Grower Summary

FV 376

Baby-leaf Cruciferae: leaf miner identification, biology and control

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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.

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Headline

- The insect responsible for leaf puncturing and the development of leaf mines in salad Crucifers is the fly *Scaptomyza flava*. The challenge to control it remains due to the pest's biology and the development of insecticide resistance within the species.

Background

Before the summer of 2009 leaf miners were not considered to be significant pests of watercress or Cruciferae grown as baby-leaf salads. However, from mid-summer onwards serious economic damage was recorded widely in these crops in central, eastern and southern England, with reports of up to 40% of harvested leaves affected by puncturing or mines. Economic losses resulted from crop rejection, additional pack house labour inputs and the cost of increased insecticide application.

The species involved was not understood at the time the damage occurred and there were at least five candidate leaf miners that might have been responsible for the 2009 damage. To manage a pest effectively it is vital to know its identity, as only then can the biology and population dynamics of the insect be confirmed, both of which strongly influence how the pest may be controlled. The first step was therefore to confirm the identity of the pest responsible for the damage in the range of crops in question, which included rocket, tat-soi, mizuna, pak-choi and watercress.

Having identified a pest it then becomes possible to monitor its activity and establish details of its biology. Information on the number of generations that occur, and the timing and duration of periods of activity, may be useful in devising methods of reducing damage. Establishing the host range of the pest, together with information on aspects such as the effects of natural enemies, can also be advantageous.

Management of a pest frequently requires chemical intervention. Although knowledge of the biology of the insect can guide the need for, and timing of, such intervention, the relative efficacy of differing candidate materials can only be established by practical comparison in the field.

This project was therefore instigated with the following objectives:

I. To identify the leaf miners responsible for the commercial damage seen in baby-leaf Cruciferae and watercress in 2009.

II. To secure information on the biology and population dynamics of the leaf miner(s) identified in objective I.

III. To evaluate the efficacy of control treatments

These objectives were all completed within the project. However, as the work progressed it was decided that the possibility of insecticide resistance should be investigated in addition. This was added as objective IV.

Summary

The insect responsible for significant plant damage and economic losses in salad Cruciferae in 2009 and 2010 has been identified as the Drosophilid fly *Scaptomyza flava* (Fallén, 1823) – see image below:

Adult *S flava.* Note the overall pale brown colouration, with faint paler/darker stripes on the thorax, and red eyes. The wings are unusually long for a small fly, about 50% longer than the head and thorax combined.

This was identified after rearing larvae found in leaf mines, by sampling insects in affected crops and by direct observation in the field. No other leaf-mining insects were found in significant numbers.

S. flava is active between April and September, with a number (probably 3 or 4) of generations during the summer months. Populations seem to fluctuate from site to site, but from the data gathered by monitoring with sticky traps in 2010 it is now known that sudden, unpredictable and large increases can occur at different times on different sites.

A leaf-dip bioassay and a 'pollen beetle' glass vial resistance test both indicated that the field dose of the widely-used pyrethroid insecticide Hallmark with Zeon Technology (lambda-cyhalothrin) would not give control of *S. flava* taken from a crop of rocket in Norfolk, although a dose five times this rate was effective in the glass vial test. It is suspected therefore that *S. flava* has acquired resistance to this class of insecticides. Pyrethroids are used frequently on salad Cruciferae for the control of caterpillars, sawflies etc., and it may be the case that the natural enemies of *S. flava* are being reduced by such treatment, exacerbating the *S. flava* problem.

A trial was conducted investigating the effectiveness of a range of treatments on the level of leaf miner damage occurring in a crop of wild rocket. The only insecticide that gave a significant reduction in damage 9 days after treatment was BASF Dimethoate 40 (dimethoate), an organophosphate pesticide with contact and systemic action that has no

approval for use on salad crops and which was only included in the trial as a basis for comparison with other candidate pesticides. Decis (deltamethrin), Conserve (spinosad), Movento (spirotetramat), Biscaya (thiacloprid), HGW86 10 OD (cyazypyr), Savona (soft soap) and Garlic Barrier Plus (garlic extracts) had no significant effect on the level of leaf puncturing in the trial. The most successful treatment consisted of covering the crops from emergence to harvest with Enviromesh insect-proof netting, which produced a significant reduction in leaf miner puncturing throughout the trial.

Financial Benefits

Whilst low levels of leaf miner puncturing in salad Cruciferae seem to be tolerated by retailers and the public, higher levels can result in total crop write-off, for major producers resulting in five-figure losses for each week's lost production. The ability to recognise, monitor and control this insect in salad Crucifer crops therefore has considerable financial benefits for some producers at times of high pest pressure.

Action Points

- Become familiar with the appearance of *Scaptomyza flava* adults.
- Use white sticky traps in fields of salad Cruciferae to monitor the activity of *S. flava*.
- Do not rely on frequent application of pyrethroid insecticides to control *S. flava* as this is unlikely to be effective due to insecticide resistance (though it may be necessary for the control of other pests such as turnip sawfly)
- Be prepared to cover crops with insect-proof netting when the activity of *S. flava*, as indicated by the sticky traps, is on the increase.