Grower Summary

FV 408a

Baby-leaf Cruciferae and Watercress: Improved control of *Scaptomyza flava* (extension to FV 408)

Final 2014

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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 this report, please email the HDC office (hdc@hdc.ahdb.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

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Project Number:	FV 408a
Project Title:	Baby-leaf Cruciferae and Watercress: Improved control of *Scaptomyza flava* (extension to FV 408)
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Report:	Final report 2014
Publication Date:	18 February 2015
Previous report/(s):	None
Start Date:	February 2014
End Date:	July 2015 (extended from 30 November 2014)
Project Cost:	£26,461

GROWER SUMMARY

Headline

Potential products for the control of *Scaptomyza* species have been identified in laboratory based rocket leaf dip tests and in semi-field cage trials. Further work will determine the efficacy of insecticide spray applications in reducing pest damage in a commercial cruciferous baby-leaf crop.

Background

During summer 2009, leaf miners caused serious economic damage to watercress and Cruciferae grown as baby-leaf salads in central, eastern and southern England. In severe cases up to 40% of leaves have been damaged. As a result, growers incurred economic losses resulting from increased pesticide applications, crop rejection and additional packhouse labour inputs. In HDC project FV 376, *S. flava* was identified as the pest responsible for the damage.

In FV 376, crop covers were shown to be the only effective measure for the control of *S. flava* and, as in FV 376 the subsequent project, FV 408, did not identify any effective pesticides in a field trial. However, in HDC project FV 408, two experimental products and spinosad (Tracer) gave effective kill of adult *S. flava* in leaf dip laboratory tests. This project aims to build on previous work and identify insecticides which can provide reliable control of *S. flava* on baby-leaf Cruciferae. The project will also provide information on the behaviour of *S. flava.*

Summary

Culturing *Scaptomyza* sp.

A culture of *Scaptomyza* sp. is maintained at ADAS, Boxworth in insect-proof cages containing rocket. When there are few leaves left for new mines to develop, the adult flies are transferred to a new insect-proof cage containing pots of fresh rocket. The old cage of rocket is left to allow the larvae to mine the leaves and pupate. The new flies are then collected when they emerge and added to a new cage.

Due to difficulties in culturing *Scaptomyza* adults in high enough numbers for the experiments which require over 110-250 flies for good replication, visits to a

commercial crop in East Anglia were made and *Scaptomyza* sp. were collected. *Scaptomyza* sp. were collected successfully by sweeping a net above the crop on a warm still day which resulted in catches of 140 *Scaptomyza* sp. over a two hour period. This method will continue to be used to provide flies for future work. As the adults were collected from the field it is impossible to confirm that each adult is *S. flava* and not another other closely related rocket leaf mining species such as *Scaptomyza pallida.* Therefore this project will now refer to *Scaptomyza* sp.

Objective 1: Determine the survival of *S. flava (*now *Scaptomyza* sp.) adults on pesticide-treated rocket leaves under controlled laboratory conditions.

The survival of *Scaptomyza sp.* adults on pesticide-treated rocket leaves under controlled laboratory conditions was determined. A fully expanded rocket leaf was dipped into the insecticide treatment to represent spraying to run-off. The leaf was allowed to dry on a mesh tray before being placed in a ventilated container with a piece of cotton wool soaked in 1:1 solution of honey and water as a food source for the adult flies. Two *Scaptomyza* sp. adult flies were added to each container.

The experiment consisted of 11 treatments (Table 1) with five replicate containers each (10 flies per treatment- 110 flies in total). After 24 and 48 hours the numbers of live and dead flies were counted.

Table 1 Treatments used in Objective 1

Trt. Num	Treatment name/code	Active ingredient	Rate	Approval status on outdoor rocket
1	Untreated	Water	300 litres of water per hectare	-
2	HDCI 059	-	-	Not approved (approved on certain other crops in UK)
3	Hallmark	lambda-cyhalothrin	75 ml/ha in 300 litres of water per hectare	EAMU 0636/2006
4	Movento	spirotetramat	0.5 l/ha in 300 litres of water per hectare	EAMU 2410/2010
5	Tracer	Spinosad	200 ml/ha in 300 litres of water per hectare	EAMU 1290/2008
6	HDCI 045	-	-	Not approved in UK
7	HDCI 046	-	-	Not approved (approved on certain other crops in UK)
8	HDCI 047	-	-	Not approved in UK
9	HDCI 062	-	-	Not approved in UK
10	HDCI 060	-	-	Not approved in UK
11	HDCI 061	-	-	Not approved in UK

After 24 hours, HDCI 060 and Tracer were the best performing products reducing the mean number of live *Scaptomyza* flies to 0 and 0.2 respectively (Figure 1). After 48 hours, Tracer, HDCI 060, HDCI 045, HDCI 047, and HDCI 061 were the best performing products reducing the mean number of live *Scaptomyza* flies per pot to 0, 0, 0.2, 0.4, and 0.6 respectively (Figure 2).

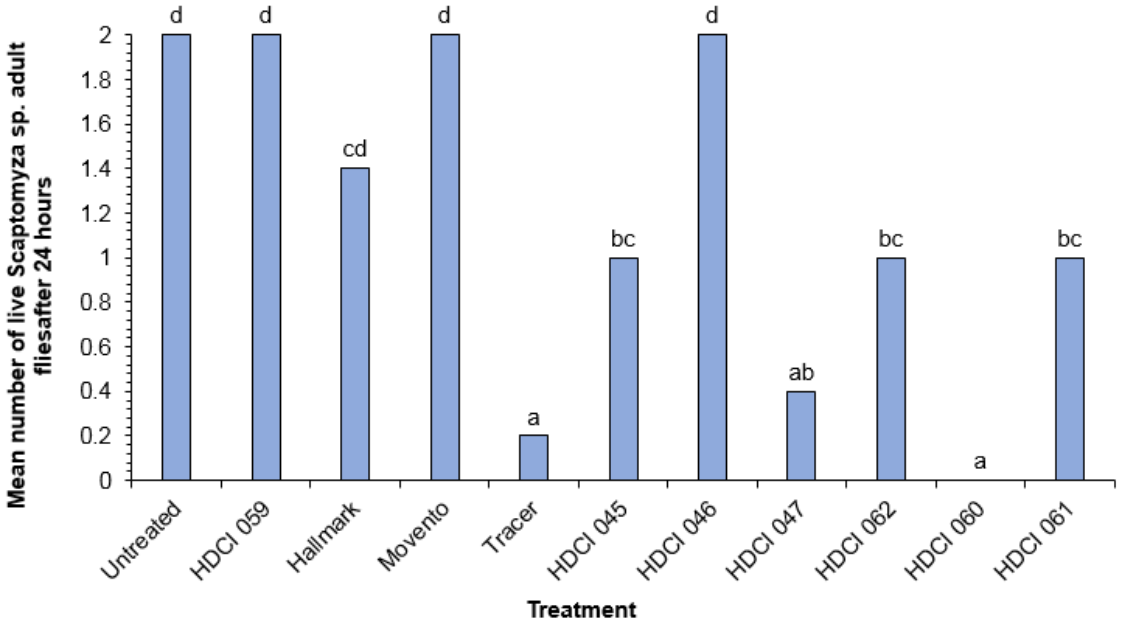

Figure 1 The mean number of live *Scaptomyza* sp. adult flies alive after 24 hours (treatments that share the same letter are not significantly different from each other).

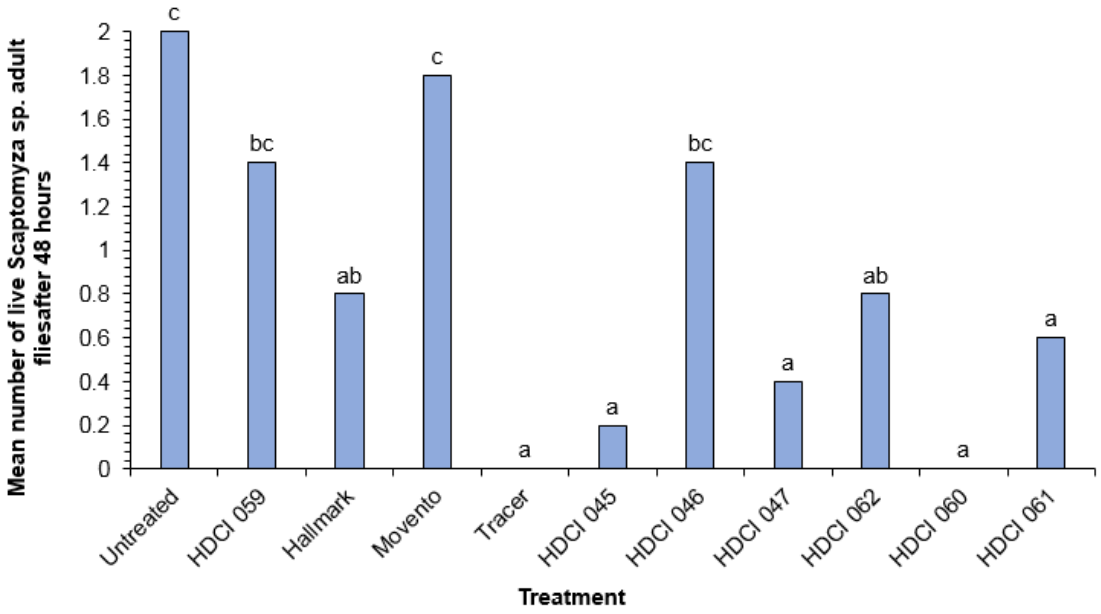

Figure 2 The mean number of live *Scaptomyza* sp. adult flies alive after 48 hours (treatments that share the same letter are not significantly different from each other).

Objective 2: Record the survival and leaf puncturing damage of *S. flava (*now *Scaptomyza* sp.) adults on whole rocket plants following spray application under semi-field conditions.

The experiment consisted of five treatments including an untreated control. Four of the best performing products from Objective 1 were selected including Tracer, HDCI 045, HDCI 047 and HDCI 060. Each treatment had five replicate plots. Each plot consisted of an insect-proof cage containing four pots, each pot contained three rocket plants at the two true leaf stage (12 plants per cage). Plants were sprayed with a pot sprayer and arranged in the cages.

Ten flies were then added to each cage which was kept in a glasshouse at ADAS, Boxworth. Each cage had a dish containing cotton wool soaked in a 1:1 solution of honey and water as a food source for the adult flies. It was assumed that the flies added to the cage were an even mix of males and females due to the difficulties in identifying the sex of *Scaptomyza* without killing them or anaesthetizing them with carbon dioxide which can sometimes be fatal. As there were only 150 flies available for the experiment out of the 250 required, only three of the five replicates were completed.

After 72 hours the number of live *Scaptomyza* adult flies and the number of leaf punctures were counted on every plant in each cage.

The results from Objective 2 identified changes which are required to the experimental method to improve the robustness of the data. When looking at the mean number of leaf punctures per plant, the data (based on three of five replicates) showed that the mean number of punctures by HDCI060, Tracer and HDCI047 was reduced to 2, 4.5 and 6.3 punctures per plant compared with the untreated control which had 6.4 punctures per plant. HDCI 045 led to more punctures than the control with a mean of 10.3 punctures per plant. However, when looking at the raw data, in one of the four replicate untreated control cages (where we would expect the most damage), no leaf puncturing occurred. This suggests that all introduced flies may have been males that would not have made egg-laying punctures. Therefore, this highlights the need to confirm the sex of the flies being introduced otherwise some treatments may have more damage than others simply because they have more females. Therefore the experiment will be repeated using the same proportion of males and females in each cage. A method using carbon dioxide to anaesthetize the

flies is being investigated.

Objective 3: Determine whether pesticide-treated plants are repellent to *S. flava (*now *Scaptomyza* sp.) adults under semi-field conditions*.*

This work is to be completed over the winter months if the culture provides enough flies (250 required). Alternatively it will be completed as soon as *Scaptomyza* sp*.* are active in commercial crops and can be collected.

Objective 4: Determine the efficacy of insecticide spray applications in reducing *S. flava (*now *Scaptomyza* sp.) puncturing damage on a commercial baby-leaf cruciferous crop.

This work is planned for completion in June using the most promising products.

Financial Benefits

If a crop was written off, the cost to buy replacement material would be approximately £2.40/kg (£2,400/tonne). Therefore, replacing a typical 20 tonne weekly programme during the summer would result in a grower cost of £48,000 per week. An effective additional method for reducing damage by *Scaptomyza* sp. in baby-leaf Cruciferous crops therefore has considerable financial benefits for growers at times of high pest pressure.

As a result of this project growers will benefit from improved knowledge on the effectiveness of selected pesticides in controlling this pest to avoid crop rejection.

Action Points

- Grower can use crop covers to protect plants from adult flies.