

“There’s no quick fix for CSFB so we have to learn how to live with the problem.”

AHDB

from theory
to field

Living with the enemy

For many growers the writing is on the wall for oilseed rape unless cultural controls can be developed to limit cabbage stem flea beetle damage. CPM discovers how research to find an IPM approach is being speeded up by a massive collaboration across the industry.

By Lucy de la Pasture

Cabbage stem flea beetle has dominated the news for the past few seasons and the race is on to try and find a solution and keep oilseed rape as a viable break crop in the rotation. In the process it has quickly become clear that there’s a fundamental gap in knowledge about the phenology of the pest — information about the lifecycle and its behaviour that could help find its weak spot.

Until now the research has been fragmented but recognising that a more collaborative approach may be more

efficient, AHDB have instigated a new CSFB project. It aims to plug the gaps in the biology of the pest and develop a suite of measures that together will help re-establish OSR as the break crop of choice.

An IPM approach

“There’s no quick fix for CSFB so we have to learn how to live with the problem,” explains Charlotte Rowley, pest scientist at AHDB. “We’re coordinating effort, be it research results or on-farm findings, to help gain the knowledge needed to develop an IPM approach.”

Last year the results of a previous AHDB project revealed the factors most likely to influence CSFB pressure, including an estimate of reliability for each effect and an indication of how open each factor is to management. The research concluded that no non-chemical approach used alone is reliable, so a combination of tactics is going to be needed to tip the balance in favour of the crop.

ADAS entomologist Dr Sacha White has taken the reins of the new project, having also led its forerunner. It’s being run in a scientific partnership with Harper Adams University (HAU), where Dr Tom Pope is looking at the pest’s biology. The project is being supported by a huge number of commercial companies with an interest in the future of the OSR crop, with representatives

from plant breeding, agronomy, crop protection, nutrition and marketing.

“The work to better understand the biology of CSFB is looking at eight specific things,” explains Sacha. “First of these it to understand what governs adult migration. Work has been done in mainland Europe, so we have some idea of the environmental factors that influence migration, but more work needs to be done in the UK’s maritime climate.”

The researchers are monitoring more than a dozen sites from Aug to the end of Oct in ▶



The new research project aims to plug the gaps in the knowledge about the biology of CSFB and will pull together an IPM approach for controlling damage, explains Sacha White.

► order to relate the changes in adult numbers to weather conditions. The hope is to identify factors to accurately predict the migration of the pest to help farmers make more informed decisions about drilling date and use of other controls, be they chemical or non-chemical.

Work is also taking place under controlled conditions at HAU to look at the effect of temperature on egg laying and development and on larval development and movement. This aims to allow better forecasting of the life stages of the pest in the crop so that treatments targeting egg hatch can be better timed and larval numbers better predicted.

Separate work is underway to look at larval feeding and damage. "The previous project found variable levels of damage with larval populations in field trials. We need a



Controlled experiments are looking at the impact of CSFB larvae on plants to better predict their damage potential in the growing crop and the ability of plants to tolerate it.

better basic understanding of larval impact so we're using pot trials to limit the variables and infesting OSR plants with different numbers of larvae to see the effect they have over the winter.

"We're also infesting plants at different times in the winter to assess the effect of the time of larval invasion, which has become more relevant in the mild winters of late because egg laying has continued throughout the winter and so has larval invasion.

Higher larval loads

Results from field trials have indicated that some crops are able to tolerate higher larval loads than others, so the researchers are attempting to get a better understanding of what's actually going on. "It's possible that the ability of a plant to tolerate larvae may be linked to its stem width. It's reasonable to suspect that plants with thicker stems are in a better position to put up with larval feeding. We're looking at pot trials and producing plants with different stem widths and infesting them to assess how they tolerate the feeding of the larvae."

Another unknown is whether adult CSFB prefer certain growth stages of OSR, with some evidence suggesting that the youngest stages are favoured. Choice experiments are being carried out at HAU to establish their preference and this will help understanding of adult migration, how migrating adults choose fields, and may



Monitoring shows adult numbers were as high this autumn as in 2019 but damage was generally not as great, reflecting better soil conditions during establishment.

help inform how to use trap cropping to best effect, he adds.

The final aspects of the pest's biology being investigated is the relationship between adult numbers in the autumn and crop damage, and the relationship between the number of scars on the plant and the number of larvae within them.

"Together these pieces of research will help us to better predict the phenology and impact of the CSFB so we can understand risk, target treatments and predict damage more accurately," adds Sacha.

The second part of the new project involves standard field trials, but it also takes IPM strategies out into a wider network of farm trials and this is where the whole industry is pulling together, explains Charlotte.

"These may be ADAS trials, project partner trials, tramline trials or farm-scale

The beauty of establishment

For many growers, while decent yields are a bonus when it comes to growing OSR, of far greater importance is getting the crop established in the first place. Recognising this, Oilseed YEN ran an 'establishment beauty contest' last autumn in an effort to gather data and learn more about the factors that lead to good OSR establishment, explains ADAS' Dr Sarah Kendall, who runs the Oilseed YEN.

"48 crops were assessed for plant establishment and were judged on the evenness of plant spacing, uniformity of plant size, plant vigour, plant health and the absence of weeds."

Even though there's a limit to the interpretation of data from 48 crops, Sarah says there were some statistically significant outcomes when looking at the top 50% of entrants (76% establishment) compared with the bottom 50% (40% establishment).

"The sowing date was significant, with the top 50% averaging the 25 Aug, whereas the less well established 50% had an average sowing date that was 10 days earlier on 15 Aug."

CSFB pressure was the same across both groups — with an average of 4% damage. Sarah says that the pest wasn't a key driver of the difference between the two groups since the pressure wasn't generally high in either group.

Sarah points out that the results shouldn't make 25 Aug a target date but does highlight the importance of soil conditions. "Waiting for the right soil conditions when sowing OSR can be very advantageous, and we'll look into the weather data in more detail to understand the contribution of temperature and rainfall to establishment."

Row width also showed a significant difference, with the best-established crops drilled at 30cm and the least-well established at 41cm. Although the findings aren't necessarily a surprise, says Sarah, it highlights the need to think carefully about optimising plant spacing.

"There was also a variety effect, with a higher proportion of hybrids in the top group (86%) than in the bottom group (67%). Careful selection of variety in terms of speed of development in the autumn and matching with target drilling date is



Sarah Kendall says analysis of the autumn Oilseed YEN data showed sowing date had a statistically significant effect on establishment, with later sowings more successful.

also important," she notes.

When it came to establishment methods and the way crop residues were managed none of the differences were of any statistical significance. Similarly there were negligible differences when it came to inputs, including the number of insecticide applications.

Research roundup

From Theory to Field is part of AHDB's delivery of knowledge exchange on grower-funded research projects. *CPM* would like to thank AHDB for its support and in providing privileged access to staff and others involved in helping put these articles together.

AHDB Project No 21120185 'Reducing the impact of CSFB on OSR in the UK' aims to improve understanding of the pest's biology and investigate alternative management methods. It runs from July 2020 to July 2023 at a cost to the sector of £240,000. Additional funds (£42,000) and in-kind contributions (£268,520) are provided by some of project's industry partners to meet the £550,520 total project cost. The project is led by RSK ADAS in scientific partnership with Harper Adams University. Industry partners are BASF, Bayer, Cotton Farm

Consultancy, DSV, Elsoms, Frontier, Innovative Farmers, KWS, Limagrain, Syngenta, Tuckwells, United Oilseeds and Yara.

'CSFB: evaluating management of oilseed rape on-farm for maximum margins' is led by NIAB and funded by Defra. It aims to test management methods on a wider scale, encouraging growers to carry out their own trials and assess their effectiveness. Csfb-SMART connects the AHDB and Defra-funded projects.

Oilseed YEN establishment beauty contest received £7700 of AHDB funding. The winners were Robert Fleming, Scottish Borders (early drilled, up to 14 Aug), sponsored by Limagrain; Stuart Russell, Lincs (normal drilled, 15-31 Aug) sponsored by DSV; and Rob Fox, Warwicks (late drilled, 01 Sept onwards) sponsored by AHDB.

trials. The idea is that ADAS will bring together all of the information gained and come up with ways of optimising and combining techniques," she says.

Sacha explains that there are 16 trials in the project this year and these will primarily test the control measures which either help avoid the pest, such as sowing date to avoid the main migration period, or will mitigate against it — such as crop nutrition or PGRs. Other measures being evaluated include companion cropping, establishment methods, stubble length, use of organic amendments and varietal variations.

Even though the project is in its infancy

there are some interesting observations already, says Sacha. "Adult monitoring last autumn found a huge variation in between sites. It was interesting because there were reports from the field that CSFB numbers were low but in some of the trials the traps were showing the numbers were just as high as in previous years but with less damage than usual.

Sacha also highlights a drilling date trial carried out this autumn. "Survey data shows that early drilling results in less adult damage but higher numbers of larvae so we wanted to show this held true in a trial.

"The areas drilled at the beginning of Sept



The damage caused by larvae is becoming increasingly important as winters have become milder, which enables prolonged egg laying and larval invasion.

were wiped out completely as this coincided with the peak migration. The late Aug and mid-Sept drillings survived the adult damage well but by Nov the mid-Sept drill date had ten times fewer larvae than the late Aug drill date, so drilling date seems to have a very strong and reliable effect. We'll follow these crops through the spring and take them to harvest to see how the effect of drill date carries through."

As well as this research, the AHDB project is collaborating with a wider Defra-funded project being run by NIAB — csfb-SMART — which will show how the different interventions are working on a much larger scale (see panel below). ■

Collaboration makes sense

When NIAB were awarded a grant by Defra to fund farmer/farm-scale field trials, the obvious thing to do was to liaise with AHDB to make sure all the research was travelling in the same direction, explains NIAB's break crop specialist Colin Peters.

The project has been named csfb-SMART — which stands for Sharing Management and Agronomy Research Tools — and is supported by more than 20 commercial partners. Colin is hopeful it will help the industry understand a lot more about how the pest behaves at a field scale.

"We have to learn to live with CSFB because everything we do now will be in the presence of the pest. The aim is to get growers together and carry out standardised monitoring to assess which methodologies are working and to share that information."

He describes the project as an 'open book' and says it will evolve as it progresses. "The only prescriptive element will be to help growers

monitor CSFB and larvae better. The data we gather will produce more fact-driven information about factors such as drilling dates, weather effects on drilling, fertiliser requirements and how the beetle is behaving in crops."

In fact Colin sees the purpose not as collecting data but more collecting evidence that will help farmers know how to successfully establish the crop and what to do to keep it successful through its lifetime without succumbing to CSFB.

Csfb-SMART is in its very early days but in the first three weeks, 150 people have expressed an interest, with 49 attending the first webinar which took place in early March. Participants are given an option of how involved they'd like to be, with hosting trials for the most enthusiastic to receiving the data outcomes for others with a less hands-on interest. A survey has recently gone out to interested parties with the aim of getting smaller, like-minded groups together so that the on-farm trials are coordinated.



Colin Peters explains the aim of csfb-SMART is to get growers together, standardise monitoring and share what's working on farms.

"OSR is a good break crop and has no obvious replacement in the rotation. We hope to pinpoint the things that work and note varietal interactions with larval load and how this may change geographically. The funding is to get techniques out onto farms and is open to all — those who are currently growing OSR and those who are having a break from the crop," says Colin.