



## Did all your fields yield to their potential this year?

### In this issue

**As we reflect on the performance of each field in 2015, we can be proud of those that yielded well, but where they didn't do so well, it is important to find out why. It could be due to problems with this year's crop, or more likely, linked to longer term problems in the soil. Soil organic matter levels are progressively declining and compaction to depth, usually caused by heavier machinery and higher axle weights over a number of years, is rising. Fertiliser technical development manager Mike Slater explores the causes and how we can address them to improve our bottom lines.**

Autumn is the ideal time to examine those fields that have underperformed, to identify the actual causes and make plans to remedy the problems. Over many years, organic matter levels on arable fields have been falling; every time soils are moved, especially when ploughing, additional oxygen is introduced to the soil and organic matter is oxidised. It has always been a challenge to maintain organic matter levels and when they decline, soils become more vulnerable to compaction. In a compacted soil, crop root development is restricted and this limits nutrient and water uptake during the growing season. Compacted soil will also fill with water more rapidly through the winter, potentially leading to longer periods of water logging. Where organic matter levels have declined, care needs to be taken to steadily increase them again.

A useful contribution can be made by using cover crops which will generate additional organic material to add to the soil. Winter turnip rape, for example, grows quickly in the autumn and has very high organic matter production properties, as well as having excellent nitrogen catching abilities. Kings soil vitality mix and Kings soil structure mix both include a variety of species to boost organic matter levels and improve soil health, and oil radish is also excellent at improving soil structure, producing high organic matter yields quickly as well as catching residual nitrogen.

Trials have shown that this crop has the potential to produce huge quantities of biomass, with up to 30t/ha of fresh matter of which around 10% is dry matter which contributes to soil organic matter levels. Organic matter revitalises the soil, helps improve soil structure and increases valuable humus content. Now included on the approved list of EFA cover crops in England too, oil radish has a multitude of benefits. (Read more on page 8.)

Declining organic matter levels and compaction and water logging are the primary causes of reduced microbial activity. Addressing these issues is essential as we depend on this microbial activity to enable nutrients to be made fully available to the crop.

Harvesting in poor conditions, especially of root crops, is a common cause of compaction. These effects are often unavoidable and can last for many years. Identifying those fields affected and the depth of the compaction starts with field inspections and digging holes before measuring soil density to identify the severity of the problem.



Early oil radish

Our cultivation practices should recognise the actual soil texture in different fields. Soil textures vary across most farms; significant differences are easy to see but more subtle changes can be missed. A comprehensive map of the soil texture of any farm is the foundation for all cultivation practices and for a small additional charge, laboratories can test the soil texture and organic matter of soil samples in addition to pH, phosphate, potash and magnesium analysis.

**"It has always been a challenge to maintain organic matter levels and when they decline, soils become more vulnerable to compaction."**

**Mike Slater**

Fertiliser technical development manager





# Did all your fields yield to their potential this year?

To improve soil structure at least cost, SOYL advises that cultivations should be conducted at variable depths. Soil density is assessed by detailed electrical conductivity survey followed by a field inspection to programme the Autodepth unit, which can be retrofitted to existing equipment. This calculates the required cultivation depth using a sensor and automatically adjusts the hydraulic settings to lift or lower the machine accordingly. This alters the working depth of the cultivator to make sure soil is only disturbed where necessary.

Cover crops can play a part in reducing compaction too. Kings soil structure mix includes deep rooting species including Tillage Radish, which has deep, thick roots with the ability to punch through poor soil structure, helping difficult, compacted soils.

SOYL's precision nutrient management service also gives a highly detailed insight into the nutrient status of soils.

The physical, microbial and chemical measures of soils are all essential to ensure the best growing conditions for our crops. These are all examined by Frontier's new soil report. By measuring the different properties of soil, effective action plans can be prepared for each field to improve yield potential. These plans may take a few years to achieve the desired targets, but understanding the soil and ensuring it is in the best condition is key to achieving healthy, profitable crops.



Mark Fletcher

Norfolk grower Mark Fletcher explains how strategic sampling was conducted on his land. "Understanding the different soil type zones meant the sampling for P and K was targeted rather than the standard W formation. We placed our sample points strategically to capture all the different areas, checking not only variation in soil type but also if any other factors were affecting nutrient levels, so that we could target our inputs better."



"The soil is the engine room. The chemistry, physiology and biology of the soil all need to be in balance for crops to thrive"

Peter Croot  
Regional SOYL manager

SOYL used these samples to identify phosphate, potash, magnesium and pH levels. This level of analysis can pick up variation even within similar soil types that growers may never have realised was there and addressing this is crucial; areas below target indices can have a detrimental effect on the overall performance of a field and potentially incur significant yield penalties. Nutrient sampling gives a true starting point, providing accurate maps that can be used to target fertiliser where it is needed and reduce waste. That means potentially reduced fertiliser bills as well as a healthier crop.

SOYL regional manager Peter Croot explains why it's so important to understand our soils and treat them with care. "The soil is the engine room," he says. "The chemistry, physiology and biology of the soil all need to be in balance for crops to thrive. Precision techniques enable those properties to be accurately assessed, so we can look at a field in detail rather than managing it based on an average."



Compaction to depth in soil is on the increase

Mark appreciates the importance of soil health. As well as treating each area with the care it needs and targeting his inputs, he grows cover crops prior to sugar beet to retain nutrients and prevent leaching, and has also reduced cultivations across the land.

"Soil is a living organism that needs to be healthy if it's to work well," he reasons. "If I can target my inputs and work the land so that both the soil and the crops are healthy, that has to be good for yields."

We must also recognise that although tyre design has significantly improved over the last twenty years, machinery is now larger and axle weights have disproportionately increased, raising the likelihood of compaction. The pressure on margins has driven change and to reduce costs of production per tonne, soil health needs to improve so that yield potential can rise and costs can be spread over more tonnes.

**If you have fields that are not performing as well as expected, the Frontier soil report will help to identify the restricting factors. To find out more, talk to your Frontier contact.**



# Pulse prospects

The UK bean market has changed dramatically over the past year. Growers are now considering increasing bean acreages due to CAP reform changes, the need to grow more spring crops and some disaffection with low oilseed values. Pulse trader Andy Bury takes a look at the market and what the future holds for pulse growers.

## Current crop bean market

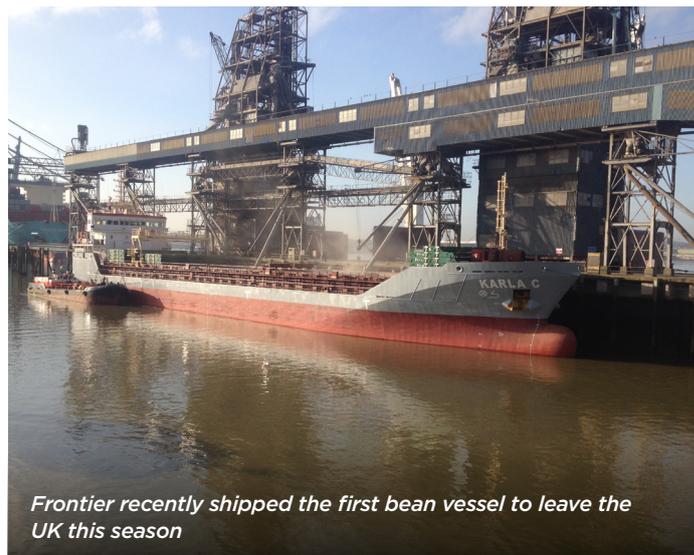
The market response to the increase in marketable supply, up from 420,000 tonnes last year to over 550,000 tonnes this year, has led to a reduction in values. While this is initially seen as negative, it has stimulated demand from UK feed compounders to buy feed beans and over the past three months, all feed mills that manufacture ruminant feeds have been incorporating beans into their rations. With 25% protein and beans valued at a £15/tonne premium over wheat, demand for imported soymeal is reduced.

Buyers of human consumption beans are having a tougher time. In Egypt, traders are finding it hard to find sufficient dollars to pay for bulk bean cargoes; with each cargo costing in excess of \$2 million and strong currency restrictions enforced by the Egyptian government, this doesn't look likely to become easier in the near future. The main advantage for the UK is that this year's French bean quality is very poor and will not make the grade as human consumption. In the Baltic States, there are a lot more beans this year and although they are offered at cheaper levels than UK beans, they have no track record of quality, so buyers are always looking towards the UK for new supplies.



Peas in flower

The outlook for the next few months is still bearish as we expect to see the later harvested crops in the North come in with bigger yields and better quality than the South and East. However, spot demand may remain firm in certain areas as many of the later harvested beans are still wet and will require drying, forcing buyers to pay to cover short positions.



Frontier recently shipped the first bean vessel to leave the UK this season

## New crop pulse outlook

Despite lower values, the area of pulses is still expected to grow in 2016. There is a word of warning for growers looking to plant peas, however. Over the past two years, demand for domestic peas has fallen by over 20% as buyers of micronised peas have substituted peas with other flaked products, such as maize or even dyed wheat flakes, to reduce their costs in pet food and other coarse rations.

With this reduced demand and the threat of imported peas from France, Canada and the Baltic States, it certainly seems this demand will decline further which will force prices lower. We would strongly recommend growers look at beans, which now have sustainable domestic feed demand as well as a growing demand for human consumption beans in Egypt and the Middle East. Frontier will soon be launching a new buyback bean contract for harvest 2016.

“The market response to the increase in marketable supply has stimulated demand from UK feed compounders.”

Andy Bury  
Pulse trader





# Oilseed rape: managing crop and canopy health to maximise output

Just a few years ago, output prices were significantly higher than they are today; oilseed rape justified its place in the rotation as one of the more profitable crops grown on many farms as well as a break between cereals. But markets change, output prices are under pressure and growers must question the best route to profitability, particularly by selecting the best investments to make now that will pay dividends at harvest.

Individual farmers have little influence on global markets; however, costs of production are very much within their control and for many there is still scope for improvement. Lowering inputs to reduce production costs is too often a false economy; achieving higher yields and quality improvements to dilute fixed costs is key and requires attention to detail, choosing appropriate products and making timely applications. Crop production specialist Paul Cartwright and national crop nutrition technical manager Edward Downing consider how to get the best out of our crops in the current climate.

## Comparison table for winter OSR to demonstrate how achieving higher yields reduces cost of production and improves margin

		Winter OSR			
Projected yield (t/ha)		3.5	4	4.5	5
Projected price (Nov incl oil bonus) (£/tonne)		£273			
Total output (£/ha)		£956	£1,092	£1,229	£1,365
Inputs:	Seed (£/ha)	£55	£55	£55	£55
	Fertiliser* (£/ha)	£230	£256	£282	£308
	Crop protection** (£/ha)	£200	£215	£230	£245
Costs per hectare:	Variable (£/ha)	£485	£526	£567	£608
	Fixed (£/ha)	£400			
Costs per tonne:	Variable (£/tonne)	£139	£132	£126	£122
	Fixed (£/tonne)	£114	£100	£89	£80
Overall cost of production (£/tonne)		£253	£232	£215	£202
Net margin £/ha		£71	£166	£262	£357

\* NPK fertiliser requirements increase in line with projected yield

\*\* additional PGR/fungicide & growth stimulants used to optimise root & canopy structure



“Growers have more tools at their disposal than ever before to regulate the growth of oilseed rape crops ahead of winter.”

**Paul Cartwright**

Crop production specialist:

## Canopy management

Canopy size matters and growers have more tools at their disposal than ever before to regulate the growth of oilseed rape crops ahead of winter. Knowledge of the growth habits of different varieties is vital; for example, Picto has vigorous early growth, producing big leaves and stiff stems that will naturally resist lodging.

This has implications for weed management, tolerance of slug and pigeon grazing, insect pest damage, early autumn disease susceptibility and requirements for plant growth regulators to manage canopy development.

## Weed control

With difficult grass weeds present on many farms and growing concern over resistant broad leaved weeds, such as poppy and chickweed in parts of the UK, growers must take the opportunity provided by winter oilseed rape to make use of herbicides with different modes of action to those available for use in cereals and pulses.

Pre-emergence and early post-emergence herbicides based on metazachlor have provided a solid foundation to weed control programmes this autumn. In many cases these are followed up with Centurion Max (clethodim) for grass weeds and AstroKerb (propyzamide + aminopyralid) for grass and broad leaved weeds. A competitive crop will complement the investment made in a comprehensive herbicide programme, often making the difference between good and excellent weed control.

## Growth stimulants

Oilseed rape crops vary in their development so far this autumn; catchy weather through harvest resulted in protracted drilling in many areas. Moisture is not an issue, but later drilled and slow-growing crops in particular will benefit from applications of growth promoters from the two to four-leaf stage onwards. Tauron, a zinc based growth and root promoter, and Radix, a phosphate based plant stimulant, are taken up directly by leaves and through the soil and offer crops a ‘shot in the arm’, helping to maximise the use of available resources and push plants through vulnerable early growth stages.

Development of bigger leaves means crops can sustain an amount of pest grazing and early disease infection before treatment thresholds are reached. As a result, growers will retain some flexibility to time applications around other jobs on farm; in some cases this will allow operations to be combined, such as tank mixing insecticides with graminicides where compatible and potentially saving a sprayer pass.

### Disease tolerance

Ascospores developing on stubble and trash from previous oilseed rape crops, combined with warm, wet weather through August and September means phoma risk will be high. Again, knowing your variety is key to minimising risk. Varieties such as Harper score 9 (high resistance) for stem canker on the AHDB Recommended List and may be a lower priority for treatment if other more susceptible varieties are also being grown. Small plants are more

vulnerable to severe phoma infections in the autumn as the pathogen moves more quickly into stems through short leaf petioles. The risk of developing yield robbing stem cankers later in the season will also be lower if varietal resistance is high.



Phoma in OSR

### Growth regulation

For early fungicide applications and for later treatments on smaller or backward crops, choose products with no plant growth regulatory activity that could hold back leaf development. Refinzar (penthiopyrad + picoxystrobin) is suited to this position, offering high levels of phoma control and preventative light leaf spot activity with no growth regulation.

Tebuconazole based products such as Corinth (tebuconazole + prothioconazole) are more suited to the later phoma and light leaf spot timings, offering good all round activity with some growth regulation for potentially large canopies in preparation for winter.

Canopy management starts in the autumn; it is not just a springtime activity. Modest oilseed rape canopies with well developed root structures offer consistently high yield potential through high efficiency of light use and better access to nutrients and water during the drier spring months. Forward crops with lush leaf growth could benefit from autumn applications of growth regulators based on metconazole, which slows stem elongation and leaf expansion to improve winter hardiness while diverting energy into developing the root structure at depth.

Caryx (metconazole + mepiquat chloride) is a specific growth regulator for oilseed rape, now with a registration permitting autumn application. It offers flexibility to tailor rates to individual crops and may be applied together with a fungicide if disease control is also required.



Boron deficiency in OSR

### Nutrition

OSR crops should hopefully now be reasonably well established, so thoughts move away from the need to apply nitrogen and phosphate to aid establishment and on to supporting healthy crop growth.

One of the key areas to focus on in the autumn is boron. Although symptoms aren't normally seen until early spring, it's important to make sure your crops avoid going into the winter with a deficiency. Frontier trials have shown that to achieve optimum yields, at least 600gms/ha of boron needs to be applied through the growing season. Approximately 30-50% should be foliar applied in the autumn when the crop has 6-8 true leaves and is still actively growing before the winter shutdown. The remainder should be applied as soon as active growth occurs in the spring. This advice applies to most situations, but some factors increase susceptibility, including soils that are sandy, have high organic matter, a high pH or have recently been limed. This can be exacerbated further by high winter rainfall as boron can be lost through leaching.



Magnesium deficiency in OSR

Magnesium should also be considered in the autumn, but this should only be required where soil levels are very low as the bulk of crop uptake happens in the spring. In this situation, foliar applications can help support autumn growth before a fertiliser application of Kieserite in spring meets the high crop demand. Depending on the dose, this will also supply some or all of the crop's sulphur demand.

The only other nutrient to really consider in the autumn is manganese. This must be applied on the known deficient sites. Please remember that alkaline soils are more susceptible and this also includes any land that has recently been limed.

These nutrients may only be required in small quantities but they are essential for healthy crop growth to maximise the potential in the spring.

“Autumn nutrition applications need to support healthy crop growth; it's important to make sure your crops avoid going into winter with a deficiency.”



Edward Downing  
Crop nutrition technical manager



# Farming under the Water Framework Directive

Agriculture is currently facing a number of significant challenges and water related issues have the potential to be one of the most constraining when it comes to the long term availability of crop protection products. With the first round of Water Framework Directive (WFD) River Basin Management Plans (RBMP) just completed, it is clear that measures put in place to date have been insufficient to mitigate many of the non-target, water related impacts. Crop production specialist Dr Paul Fogg examines the requirements and what they mean for the future of farming.

Defra suggests that around a fifth of failures to meet WFD 'good status' are attributed to agriculture (fig.1). Farming contributes significantly to water pollution (50-60% of nitrate load, 20-30% P, 75% sediment); pesticides remain the single biggest issue and represent an infraction risk.

## Drinking Water Protection Areas

While a huge amount has been achieved by the Voluntary Initiative, industry stewardship campaigns, advisors and farmers, when it comes to pesticide concentrations in raw drinking water supplies, the compliance picture still represents a challenge. In the UK, the Environment Agency is responsible for delivering WFD compliance. In relation to pesticides, it has adopted an approach of designating Drinking Water Protection Areas (DrWPA) and associated safeguard zones to protect drinking water supplies.

DrWPAs are WFD water bodies with an abstraction of over 10m<sup>3</sup> per day or serving more than 50 people. The safeguard zone is the farmed land that sits upstream of the DrWPA in which activities could impact on water quality at the point of abstraction. There are currently 631 DrWPAs in England and Wales, of which 485 specifically relate to surface water. To find out if you are advising in a safeguard zone, visit Environment Agency - [What's in your backyard?](#)

Surface water remains the biggest area of concern (fig.2) as 40% of surface water DrWPAs (195 of 485) are currently 'at risk', meaning extra treatment has already been required or will likely be needed in the future if the water industry is to comply with the 0.1µg/L for individual pesticides and 0.5µg/L for total pesticides at the tap.



The situation is further complicated by the fact that under Article 7 of the WFD for DrWPA, there is a need to:

- a) ensure that, under the water treatment regime applied, the drinking water produced meets the requirements of the Drinking Water Directive (0.1µg/L and 0.5µg/L limits); and
- b) ensure necessary protection of the DrWPA, with the aim of avoiding deterioration in water quality in order to reduce the level of purification treatment required in producing drinking water.

A baseline year for existing end of pipe treatment infrastructure and operation costs was set in 2008, which is why there is now a clear focus on source control or catchment management by all stakeholders.

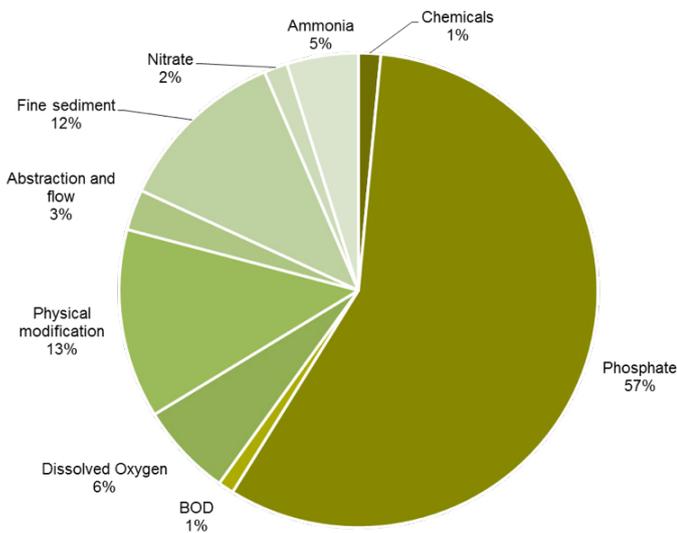


Figure 1 Breakdown of failures to achieve 'good status' in English water bodies attributed to agriculture and rural land management, 2013

### Water Framework Directive at a glance

- Became British law in 2003 - aim for all water bodies to meet minimum of good status
- River basin districts identified and risks assessed
- Programmes of measures agreed
- First round - River Basin Management Plans implemented 2009 - 2015
- 6 year cycles - targets to achieve 'good status' 2015, 2021 and 2027.

**Correction**

In the September issue of My Technical Brief we stated that the Pincey Brook pilot catchment was located within the Cherwell catchment; it is actually in Essex near Bishop Stortford. It has also been brought to our attention that the Thames Water trial area has been expanded this year to include the River Ash catchment, near Hertford, and the Cobbins Brook catchment near Cheshunt. Apologies for any confusion that may have been caused.

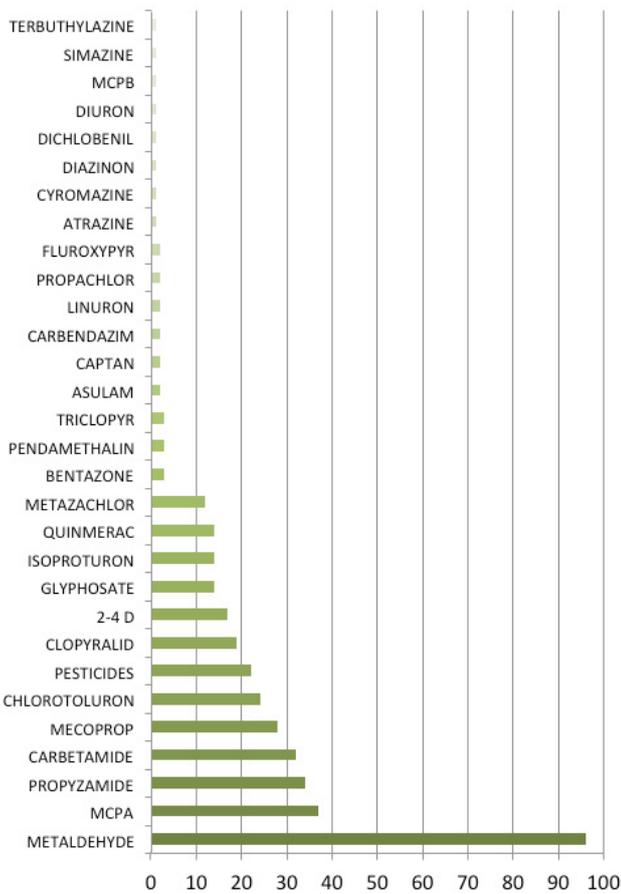


Figure 2: Number of surface water DrWPAs in England and Wales 'at risk' from named pesticides and active substances.

**Contraventions**

The first six year RBMP cycle ended in early 2015 with the second round plans due to be published this December. Measures for mitigating pesticides in the first cycle relied on voluntary approaches to bring about the required level of improvement. However, the compliance picture suggests that work still needs to be done. Metaldehyde alone caused 88 DrWPAs (17%) to be at risk in 2013 and as has been well documented, removing metaldehyde from raw water using advanced end of pipe treatment is a challenge. As a result, Defra's view is that metaldehyde represents an infringement risk under the Drinking Water Directive, or the 0.1µg/L standard.

In addition, several of the herbicides used on oilseed rape in the autumn are demonstrating an increasing trend in the frequency and magnitude of concentrations in raw surface water. This too

contravenes WFD objectives and could again represent an infringement risk, this time under the WFD. Defra's policy objective is to ensure WFD objectives are achieved in the second RBMP cycle and thereby mitigate the infringement risk.



**The future**

To this end, Defra is looking to consult later this year on a range of new measures which will provide the necessary protection while also ensuring continued food security and sustainable food and farming. Measures are likely to be based on options considered in a recent cost benefit appraisal and may include national product substitutions, targeted product substitutions in 'at risk' DrWPAs / safeguard zones, enhanced voluntary measures, crop rotations and promotion of additional catchment measures. The reality is that there are no easy solutions. However, current thoughts are that targeted approaches on 'high risk' fields in at risk areas could potentially deliver the required level of water quality improvement.

The questions yet to be answered are how and who should define what represents 'high risk', whether closer collaboration, greater uptake and additional measures will deliver compliance voluntarily and whether additional rules and regulations are required to ensure compliance is achieved. The industry can ill afford to lose any more active ingredients. The answer lies in driving innovation, developing novel strategies, providing robust evidence and accepting that we can grow food and manage crops differently.

"A huge amount has been achieved, but when it comes to pesticide concentrations in raw drinking water supplies, compliance still represents a challenge."

**Dr Paul Fogg**  
Crop production specialist





# EFA and cropping diversity

The requirements of Ecological Focus Areas (EFAs) have been implemented for the first time during the 2014/15 cropping year and growers are now in a position to reassess the options available and how they can best fit within their business.

Defra has confirmed there will be no changes to the EFA greening options available for 2016, meaning 5% of arable land needs to continue to be allocated to at least one of the following options:

- Fallow land
- A nitrogen fixing crop
- Hedges.
- Buffer strips
- A catch or cover crop

Two of these options have attracted significant interest over recent months. Kings manager Richard Barnes considers them in more detail.

## Catch or cover crops

The only amendment to the 2016 EFA requirements is that oil radish will be included within the approved list of cover crops in England. This list currently consists of a mix of a cereal (rye, barley, oats) and a non cereal (vetch, phacelia, mustard, lucerne), while in Scotland it can be a mix of at least two crops (rye, vetch, phacelia, barley, mustard, oats, lucerne, triticale). This is a significant breakthrough and is anticipated to follow into Scotland in due course. Kings' extensive trials and demonstration network in the region will be key to this progression; results to date have shown the crop to demonstrate good winter hardiness alongside excellent rooting and biomass production. This work is being increased from three sites to six this winter to extend the geographical range of our investigations.

The addition of oil radish in England enables this option to be of significant benefit to the arable rotation. It is a quick growing, winter hardy crop that is renowned for its excellent rooting and nutrient scavenging activity. When combined with vetch, phacelia, oats or rye, it offers great flexibility and can be integrated within a wide range of combinable crop and root rotations.



## Fallow land

This option has the potential to be of greatest benefit to many farm businesses. With a sensible weighting of 1ha:1ha it is a good means of meeting the required EFA area and the current rules offer significant flexibility. The ability to commit fallow land to headland margins or apply it across a field scale can keep options open, especially with the potential to plant either a wild bird seed or nectar flower source. These two elements are approved to be planted within the 'closed period' of the first six months of the year, so fit well with the traditional planting time for these crops through May and June. Planting grass buffer strips next to watercourses and hedgerows will bring additional compliance benefits as well as helping to support farmland wildlife.

With many growers now coming to the end of their Entry Level Stewardship (ELS) or Scottish Rural Development Programme (SRDP) agreements, the fallow option provides great potential to carry these elements forward while the new Countryside Stewardship (CS) and SRDP schemes become clearer. The temptation to remove grass margins, bird seed and nectar plots without the support of stewardship scheme income may be strong, but it is worth considering the location of these features and why they were created in the first place. Previously unproductive land, such as north sides of woods, heavy clay caps and awkward corners, is unlikely to have changed in this respect, so the transfer to an EFA fallow option may be well worth it. With the ability to amend your allocation annually, there is then the potential option to transfer some or all of the features into a new CS or SRDP agreement as required.

**For advice and guidance on how to get the most out of EFA options, speak to your usual Frontier or Kings contact.**

“Oil radish has been added to the approved list of EFA cover crops in England and can be of significant benefit to the arable rotation.”



**Richard Barnes**  
Kings manager