



## Managing soil erosion: are you cross compliant?

### In this issue

**2015 was declared the International Year of Soils by the 68th UN General Assembly. Its aim was to increase awareness and understanding of the importance of soil for food security and essential ecosystem functions. Coupled with the regulations imposed by the EU Water Framework Directive, the spotlight is firmly on farmers and land managers when it comes to managing soil erosion and related water quality issues. MyCompliance and Kings technical advisor Charlotte Helliwell and technical manager Reuben Morris explain the regulations and how to meet them.**

While the annual Soil Protection Review is no longer required under the Basic Payment Scheme, it has been replaced with GAECs 4 and 5. Under these new requirements, farmers and land managers must take all reasonable steps to provide minimum soil cover, unless there is an agronomic justification for not doing so, and to minimise soil erosion by ensuring land management measures are in place to mitigate it. The likelihood of falling foul of these new regulations will become much clearer following inspections in 2016.



Soil erosion and run off.

To demonstrate the measures taken to minimise soil erosion, growers must keep careful records. If you have bare land for any one of the accepted agronomic justifications, this should be kept in a written log within the farm records. Written advice from a BASIS qualified agronomist can be included in supporting records. Most importantly, the land management measure in place to reduce erosion must be effective; where measures are in place but soil erosion still occurs, this will be considered non-compliance. The penalty for non-compliance will depend on the scale of the issue. The key point is a shift in emphasis, from one based on procedure to one based on outcome.

To effectively minimise soil erosion after late harvested crops such as sugar beet and maize, establishment of a winter cereal or green cover is ideal, but is not always possible.

When deciding on the measures to implement, a variety of factors should be considered. Lifting sugar beet, for example, leaves a disturbed soil surface and tops provide some crop aftermath. As the crop is mostly grown in the East on flat land, slope is rarely an issue. Harvesting maize, on the other hand, leaves a stubble but little crop aftermath. Slope of land is often a consideration in the West, but not in the new maize area in the East. Wheelings and compaction created during harvesting of both crops can result in surface runoff and soil erosion, especially on slopes.

To remedy this, avoid high risk crops on sloping fields, or consider planting early maturing varieties to remove the need to harvest late in poor conditions and allow early establishment of a following winter cereal or cover crop. Reduce any wheelings and compaction created during harvesting by using low ground pressure tyres on carting tractors and trailers and control traffic to reduce the area of soil damaged. After harvest, loosen compaction and reduce capping and slumping with appropriate cultivations, for example by rough ploughing sandy or silty soils.

**For assistance with cross compliance and meeting other farm regulations, Frontier's MyCompliance farm management services can help. Contact 0333 0044 555 or email [mycompliancehelpline@frontierag.co.uk](mailto:mycompliancehelpline@frontierag.co.uk).**

**Click here to view the latest guidance**  
[The guide to cross compliance in England](#)  
[Cross compliance in England: soil protection standards, including GAEC 4 & 5](#)

**"Measures to minimise erosion must be effective. Where measures are in place but soil erosion still occurs, this will be considered non-compliance."**

**Charlotte Helliwell**  
MyCompliance and Kings technical advisor





# Identifying the best green cover for your farm's needs

Interest in green cover crops has soared in recent years. As growers recognise their value in improving soil vitality and managing pest, weed and disease issues, vast areas of cover crops are being planted across the UK. With so many species available, however, it's crucial to understand their properties, advantages and how to match them up with farm needs. Kings northern technical advisor Clive Wood examines some of the options and the situations they are most suited to.

Having attended numerous on farm cover crop events in recent months, it is clear that while growers understand that cover cropping is useful, many are still unsure about the specific role of individual species. To see the best results, it's essential to select the right crop for your own individual needs.

Cover cropping doesn't provide an immediate solution to on farm issues. It takes time for crops to really make a difference, but with informed choices, careful management and a little patience, noticeable improvements will eventually convert into measurable financial savings and yield and quality increases.

To achieve the best results, cover crop mixes will vary from farm to farm and in some cases, from field to field. Keeping things simple is often the most appropriate route in business and this is true for cover crops too. It's important that mixes don't include an excessive number of species; more than five can bring unnecessary complications, since they may not all be suited to planting at the same time, may be trying to perform too many roles at once and therefore give a diluted effect, or may give the same results as fewer species and therefore be superfluous. For example, buckwheat gives an incredible performance when planted earlier in the year, but would be less suitable for post harvest autumn sown seed mixes as its growth is less vigorous and its contribution therefore less effective.

Kings and Frontier trials data and on farm evidence has indicated that multi species mixes of ten or more restrict good root development; the root system often appears shallow with less above ground biomass and unfulfilled potential when it comes to nutrient capture and organic matter increases.



Table 1 - Data from above ground harvest on 18th December 2014 in Kings trials in Essex

Crop	Fresh weight t/ha	N%	Total N kg/ha
Oil radish	25	4.3	115
Turnip rape	20	3.1	88
Mustard	17	3.1	72
Vetch/rye	20	2.7	60
Vitality mix	22	2.5	67
Structure mix	21	2.0	72

## Radish

Oil radish has been added to the approved list of crops for Ecological Focus Areas (EFA) in both England and Scotland from this month. Its vigorous roots provide superior nutrient catching ability and improve soil structure which makes it a highly attractive option. Frontier trials data shows radish varieties to have a significant effect on black-grass, making it a fantastic crop to grow. Including multi-resistant radish varieties in a mix with black oats can also be a wise EFA choice if nematode control and biofumigation are needed.



*This deep rooting tillage radish has managed to force its way through extreme layers of compaction.*

## Including cereals in a mix

Where cover crops are being grown as part of an EFA in England, a cereal must be included in the mix. Including cereals in a cover crop mix must be well considered and managed, as any cereal has the potential to act as a green bridge for foliar disease, and may also increase the risk of pests such as aphids. With expert advice and careful management, however, growers can minimise risk and reap the rewards of these crops.



Table 2 - Data from 1 sq.m cut downs in trials at Alford, Lincs. January 2015

Crop	Fresh weight t/ha	D.M T/ha	% N	N Kg/ha	K Kg/ha	Black-grass plants/sq m
Siletina radish	39.8	4.93	4.6	227	204	4
Defender radish	31.5	3.02	4.8	147	171	0
Mustard	33.6	6.72	3.52	236	212	103
Winter 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

### Oats and rye

Where a cereal is required in a cover crop mix, oats and rye have their place depending on the circumstances. Oats may be more attractive where rye is part of the rotation and vice versa.

Compared to oats, rye is very winter hardy, has a deeper rooting system and is less prone to pest and disease problems. Three years of trials data is starting to show individual trends, including the apparent ability of deep rooting cereals such as rye to capture greater amounts of potassium and phosphorus at depth. This means available P and K is relocated, placed back into the rooting zone of the newly planted crop.

### Strigosa or sativa oats

Oats are a prime example of the need to understand individual species and how they can meet farm needs. Strigosa oats, or black oats, are fast growing and early maturing, making them well suited to short term cover. They are particularly useful where rapid early growth is required, for example to provide fast ground cover to reduce soil erosion. Strigosa oats are also valuable where free living nematode control is a priority; as our winters become apparently milder and wetter each year, this is going to become increasingly important.

However, strigosa oats are not winter hardy and if sown in early autumn, setting viable seed is a great concern. If intended for any other purpose, the sativa oat, also known as a UK or common oat, will perform equally well, rooting effectively but without the risk of producing viable seed. This is at a considerable saving compared to strigosa oats too; at current prices they are approximately half of the cost.

To make sure that the species grown are properly suited to the needs of your business, carefully assessing and listing any issues on farm that need to be addressed is a useful exercise. Frontier's soil health report is also an excellent starting point. Examining the physical, chemical and biological properties of soil, the report provides accurate information including soil density, porosity, texture, microbial activity, compaction vulnerability and organic matter content. This can be used to determine possible improvements and areas that might benefit from cover cropping, which can then inform species selection. Finally, talk to the experts for advice on choosing the right cover crops to achieve maximum benefits for your business.



“With informed choices, careful management and a little patience, green cover crops can deliver measurable financial savings as well as yield and quality increases.”



**Clive Wood**  
Kings northern technical advisor



# Proactive approach pays off when dealing with disease

As spring draws nearer, having a clear disease management strategy is essential. Crop production specialists Dr Paul Fogg and Paul Cartwright examine the challenges growers are likely to face in the coming months and how best to deal with them.

## Wheat

Fungicide strategies understandably focus on maintaining the green leaf area for as long as possible during the key grain filling period, since the flag leaf and ear contribute towards 65% of the final yield. Robust fungicide applications are therefore centred around BBCH 31 – 33 and 39. This has historically relied on active substances that provided eradicant disease activity, but with curative control through triazoles declining and new strains of *Septoria tritici* recently reported that have a reduced sensitivity to SDHIs, we are now entering an era of disease prevention rather than cure.

Choice of variety forms the first line of defence when it comes to disease management but also in helping to manage the relative risk of growing the crop. Trials data from 2015 help demonstrate this point (see figure 1). Following a robust fungicide and PGR programme, all varieties yielded exceptionally well. However, it is the untreated yields that highlight the value of varietal traits and the benefit they bring when it comes to mitigating some of the risk factors, such as stretched spray timings, weather and resistance; KWS Siskin 12.73 t/ha compared to KWS Santiago 9.05 t/ha for example. Integrating cultural control measures, such as seed rate, sowing date, nutrition and root promotion, to give the crop the best possible start should also be factored into the disease control strategy.

Disease resistance is not a new phenomena but it is now being taken more seriously, particularly in the case of *S. tritici*. Looking back, new fungicide modes of action (MOA) have appeared on the market approximately every 20 years and while growers may perceive that they own a herbicide resistant weed, the same cannot always be said for a fungicide resistant pathogen. Triazole sensitivity shifts against *S. tritici* are well accepted, with selection influenced more by the number of times the pathogen is exposed to the MOA than by the dose rate.



“Choice of variety forms the first line of defence when it comes to disease management.”

**Dr Paul Fogg**  
Crop production specialist

The key message when it comes to triazoles is to maintain robust rates. SDHI selection is driven by dose and number of sprays. It is vital that effective resistance management strategies are employed; growers should use no more than two SDHIs in the programme, always mix multiple MOA, ensure multi-site chemistry forms part of the tank mix and that active substance loadings are balanced, particularly for single site chemistry.

It's also important to recognise the impact of in-field activity on resistance management. *S. tritici* is a polycyclic pathogen, meaning that given the right conditions, multiple infection events can occur in a single season. With each disease life cycle and fungicide application there is an opportunity for mutation and selection; not all disease blows over the hedge.

Disease management relies on protecting the crop before infection rather than trying to treat the symptoms after they appear. Looking at the canopy structure, leaf 3 and 4 are not significantly limiting when it comes to final yield contribution, but they are potentially a key source of inoculum. Front loading fungicide programmes allows better management of the disease progression curve and again helps to mitigate some of the associated risks, with a delayed T1 (BBCH 31-33) spray for example. Robust T0s (2 – 3 weeks before T1) are now considered a routine spray for most high risk sites.

Given the wet, mild weather experienced so far this season, disease pressure could be significant coming into the spring. Aim to start management early by front loading the programme. Consider multi-sites as first in the tank products and look to use throughout the programme. SDHIs are essential for wheat and robust resistance management strategies should be employed. Reactive strategies are less effective, increase the risk of resistance and ultimately cost more.

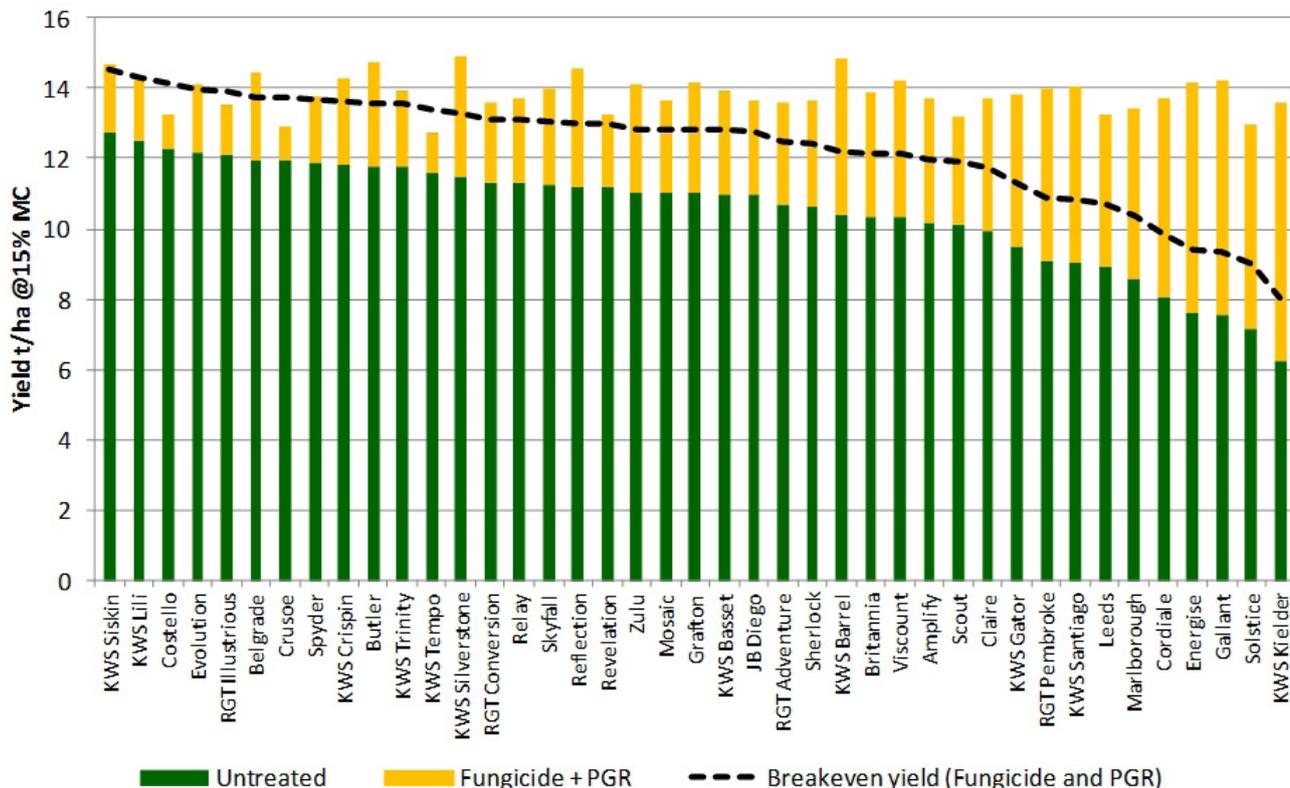
## Oilseed rape

Following the warmest December for over 100 years and recent high rainfall across much of the UK, 2016 will no doubt present some challenges. With few significant frosts to slow crop and disease development, oilseed rape growers are encouraged to prepare for an early start to the spring season.

Last summer's oilseed rape pest and disease survey indicated that light leaf spot was affecting stems and pods in around three quarters of crops nationally; Rothamsted Research's [preliminary forecast](#) for 2016 suggests crops will be under similar pressure in much of the north, west and south west.

Many varieties will have moderate resistance to light leaf spot, equivalent to scores of 5 or 6 on AHDB Recommended Lists, but should still be considered at risk, particularly if early drilled. Varieties such as DK Extrovert (7), Ovation and Nikita (both 8) will offer

Figure 1 - 2015 Winter wheat fungicide variety interaction - Response to fungicide / PGR over untreated



better resistance but must still be monitored, especially in cool, wet conditions that favour light leaf spot development.

Most fungicide applications will provide around four weeks' protection. Light leaf spot can complete its life cycle and produce fresh spores in as little as four weeks at 20°C; new generations will take longer to develop in cold winter weather. The unusually warm December increases the chances of light leaf spot re-infecting unprotected crops before stem extension treatments are applied.

Regularly checking crops for early signs of disease is vital. Light leaf spot often develops as patches in fields, expanding out from the original point of infection, so look out for larger pale lesions surrounded by smaller 'droplets' on leaves. Where ground conditions permit travel, be prepared to treat crops as soon as symptoms appear before stem extension. Be especially vigilant with crops where no late autumn fungicide was applied.

If symptoms are absent or unclear, incubating leaf samples for up to three days in a plastic bag at ambient temperatures will encourage spore droplets to develop and confirm the presence of the disease. Light leaf spot is polycyclic, producing multiple generations per season. Once present in the crop, it will continue to infect any new and unprotected leaf tissue, stems and ultimately pods if favourable conditions persist.

Northern England and Scotland are historically high risk areas and where treatment has been left until stem extension without protectant sprays applied in late autumn/winter, good control of light leaf spot has been difficult to achieve. Control is possible using preventative strategies that employ fungicides with different modes of action. Azole-resistant strains of light leaf spot have been isolated

in the UK; growers must avoid repeated use of similar chemistry in isolation as part of a resistance management strategy.

Fungicide choice will depend on application timing, previous fungicide use and plant growth regulation requirements. Prothioconazole + tebuconazole (e.g. Prosaro) offers excellent light leaf spot control; formulations containing higher rates of tebuconazole (e.g. Corinth) offer similar protectant activity with slightly stronger growth regulation properties. Penthiopyrad + picoxystrobin (e.g. Refinzar) has shown comparable light leaf spot activity in trials and provides a non-azole fungicide option with no growth regulation (one application per crop).

If light leaf spot pressure remains high and further fungicide protection is required between stem extension and flowering, bixafen + prothioconazole + tebuconazole (e.g. Skyway) gives light leaf spot activity together with early sclerotinia protection, using different modes of action (SDHI and azole) as part of an integrated disease management programme.

For further guidance on preventing, identifying or addressing disease symptoms in your crops, take expert advice.

"An unusually warm December increases the chances of light leaf spot re-infecting unprotected crops."

**Paul Cartwright**  
Crop production specialist





# Know your spring crop nutrient needs

**Spring nutrition programmes will need careful planning following the extraordinary weather of the last few months, which included high annual rainfall, the wettest December on record and an unusually warm autumn and winter. Fertiliser technical development manager Steve Dudman and SOYL technical manager Simon Griffin examine crop needs this spring and how precision techniques can ensure crop potential is fulfilled.**

Recent wet, mild conditions mean that soils have been mineralising crop residues and organic matter for 4 to 5 months in the case of fields after oilseed rape, cereals, peas or beans. Crop available nitrogen and sulphur will have been released during this period and while winter drilled crops and cover crops will have captured some of this, fields that have been left bare or with little cover will have highly variable levels of mobile nutrients left in the soil for spring crops.

The spread of heavy winter rainfall has been uneven and some soils will take much longer than others to be fit for spring cultivations. Patience will be a virtue as we strive to find a balance between drilling early to maximise the length of the growing season with waiting for suitable soil conditions before cultivating. Conditions will undoubtedly range vastly across the country.

## Soil nutrient levels after winter

Mobile nutrients nitrogen and sulphur and micronutrient boron could be at low levels. Phosphate and potash levels after large cereal, sugar beet or maize crop removal could also be down. In addition, barley, peas and sugar beet are particularly susceptible to low pH and will suffer yield losses at levels below pH 6.5.



*Soil sampling is highly recommended.*

It always pays to get the basics right and that includes identifying pH, phosphate and potash levels for spring crops, so soil sampling is highly recommended; there is still time to check any fields that may have been missed or not sampled for several years. Where soil conditions are not appropriate for conventional lime spreading, remember that granulated lime applied through the fertiliser spreader can provide a short term solution with a fast acting product.

Spring crops need to germinate and establish an extensive root system as quickly as possible to maximise a short growing season. Where seed bed conditions are not ideal or drilling has to be delayed, rooting could be restricted. This means the crop will have a smaller volume of soil to draw nutrients from than would otherwise be the case. It's therefore vital that nutrients are readily available to crops. Fresh, water soluble phosphate in particular is important to stimulate a vibrant root system. Checking for micronutrient requirements will also be needed.

## Spring barley and spring wheat

Where malting varieties are grown, the aim will be to hit grain N between 1.65% and 1.85%. The question is whether last year's nitrogen rates will be correct for this season. Many growers will typically be applying 120-150kgN/ha, but careful assessment of the likely soil nitrogen availability will be needed, particularly on medium to light and shallow soils where nitrogen leaching could be heavier than in previous years. Sulphur is almost as mobile as nitrogen in the soil and will likely need applying in most situations this spring too. Consider applying 10-15kg/ha S (25-38kg/ha SO<sub>3</sub>).

Where soil indices are low or where rooting may be restricted, it will be important for phosphate to be quickly available for vigorous root establishment. Application by placement or incorporation at drilling would be preferred, or alternatively as soon after drilling as possible. Good quality N/P/K/S compound fertilisers allow all the main nutrients to be applied early and can reduce workload at a busy time of year.

The situation for spring wheat is similar to that of spring barley; sulphur and early phosphate and potash will need applying at a similar rate. Again, an assessment of spring soil nitrogen will be required. Typically nitrogen rates of 150-175kgN/ha are used but a late foliar nitrogen application should be considered where milling varieties are grown and yield expectations are high.



*Careful assessment of the likely soil nitrogen availability will be needed on medium to light and shallow soils.*



### Peas and beans

Peas and beans are often given minimal input from a nutrition point of view and are particularly susceptible to poor seed beds and soil structure. As well as being patient with timing of seed bed cultivations, it's important to identify soil phosphate and potash levels. Recent work has highlighted the poor vigour in pea crops where the soil phosphate index is below the target index 2. Even where the soil is at target index, aim to apply 40-70kg/ha of phosphate and potash into the seed bed for that vital early root development. Index 0 soils will require up to 100kg/ha. Particularly on light and medium soil, there is a requirement for sulphur of 25kg SO<sub>3</sub>/ha and generally 50-100kg/ha of magnesium where soils are at index 0 or 1.



*Peas and beans are particularly susceptible to poor seed beds and soil structure.*

### Sugar beet

Sugar beet suffers yield effects at pH 6.5 and below, so it is critical to ensure the soil pH for all fields is correct before considering the nutrition programme.

Sugar beet yields have risen significantly in recent years, with many farms achieving average yields of 100t/ha. It's important to contrast this with the 60t/ha yields that standard phosphate, potash and magnesium recommendations are based on. This means an increase to 80kg/ha for phosphate and 170kg/ha for potash at index 2 to balance offtake. Remember magnesium on low index soils and make sure the source is water soluble. Sodium and sulphur need to be considered where soil levels are low.

Boron is quite mobile in the soil, so any areas receiving prolonged and heavy rainfall may currently have low levels. Boron deficiency can significantly reduce sugar beet yields, so ensure your nutrition plan includes boron in the suspension form or as a coated solid fertiliser. Alternatively, consider applying foliar sprays in the spring.

### Maize

Maize is also particularly susceptible to poor seed beds and soil structure. While it potentially has a long growing season, soils coming out of this very wet winter may take considerable time to work down to a seed bed. Although many crops are grown with the benefit of organic manures, an increasing number are not and with the potential for restricted rooting, it is vital that fresh water soluble phosphate is available to the crop right from the start this spring. Phosphate in the form of Di-ammonium phosphate (DAP) applied at drilling will ensure rapid uptake of phosphate into the plant. An application of 130kg/ha will supply 33kgN/ha and 85kg P<sub>2</sub>O<sub>5</sub>/ha.

After the high yields of harvest 2015 and the large removals of P and K, it is important to build their replacement into the spring programme. Be sure to assess and plan the risk of low nitrogen and sulphur on the lighter and medium soils after exceptionally high December rainfall too. If crops are to meet their potential, considering recent conditions and adapting spring nutrition plans to meet consequent crop needs is vital.



*Soils coming out of this very wet winter may take considerable time to work down to a seed bed.*

“It always pays to get the basics right and that includes identifying pH, phosphate and potash levels for spring crops.”

**Steve Dudman**  
Fertiliser technical development manager





# Know your spring crop nutrient needs



## Precision techniques

Crop uptake can be estimated using satellite images taken for SOYL's variable rate nitrogen service, SOYLSense. A wheat crop at Leaf Area Index 1 will have taken up around

30kg/ha N from the soil and an oilseed rape crop at Green Area Index 1 will have taken up around 50kg/ha of N. The first SOYLSense satellite image, available in early February, will give an indication of Leaf Area Index in winter crops which will help to tailor early N applications to meet crop demand.



The most accurate way to assess soil mineral nitrogen levels, however, is to take a soil sample to 90cms and have it analysed by a laboratory. Results can then be used to adjust N rates; they can also be entered into SOYLSense N models to ensure that nitrogen recommendations are corrected after recent rainfall.

The first dose of N for winter wheat is generally applied during tillering and before stem elongation, a vital stage to get nitrogen into the crop. Variable application will target lower biomass areas that have less tillers with higher rates of N. Importantly for thin crops, this will ensure tiller survival. Conversely, thick crops with excessive tiller numbers will require lower rates of N to restrict further tillering. Crop variation can again be assessed using SOYLSense satellite imagery.

To achieve optimum yields, all nitrogen should be applied variably. [Click here to see the recommended SOYLSense models for winter wheat and winter oilseed rape.](#)

To get spring crops off to the best start, **sulphur** should be applied with the first nitrogen dose in February or March. SOYL research has shown that varying the N dose by +/- 20% when using a typical ammonium sulphate fertiliser does not lead to any sulphur deficiency in the crop.

Any **phosphorous** that was not applied in autumn should be applied when time and conditions allow. Remember that phosphite and P starter fertiliser are not a replacement for phosphate fertiliser applications; phosphate will still be required to meet soil and crop needs.

**Potassium** applications should also be considered as soon as conditions allow and should be completed before peak nutrient uptake, around BBCH 32. Care must be taken to avoid spreading both P and K on flooded land.

**Magnesium** should typically be applied once every 3 or 4 years, unless levels are very low across large areas of the farm. Applications should ideally be made within 18 months of sampling, but may need to be more regular where soil magnesium levels are very low.

After such a wet winter, pH levels are likely to have dropped so **lime** applications are strongly recommended where possible.

To make sure the correct rates of these products are applied, SOYL's nutrient management service, which includes GPS sampling, analysis and mapping, can be used to provide detailed information on P and K, magnesium and pH levels. Applying inputs variably, to rectify deficiencies while avoiding waste in well-supplied areas, can reduce costs as well as improving yields.

“Recent conditions have undoubtedly affected nutrient content in our soils. Precision methods can help to correct this so that crops can thrive this spring.”

Simon Griffin  
Technical manager

