How researchers hope to solve the saddle gall midge threat in cereals

The loss of insecticide chlorpyrifos highlights the need for an integrated control strategy for sporadic pests such as the saddle gall midge. *Sarah Henly* asks lead researcher Steve Ellis how we can prepare for a high-risk year

The insecticide chlorpyrifos can no longer be used to control saddle gall midge in cereal crops

Taking an integrated approach will be crucial for the future control of saddle gall midge as, unlike orange wheat blossom midge, there are no approved chemical control options, nor cereal varieties offering tolerance.

That's because from this month (1 April), the only permitted use of chlorpyrifos will be the protected brassica seedling drench treatment applied via an automated gantry sprayer.

However, saddle gall midge has kept a low profile in recent years, giving us time to come up with other measures to predict risk and reduce the threat, says Steve Ellis of Adas, who is leading the project on risk assessment and monitoring to facilitate forecasting of outbreaks.

"The last bad infestation took place in 2011, when high spring temperatures encouraged early midge hatch and egg laying, particularly in winter wheat. Anecdotal evidence suggested yield losses of 70% in localised areas weren't uncommon that year.

"Fortunately for growers, they haven't been a widespread problem since then, although it has hindered our work on developing thresholds."

EMERGENCE

The adult midges commonly emerge from their overwintering sites in the soil in May or early June. After mating, the larger females lay their red eggs in rafts along the leaf veins on the upper and lower surfaces of cereal and grass leaves.

Eggs hatch within two weeks and the newly hatched larvae move down the leaves to feed on the stem underneath the leaf sheath, where their feeding activity causes the formation of the characteristic saddle-shaped galls.

Once larvae achieve maturity in July, they fall off the stems and seek refuge in small hollows within the soil, where they remain until the following spring. They pupate in April and eventually emerge as adults in May.

Dr Ellis is trying to understand more about their life cycle and relationship to the weather. There is no doubt saddle gall midge activity is temperature and moisture dependent. Further knowledge could help to predict emergence, as has been done for orange wheat blossom midge.

"What we would like to know is can we use soil sampling to monitor midge development and predict the likely timing of the emergence of the adults?

PREDICTING RISK

"We are testing promising computer models developed at Harper Adams University by AHDB PhD student Charlotte Rowley and we are looking at field monitoring using yellow water traps as another useful risk assessment tool. Prototype pheromone traps also developed at Harper are also proving very effective at catching adult midges."

Investigating links between the pest and yield is proving complex. There is no clear relationship between gall number and yield. This may be due to lower pest infestation levels generally in recent seasons. It is also likely that the timing of gall formation plays a part.

Dr Ellis has established trials to validate provisional control thresholds and evaluate the efficacy of a range of off-label approvals and timing for midge control.

"In trials, insecticides targeted at the first appearance of saddle gall midge adults were generally most effective at controlling the pest. Sprays targeted at the larvae were ineffective. Lambda-cyhalothrin and thiacloprid both gave good control of saddle gall midge and a single spray of lambda-cyhalothrin was as effective as a programme of sprays of this active."

There's an interesting new lead in the hunt for a solution to saddle gall midge, in the form of a potential biological control agent. The entomopathogenic fungus, Lecanicillium spp, has been identified as a potential parasite of the larvae in North Yorkshire.

"Finding out how widespread the fungus is in soil will be the next step. We hope it will be something we can work into an integrated control strategy," concludes Dr Ellis.

AHDB perspective by *Caroline Nicholls*

Research and knowledge transfer manager

"Although the last serious outbreak of saddle gall midge was some five years ago, wheat and barley crops remain vulnerable to yield loss, particularly when adults emerge early and in large numbers. This research should improve our understanding of the midge's life cycle, develop ways to forecast infestations and start to develop an integrated pest management strategy for high-risk seasons."

Research reasons

This project is helping us to understand more about the saddle gall midge lifecycle and its effect on yield, with the aim of formulating an integrated control strategy.

Project: Improving risk assessment and control of saddle gall midge (Haplodiplosis marginata)

Timescale: February 2013-March 2016

Researchers involved: Adas and Harper Adams University

Funders: AHDB and Dow AgroSciences

Cost: £89,500

Key points

- Midge infestation generally reduces grain size and the effect may increase with earliness of hatch
- Monitoring soil for larvae and pupae and modelling with weather data can help to predict timing of emergence
- Insecticides targeted at adult midges were most effective at reducing infestation