



from theory
to field

Tough prospects for OSR?

Rapeseed dressed with clothianidin

An HGCA research review has assessed the potential impact of the restriction on neonicotinoids. *CPM* finds out what work is currently underway that may offer help to growers.

By Tom Allen-Stevens

On 1 Dec, a restriction on three neonicotinoid pesticides, suspected to have an influence on bee health, comes into effect. It applies to the use of the seed treatments clothianidin, imidacloprid and thiamethoxam on crops which are attractive to bees, and also spring cereals.

This means that after 30 Nov 2013, oilseed rape and linseed treated with Chinook (beta-cyfluthrin+ imidacloprid), Modesto (beta-cyfluthrin+ clothianidin),

Conquest and Cruiser OSR (fludioxonil+ metalaxyl-M+ thiamethoxam) can't be planted. Maize and cereals, such as spring wheat and spring barley, planted between Jan and June may not be treated with Tripod Plus (fuberidazole+ imidacloprid+ triadimenol), NipsIT Inside, Poncho and Deter dressings (that contain clothianidin). But the restriction doesn't affect cereals sown between July and Dec, potatoes or sugar beet.

Research review

HGCA has been swift to respond to the restriction that was announced on 24 May, conducting a research review into the implications it'll have on crop production. "The biggest effect will be on OSR growers," reports Caroline Nicholls, who carried out the review. "In particular, it's going to make it considerably harder to control peach-potato aphid (*Myzus persicae*) and cabbage stem flea beetle (CSFB)."

Seed dressings, such as Chinook and Cruiser OSR, protect the young seedling

“It's going to make it considerably harder to control peach-potato aphid and cabbage stem flea beetle”

from attack for the first six to eight weeks after drilling, she explains. "Of the area harvested in 2011, only 29% didn't receive a neonicotinoid seed dressing, and this was predominantly in the far west and north of the UK. So about 71% of the nation's OSR crop will need alternative treatment next autumn."

Perhaps the biggest question mark hangs over CSFB. "There's been little recent research on the pest and there's no robust data on its effect on yield," she notes.

CSFB is one of a number of flea beetles that attack OSR. It migrates into the crop soon after emergence, chewing holes in the cotyledons and early true leaves. In severe cases, an entire crop can disappear as it emerges.

"The tell-tale sign of flea beetle damage is shot-holing of the leaves. Seed dressings usually protect the crop until it's big enough



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to grow away from the damage — you'd only need to treat a 3-4 true-leaf crop if more than 50% of the leaf area had been eaten. Unlike other flea beetles, CSFB also lay their eggs in the crop, and the damage from the larvae can be as bad as adult feeding," explains Caroline Nicholls.

The total area of OSR affected would tend to vary with the conditions — CSFB prefers a mild, fine autumn — but it's still a widespread and common pest, she points out, so typically this would be 67% of the UK crop. "Expert opinion suggests about 1% of the affected crop is lost to CSFB annually. That's currently a cost of around £5M per year in untreated crops."

There's currently no other seed treatment available, leaving control to pyrethroid sprays once the neonicotinoid restriction comes into force. "CSFB resistant to pyrethroids have been detected in Germany, but so far there's been no confirmed case of resistance in the UK."

There are bigger implications for TuYV, however. Typically 60% of the total area of OSR is affected by the virus, although this varies regionally and from year to year. Yield losses can be up to 30%, but are typically 15% in untreated crops.

"This means an average annual yield loss in untreated crops of £67M," states Caroline Nicholls.

TuYV may have been present in UK crops for decades, but only recent HGCA-funded research has indicated its prevalence and quantified its effect. The virus is carried

into OSR by around 20 aphid species, but *M. persicae* is by far the most important, according to Dr Mark Stevens of BBRO, who led the research, while he was at Rothamsted Research.

"On average, around 30% of the *M. persicae* population carries TuYV, but it can be up to 70%," he notes. "For an OSR crop, it's a serious threat to yield because the virus hits almost every aspect of productivity."

It affects crop height and photosynthesis in particular, and there's a build up of starch in the leaves and the plant produces fewer pods. The virus can raise glucosinolate levels in the oil, which can affect processing quality. "But the problem is you don't usually see the symptoms in the crop until spring. Even then, it's very often misdiagnosed," points out Mark Stevens.

Virus 'hotspots'

Whether a crop is at risk depends heavily on virus carrying winged aphid numbers in autumn. These carry the virus over from the previous crop — it's often transferred into vegetable crops or weeds between OSR harvest and establishment. "Some locations will be at greater risk than others — sampling has revealed there are clear virus 'hotspots' along the south coast and into the Wash."

In autumn 2011, this led to levels of the virus in the crop that ranged from 10-84%. But poor weather since has seen aphid numbers plummet, and it's thought levels in the current crop are low. What's more, the cold spring has meant a slow recolonisation of the crop, according to Dr Richard Harrington of Rothamsted Research, who runs the Rothamsted Insect Survey (RIS).

"It's been one of the slowest starts to the aphid season I've seen in the 34 years I've been here," he reports. The RIS uses a network of suction traps to monitor aphid ▶

Richard Harrington warns that there's never been a situation when such a potentially large area of OSR will be drilled unprotected from aphids.



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Cabbage stem flea beetle currently costs the industry around £5M per year in untreated crops.

► numbers on a daily basis, delivering the information to growers via Aphid Advisory Alerts or Aphid News, part-funded by HGCA.

“*M. persicae* are just beginning to appear in traps, but it’s too late to have an impact on TuYV. We’re expecting levels of the virus to be very low.”

This means the threat to the crop planted in 2013 is likely to be low. But most crops will be protected in their early, most vulnerable stages through a neonicotinoid

seed dressing, he points out. “Treated seed offers six to eight weeks protection, so it pays to be aware of aphid activity after this period — in a mild autumn, crops can be susceptible to continued infection.

“The great uncertainty is what will happen in the 2014-15 cropping year. We’ve never had a situation when such a potentially large area of OSR will be drilled unprotected — we don’t yet know what that’ll do to aphid numbers and levels of the virus.”

Planning required for new restriction

It may have been 11 years ago, but the memory of having an entire field of oilseed rape wiped out by cabbage stem flea beetle is still lodged as a raw experience for Paul Temple, with 350ha on the edge of the E Yorks Wolds.

“The crop was only just emerging and it simply disappeared. You then find yourself spraying cypermethrin as a matter of course to avoid it ever happening again. Neonicotinoid seed dressings represent the perfect form of precision farming — a good level of protection applied precisely to the plant,” he points out.

The plan is to watch the crop like a hawk in autumn 2014, ready to go in with cypermethrin if the threat warrants it.



This year, there’s 40ha of OSR at Wold Farm near Driffield. “A good emergence in the autumn is a priority for us — we’re high up on the Wolds and our soils are not the warmest. Achieving the right plant population is also important, and with neonic dressings you get used to a seed rate that you can be confident will bring the right results.

“So in autumn 2014, we’re going to have to watch the crop like a hawk, ready to go in with cypermethrin if the threat warrants it, and reassess what sort of seed rate we’ll need,” says Paul Temple.

This will put an extra layer of management into the system at a busy time, he notes. “Sept is the busiest month on the farm, so it’s an extra headache I can do without. But OSR emergence is such a key priority that protecting the early crop will take precedence. It means we’re going to have to plan things carefully to ensure other aspects don’t slip.”

OSR fits into a rotation that includes winter wheat, winter barley and forage maize on the mixed farm. He doesn’t think it’ll mean a change of variety choice or cropping, but he’ll be brushing up on his background knowledge.



To Paul Temple, the seed dressing represents the perfect form of precision farming — a good level of protection applied precisely to the plant.

“It’s only when a problem like this comes along that you realise you’ve got to re-learn some of the fundamentals — we’ve all taken flea beetle control for granted in recent years, while TuYV isn’t something we’ve had to worry about unless you get a mild autumn. I’ll be digging out the HGCA topic sheets and looking more closely at the aphid alerts as autumn 2014 approaches, to make sure I’m prepared for what could be some new experiences.”



*Stephen Foster warns that the neonicotinoid restriction is bad news for OSR growers as *M. persicae* is fully resistant to pyrethroids — the only other options currently available at that point in the season.*

What's more, alternative control of aphids is limited, as most *M. persicae* are now resistant to pyrethroids and pirimicarb, points out Rothamsted's Dr Steve Foster.

"This restriction is bad news for OSR growers as *M. persicae* is fully resistant to the only other options currently available at that point in the season. If we get aphids with TuYV in the crop in autumn 2014, there'll be precious little a grower will be able to do about it. This could have serious consequences for the entire crop in future years."

The resistance-monitoring project, part-funded

by HGCA and currently underway at Rothamsted, involves screening live samples of *M. persicae* against a range of insecticides. "These are UK samples and we do live screening so that we can pick up any new mutations that confer resistance against these insecticides," explains Steve Foster.

High level of resistance

Almost every sample tested last year was carrying the new mutation, known as super kdr (knock-down resistance). "This gives the aphid a high level of resistance to pyrethroids — it's basically not worth using a pyrethroid to control *M. persicae* in the UK at present. They also have high levels of MACE resistance to pirimicarb, so growers face a double whammy. Other UK aphid pests currently don't carry such strong resistance."

There's chemistry that's still effective against the pest, however, although no actives are currently approved. "You can still use ►

The tell-tale sign of flea beetle damage is shot-holing of the leaves, while whole crops can be lost at cotyledon stage.



Research round-up

HGCA project 3768, Combating Resistance to Aphicides in UK Aphid Pests, runs from April 2012 to March 2015. Its aim is to monitor the response of field-collected live samples of peach-potato aphid (*Myzus persicae*) to a range of novel aphicides and also monitor for established forms of resistance. Led by Rothamsted Research, with partners Bayer CropScience, Belchim, DuPont, Interfarm, Syngenta, Nufarm, HDC, Potato Council, BBRO and CRD, its total cost is £482,376, with £24,000 funded by HGCA.

HGCA project 3475, Aphid advisory alerts, runs for 48 months from April 2009 to March 2014. Its aim is to provide growers with forecasts of aphid flight times and information on the insecticide-resistance status of *Myzus persicae* and the presence in them of TuYV. Total cost is

£394,554, of which HGCA is contributing £173,954. Led by Rothamsted Research, industry partners are BBRO, Bayer CropScience, and Syngenta. The project capitalises on investment from the BBSRC and Lawes Agricultural Trust.

HGCA Research Review 77, Implications of the restriction on the neonicotinoids: imidacloprid, clothianidin and thiamethoxam on crop protection in oilseeds and cereals in the UK, was completed in June 2013, and is available to download at www.hgca.com/neonics.

Information Sheet 24 on cabbage stem flea beetle was updated in May 2013. Information Sheet 16 on aphids and virus diseases in cereals and oilseed rape was issued in summer 2012. Both are available to download at www.hgca.com.

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Myzus persicae carry turnip yellows virus into OSR, typically causing losses of 15% in untreated crops.

► thiacloprid as a foliar spray, but not for autumn aphids. Strong resistance to neonicotinoids is now present in *M. persicae* populations in southern Europe, primarily on peach and nectarine trees, and we've seen samples in the UK that have probably been imported on plant material from abroad. But so far there's no indication that neonicotinoid-resistant aphids have entered this country."

Specific approval

Other actives have been tested in the project and show good activity, he reports, but could only be used in OSR if specific approval was successfully sought.

"Pymetrozine is effective in potatoes and we haven't found any resistance to flonicamid either in this pest.

"There's also a new class of insecticides

we're working on that looks very promising. The diamides work on calcium channels in insect muscles. It's a totally new mode of action that circumvents the established resistance mechanisms. This is potentially an excellent addition, and it's systemic, so could be a new seed treatment. But it's still very much on the horizon in the UK," says Steve Foster.

Following the announcement of the restriction, and with help from HGCA, the Rothamsted team also hopes to perform some resistance tests on CSFB. "There's been very little monitoring of this pest in the UK, although we know resistance has been found in Germany. Initially, we'll only be testing a few ad hoc samples, but depending on the results, we may need to widen this out to a dedicated survey," he reports.

His advice to growers is to spray for CSFB only when threshold levels are exceeded, to avoid pyrethroids and pirimicarb if *M. persicae* is the target (which effectively discounts any treatment against the pest under current approvals), and to use full rates. "Don't reduce concentration to save money — it's not good for resistance management."

The aphid-resistance monitoring work will be essential to assess effectiveness of chemistry used throughout the season on OSR, notes Caroline Nicholls. "40% of all insecticides used on OSR are in the autumn and all of the pests targeted at this time, with CSFB the main target, are currently controlled with neonicotinoids. Pyrethroids are already the most commonly used insecticide on OSR, and use is expected to increase because of the neonicotinoid restriction. So it's clear that this restriction will have implications for resistance in a number of target pests and especially for levels of TuYV in OSR." ■

For an OSR crop, TuYV is a bit like getting a bout of 'flu — the virus hits almost every aspect of productivity.



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