



## In this issue

Many crops achieved high yields last year, but with additional nitrogen, some could have done better according to Mike Slater, fertiliser technical manager. This was indicated by the low nitrogen content of many grain samples and with spring top dressing of nitrogen imminent, he urges growers to reflect on the total crop requirements.

### Set realistic yield targets but revise them as the season progresses

If, as last year, conditions signal a higher yield potential, monitoring biomass accumulation helps to anticipate a rise in yield potential. A 10t/ha feed wheat crop has a total uptake demand of around 250kg N/ha, sourced from the soil and fertiliser applications; for a 12t/ha crop the plant will need to take up an extra 40kg N/ha. High yielding milling crops need an additional uptake of 40-60kg to achieve a full milling premium. When working within NVZ constraints, crops grown on soils low in mineralised nitrogen may not be able to be fully supported from fertiliser applications.

### Assess spring soil nitrogen availability

Last autumn, the level of residual nitrogen in soils varied greatly across the country from 180kg/ha to 32kg/ha down to 90cm. The average was 96kg N/ha. High soil temperatures, over 5°C through to December, mean soils have been mineralising and releasing nitrogen, however, depending on local rainfall some will have been lost through leaching. Mineralised N testing this spring is showing results from 18 to 97kg N/ha, and the average is now 51kg N/ha, a fall of 47%.

### Review nitrogen uptake by early spring on a field by field basis

On our monitoring sites, nitrogen taken up by oilseed rape crops ranges from 53kg N/ha down to 38kg N/ha, however, some very high biomass rape crops have been reported with potentially high levels of uptake. For winter wheat, our monitoring sites indicate a nitrogen uptake of 20kg N/ha, although again, this varies.

### Plan nitrogen for combinable winter crops

Base your plan on three applications. The early one can be omitted or delayed if the crop is well advanced. The first stage is to plan nitrogen applications to build the ideal canopy for the crop; around 3.5 GAI for oilseed rape requiring nitrogen uptake of 175kg N/ha and a GAI of 6 for winter wheat requiring 180kg N/ha. The quantity of nitrogen applied should be dependent on soil nitrogen availability. Min N testing is most useful on high organic matter soils or where manures have been applied. On medium to heavy soils with white straw rotations, there is less variation and the likely nitrogen availability is more easily determined.

We must ensure that more backward crops have early nitrogen; remember when the N concentration in oilseed rape crops falls, stem elongation is triggered even if inadequate vegetative growth has occurred. In cereals, a fall in N concentration at GS 31/32 will initiate terminal spikelet leading to smaller ears. The target should be to keep nitrogen concentration in the last expanded leaf at around 4%.

With soil N levels slightly higher than at this stage last year and crops generally in a good condition, the need for very early nitrogen is not so urgent; however, soil nitrogen can still be lost until soils warm up. Assess crops individually and identify those where early nitrogen will be needed at the earliest opportunity and those where it can be delayed. To summarise:

- Nearly half the residual soil nitrogen has been lost over winter
- Soil N results vary widely field to field, so should be assessed separately
- Most winter sown crops have the potential to produce high yields
- Last year many crops with low protein levels didn't reach their potential
- Make sure adequate nitrogen is applied to support full yield potential

“With only slightly more nitrogen in the soil than last year and many crops in excellent condition with high yield potential, ensure that adequate nitrogen in total is applied to support this potential.”

Mike Slater  
Fertiliser technical manager





# Spring crop variety choice for 2015

**As the spring drilling window approaches, Frontier's northern seed manager, David Waite explores the cropping options available to farmers around the UK.**

A grower's decision to sow a spring crop and their chosen variety will depend on many factors, including location, soil type and end market. With the implementation of the three crop rule under the new Common Agricultural Policy, spring cropping is expected to increase. Several options are available:

## Spring barley

The barley market neatly divides into four main markets: beer brewing and malt whisky distilling, which are the largest human consumption sectors, and grain distilling and animal feed for domestic use and export. In recent years, the volumes required for brewing have declined while distilling volumes have increased, with the majority of distilling malt now produced in the Midlands and North of England. The end market for the harvested barley is dictated by the variety, grain nitrogen content, protein level and geography.



For brewing, Propino, Tipple, Concerto and Odyssey are favoured by most English maltsters, with ideal grain nitrogen levels of 1.65% to 1.85%. Concerto and Odyssey are particularly popular in England due to their dual purpose nature which allows them to be used in both the beer brewing and malt whisky industries. Growers need to be aware of the requirements of their local markets to ensure their grain is produced to the appropriate nitrogen level. Maltsters are currently evaluating KWS Irina and RGT Planet for the brewing market. The Institute of Brewing & Distilling (IBD) are still evaluating Sanette.

Malt whisky production has, in recent years, moved towards barley varieties that are described as non-GN producers, since GN, or glycoxydic nitrile, content in malt has a tendency to impair quality when used in whisky production. Concerto is the leading variety for this market and currently dominates the barley acreage in the North of England and Scotland.

Odyssey gained full approval from the IBD in 2014 and will be used alongside Concerto, although its slightly later maturity did cause some quality issues in northern Scotland last year. For this sector, the maltster requires grain nitrogen levels below 1.65% nitrogen and will often pay a premium when levels are below 1.5%. Moonshine and Optic are also still required in Scotland by maltsters for the whisky market.

Grain distilling is still dominated by the use of wheat, though some maize has also been used this season. Both types of grain require around 10% malting barley adding to the process to assist fermentation. A naturally occurring enzyme, diastase, is present in certain varieties at higher levels and this can be further increased by raising the grain nitrogen content. This sector is currently dominated by Belgravia and the specification required is above 1.75% nitrogen. A larger premium is paid to the grower for producing grain above 2% nitrogen for this reason. However, low nitrogen (under 1.65%) can also be used for malt whisky.

Feed barley for domestic or export consumption completes the picture and a specification of 15% moisture, a specific weight of 63 kilos per hectolitre and admixture levels of less than 2% is required. High output varieties with good quality straw are ideal for this. Waggon currently dominates, but Sanette will also perform well. In reality, any barley variety is suitable and agronomic considerations will generally dictate what is grown.

## Spring wheat

Spring wheat is a much smaller market. It is dominated by Mulika, which has an excellent complement of grain quality, agronomic characteristics and end market acceptance. Spring wheat generally achieves a higher protein level than winter sown wheat and this quality is one of the main reasons that Mulika is now preferred by most flour millers and bakers.

Belepi is a new, interesting variety that can be sown from October through to April. Bred in the UK by John Blackman, it is already flourishing in France. The high yields, great tillering capacity and early maturity make Belepi a superb variety for smothering black-grass.





### Spring oats

Seen as a healthy food option, oats are always in demand by millers and also offer a useful break crop. Firth dominated for nearly ten years but outputs have been moved forward in recent seasons by the variety Canyon. It offers increased yield combined with good mildew resistance and early maturity.



### Spring beans

Recent changes to EU legislation which require growers to produce a percentage of greening crops have led to a surge in demand for spring beans and peas.

With a human consumption market to export to in Egypt and other North African countries and animal feed compounders in the UK, there are a number of marketing opportunities for spring beans. Increased demand for fish food production is also providing healthy support for this crop and many growers now favour beans as their primary spring break crop. Vertigo, Fanfare, Fury and Fuego are all acceptable for both markets.



### Spring peas

Three main market sectors exist for peas. Marrowfat varieties are used for human consumption processing, which includes the chip shop market. Blue peas, which are actually green in colour, are broken into fine particles by micronisation for the small animal and pet food sector and yellow peas, which are more likely to be white in reality, are used as a protein source for animal feed.

### Spring oilseed rape and spring linseed

These crops make up a small, specialist proportion of the spring area. Spring oilseed rape is often grown where the winter crop has failed or when weather conditions have prevented it from being sown the previous autumn.



As always, crop establishment is crucial to the success of any crop. Recent studies have emphasised huge benefits of the addition of manganese and phosphite seed treatments to establishment and early spring growth. We strongly recommend the use of these products on spring seed where appropriate; talk to your local Frontier contact for advice and further details.

“Spring crops can be a valuable addition to your rotation, especially in light of the recent changes to the CAP regulations. Take time and advice to assess what will work best on your farm.”

**David Waite**  
Northern seed manager





# 3D Thinking cover crop trials; Soil health & Initial results demonstrate the measurable benefits to soil health, black-grass

Anecdotal evidence has long suggested that cover crops have a number of beneficial effects. With increasing interest but a lack of empirical data available, Kings and Frontier have begun a series of replicated trials looking at specific benefits of cover crops.

Paul Brown, Kings' technical advisor, considers early results and key learning to date.

At Kings, we have been interested in cover crops for many years. Recently, the wider interest in the subject has been greatly stimulated by the CAP reform promoting cover crops as an option within Ecological Focus Areas, and widespread interest in making spring cropping link effectively to black-grass control. 2015 is also the UN International Year of Soils and we certainly believe that as an industry we must not forget the importance of soil health in its widest sense. At the end of the day, well managed and biologically active soils are fundamental to profitable farming; cover crops before a spring cash crop can be a valuable part of profitable rotations.

In 2013, we had several non-replicated trials to examine how cover crops worked. These gave us initial confirmation of several beneficial effects; cover crops are effective in preventing nitrogen losses from bare land over the autumn and winter, and they produce significant organic matter that could help soil structure and soil health by feeding the soil biota. We also saw some dramatic reductions in black-grass with some varieties.

Following on from this, in autumn 2014 we created an extensive series of replicated trials at our 3D Thinking trials sites to examine these factors in more detail. Detailed trials of this nature are an innovative step in UK trials and the results will be of great value to growers.

When considering the initial results, it is important to remember that the work is ongoing; we will sow the plots with a spring cereal and monitor those crops through to harvest 2015 so we can learn more about how and when the captured and held nitrogen is released into the next crop.



## Focus on the site: Alford

A key location for these trials has been our Alford 3D Thinking trial site in Lincolnshire. This is heavy land with a high black-grass infestation. In August 2014, following a wheat crop, we sowed six plots, each with a different cover crop and one bare land control. No fertiliser was applied and the trial was regularly monitored with plot harvests of the above ground leaf and stem material in October & January. The results for the January harvest are shown to the right.

The January plot harvest showed that the cover crops produced high fresh weights. Radish, mustard and turnip rape were all over 25 tonnes per ha fresh weight, with the radish close to 40 tonnes. This equates to some of the crops producing a dry matter of over 4.5 tonnes per ha. It is this dry matter that, when incorporated into the soil, will boost soil organic matter level, help to improve soil structure and provide food for all soil life.

## Focus on the crop: Radish

As we have seen before, radish is a very efficient crop at scouring the soil for nitrogen left behind from a cereal crop; this is indicated by its high total N collection and its high % N concentration in the leaves and stem. One of the main reasons we are focusing on radish is that most varieties are Clubroot resistant, which allows it to go into an oilseed rape rotation with safety, whereas that is not the case with mustards or turnips. Radish is also leafier than mustard and flowers later. These traits mean that we see radish as a first choice cover crop, either alone or in mixtures. We are currently evaluating several radish varieties, two of which are included in this Alford trial. We see differences between these varieties and others for rooting, leaf production, speed of growth, flowering time and frost susceptibility.

These crops have accumulated high levels of nitrogen in their stem and leaf; the mustard over 230kg N/ha and radish around 150-220kg N/ha. The nitrogen left after a cereal crop has been paid for and much of this may have been lost through the drains causing financial losses to the farm and an environmental risk. We don't yet know how much N will be released to a following crop and until further research is complete fertiliser applications should not be reduced.

We are also keen to note how much potash has been accumulated in the leaf. This nutrient is also leachable, but less so than nitrogen. It also shows that to grow good cover crops with high levels of biomass the soils do need to be able to supply enough potash.



# black-grass reduction

## reduction and nutrient capture

Crop	Fresh Weight Ton/ha	D.M Ton/ha	ME (MJ/k)	Crude Protein %	C:N ratio	Black-grass Plants/sq m
Radish Variety A	39.8	4.93	10.7	28.7	8.1	4
Radish Variety B	31.5	3.02	10.8	30.4	7.9	0
Mustard	33.6	6.72	8.4	22.1	9.6	103
W.Turnip Rape	26.9	3.55	11.0	20.9	11.4	0
Strigosa Oat	11.4	2.34	10.3	35.5	15.1	202
Bare Land	4.7	1.45	7.5	15.3	12.2	268
Wheat	6.6	1.63	8.9	36.4	12.0	504

Crop	Fresh Weight Ton/ha	D.M Ton/ha	% N	N Kilos/ha	K Kilos/ha	Black-grass Plants/sq m
Radish Variety A	39.8	4.93	4.6	227	204	4
Radish Variety B	31.5	3.02	4.8	147	171	0
Mustard	33.6	6.72	3.52	236	212	103
W.Turnip Rape	26.9	3.55	3.35	119	163	0
Strigosa Oat	11.4	2.34	2.84	66	62	202
Bare Land	4.7	1.45	2.44	35	23	268
Wheat	6.6	1.63	2.9	47	38	504

### Focus on the weed: Black-grass

The Alford site was specifically chosen to test our ideas about black-grass reduction by cover crops. In the bare undisturbed soil plots there were high black-grass counts; more than 260 plants / sqm. This increased even further in plots sown with wheat where the soil movement at sowing has clearly enhanced the black-grass germination; there we recorded up to 500 plants /sqm. Black-grass plant number reduction has been significant with some cover crops; the effect was noted at many sites in 2013 and again on many farms in 2014. The reduction has been particularly noticeable with specific oil radish varieties. We do not see the same effect with mustard or Strigosa oats. In combination with spring cropping and other techniques, this presents an important opportunity to use specific oil radish varieties as cover crops to help manage the black-grass issue on some farms.



From our monitoring of the site over the autumn period, we observed black-grass growing similarly in all plots in September and October. The black-grass then died during December and in the radish plots was reduced to zero or very low populations by Christmas. Competition plays a part in this situation, but we see allelopathy, the process by which plants produce chemicals which influence the growth and survival of other plants, as being the driver of this effect. These are interesting early findings and to understand this in more detail, we have commissioned some scientific work to study cover crops and black-grass sown in pots.





# 3D Thinking cover crop trials (Cont.)

On many farms, the grazing of cover crops is likely to be useful and profitable. We are gathering good data about the feed value of these crops from our trials. Radish is proving to be similar in energy to turnips, but with higher crude protein levels. Radishes also mostly have a higher dry matter yield which, coupled with the feed analysis, makes them useful winter grazing.

The soil structure will be improved by addition of organic matter, but the deep roots of some cover crops will also play a major part in creating structure, penetrating some compaction and allowing drainage. Not all cover crops are the same and the photograph below shows a range of crops from the Alford site in mid December. We have been especially interested in root structures and how they can create tilth in the autumn, allowing reduced cultivations, strip tillage or direct drilling of some spring crops.



“Well managed and biologically active soils are fundamental to profitable farming; cover crops before a spring cash crop can be a valuable part of profitable rotations.”

**Paul Brown**  
Kings' technical advisor

### Focus on the future

We will repeat this work in 2015 and will be looking in particular at the varying options for crop destruction before spring crop planting and how the following crops respond to the nitrogen held in the crop biomass of the cover crop.

Many growers will now be interested in cover crops as an option to fulfil their 5% Ecological Focus Area. Kings can advise and offer suitable mixtures to meet these requirements based on our experience and trials results. We strongly believe that cover crops can also benefit farms when grown outside of the EFA system, as pure species or more flexible mixtures can be grown and the crop can be grazed or destroyed at alternative times.

Your Frontier or Kings contact will be well placed to discuss the options that will suit your farm and rotation best.



### In conclusion, our trials and on farm experience has confirmed that cover crops can:

- Help nutrient management and efficiency of use by preventing nitrogen and potash loss
- Produce high levels of biomass in the autumn that will help soil structure and overall soil health
- Be a useful element of a black-grass reduction strategy
- Offer valuable grazing
- Create soil tilth in the autumn that will allow much reduced spring cultivation and cost savings
- Help to bring EFAs profitably onto the farm.

# Oilseed rape early spring agronomy

**National technical development manager Stuart Hill has a clear message for oilseed rape production; drive yield increases to reduce your cost per tonne of production.**

Improvements to soil health underpin a sustainable, biodiverse and profitable farm system. Frontier advocates an integrated approach to soil management, and believes that by focusing on the fundamentals, growers can maximise the response from crop inputs, including nutrition and crop protection.

The coming month is critical to maximising yields in OSR.

## Light leaf spot

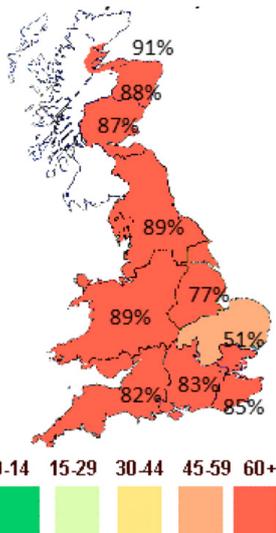
Light leaf spot is a major concern this spring. Crop Monitor ([www.cropmonitor.co.uk](http://www.cropmonitor.co.uk)) predicts a high risk across the UK caused by inoculum left in trash from high spring/summer stem infection levels.

Scotland is used to dealing with light leaf spot and relies on varieties with a minimum light leaf spot disease resistance score of 6, such as Picto, Cabernet, Ovation, DK Extrovert and DK Expower. Further south, varieties with scores under 6 prosper, including Marathon, Quartz, Harper, Eraton (HEAR) and Trinity.

November fungicide applications will not be persistent enough to carry control through until stem extension. Additionally, there are indications of a shift in sensitivity to triazole chemistry. The message is clear; be more preventative, apply as soon as is practical, do not wait until a traditional stem extension timing and use prothioconazole (Prosaro) based products or penthiopyrad/picoxystrobin (Refinzar).

Crop Monitor assessments show 96% of crops are infected with phoma. Larger crops cope better as the infection has to travel down the leaf and petioles to reach the stem, but with high infection levels, large as well as smaller crops of 3-5 leaf will need coverage. Applications for light leaf spot will also control phoma.

Another factor affecting fungicide and PGR strategy is the high number of cabbage stem flea beetle larvae this spring. Crops need checking as although little control can be achieved at this stage, high levels can increase lodging risk and the potential for disease infection from holes and damage inside stems.



## Weed control

Carbetamide (Crawler) can be applied until the end of February to finish off black-grass, ryegrass, wild oats and brome. Review the effectiveness of previous applications, such as propyzamide, and if in doubt, apply a follow up carbetamide to ensure activity. Clethodim (Centurion Max) now has restricted support up to the end of October so the main ACCase graminicide option is cycloxdim plus oil (Laser), but with high resistance levels to this chemistry it is not ideal.

This is also a good time to top up boron levels. Following the second wettest year on record, much relatively soluble boron will have been washed through soils. Boron is critical to achieve optimum flowering, seed and pod set.

## Broad leaved weeds

Use bifenox (Fox) under EAMU mixed with rape oil (ActiroB) to finish off charlock which are at stem extension and have been exposed to recent frosts.

For a broader weed spectrum including mayweed, groundsel, sow thistle, chickweed, poppy and shepherd's purse, a useful mix is bifenox (Fox) with clopyralid/picloram (Galera). Remember that doses will need adjusting according to the dominant weeds. The cut off for use of these products is green bud visible stage, so check crops carefully before application.

Galera has been re-registered and only MAPP 11961 purchased by 31st January 2015 can be used through February 2015. New label Galera, MAPP 16413, can only be used from 1st March 2015 up to green bud visible, but will have no autumn approval, thereby limiting the application window. Be aware when rotation planning that the new approval has following crop limitations of 3 years for pulses, potatoes and sugar beet.

We must give the crop a good start to maximise yield potential; we have until early March to finish off competitive weeds and the message is clear that a preventative approach is needed for disease control.

**“The message is clear; be more preventative, apply as soon as is practical, do not wait until a traditional stem extension timing.”**

**Stuart Hill**  
Technical and development manager





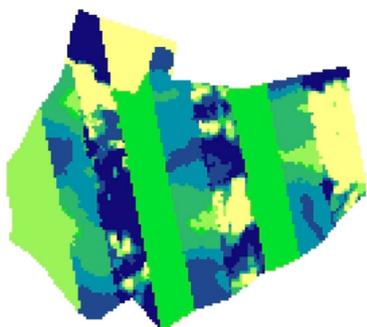
# SOYL trials results 2014

**The first results from SOYL's extensive 2014 trials programme have just been analysed. Technical manager Simon Griffin talks us through what they show and highlights some of the benefits of using SOYL's precision crop production services.**

This year's trials have included SOYLSense variable rate nitrogen on both wheat and oilseed rape, the new service of variable rate drilling for spring barley, and using biomass maps to apply plant growth regulators (PGRs) variably.

Precision crop production trials require a different approach than traditional trials of fertiliser or seed rates. We need to be able to test the benefit of managing variation at field scale, and we cannot achieve this with small plots. Over the last few years we have developed an innovative technique that combines elements of replication to give statistical validity at field scale. The plan below shows how we use flat rate and variable rate treatment strips across our trial field.

An additional benefit is that the trial plans can be programmed into the growers GPS kit. This allows a higher number of trials to be executed over a wide range of soil types and farm management scenarios. Because yields are measured with GPS yield mapping on the farmers own combine, there is no need to use plot combines to measure yield. These are expensive and it can be logistically difficult to get to different locations during harvest. The net result is that our data that shows the benefits in the field with no need for extrapolation between plots and field scale.

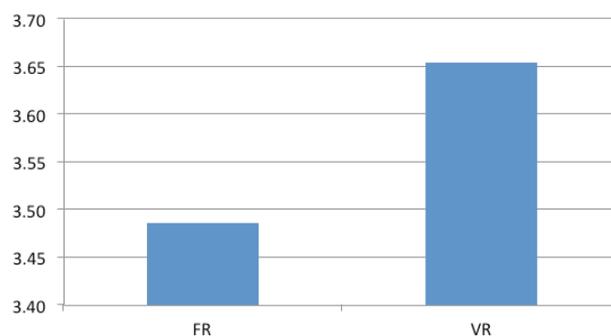


This year has been the eighth successive season where variable nitrogen management using SOYLSense has given a yield benefit in winter wheat – typically a yield of 10.82t/ha compared to 10.69 for flat rate. These results confirm the known benefits, however, analysis conducted on other measures of crop quality were also interesting. In a sample of growers who used SOYLSense as their nitrogen management system against growers who applied

nitrogen using conventional flat rates, an increase in protein of 0.3% was seen in Group 1 wheats.

We also wanted to address the question of the effect of varying sulphur. Many nitrogen products have a percentage of sulphur and we wanted to be sure that as sulphur varied with N applications it did not have a detrimental effect on the crop. We measured S content in the crop throughout the growing season and saw no real differences between sulphur content in flat or variable rate treatments, demonstrating that there is no need to worry about varying an N product that includes sulphur.

Another new trial this year looked at the potential of varying PGRs in oilseed rape. Higher rates of PGRs were applied on thicker crops, with lower rates applied on smaller crops. The first trials showed a yield benefit over flat rate standard applications of PGR.



OSR yields in flat rate and variable rate PGR treatments

These first variable rate trial results on PGRs are really exciting. There has been good establishment in rape this year so varying PGRs should be something that all growers consider.

“This year has been the eighth successive season where variable nitrogen management using SOYLSense has given a yield benefit in winter wheat.”

**Simon Griffin**  
Technical manager

