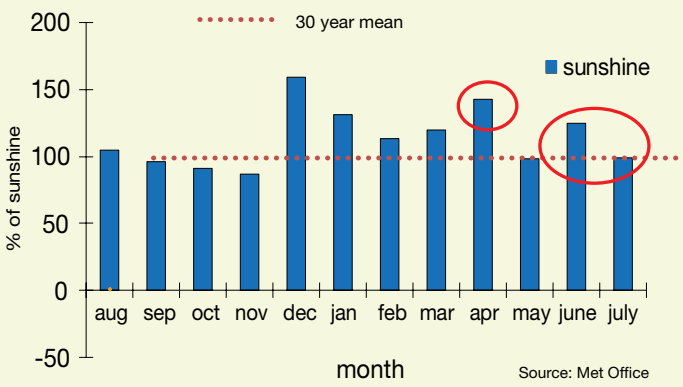


Figure 2: Sunshine levels for England, 2014/15 season.

It is possible that some of the new fungicide active ingredients in the product pipeline also offer these (and perhaps more) physiological effects, as well as enhanced disease control. In anticipation Hutchinsons are involved in a number of trials both in the UK and in Europe looking at these products and will be able to offer guidance on their use once they become registered in the UK. Make sure you contact your Hutchinsons agronomist for the most up to date information, to be certain your fungicide programmes offer you the chance to optimise yield potential on your farm.

Early disease control in Winter wheat - insights from Eire

John Spink and **Steven Kildea**, Teagasc – based at the Oak Park Crop Research Centre in Carlow, Ireland – share their experience of disease control in wheat and the threats of developing resistance to fungicides.

Irish wheat yields are on average the highest in the world, due in no small part to the high rainfall and lack of moisture stress. However, these same conditions also result in very high disease pressure from wet weather diseases - in particular Septoria leaf blotch. Yield responses to Septoria control are frequently in excess of 4 t/ha.

The high disease pressure not only results in significant potential yield loss but also selection for fungicide resistance when they are used to mitigate the loss. The development of fungicide resistance is not new. Following the loss of the strobilurins to resistance in 2004, fungicide programmes relied very heavily on prothioconazole and epoxiconazole applied with chlorothalonil, which performed very well until 2009.

Since then there has been a gradual decline in their performance. The second generation SDHI's have in the meantime provided the main "heavy lifting" in Septoria control programmes, however, in autumn 2015 isolates with moderate or severe shifts in sensitivity were found at very low frequencies in Irish field samples. We are fortunate in Ireland that we have an annual detailed country-wide survey of Septoria sensitivity, which allow us to detect these shifts before we are likely to see any impact on field performance.

So what does the severe Septoria pressure and shift in sensitivity mean for disease control here in Ireland?

Despite the pressure we do not usually see yield benefits from T0 sprays targeting just Septoria in Irish trials. However, if other diseases e.g. yellow rust are present - then a T0 treatment is vital to protect yield and ensure it does not develop later in to an epidemic. In high Septoria pressure crops a multisite T0 is frequently applied to provide insurance and flexibility later in the programme, and is particularly useful should the T1 treatment become delayed.

In Ireland the use of azoles at T0 is actively avoided as we have seen adverse effects on their performance later in the season. The use of an azole at T0 selects for isolates which are insensitive, and, as they form the basis of the later epidemic, the proportion of the Septoria population which can be easily controlled by the azole is removed before the important T1 and T2 timing. This leaves a population more difficult to control using an azole at these timings, which unfortunately also inevitability leaves the SDHIs more exposed to resistance selection.

Where rust is a problem, we recommend the addition of a strobilurin which will provide the protection required, while a morpholine will provide the curativity.

In high disease situations (generally all crops bar the late drilled and resistant varieties) our T1 would include an SDHI plus a triazole and a multi-site, with the SDHI and triazole at at-least 80% of the full label rate. In low disease situations we would consider leaving out the SDHI and use a pre-mixed triazole formulation, again with a multi-site mode of action.

Despite our high and early disease pressure, it is still the T2 that is the most important single fungicide treatment and gives the greatest yield response. As long as the top 3 leaves are kept clean we cannot improve yield by keeping lower leaves disease free, and it is the T1 and T2 that are keeping the top 3 leaves clean. **The timing of the T1 and T2 sprays is therefore all important** (at leaf 3 fully emerged and flag leaf fully emerged respectively). It is worth noting that following a warm winter or early drilling leaf 3 may not be fully emerged until the 3rd node is detectable (GS 33), so checking leaf emergence carefully is vital. If the timings are right and correct doses and mixtures of products are used there is no benefit from an additional T1.5 or splitting the flag leaf spray.

Our research shows that it is the number of times a product is used that is most important in driving resistance development, so a little and often approach of trying to spray every leaf is a poor strategy and likely to lead to increased disease resistance developing.