

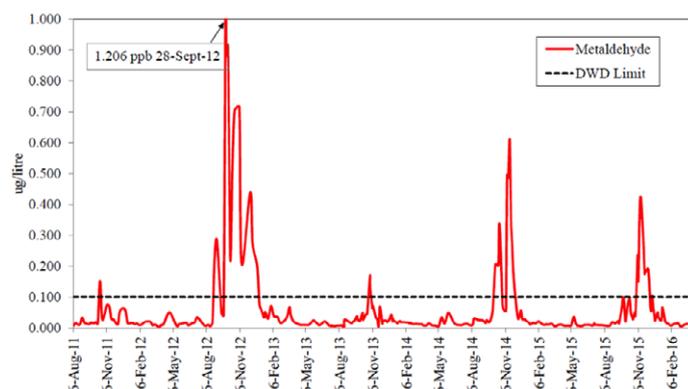
## In this issue



# Act now to keep metaldehyde in your armoury

The Drinking Water Inspectorate has given water companies this autumn and winter to prove that stewardship programmes can guarantee supplies of drinking water that meet pesticide limits. Failure to achieve this could lead to a loss of metaldehyde-based products in safeguard zones for drinking water. Crop production specialist, Reuben Morris, explains the current situation and how growers can help.

Growers and their agronomists must work together to avoid a repeat of last season, when pesticide actives such as metaldehyde were detected at drinking water intake at levels well above the limits for individual actives of 0.1 µg/l, as shown in graph 1.



**Graph 1: Metaldehyde in the River Derwent at Elvington, East Yorkshire Voluntary Initiative, April 2016**

However, the graph also shows the big impact metaldehyde stewardship has had to date, with peak levels, time at peak levels and number of peaks all reducing between 2012/13 and 2015/16.

These changes in metaldehyde levels at intake into drinking water treatment plants were achieved to a great extent by stewardship of slug pellet use by growers and agronomists.

At the same time there has been a big reduction in metaldehyde dose rates. This was achieved via a reduction of metaldehyde inclusion in pellets from 8% w/w to 3 and 1.5%. Efficacy against slugs has been maintained via improvements in metaldehyde incorporation into pellets and in their physical qualities.

Knowledge of metaldehyde levels peaking in rivers is a problem due to the absence of a rapid metaldehyde detection test for use at drinking water intake. Turbidity, or cloudiness, can be used but is not ideal. That said, the three reductions in levels at intake achieved by metaldehyde stewardship have allowed better intake management by water companies. Agronomists are also helping water companies to predict peak levels by providing weekly updates on metaldehyde applications and flows from field drains. Unfortunately it is as simple as slug pellet application plus flow from field drains equals metaldehyde in the river.

### This autumn/winter, growers must:

1. [Check the WIYBY website](#) to see if the land to be treated is in a Safeguard Zone for Drinking Water.
2. If so, take advice from your agronomist on the level of risk to drinking water from use of metaldehyde based pellets on that land. Only 20% of the total land in a Safeguard Zone may present a high risk for pesticide contamination for drinking water.
3. On high risk land, switch to ferric phosphate based pellets such as SluXX HP or Derrex. In areas of particular concern, the local water company may provide some compensation for switching products.
4. Where still using metaldehyde, keep dose rates low by applying good quality 3 or 1.5% pellets. The Chemicals Regulation Directorate is currently re-registering all metaldehyde slug pellet products. This involves a new assessment of pellet quality as regulators believe poor quality has contributed to the problem.

Growers must act wherever possible to control their slug pellet use. Individual decisions this season could impact on the future availability of metaldehyde for all growers.

“Reduced metaldehyde levels in watercourses have been achieved to a great extent by stewardship of slug pellet use, but more needs to be done.”

**Reuben Morris**  
Crop production specialist



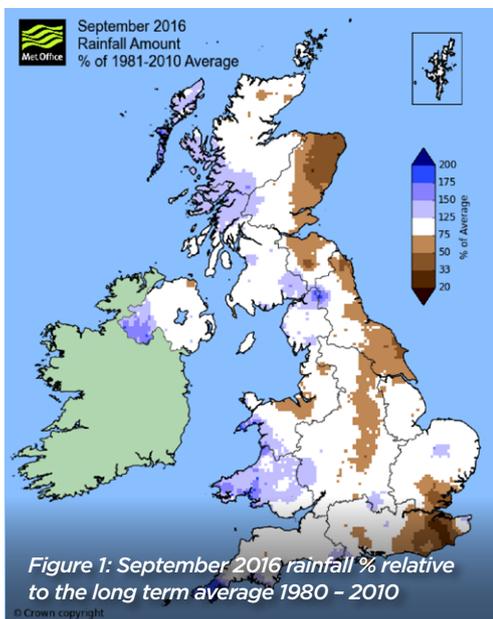


# Autumn cereal management

The specifics of this autumn's management plans will depend on local pest, weed and disease pressures, but an integrated approach is essential if crops are to succeed. Crop production specialist, Dr Paul Fogg considers the current situation and looks at three key areas for action this autumn.

## Outlook

Weather conditions since harvest have been particularly variable, with parts of the UK receiving well below the average rainfall (figure 1). The full impact of these dry conditions is yet to unfold, particularly on those farms with more challenging grass weed problems. Until recently, germination was largely restricted to volunteer cereals and oilseed rape, with a few grass weeds emerging from depth. Where fields have had sufficient moisture and less challenging grass weed problems, crops have been drilled into good conditions and emerged well.



The delay to drilling in some areas due to lack of moisture would generally be considered to bring significant benefits, as indicated in table 1. However, the lack of soil moisture in combination with reported high dormancy for black-grass this year has resulted in little opportunity for stale seedbeds so far, which will undoubtedly put more pressure on the selective residual herbicides and follow up contact graminicides.

## Herbicide planning

Herbicide programmes are an essential element of an integrated approach. It's worth taking the time to plan the herbicide strategy based on past performance, known resistance issues and inherent strengths and weaknesses of the active ingredients available. The main route for herbicide uptake and where in the soil profile the target weed will be germinating also need to be considered.

The key residual herbicides behave slightly differently when applied to the soil based on their physical and chemical characteristics as shown in table 2. For example, flufenacet has relatively low  $K_{oc}$  value so will not stick strongly to the soil and is relatively water soluble. Both of these characteristics are important as root uptake is the primary pathway for activity.

**Table 1: Advantages and disadvantages of delayed drilling in relation to managing difficult grass weeds**

Advantages	Disadvantages
Soil moisture	Seedbed condition
Germination / dormancy	Crop establishment
Stale seedbeds	Lack of crop competition; if drilling slips into November review seed rates
Improved performance of residual herbicides (25 - 30% - AHDB)	Ability to apply herbicides
Black-grass is less competitive	

These characteristics also help us to understand how individual actives are likely to behave under certain agroclimatic conditions, enabling inputs to be tailored to specific field conditions. For example, as the season progresses and soils start to reach field capacity, there is a stronger case to be made for the inclusion of adjuvants to help keep the chemistry within the active seed layer. There are also benefits from improved coverage and reduced drift.

In terms of programmes, triallate is becoming a foundation product, affording good levels of control of black-grass, ryegrass, sterile brome and great brome. Follow up residual herbicides should be based on flufenacet +/- at least two other active substances, for example pendimethalin (1000g a.s./ha) and diflufenican (120g a.s./ha). Rates of flufenacet should be 240g/ha as a minimum but in bad black-grass situations, 360g/ha is more routinely being applied, either in one application pre-emergence, or more routinely

Table 2: Key residual herbicide active ingredients and inherent physical characteristics

Active	HRAC Group	Water Solubility <sup>1</sup> (mg/L @20°C)	DT <sub>50</sub> Field <sup>2</sup>	Persistence classification	K <sub>oc</sub> <sup>3</sup>	Mobility class <sup>4</sup>
Flufenacet	K3	56	38-43	Moderately persistent	401	Moderately mobile
Diflufenican	F1	0.05	224-621	Persistent	3417	Slightly mobile
Pendimethalin	K1	0.33	27-186	Moderately persistent	17581	Non-mobile
Flurtamone	F1	10.7	46-656	Moderately persistent	329	Moderately mobile
Prosulfocarb	N	13.2	6.5-13	Non-persistent	1693	Slightly mobile
Tri-allate	N	4.1	8-205	Moderately persistent	3034	Slightly mobile
Flupysulfuron-methyl	B	603	6.6-19.2	Non-persistent	22.5	Mobile

<sup>1</sup> Water solubility: The mass of a given substance (the solute) that can dissolve in a given volume of water

<sup>2</sup> DT<sub>50</sub>: The time taken to reach 50% of the initial concentration. The higher the number the more persistent and active the substance is

<sup>3</sup> K<sub>oc</sub>: The affinity a pesticide has for organic material in the soil. The higher the number, the less mobile an active substance is. Soils with high clay or organic matter content will absorb pesticide to a greater extent relative to sands

<sup>4</sup> Mobility class: A qualification of the K<sub>oc</sub> value.

split (240 / 120 g/ha) over a pre-emergence / early post emergence sequence. The decision to add the flufenacet to mesosulfuron + iodosulfuron or additional residual actives will depend on the resistance status of the site.

### Slug management

Another common challenge facing crops that have already been drilled into moisture is slugs. Pressure has been high all year and even where soils are currently dry, this pressure is likely to increase later in the season. Understanding the risk factors to crops and water is important, in particular previous cropping, field cultivations and drainage pathways. A fully integrated approach to control must be taken.

When choosing active ingredient and product type, consider relative risk and cost effectiveness. Many crops have been Deter dressed this autumn and though BYDV control may have been the primary driver, there will be the additional benefit of some protection from grain hollowing.

In terms of follow up treatments, we learned a lot from 2012. The plan should be to control adult populations as quickly as possible early in the season, with follow up treatments applied as required. It is imperative that metaldehyde stewardship guidelines are followed and that ferric phosphate based products are used if there is a risk of surface run-off or field drainage.

### Barley yellow dwarf virus

The incidence of BYDV last year was significant, with potential yield losses of 70-80% in winter barley and 25-30% in winter wheat if infected early at BBCH 10-12 (figure 2). This year's crops will have 6 - 8 weeks protection from BYDV where they have been treated with Deter, depending on drilling date and seed rate.

Where green stubble has been left to encourage grass weed germination, there have been some reports of adult aphids on volunteer cereal crops. Only a small proportion of aphids entering cereals are likely to be carrying BYDV, although there is a risk of

green bridge transmission on untreated crops. However, the main problems with BYDV spread arise when the second generation offspring of the original winged colonisers are produced. This begins when approximately 170 day degrees above a threshold of 3°C (DD>3) have accumulated. This is calculated by subtracting 3°C from the daily mean temperature and adding the result to the running total. This should start from either the date of emergence on untreated crops, six weeks after sowing treated seed or one week after the application of a foliar spray. When it comes to foliar sprays it's important to remember that grain aphid (*Sitobion avenae*) resistance could impact the performance of pyrethroid products.

**To ensure your crop overcomes potential challenges this autumn, talk to your local expert advisor.**

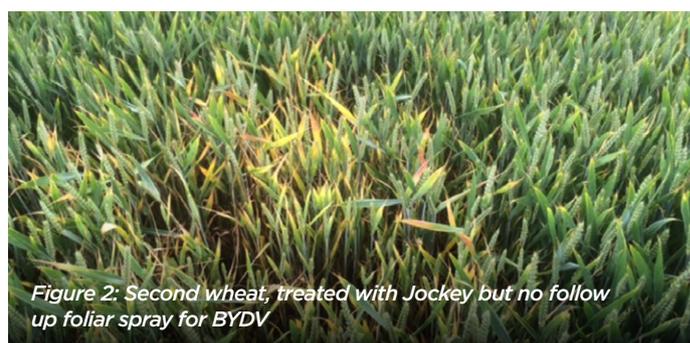


Figure 2: Second wheat, treated with Jockey but no follow up foliar spray for BYDV

“BYDV was significant last year, with potential yield losses of 70-80% in winter barley and 25-30% in winter wheat.”

**Dr Paul Fogg**  
Crop production specialist



# Managing your OSR crop successfully to spring



**Autumn is a period of intensive care for winter oilseed rape, establishing and preserving yield potential ahead of spring. Disease and pest control are year-round activities, while weed control is a job ideally completed before February. For some growers, dry soils and sporadic rainfall meant this year's crops struggled to germinate in parts of East Anglia and Kent, taking three weeks or more to finally emerge, only to be greeted by hungry flea beetles, but it's not too late. Crop production specialist, Paul Cartwright, advises on the course of action for the coming months to get the best results from your oilseed rape.**

## Why is plant health important?

The state of a plant's health is determined by both genetics and the environment in which it grows. External threats come in many forms. Weeds compete for space and resources, diseases threaten photosynthetic potential and in many cases stem and pod integrity, while insects feeding on plant tissue can slow development, waste resources and potentially spread disease.

Early soil-applied herbicides provide good levels of broad leaved and grass weed control. Developing a quick growing and competitive crop helps maximise and maintain levels of weed control as the residuals run out of steam.

Bigger plants are less prone to significant phoma infections, especially when they occur early in the autumn. The speed with which the pathogen grows from the initial leaf spot into the stem is determined by plant size. Bigger petioles mean slower transfer into stems, widening the window over which foliar fungicides effectively control the disease. Selecting varieties with good genetic resistance and encouraging rapid early growth significantly reduces risks.



*Pest control is essential to crop success.*

Last season demonstrated that crops growing in good health with minimal stress can tolerate more significant levels of leaf grazing and subsequent branch and stem damage caused by cabbage stem flea beetle larvae. Where crops were suffering with additional stress factors, damage was often worse as plants couldn't grow to compensate, limited by lack of available nutrients or moisture, for example.

## Promoting early plant growth

Biostimulants and growth promoters have often been used to deliver a much needed 'shot in the arm' for backward crops and those apparently struggling during their early growth stages. In these situations, products such as Tauron (zinc-based) or Gro-Plan P (phosphite-based) may help to push crops on and improve disease tolerance in young plants.

Despite containing a variety of elements, growth promoters are no substitute for adequate nutrition, which should have been addressed at or shortly after establishment. Successful oilseed rape crops are established on solid foundations, with early applications of nitrogen and phosphate providing the necessary building materials.

For maximum response, any fertiliser applied must be accessible to plants, not just available in the soil. The quantities delivered by most biostimulant products are not enough to replace the nutrients normally required for plant development but will be sufficient to trigger and assist certain basic plant functions. Stimulating early root growth, for example by applying Tauron from the two true leaf stage, allows plants to gain better access to resources from the soil. Hampered rooting in the early growth stages compromises stress tolerance and subsequently yield potential.

## Pest management

Although flea beetle tend to dominate the headlines, especially in hotspot areas, aphids such as *Myzus persicae* present a bigger overall threat to oilseed rape crops if left uncontrolled during the peak migration period in autumn. Direct feeding damage is rarely significant; instead aphids feeding on infected sap can transmit Turnip Yellows Virus which is a widespread issue. With yield losses typically around 15%, controlling aphids to prevent significant secondary spread of the virus is a worthwhile investment to make.

Amalie is currently the only variety with genetic resistance to Turnip Yellows Virus; all other varieties must be monitored for aphids. Although the vast majority of *Myzus persicae* are resistant to pyrethroids, alternative insecticides with different modes of



action are available and effective. Biscaya (thiacloprid) and Plenum (pymetrozine) can each be applied once in the autumn. With no established thresholds, spraying should be considered when aphids are found in crops.

Slugs are also a widespread threat to young crops. Control measures and product stewardship must go hand in hand to protect water and safeguard active substances for future use. Make use of ferric phosphate molluscicides (eg Derrex and SluXX HP) for tried and tested slug control without the possibility of metaldehyde being lost to surface waters.



*Oilseed rape needs great care in autumn to establish and preserve yield potential*

### Disease control

Traditionally a disease more associated with northern areas, light leaf spot now poses a significant potential threat in all regions. Although treatments normally follow the earlier phoma timing, choosing a fungicide with good activity on both diseases provides a sound foundation to disease control programmes ahead of the spring.

There is increasing concern over light leaf spot resistance to triazoles, so employ a preventative approach incorporating alternative chemistry groups. With no plant growth regulation activity, fungicides such as Refinzar (penthiopyrad + picoxystrobin) are ideally suited to early phoma treatments on small crops, offering protectant light leaf spot activity in addition.

Light leaf spot and PGR requirements will be key considerations when selecting fungicides for later applications and on bigger crops. Products based on metconazole provide the strongest

growth regulation, while those based on tebuconazole such as Corinth (prothioconazole + tebuconazole) or Orius P (prochloraz + tebuconazole) are excellent all-rounders, delivering preventative disease control with some foliar growth regulation where high rates are applied.

The frequency of fungicide applications is arguably the most important factor in achieving good light leaf spot control. With virtually no curative activity offered by any active ingredient, be prepared to begin treatments again early in the spring. In mild conditions, an interim application in the winter months may also be required to maintain sufficient protection.

### Grass and broad leaved weed control

A competitive crop will complement the investment made in a comprehensive herbicide programme, often making the difference between good and excellent weed control.

All applications of clethodim (eg Centurion Max) should be completed by the end of October, or earlier on early flowering and maturing varieties. Where hard water is used for spraying, ensure a water conditioner is added to the tank first for maximum performance. Make plans to follow up with a propyzamide-based herbicide, for example Kerb Flo 500, as part of a resistance management strategy.

Weather and soil conditions significantly affect both residual herbicide activity and water protection. If propyzamide leaches through soils, poor activity is the visible result in field, but this can mean water issues are being caused downstream. Control of weeds emerging from depth may be variable. Ideally, soils should be cold and moist but not saturated, drains not flowing and heavy rainfall not anticipated for at least 48 hours.

**Careful planning and execution in each of these key areas will produce a promising crop to take to yield in the New Year.**

“Although flea beetle tend to dominate the headlines, aphids present a bigger overall threat to oilseed rape crop.”

**Paul Cartwright**  
Crop production specialist





# Sulphur: are you limiting your crops' potential?

Sulphur deficient crops were more of a feature this spring, highlighting the importance of this vital plant nutrient. The first cases were seen in early April and continued through May. National crop nutrition technical manager, Edward Downing, explains how sulphur deficiency has become such a challenge and how to avoid it impacting yields.

## What's the current situation?

2016 has been a particularly bad year for sulphur deficiency for a number of reasons. Yields in 2015 were exceptionally good, meaning crops removed large amounts of all nutrients, so soils were potentially low at the start of the autumn. However, soil temperatures were then exceptionally high well into the winter, rarely falling below 5°C, which meant high levels of mineralisation of organic matter released both nitrogen and sulphur to improve levels in the soil. Unfortunately, this was followed by a cold, wet early spring which leached available sulphate out of the soil and limited mineralisation to replenish this. Such was the intensity of rain in some areas that leaching of very early sulphur fertiliser applications may have occurred on the well drained soils too.

When soils eventually warmed up and crops really started to grow, significant deficiencies began to be seen, as in Figure 1. In this case the reaction was quick, with a foliar sulphur product applied the next day and a dose of kieserite (magnesium sulphate) soon after that. Luckily it rained shortly afterwards to wash the fertiliser into the soil for the crop to start taking it up and within 4 weeks the crop had fully recovered (Fig 2). This grower was extremely lucky, however. To avoid serious damage, the risk of deficiency must be assessed and the appropriate amount of sulphur fertiliser applied.



Fig 1: Sulphur deficiency visible in spring 2016



Fig 2: The same crop four weeks later

## Why has sulphur deficiency become such an issue?

Over the last 10-15 years, the level of natural sulphur deposition from rainfall has dramatically reduced. Where once growers were receiving over 50kgs SO<sub>2</sub>/ha per year, this is now down to only a few kilos. The most recent map (figure 3) showed the majority of arable areas in the UK received less than 3kgs S/ha (7.5kgs SO<sub>2</sub>) over the year and the figure is now likely to be even lower.

This means that the risk of sulphur deficiency and the associated crop requirement is increasing, particularly in sensitive crops such as OSR and on light soils. The range of crops and soil types requiring treatment has also increased significantly; it was once thought to be a problem only for OSR crops and light soils, but the vast majority of arable crops and soil types are now at risk.

## What does deficiency look like?

Sulphur uptake increases rapidly during spring growth as the crop takes up nitrogen, so any deficiency will usually become visible from the end of March onwards. Symptoms are usually seen as diffuse yellowing of the younger leaves with plants becoming stunted and in OSR, pale flowers. It is often confused with nitrogen deficiency but this affects the older leaves rather than the new, young leaves and is usually in linear patches associated with spreading.

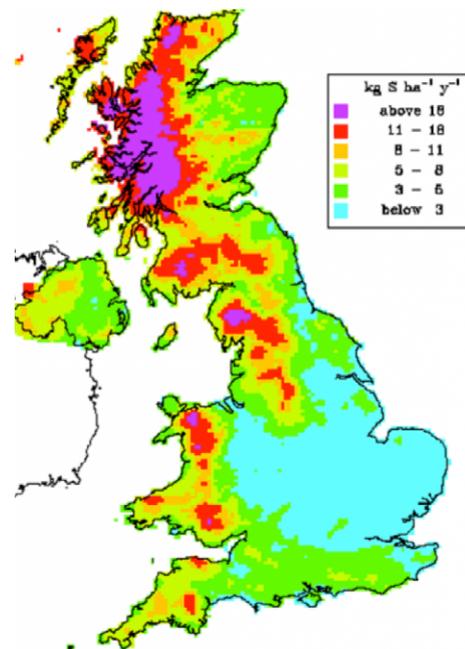


Fig 3: Natural sulphur deposition from rainfall, Centre for Ecology & Hydrology, 2011

### Can I test to find out if my crops are at risk?

Testing soil isn't very reliable because sulphur is highly mobile in soil. You can test leaf tissue for the Malate:Sulphur ratio, but if tested before the crop demand has really picked up, it might not highlight an issue that could develop later. Grain can also be tested for N:S ratio but this will be affected by an excess or sub-optimal nitrogen dose and it's clearly only useful to plan for the next season. It's safer to assume that your crops are at risk of sulphur deficiency and apply the appropriate amount of sulphur fertiliser to insure against deficiency occurring.

### What is the appropriate amount of sulphur?

The amount required is dependent on the crop grown, soil type and amount of rainfall, as light soils leach more and rainfall increases leaching. Table 1 gives guidance on the amount to apply to the main arable crops. Intensive grassland, particularly for silage, needs sulphur. An application of 20 to 40kgs/ha SO<sub>3</sub> per cut will satisfy this requirement.

**Table 1: Recommended sulphur applications**

	Risk of deficiency	Cereals	OSR	Pulses	Sugar Beet
		SO <sub>3</sub> kg/ha			
High	Light soils or medium soils in moderate to high rainfall areas	50 - 60	100 - 120	30 - 40	30 - 40
Med	Medium soils in low to moderate rainfall areas	40 - 50	80 - 100	20 - 30	20 - 30
Low	Very heavy soils in low rainfall areas	30 - 40	60 - 80	10 - 20	10 - 20

### When should this be applied?

Crop demand for sulphur happens at a similar time to nitrogen so sulphur should ideally be applied with each nitrogen application. However, the choice of products available and the varying requirements of different crops can make this difficult to achieve. Applying all the sulphur early in February runs the risk of shortfalls later in the season if any is lost through leaching, so either slightly over-apply to account for this or start with a low dose of straight nitrogen followed soon afterwards with all the sulphur. A little and often approach will be the most robust programme.

### Are there any differences between products?

As long as the sulphur within the product is in the fully water soluble sulphate form (eg DoubleTop, SingleTop, Axan, Sulphan, ammonium sulphate), the material will be immediately available for crop uptake, but could also be at risk of leaching if applied in advance of crop uptake. The amount of sulphur in relation to the nitrogen dictates how the products can be applied. High sulphur products often have to be used first as they don't apply much nitrogen, whereas the low sulphur products often need to be applied in two doses to supply enough sulphur. Quality of granules can differ but this normally only has an influence at bout widths wider than 30 metres.

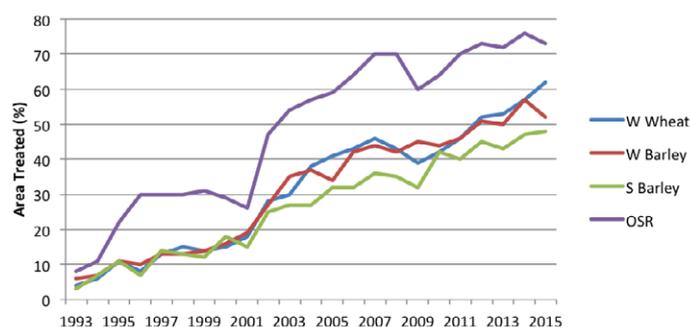
### So what's actually happening on farm?

Graphs 1 and 2 show the percentage area of the main arable crops treated with sulphur fertiliser and the average application rate (kg SO<sub>3</sub>/ha) of those crops receiving sulphur.

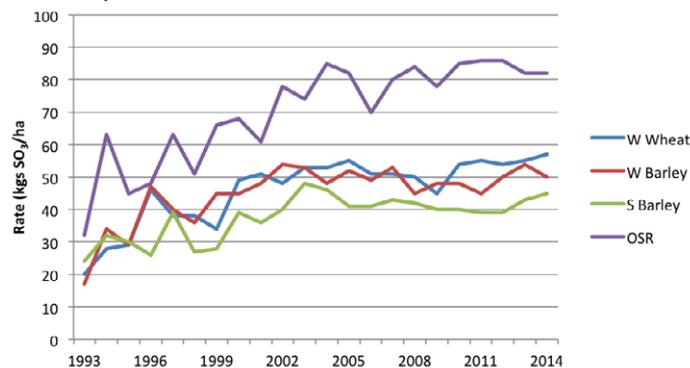
Interestingly, the average application rates show that those growers applying sulphur are broadly using the right rates. It's also encouraging to see the areas increasing, but significant areas are still not receiving any sulphur. Over 25% of OSR, over 40% of winter cereals and over 50% of spring barley - or 1.5million hectares of these crops - are relying on the soil or the small amounts from any manure applications to fully meet the crops' sulphur demand. There are also significant areas of other crops, such as sugar beet, pulses and intensive grassland not receiving any sulphur.

Don't risk sulphur deficiency limiting your crop potential; talk to the experts and plan your nutrition needs now.

**Graph 1: Area of main arable crops treated with sulphur fertiliser**



**Graph 2: Average application rates of sulphur fertiliser to main arable crops**



Source: British Survey of Fertiliser Practice

“It's safer to assume that your crops are at risk of sulphur deficiency and to apply the appropriate amount of sulphur fertiliser to insure against deficiency occurring.”

**Edward Downing**  
National crop nutrition technical manager





# Stewardship's advantages to sporting interests

Allocating parcels of unproductive or unprofitable land to stewardship is good for the environment and with higher payments under Countryside Stewardship than the old Entry and Higher Level Stewardship (ELS/HLS), farm finances can profit too. However, the advantages don't end there. Stewardship schemes can also have immense benefits for sporting interests. Kings southern technical advisor, Marc Bull, explains the best options for results all round.

The Mid Tier Countryside Stewardship option is more competitive than the old ELS. One of the key areas for scoring is the farmland pollinator and wild bird package, with Natural England looking for 10% of land divided between:

- Nesting habitat for birds. This doubles up as overwinter habitat for beneficial insects and pollinators. In essence these are tussocky grass areas, usually field margins, beetle banks (AB3) or field corners
- Brood rearing habitat, fulfilled by floristically enhanced grass margins (AB8) and pollen and nectar plots (AB1). Again this doubles up for pollinators and other beneficial species as a summer foraging habitat.
- Overwinter habitat, met with wild bird seed (AB9) which will flower and provide pollinators with a late season nectar source. This option can also be enhanced by the supplementary feeding option (AB12).

The aim of this particular package is to stop the decline in farmland pollinators and farmland songbirds. These options will also benefit game birds, since pheasants and English and French partridges have similar habits to other farmland bird species. If implementing these habitats along with supplementary feeding and targeted predator control, growers will see wild broods of pheasants and partridges in no time at all.

As well as providing a food source, pollen and nectar plots can help to prevent game birds from wandering over the boundary. These habitats give lively birds plenty of distraction without causing a draw in the winter months, as there will be no cover or feed value left in the plots by the start of the shoot season.

While these options are advantageous for sporting efforts, the whole farm does not need to be entered into Countryside Stewardship, and nor should all game cover be put into a wild bird seed option. Half in a scheme and half outside of it will provide a well balanced mix of feed and cover for game and other farmland birds, along with the flexibility to manage weed burdens by using different chemistry across two mixtures or selecting compatible mixtures to use the same herbicides. Running them side by side is advisable to help create a crop rotation and act as a windbreak. For example, Moir Mix would work well next to Poacher Maize, rotated every couple of years to clean the plots and give them a rest from brassicas. If not practising the supplementary feeding option, feeders should be placed in the game cover element of the habitat along with any release pens to prevent breaching stewardship rules.



*Moir Mix works well alongside Poacher Maize, providing feed and cover for game and farmland birds*

**For expert advice on stewardship including how to choose, establish and manage crops for maximum benefits, contact your local advisor.**

“By implementing these habitats along with supplementary feeding and predator control, growers will see wild broods of pheasants and partridges in no time at all.”



**Marc Bull**

Kings southern technical advisor

