

Rethinking OSR?

“More than one pyrethroid application is just selecting for resistance.”

Technical OSR planning

It's been a torrid season for oilseed rape with many growers questioning its place in their rotation. But should it be discarded on the back of an exceptional season or can the crop be managed better?

CPM finds out.

By Lucy de la Pasture

A series of unusual weather events created a perfect storm for cabbage stem flea beetle (CSFB), says Dr Sacha White, senior research entomologist at ADAS Boxworth in Cambs. A very dry summer which extended well into the autumn meant many oilseed rape crops had a difficult time establishing due to lack of moisture and adult flea beetle damage.

“Another warm winter meant that adults were able to continue egg laying for longer than usual, which resulted in record numbers of larvae and additional crop

losses this spring,” he says.

CSFB has become OSR's number one enemy since the loss of neonicotinoid seed treatments, with 5% of the national crop lost in 2014/15 and 9% in 2016/17. This year AICC estimate that 11% will be lost on the basis of a survey conducted last winter, equivalent to £79 million. But it's likely that this is an underestimate as larval numbers continued to increase into the spring and crops were still being written-off as late as April, suggests Sacha.

Pyrethroid resistance

In recent times the solution to nearly every agronomy problem has been to rely on a pesticide as a first line of defence, but with increasing resistance to pyrethroid insecticides this is no longer a strategy that will work.

“Pyrethroids used to get control of CSFB adults and larvae if they were well-timed, but resistance was first detected in 2014 and is becoming widespread. We don't yet know if the larvae are resistant as well as the adults, but we suspect that they are,” he says.

In spite of this, pyrethroid applications have tripled from 2010 to 2016 but applying

them may be counter-productive, Sacha points out. “Making more than one pyrethroid application is just selecting for resistance and killing the natural enemies of CSFB, such as ground beetles which play a very important role in eating eggs over the winter period.”

So without any effective chemistry to save the day, what can growers do to mitigate the effects of CSFB? Sacha believes there is no single solution but by adopting a number of cultural control options with the optimum agronomic approach then damage can be limited. It's similar to the approach growers have adopted to blackgrass, where a combination of different methods can add up to give the desired level of overall control.

Modelling carried out as part of the AHDB-funded IPM project, suggests that the only consistent agronomic approach that affects CSFB pressure is the date of drilling. The advice used to be to drill OSR earlier so that the crop established before the main period of CSFB migration (usually late-Aug) but in recent years it's the larvae which have become the biggest threat.

“A survey of 1100 sites over 14 years showed a clear trend in larval reduction by drilling later. Newly planted crops avoid the main adult migration, so CSFB arrive later in crops. This results in later egg hatching and a slower rate of development of both larvae and eggs as temperatures cool off in the autumn. We've seen the effect carry through to spring populations.

“We need to better understand OSR variety selection as some are much better suited than others for later drilling,” he adds.

There's also a disease consideration ▶



Sacha White believes cultural controls with a delay in drilling is the best strategy to reduce the impact of CSFB on crops.

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► when looking at drilling date, adds Dr Faye Ritchie, plant pathologist at ADAS Boxworth. “On balance, later drilling decreases the risk of light leaf spot and club root while earlier drilling decreases the risk of phoma leaf spot/stem canker.

“Leaf size is an important factor when it comes to phoma, the larger the leaf then the longer it takes the fungus to spread through the leaf and petiole and then into the stem. Late sown, small crops are at a higher risk,” she says.

Light leaf spot is a very different disease and its airborne ascospores, which cause the primary infection in OSR crops, can be released from July onwards. This means earlier drilled crops are exposed to higher levels of inoculum. By late Oct there’s a

Countering flea beetle pressures

OSR varieties that develop more rapidly in the autumn and earlier in the spring can substantially reduce damage from cabbage stem flea beetle larvae as well as adults, according to the latest research from agronomy specialists Agrii.

Used alongside the most appropriate seedbed management, drilling practice, early nutrition and insecticide treatment, they offer growers a good way of countering the recent upsurge in the pest, in the view of view of technical specialists, Jim Carswell and David Leaper.

They point out that, just like blackgrass and septoria, a thoroughly integrated approach to agronomy can help manage the flea beetle threat and ensure OSR retains its place as the first-choice break in most winter cereal rotations.

“We have undertaken almost 40 specific flea beetle management trials since 2009,” says R&D manager, Jim. “These have explored a whole range of approaches to dealing with the pest — from sacrificial field boundaries to companion cropping and various ways of disguising the emerging crop as well as improving its establishment and early resilience.

“It’s crystal clear from this work that no single approach offers the consistency of the seed treatments we no longer have. Anything that gets in the way of early crop growth — like last autumn’s serious lack of moisture — can significantly increase flea beetle impact. So the focus has to be on the key elements of agronomy that prove most effective in ensuring rapid and reliable establishment and autumn development.”

Drilling in the first 10 days of Aug to achieve a robust canopy ahead of the main late Aug/early Sept flea beetle migration has proved its worth in maximising early crop survival in Agrii’s experience.

But early drilled crops tend to carry greater larval burdens than those drilled in early Sept. The downside of later-drilled crops is that they can develop less rapidly, making them more vulnerable to attack.

“Whenever you drill, the most important thing is to drill into moisture. In the six weeks between the start of Aug and mid-Sept there will almost always be a time when your ground is carrying sufficient moisture. Regardless of calendar date, that is the time to drill,” says Jim.

“Almost regardless of drilling date, I also favour fast-developing varieties,” adds seed technical

manager, David. “They give the crop the best chance of growing away from any setbacks. If conditions allow, they may put on a little too much autumn growth. But we can always give them a timely check as well as a useful rooting boost with an early PGR.

“We also know from our trial work how valuable such varieties can be in minimising the larval damage which put paid to so many crops this spring. Current trials across more than 40 varieties on four sites significantly affected by flea beetle, have indicated a clear association between the level of beetle damage and speed of crop development.

“We’ve long found the fastest developing varieties in the autumn are better at growing away from adult grazing. These trials show the earliest to grow away in the spring — most notably DK Expedient, DK Exclaim, DK Exsteel, Inv1035 and Ambassador — also suffer the least stunting and main stem loss. Again this seems to be due to their superior ability to compensate through earlier canopy development.”

As far as cultivation is concerned, there’s good field evidence that crops established under no-till and reduced tillage systems generally suffer less from flea beetle. Better moisture conservation is likely to be important here, says Jim.

At the same time, the Agrii work suggests that longer cereal stubbles, an even spread of chopped straw and chaff across the surface and the least soil movement at drilling are valuable in disguising the green-on-brown visual attraction of the emerging crop to adult beetles.

“Good seed-to-soil contact at drilling, lack of compaction to limit root development and a soil pH which doesn’t limit nutrient availability are vital for the best establishment,” he adds.

“Treating the seed with Take-off PGA or the new biological dressing, Integral Pro, can further improve rooting and early canopy development at a very modest cost. But the single most beneficial aid to establishment we find is a well-balanced seedbed fertiliser” he says.

“Resistance means insecticides aren’t performing as well as they used to,” Jim agrees. “Even so, they remain vital to crop survival, with our trials showing valuable advantages from a quality pyrethroid such as Cleancrop Argent (lambda-cyhalothrin) as well as adjuvants that improve uptake and coverage. Anecdotally, it may



Jim Carswell (left) and David Leaper have been looking at a number of approaches to reduce CSFB damage.

be preferable to spray at night for the best targeting. “Including garlic and other solutions with strong odours in the spray tank may also be useful to mask the smell of OSR that is attractive to adult beetles. Again, though, we don’t yet have sufficient scientific evidence here.”

Companion cropping is another area of agronomy where Agrii has growing evidence of flea beetle management value. But only with the right companions and providing they are established sufficiently well.

“You need to have a mix that fools the beetles but isn’t too competitive with the crop,” explains David. “Over the past three seasons, we’ve had great success with carefully selected varieties of buckwheat and vetch that are established strongly in cereal stubbles and readily eliminated by early frosts or herbicide treatment.

“In several cases, this companion cropping has allowed our agronomists to establish excellent OSR crops with minimal insecticide use while neighbouring crops were completely lost to beetle infestation.

“Crucifers like white mustard and turnip rape have proved diversionary when grown with Clearfield varieties and easy to eliminate in the system. But they are best avoided in our experience because they can be much too competitive with the crop,” he advises.

“We find faster-developing Clearfield varieties like DK Impressario CL can also have a clear edge for their tolerance to ALS inhibitor residues when grown in reduced tillage systems where these herbicides have been used; especially if late-spring applied in a dry season.”

switch in the lifecycle and the fungus produces conidiospores which are dispersed by rain splash, meaning infection spread is more local.

"Phoma is the easier of the two diseases to control with good single gene and quantitative resistance available in varieties and effective control from fungicides," says Faye.

Light leaf spot has a polycyclic lifecycle and is more difficult to control. "Using varieties with a high resistance rating delays the epidemic, with big differences in disease levels seen in trials between varieties with an AHDB Recommended List resistance rating of 7 and those with a lower rating of 5.

"Fungicides generally only control 50-60% of a light leaf spot epidemic but can still provide a cost-effective yield response," she adds.

Genetic trait

ADAS have looked at the attractiveness and palatability of different varieties to CSFB and have so far found no significant differences, but this may not correspond to work being carried out elsewhere. A point in case is research at John Innes Centre is looking to find a genetic trait that may ultimately be used to confer resistance in new OSR varieties, points out Sacha.

"We'll also be looking at whether some varieties are better able to tolerate damage than others in the IPM project," he adds.

Vigour has been suggested as a useful characteristic to help crops grow away from flea beetle damage and Sacha agrees that this is true. As well as autumn vigour, the ability to grow away quickly in the spring could be as important, he says.

Dr Carol Norris, agronomic services manager for BASF which has the InVigor range of hybrid OSR varieties in its portfolio, highlights work carried out in 2013/14 by Dr Pete Berry and Liz Hudson of ADAS. It gave an insight into the impact vigorous hybrids can have on



Faye Ritchie says the effect on diseases needs to be considered when drilling early or later than normal.

drilling date and yield, with some varieties having an apparent tolerance to delayed sowing date, she says.

"I'm often challenged as to whether hybrids really are more vigorous than open-pollinated varieties. The answer is generally 'yes, they are', but hybrids vary in their vigour.

"Some hybrid breeding programmes have clearly developed heterotic pools which maximise the hybrid effect, which is why we tend to see the InVigor varieties standing out in the autumn for vigour next to some other hybrid varieties."

Carol is advocating a move to a later drilling for OSR as a means of limiting CSFB damage, and she believes choosing the right hybrid variety can help balance the establishment risk with potential gross output.

"What we suggest growers should be doing is looking at whether they are prepared to compromise their establishment for the chance of a couple of % in gross output. Choosing a variety such as InV1035, with high early vigour lowers the establishment risk and can still produce a high output," she explains.

Increasing seed rate is of no benefit where CSFB larvae are concerned, explains Sacha. "We looked at seed rates of 10-120 seeds/m² and found no difference in the larval population/plant between seed ▶



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All hybrids have vigour but not all have the same amount of vigour at the same time, points out Carol Norris.

► rates. This suggests there's no benefit to be had from ramping up the seed rate in terms of larval load and a positive disadvantage in that there are more larvae/m² where there are more plants/m²,

Summary of drilling dates and disease risk

Disease	Drill (to decrease risk)	Why?
Phoma leaf spot/stem canker	Earlier	Larger leaf size
Light leaf spot	Later	Less build-up of disease
Clubroot	Later	Lower soil temperatures

Source: ADAS, 2019

which also means higher pest return for future years."

Cultural approaches to limiting CSFB are also being evaluated by ADAS and 'trap cropping' and 'defoliation' are both showing promise.

The trap cropping trials have made use of the OSR volunteers that emerge after harvest so that adult CSFB will fly in and feed on them when they begin to emerge in

early Aug, before the new crop has been planted.

"Once the adults have flown into the trap crop, they start to lose wing muscle so become less able to migrate. By delaying burning off OSR volunteers until late Sept, it should be possible to reduce the number of adults that will affect the newly planted crop," explains Sacha.

Results so far have given significant reductions of adults throughout the whole trial, even after the OSR volunteers were controlled, and there's been a corresponding reduction in the population of larvae in crops, he highlights.

Trap crop

"We've seen benefits in four of the six paired fields (OSR vol/new crop) with up to 89% fewer adults, 74% less adult damage, 39% more plants, and 67% less larvae. The trap crop effectively breaks pest life-cycle."

Taking a broader view, Sacha points out that we still need to understand the factors that reduce effectiveness, such as the area of volunteer OSR area left as the trap crop and the drilling date of the new crop.

Faye has a few concerns about leaving OSR stubbles for longer on the surface because they act as a source of airborne spores to infect neighbouring crops and volunteers as a green bridge for some diseases.

"A balance needs to be reached when it comes to controlling diseases where inoculum can build up on stubbles and volunteers, such as phoma stem canker and light leaf spot. Club root is another risk and leaving uncontrolled volunteers long enough will potentially allow the disease to go through another cycle," she says.

Another cultural approach that has moved from trial plots this season into commercial fields under the Innovative Farmers Field Lab initiative is defoliation.

"The Field Lab is looking at the effects of defoliation on eight farms in 12 fields. In plot trials there were significant reductions in larvae (31-55%) when the crop was mown off, with the highest yields when defoliation took place in Dec. The Field Lab growers are looking at different methods, including grazing by sheep, and initial assessments

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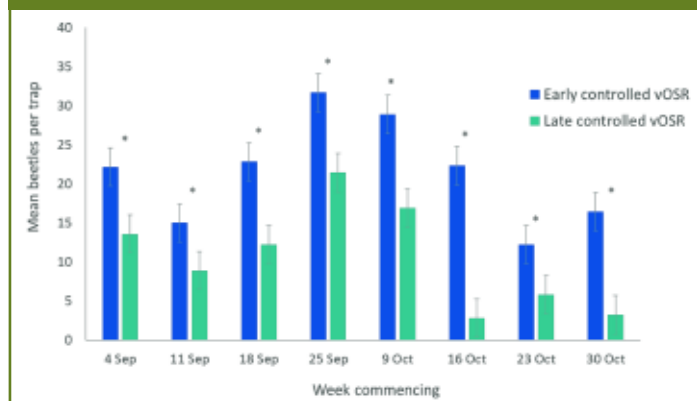
show that all but one of the sites that were defoliated have fewer larvae than undefoliated plots," he explains.

Ultimately when considering the prospects of OSR for next season, Sacha believes the season needs to be kept in perspective and it's not a forgone

conclusion that the next OSR crop will be under the same pressure as the one that will soon be harvested.

"Larvae aren't invincible — this season everything has worked in their favour. Weather may not prove so favourable next time around." ■

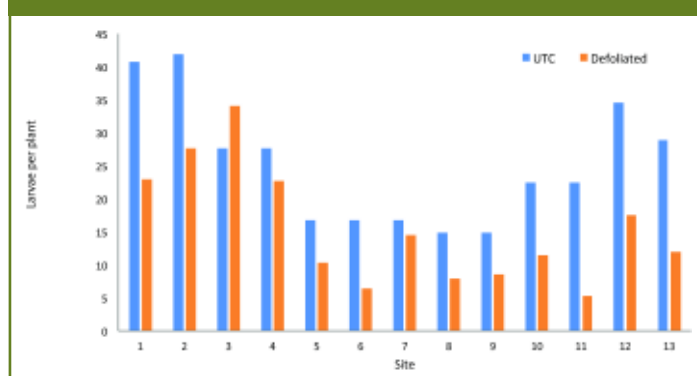
Trap Cropping 2017/18



Results show the impact of volunteer OSR on numbers of adult CSFB.

Source: ADAS, 2019

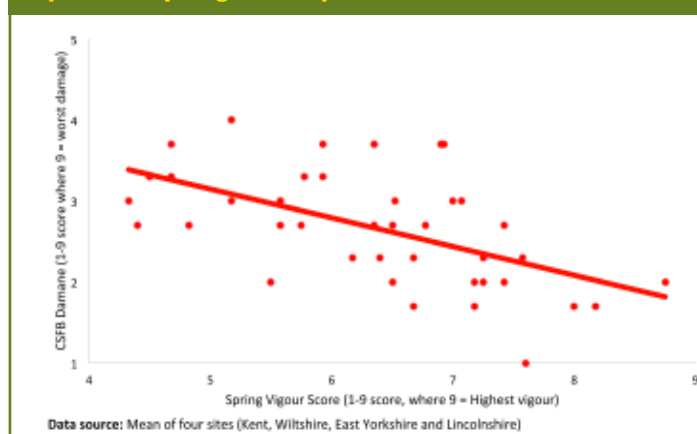
Defoliation Field Lab results



There was up to 77% reduction in larvae where crops were defoliated compared to untreated, with a mean reduction of 40%.

Source: ADAS, 2019

Speed of spring development



Results show CSFB larval damage v speed of development in the spring.

Source: Agrii, 2019



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