Grower Summary

FV 406

Brassicas: Integrated management of whitefly, *Aleyrodes proletella*

Final 2013

Disclaimer

The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

Use of pesticides

Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.

Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

Further information

If you would like a copy of the full report, please email the HDC office (hdc@hdc.ahdb.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

HDC
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

Tel – 0247 669 2051

HDC is a division of the Agriculture and Horticulture Development Board.

Project Number:	FV 406
Project Title:	Brassicas: Integrated management of whitefly, *Aleyrodes proletella*
Project Leader:	Simon Springate/John Colvin
Contractor:	University of Greenwich
Industry Representative:	Andy Blair, Emmett UK Ltd
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Headline

Early insecticide applications based on monitoring proved as effective as periodic applications in controlling whiteflies on kale. Two applications of a coded product were comparable to existing systemic products. Releases of parasitoid wasps provided control levels equivalent to insecticides at the point of release.

Background

The Brassica whitefly, *Aleyrodes proletella*, has become an increasing problem in Brassica horticulture, particularly on Brussels sprouts and kale. The reasons for this are likely to be complex, with climate and weather being significant factors. Loss of insecticides, pyrethroid resistance and difficulty in targeting the pest may also play roles. Over-reliance on registered systemic products may lead to further resistance development. Natural enemies of the native whitefly such as parasitoid wasps may prove useful as a component of pest management systems.

Summary of the project and main conclusions

The aim of the project was to field test the impact of releasing parasitoid wasps (*Encarsia tricolor*) on whitefly-infested kale and to explore the effect of early insecticide applications, including a novel coded product, based on monitoring of whitefly populations. The work was undertaken by staff of the Natural Resources Institute (NRI; University of Greenwich), Allium & Brassica Agronomy Ltd. and Elsoms Seeds.

An experimental field trial was carried out in 2012 on 9 x 9 plant kale plots in Lincolnshire. Each treatment (Table 1) was applied to four plots. Netting was applied after whitefly had begun to infest the crop, to assess the effect of restricting parasitoid dispersal. Early applications of Movento (Spirotetramat) and a coded product (HDCI 039) based on monitoring of whiteflies were compared with a spray regime similar to that used in the industry for control of heavy whitefly infestations. Due to production difficulties, parasitoids were released at lower numbers over a more prolonged period than planned. To partially compensate for this, measures of whitefly numbers were carried out from the centre of plots (the point of parasitoid release) to the edge.

Table 1. Experimental treatments applied in the field trial

	Treatments	
A.	**Control**	(no insecticide/biocontrol)
B.	**Netting Control**	
C.	**Encarsia**	(early *Encarsia tricolor* release)
D.	**Encarsia + Movento**	(early *Encarsia tricolor* release + late Movento)
E.	**Net + Encarsia**	(Netting with early *Encarsia tricolor* release)
F.	**Movento (early)**	
G.	**HDCI 039 (early)**	(coded product; 2 applications, 10 days apart)
H.	**'Industry'**	(Movento, Biscaya, Movento. approx. 1 month apart)

Whitefly levels on the trial site were higher than on crops in the region in 2012. All insecticide applications had a significant impact on pest infestations. The coded product had an immediate impact on adult numbers and thereby egg-laying, whereas the registered treatments showed a lag in mortality, resulting in slightly higher egg numbers. There was no difference between the two registered treatments (F and H). These early effects were reflected in later assessments of larval density and leaf quality (Fig. 1). There was little evidence that late 'Movento' applications had an influence in either the combined parasitoid treatment or the 'Industry' rotation, though rainfall after application may have impaired activity.

The netting treatments reduced levels of adult whiteflies compared to uncovered control plots, suggesting that immigration of insects onto crops took place over a period of at least a month. Parasitoid treatments had a limited impact on whitefly levels and contamination overall but there was evidence of reductions to levels approaching those found in insecticide treatments close to the point of release (Fig. 2). Levels of parasitism outside of release plots were negligible, with two other parasitoid species found at low levels in samples.

In 2012 whitefly levels were low on commercial crops in the region and whilst this trial suggests pest management components and strategies that are clearly effective, the trial took place at a single location in one year and results may differ under different conditions.

Further work should explore the optimal combination and timing of insecticide products and other control measures, driven by monitoring and/or prediction of whitefly infestations. Understanding annual movements of whitefly adults in the agricultural landscape and the period of immigration into the crop would also have value as would the opportunities for integrating biological, cultural and chemical controls.

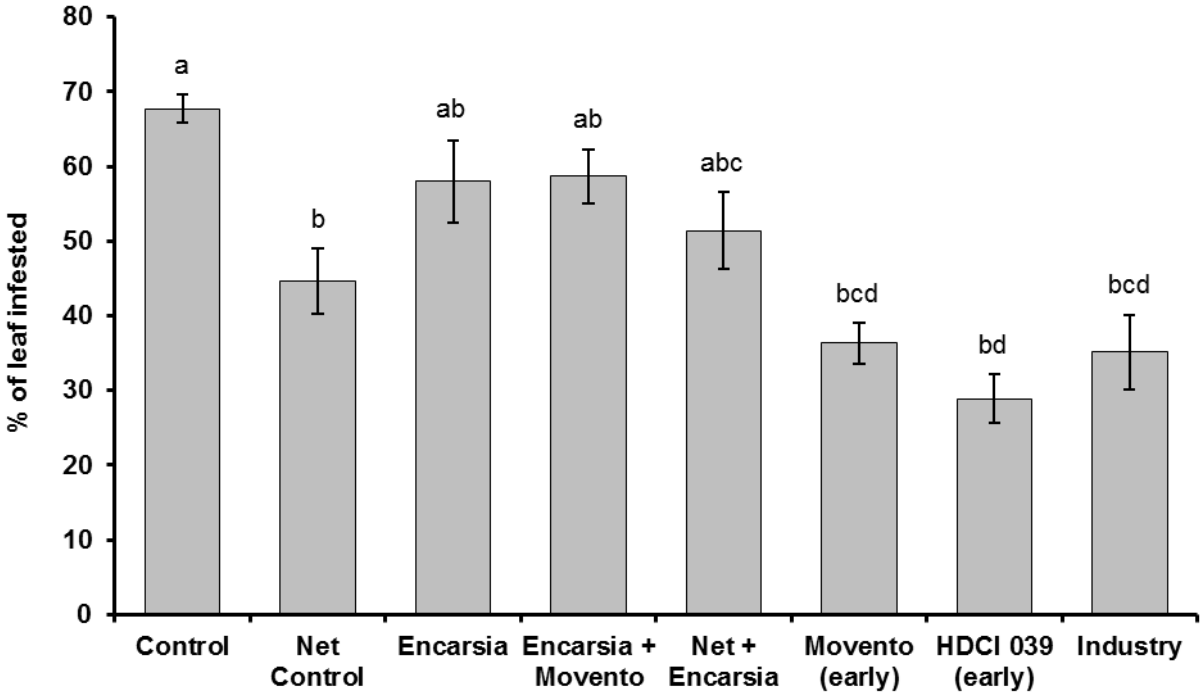

Figure 1. Mean percentage contamination of leaves in each treatment at harvest and in a crop in the same region.

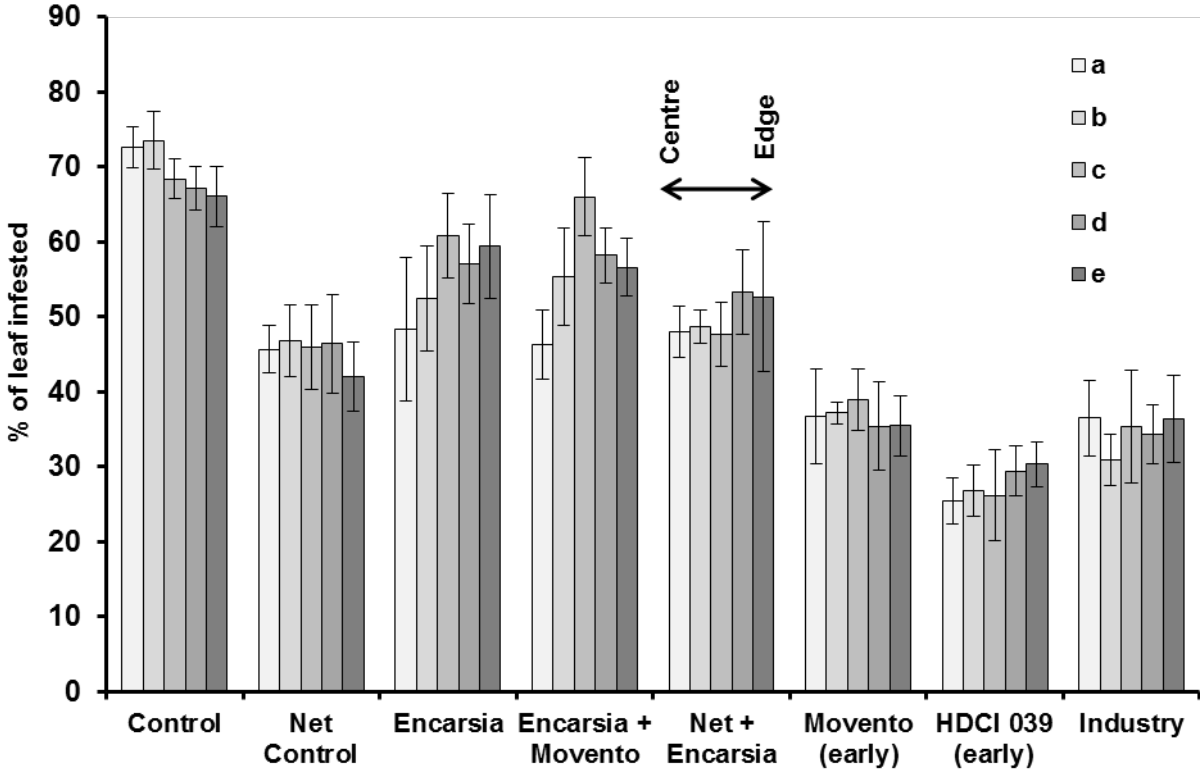

Figure 2. Mean percentage contamination of leaves in each treatment at different positions in plots.

Financial Benefits

Brassica crops occupy more than 32,000ha and have an annual market value of about £160 million (HDC, 2010). While a limited proportion of this total consists of crops economically damaged by whiteflies in practice, other Brassicas may act as pest reservoirs for nearby or following susceptible crops.

Losses due to whiteflies are difficult to quantify, as the impact on yield is through rejection of produce within the supply chain. Also, whitefly pest pressure varies from year to year and so the annual impact is variable. The Brassica crops most affected by the presence of whitefly and associated contamination/quality issues are Brussels sprouts and particularly kale. The research carried out by this project has shown that a novel coded product can provide effective control and that early insecticide applications produced a similar impact to regularly spaced applications throughout the period of crop growth. Reduction in number of applications would reduce costs, but this may be offset by staff time for monitoring, even if an efficient system was devised.

Estimating unit costs of such parasitoids to the grower is difficult as (a) mass rearing systems for this agent do not already exist, (b) release rates for field scale control have not been determined and would ideally depend on whitefly levels in a particular year and (c) prices per customer would depend on area to be treated, the size of the market and negotiation with suppliers.

Action Points

- Early interventions provided considerable and long-lasting reductions in whitefly populations. This can be done by ensuring that insecticides are applied while the infestation is still in its early stages and preferably when plants are small, to reduce the population at harvest.
- All of the insecticide treatments significantly improved harvest quality of leaves over the control, but the best performance was achieved by the coded product. When the coded product is registered for use in the UK, ensure that it can be applied to kale and Brussels sprouts as part of insecticide rotations.
- At the centres of the plots, the effect of the beneficial insects was equivalent by some measures to that achieved by the insecticides. Substantial releases targeted at an early stage of whitefly infestation may provide control.
- Adult whitefly immigration is clearly a contributing factor to the problem and may take place over a prolonged period. Where possible, site susceptible crops away from older, infested and overwintering crops to limit adult whitefly migration. Also

identifying whitefly overwintering may provide the most efficient target for intervention with cultural, chemical or biological controls.