# Grower Summary

## FV 406a

Brassicas: Improving control of whitefly

Final 2016

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| **Project title:** | Brassicas: Improving control of whitefly |
| **Project number:** | FV 406a |
| **Project leader:** | Rosemary Collier and Simon Springate |
| **Report:** | Final |
| **Previous report:** | February 2015 |
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| **Location of project:** | Warwick Crop Centre<br>University of Greenwich<br>Elsoms Seeds |
| **Industry Representative:** | Andy Blair |
| **Date project commenced:** | 1 March 2014 |
| **Date project completed (or expected completion date):** | 28 February 2016 |

# GROWER SUMMARY

## Headline

Movento was the most effective and persistent insecticide treatment for whitefly control and was particularly effective when applied in July and August, coinciding with soon after the start of the second and third generations of whitefly. Foliar sprays of HDCI 073, HDCI 075, HDCI 085 and HDCI 086 also provided control, but were not as persistent, as did Sanokote seed treatment or crop covers applied in the early stages of growth.

## Background

Whitefly (*Aleyrodes proletella*) is becoming increasingly difficult to control on kale and Brussels sprout in particular. The overall aim of the current project is to improve understanding of the biology and ecology of cabbage whitefly to help growers minimise the development of whitefly infestations and control unacceptable infestations effectively. It focuses particularly on the assessment of novel methods of control and on the timing of the most promising of these together with existing treatments. The specific objectives of the project are described in the Summary. Objectives 1, 3 and 4 were undertaken at Warwick Crop Centre and Objective 2 was undertaken by staff of the Natural Resources Institute (University of Greenwich), Syngenta Bioline, Allium & Brassica Agronomy Ltd., Elsoms Seeds and Warwick Crop Centre in Year 2.

### Summary

***Objective 1: Investigate additional treatments for whitefly control.***

The aim of this objective was to evaluate new products to determine whether they would be effective as part of a programme to control whitefly. Trials were undertaken in 2014 and 2015 (details in Table A). There were two pre-planting treatments – Sanokote (imidacloprid) seed treatment in 2014 and a module drench of HDCI 085 in 2015. As a biopesticide, HDCI 074 was applied more frequently than the other treatments.

**Table A** Trial details in 2014 and 2015

| | Planting date | Treatment date | Assessment dates |
|---|---|---|---|
| 2014 | 13 May | All - 20 Aug, 12 Sep<br>HDCI 074 - 27 Aug, 3 Sep | 7 Aug (Sanokote only), 19 Aug (Sanokote only), 22 Oct |
| 2015 | 28 May | 16 Jul, 12 Aug | 16 Jul (HDCI 085 drench only) 7 Aug, 9 Sep, 2 Oct |

Lower numbers of egg circles, leaves infested with larvae and adults were found on the plants treated with Sanokote throughout the trial in 2014, but these differences were statistically significant on the first assessment date (7 August) only. When all treatments were compared on 22 October 2014 (29 days after the last spray application), the numbers of egg circles, larvae and adults were reduced by Movento, HDCI 075 and HDCI 073, whilst the biopesticide HDCI 074 reduced the numbers of larvae. In 2015, the HDCI 085 drench treatment had little or no effect on any whitefly life stage. On 7 August 2015, 22 days after first spray application, all of the spray treatments had reduced the numbers of all whitefly life stages compared with the untreated control. Movento reduced egg numbers and numbers of leaves with larvae compared with all other treatments. HDCI 085 was the next best treatment reducing egg numbers and numbers of leaves with larvae compared with all other treatments except Movento. Additionally, when considering eggs and larvae, HDCI 075 was more effective than all other treatments except Movento and HDCI 085. Differences in adult numbers were smaller but Movento reduced numbers compared with the drench treatment, HDCI 073 and HDCI 086. On 9 September 2015, 28 days after second spray application, levels of control appeared to have diminished. Only Movento reduced numbers of all whitefly life stages compared with the untreated control. HDCI 085 and HDCI 075 both reduced the numbers of leaves with larvae but not the numbers of eggs or adults. On 2 October 2015, 51 days after second spray application, only Movento reduced the numbers of all whitefly life stages compared with the untreated control. No other treatments reduced numbers of eggs or leaves with larvae but HDCI 085, HDCI 075 and HDCI073 had all reduced numbers of adults. Data for the mean number of leaves with whitefly larvae on the main assessment dates in 2015 are shown Figure A.

***Objective 2: To investigate the efficacy of parasitoid release and crop covers, alone and in combination, in suppressing whitefly infestations.***

The aim in 2014 was to field test the impact of parasitoid releases on whitefly infestations on kale and to explore the effect of covering the crop during the early stages of growth. A production system for the parasitoid wasp *Encarsia tricolor* was established at Syngenta Bioline to provide insects for field release in a trial in Lincolnshire. Unfortunately the parasitoid production collapsed and so part of the trial was re-focused. However, the netting covers significantly disrupted whitefly infestation. This part of the project was continued in 2015 by dividing the rearing process between University of Greenwich and the University of Warwick. Simon Springate produced vials of adult parasitoids at approximately weekly intervals and these were introduced onto kale plants infested with cabbage whitefly which were maintained in a polytunnel at Warwick Crop Centre. Production at Warwick Crop Centre was inconsistent and compounded by regular infestations of *Myzus persicae* which interfered with both whitefly

production and parasitoid rearing. However, despite these problems, each plot was inoculated with an average of 244 parasitoid pupae overall. When the parasitoid pupae had developed in the whitefly larvae (seen as blackened pupae), the pupae were counted and the plants were removed to 10 'isolated' field plots, infested naturally with whitefly, which were separated into 5 pairs based on their location. One plot from each pair was inoculated with plants supporting the parasitoids and one plot was untreated. Unfortunately there were no treatment differences on any assessment date. Paired plots were very similar, the largest differences occurring between different locations. Small numbers of parasitized whitefly larvae were observed, predominantly on the last assessment date in one location.

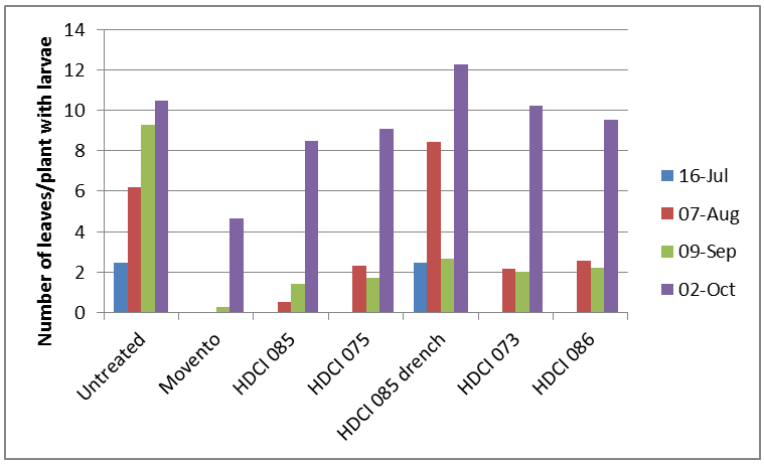


**Figure A** Mean number of leaves with whitefly larvae per plant on four occasions in 2015.

**Objective 3: Investigate the most effective way to use Movento and other effective insecticides in terms of the interval between treatments.**

The aim of Trial 3.1 in 2014 was to investigate the persistence of Movento, Sanokote (imidacloprid) and HDCI 075. The plants (kale) were transplanted on 21 May and sprayed on 20 August. Assessments were made on 7 and 19 August (Sanokote and untreated control only) and on 17 September and 23 October. There were always more whitefly in the untreated control plots than in those treated with Sanokote, but the differences were statistically significant on 19 August only. On 17 September (28 days after spraying), both spray treatments had reduced the numbers of whitefly egg circles, larvae and adults compared with the untreated control. By 23 October (64 days after spraying) there were no differences between treatments in the numbers of adults, but larval numbers were reduced by all treatments and Movento appeared to be having a continued effect on egg numbers.

In 2015 a field trial (Trial 3.2) using kale was transplanted on 28 May. Some of the treatments were grown from seed treated with Sanokote (imidacloprid – for continuity with 2014) (Figure B). Spray treatments with Movento were applied after the start of either the second, third or fourth whitefly generations as indicated by monitoring by Spencer Collins on other plots as part of his PhD project (CP 091). For two treatments, crop covers (0.8mm mesh) were used from transplanting to exclude whitefly adults and were removed at the start of either the second (16 July) or third (12 August) generations. On 8 July (pre-spray) the infestation was relatively low but the Sanokote seed treatment reduced numbers of eggs and adults compared with the untreated control. On 6 August (after Generation 2 spray) all of the sprayed treatments and the covered treatments reduced all whitefly life stages compared with the untreated control. On 11 September (after Generation 3 spray) all treatments except 'Movento 3 + 4' (which had only the Generation 3 spray) reduced the numbers of leaves with larvae. Additionally, both Sanokote treatments and the Movento treatment sprayed at Generations 2 and 3 reduced egg numbers and both Sanokote treatments reduced adults. On 12 October (after Generation 4 spray) both Sanokote treatments and the Movento treatment sprayed at Generations 2 and 4 reduced the numbers of all life stages of the whitefly compared with the untreated control. Movento applied at Generations 2 and 3 reduced eggs and adults. The two covering treatments both reduced the numbers of adults compared with untreated control.

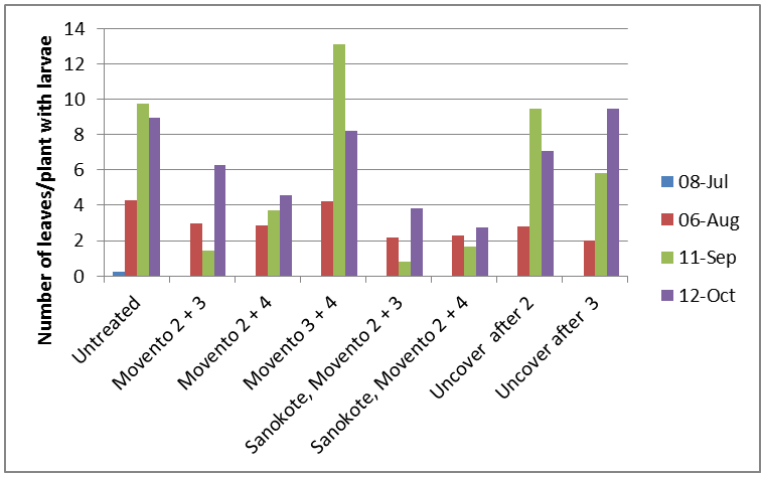


**Figure B** Mean numbers of leaves with larvae per plant in Trial 3.2**.**

**Objective 4: Investigate the most effective overall treatment strategy for whitefly control**

This objective was addressed in 2014 with a field trial using kale transplanted on 21 May (Trial 4.1). For each of the four insecticide treatments, a single spray of Movento was applied soon after the start of either the first, second, third or fourth generations as indicated by monitoring undertaken by Spencer Collins. The sprays were applied on 9 June, 17 July, 20 August or 12 September. The plots sprayed on 17 July had lower numbers of egg circles than the untreated control on all 3 assessment dates, lower numbers of larvae on the first two assessment dates and lower numbers of adults on the last two assessment dates. The plots sprayed on 20 August had lower numbers of larvae and adults on the last assessment date. Overall, a single spray applied either on 17 July or 20 August appeared to reduce the infestation more effectively than sprays on 9 June or 12 September.

The aim of Trial 4.2 in 2015 was to investigate the efficacy of different insecticides applied as two sprays in a four spray programme based on Movento (Figure C). The Movento sprays were applied as the two middle treatments in the programme based on the results obtained in 2014. Kale plants were transplanted on 28 May. There was an untreated control treatment and in the other treatments two sprays of Movento were applied soon after the start of the second and third generations as indicated by monitoring. The other insecticides were applied at the start of the first and fourth generations. The sprays were applied on 29 June, 16 July, 12 August and 18 September. On 15 July (after the first spray) treatment differences were only significant for larvae, with HDCI 073 reducing the numbers of leaves with larvae compared with the untreated control. HDCI 085 also reduced larval numbers but this was not quite significant. On 7 August (after one Movento spray), 8 September (after 2 Movento sprays) and 9 October (after the final coded spray) all treatments reduced the numbers of all life stages compared with the untreated control. There were no significant differences between the treatment programmes.

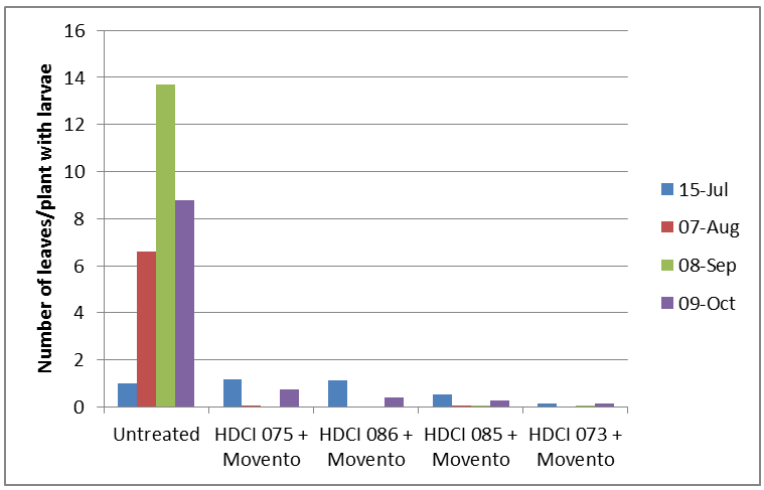

**Figure C** Mean number of leaves with larvae per plant on four assessment occasions.

## Financial Benefits

In recent years the cabbage whitefly has caused considerable reductions to the quality and marketable yield of Brussels sprout and kale crops in particular. As control options are currently limited, additional options and information on how to use current control options more effectively will be very valuable to the industry.

## Action Points

- Application of netting covers for a restricted period following planting can disrupt whitefly colonisation and population growth without impacts on plant growth.
- Growers should try to use the considerable efficacy and relative persistence of Movento to best effect in their spray programmes. Movento was particularly effective when applied in July and August, after the start of the second and third generations of whitefly.
- Sanokote seed treatment with imidacloprid can suppress the development of whitefly infestations, particularly early in the season. It might be expected that Phytodrip treatment with the neonicitinoid thiamethoxam would perform similarly to imidacloprid, although it has not been tested directly.
- Some novel insecticides offer whitefly control and could be used (subject to approval) to augment control with Movento.