Annual Project Report
August 2019 to July 2020

Project title	Management of aphid and BYDV risk in winter cereals		
Project number	21120077a		
Start date	26 August 2019	**End date**	31 December 2022

Project aim and objectives

This project aims to improve management of BYDV through the development of effective and economical BYDV vector monitoring and decision support systems (DSS) for employing cultural and chemical control.

Objective 1. Optimising monitoring for BYDV

1.1 To minimise in-field monitoring effort by understanding the zone around suction traps in which data on suction trap aphid numbers and % viruliferous aphids (the % of aphids carrying the virus) is a reliable indicator of in-field BYDV risk.

1.2 To determine the relationship between aphid numbers in crops and those in suction traps and in-field traps, enabling monitoring data to be linked with predictive risk models.

1.3 To determine if monitoring effort and cost can be reduced by using image analysis to identify cereal aphids in traps.

1.4 To provide a report on a cost-effective and practical BYDV monitoring service.

Objective 2. Development of both a BYDV risk DSS and a BYDV spray DSS

2.1 To develop a 'risk DSS' to predict BYDV risk based on agronomic and other factors.

2.2 To develop a 'spray DSS' to predict the need for an insecticide treatment.

2.3 To assess ability of the risk DSS and spray DSS to predict levels of BYDV in the spring.

2.4 To determine the performance of the spray DSS in trials.

2.5 To understand the effect of virus tolerant winter barley varieties on BYDV management.

Objective 3. Knowledge exchange and reporting

3.1 To disseminate and report outputs to the industry.

Key messages emerging from the project

- Very low aphid pressure was recorded from late October in 2019, which was likely due to high rainfall across much of the country. This highlights the importance of weather in determining virus risk.
- First year results suggest that sufficient numbers of BYDV aphids need to be caught in in-field traps to reliably gauge virus pressure in-field.
- Aphids were caught in in-field traps when aphid populations were very low, suggesting that traps can provide a reliable indicator of aphid presence, even when aphid pressure is low.

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Summary of results from the reporting year
Obj. 1.1: Aphid numbers and % viruliferous aphids were monitored in in-field traps (water and sticky traps) in 24 fields around three suction traps (Brooms Barn, Newcastle and Starcross) in autumn 2019. Low numbers of aphids were found in suction and in-field traps. The % viruliferous aphids varied between suction traps and over time. In the autumn, the highest % viruliferous aphids was 58% at Starcross and the lowest was 6% at Broom Barn. The % of aphids that were viruliferous in in-field traps was similar to that in the local suction trap only when sufficient numbers of aphids were caught in in-field traps. Obj. 1.2: Aphid numbers were assessed in untreated areas of crops at 12 sites in the autumn. Low aphid numbers were found at all sites but aphids were still caught in in-field traps. Very few BYDV symptoms were seen in the spring. Obj. 2.1: A prototype risk DSS has been developed. It predicts BYDV risk in the autumn based on aphid numbers, % viruliferous aphids, drill date and crop location. Obj. 2.2: A prototype spray DSS has been developed. This combines elements of two previous models and predicts whether an insecticide spray is economic based on aphid numbers, % viruliferous aphids, drill date, location, weather, plant populations, crop type, intended market and spray costs.

Key issues to be addressed in the next year
• Include impact of BYDV-tolerant barley varieties in the risk and spray DSS. • Test spray DSS in six tramline trials and a plot trial. These will be sited across the UK, including at Strategic Farm East, and will compare the spray DSS developed here with the current AHDB T-SUM model and untreated areas. Aphid numbers, BYDV symptoms, yield and economics of BYDV control will be compared. • Adapt the spray DSS based on trial results. • Monitor 36 sites around three suction traps (Hereford, Starcross and Yorkshire) to further understand the reliability of relying on local suction trap data. • Monitor aphid populations in untreated areas in six fields to further understand the relationship between crop infestations and numbers of aphids caught in local suction traps and in-field traps. • Validate the risk DSS through BYDV surveys.

Lead partner	ADAS
Scientific partners	Rothamsted Research
Industry partners	Syngenta UK Ltd, KWS UK Ltd, Limagrain UK, BASF Digital Farming GmbH

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Government sponsor	n/a
Has your project featured in any of the following in the last year?	
Events	***Press articles***
ADAS Farming Association conferences – autumn 2019 (Boxworth, Gleadthorpe, High Mowthorpe and Rosemaund). ADAS Farming Association virtual conference – 14 October 2020	"Seeking better BYDV management decisions" – Arable Farming, July 2020. "Staying ahead of BYDV" – Crop Protection Magazine, September 2020.
Conference presentations, papers or posters	***Scientific papers***
Other	