

## Final Project Summary

<b>Project title</b>	Improving risk assessment and control of saddle gall midge ( <i>Haplodiplosis marginata</i> )		
<b>Project number</b>	RD-2012-3806	<b>Final Project Report</b>	PR568
<b>Start date</b>	February 2013	<b>End date</b>	March 2016
<b>AHDB Cereals &amp; Oilseeds funding</b>	£89,547	<b>Total cost</b>	£89,547

### What was the challenge/demand for the work?

Saddle gall midge is a sporadic, but periodically and locally-important, pest of wheat, barley, rye and oats in the UK. Severe, widespread outbreaks occurred in continuous cereals on heavy land in 2010 and 2011, from Wiltshire to the Scottish Borders, with yield losses in the most severe cases reaching 70%. The occasional nature of the pest in the UK means that experience of the problem amongst researchers, agronomists and the farming community is minimal, when compared to more common pests such as aphids or wheat bulb fly. This project intended to address this knowledge gap.

The limited literature available on saddle gall midge was summarised in HGCA Research Review No 76 'Ecology and control of saddle gall midge *Haplodiplosis marginata* von Roser (Diptera: Cecidomyiidae) (Dewar, 2012). The review discussed life history, distribution and abundance, host plant preferences, forecasting and monitoring, crop damage and control measures. AHDB Information Sheet 50 'Saddle gall midge' summarised the main areas of the review. Both the Review and the Information Sheet were used to help scope this project.

### How did the project address this?

This project draws on the results of the previous AHDB Cereals & Oilseeds funded monitoring to improve our understanding of the biology of saddle gall midge and to develop a better informed risk assessment methodology for the pest. The main objectives of the project were:

1. To monitor midge development in relation to meteorological data to improve understanding of the pest's life-cycle to facilitate improved forecasting of outbreaks.
2. To measure the impact of midge infestation on crop yield of wheat and barley
3. To evaluate the efficacy of a range of timings and products for midge control
4. To use data from objectives 1-3 to propose provisional thresholds for saddle gall midge

While the Agriculture and Horticulture Development Board seeks to ensure that the information contained within this document is accurate at the time of printing, no warranty is given in respect thereof and, to the maximum extent permitted by law, the Agriculture and Horticulture Development Board accepts no liability for loss, damage or injury howsoever caused (including that caused by negligence) or suffered directly or indirectly in relation to information and opinions contained in or omitted from this document. Reference herein to trade names and proprietary products without stating that they are protected does not imply that they may be regarded as unprotected and thus free for general use. No endorsement of named products is intended, nor is any criticism implied of other alternative, but unnamed, products.

AHDB Cereals & Oilseeds is a division of the Agriculture and Horticulture Development Board (AHDB).

## Final Project Summary

This project also closely liaised with an AHDB Cereals & Oilseeds PhD studentship (Project number 214-0002) entitled 'Investigating the effect of natural enemies and environmental conditions on soil populations of saddle gall midge (*Haplodiplosis marginata*)' undertaken by Charlotte Rowley at Harper Adams University which began on 1 October 2013.

### What outputs has the project delivered?

Soil sampling was an effective method of assessing levels of saddle gall midge and monitoring its development. Detection of midge pupation provides an early warning of adult emergence and is an important component of risk assessment for the pest. A fungal parasite *Lecanicillium* spp of midge larvae was identified and had a dramatic effect on larval development such that few became pupae. Yellow water traps were more effective than yellow sticky traps or emergence traps at catching saddle gall midge adults. In collaboration with Harper Adams University developmental models using soil and air temperature were evaluated and predicted the timing of pest emergence to within eight days. Also prototype pheromone traps were tested and were very effective at trapping adult male saddle gall midge.

There was no clear relationship between larval infestation and crop yield probably due to the low level of pest infestation throughout the project. Chemical control of saddle gall midge reduced tiller infestation by up to 92%, but had no impact on crop yield indicating that damage does not always equate to loss of yield. A single spray of lambda-cyhalothrin generally resulted in the lowest levels of pest infestation (Figure 1). Sprays targeted at the first appearance of saddle gall midge adults were generally most effective at reducing pest infestation but those targeted at larvae were ineffective (Figure 2).

## Final Project Summary

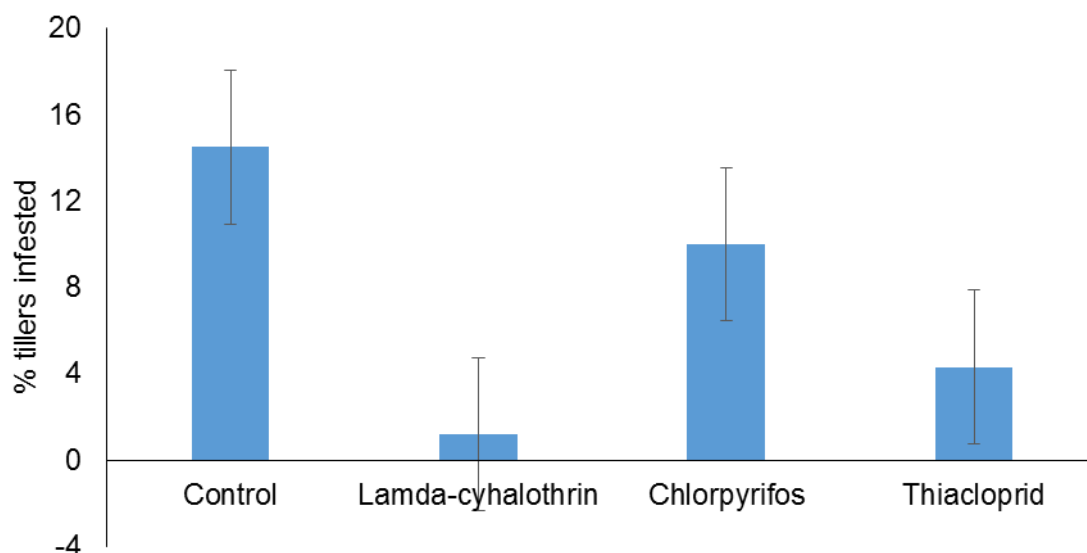


Figure 1. Efficacy of a range of insecticides for control of saddle gall midge at Royston, Cambridgeshire 2015 (Bars are LSD values,  $P < 0.05$ ).

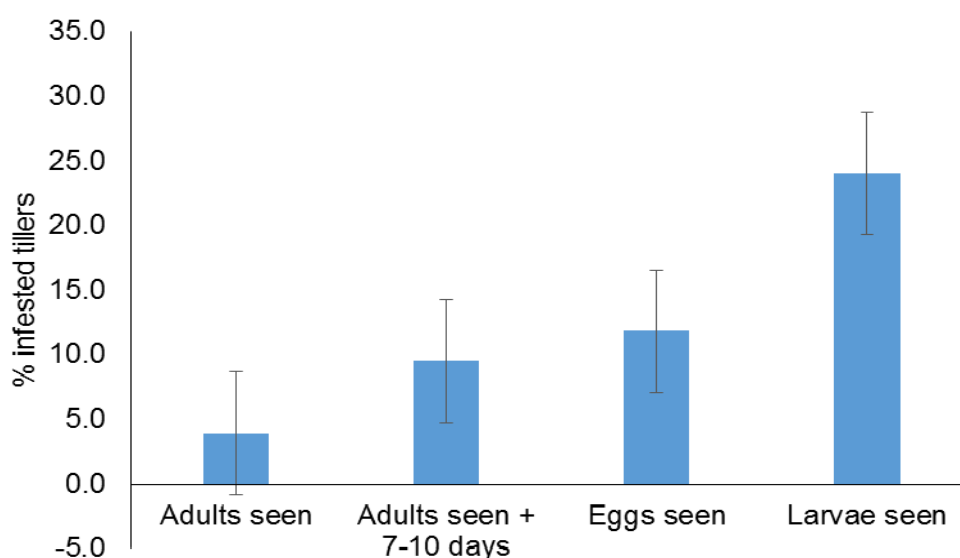


Figure 2. Efficacy of insecticide sprays applied at a range of timings for control of saddle gall midge at Wendover, Buckinghamshire 2014 (Bars are LSD values,  $P < 0.05$ ).

While the Agriculture and Horticulture Development Board seeks to ensure that the information contained within this document is accurate at the time of printing, no warranty is given in respect thereof and, to the maximum extent permitted by law, the Agriculture and Horticulture Development Board accepts no liability for loss, damage or injury howsoever caused (including that caused by negligence) or suffered directly or indirectly in relation to information and opinions contained in or omitted from this document. Reference herein to trade names and proprietary products without stating that they are protected does not imply that they may be regarded as unprotected and thus free for general use. No endorsement of named products is intended, nor is any criticism implied of other alternative, but unnamed, products.

AHDB Cereals & Oilseeds is a division of the Agriculture and Horticulture Development Board (AHDB).

## Final Project Summary

Levels of saddle gall midge were generally too low to make any progress on the development of a threshold for the pest and there was no evidence to suggest that the larval threshold of greater than 500 larvae/m<sup>2</sup> should not continue to be used until experimental evidence suggests otherwise.

A basic IPM strategy is proposed for the pest which takes into account individual field risk, pest numbers, monitoring of pest development and the timing of adult emergence to determine the need for insecticide treatment. The project should help to reduce the unpredictability of saddle gall midge attack and help to minimise unnecessary insecticide treatment against the pest.

### Who will benefit from this project and why?

The project will benefit farmers and agronomists by improving what is known about saddle gall midge. In particular information is provided on how best to monitor the pest, how it may impact on crop yield and if pest levels justify chemical control, which are likely to be the best products and when they should be applied for optimum efficacy. The main problem with this pest is its unpredictability and this project provides a basic IPM strategy which can be developed in order to ensure that the potential for unforeseen and damaging outbreaks is minimised.

### If the challenge has not been specifically met, state why and how this could be overcome

Levels of saddle gall midge were generally too low to make any progress on the development of threshold. Results showed that despite up to 33% plant infestation, 18% tiller infestation and 0.7 galls/tiller there was no impact on yield. The current threshold of greater than 500 larvae/m<sup>2</sup> should continue to be used until experimental evidence suggests otherwise.

<b>Lead partner</b>	Dr Steve Ellis, ADAS UK Ltd
<b>Scientific partners</b>	N/A
<b>Industry partners</b>	Some funding was received in year 1 of the project from Dow AgroSciences to help monitor saddle gall midge in soil.
<b>Government sponsor</b>	N/A

While the Agriculture and Horticulture Development Board seeks to ensure that the information contained within this document is accurate at the time of printing, no warranty is given in respect thereof and, to the maximum extent permitted by law, the Agriculture and Horticulture Development Board accepts no liability for loss, damage or injury howsoever caused (including that caused by negligence) or suffered directly or indirectly in relation to information and opinions contained in or omitted from this document. Reference herein to trade names and proprietary products without stating that they are protected does not imply that they may be regarded as unprotected and thus free for general use. No endorsement of named products is intended, nor is any criticism implied of other alternative, but unnamed, products.

AHDB Cereals & Oilseeds is a division of the Agriculture and Horticulture Development Board (AHDB).