Grower Summary

FV 389

Combining biopesticides and other treatments to increase pest control.

Annual 2012

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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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Project Number:	FV 389
Project Title:	Combining biopesticides and other treatments to increase pest control.
Project Leader:	Rosemary Collier
Contractor:	University of Warwick
Industry Representative:	Matt Rawson, Pasture Farm
Report:	Annual
Publication Date:	12/06/2012
Previous report/(s):	None
Start Date:	1st April 2011
End Date:	31st March 2013
Project Cost (Total Project Cost):	£23,137

Headline

Biopesticides, pesticides and behaviour modifiers have been identified that can be tested in combination to control important vegetable pests. Detailed laboratory tests are underway.

Background

There is much interest in identifying effective treatments for pests whilst reducing reliance on synthetic pesticides. One way to achieve this may be by 'combining' treatments to improve efficacy. Whilst this is done routinely with pesticide mixtures (e.g. Dovetail) and with pesticide/adjuvant combinations, there may be other improvements that could be achieved through, for example, combining insecticides or biopesticides with a treatment that modifies pest activity (and thereby pesticide uptake) or pest susceptibility. Such treatments could be applied at the same time or sequentially.

The aim of this project is to undertake a series of small-scale laboratory tests with pest insects that can be obtained easily from cultures to evaluate the potential of a range of treatments by comparing their activity separately and in combination. The term 'biopesticide' is used in the broadest sense, so could include biocontrol agents, botanicals or semio-chemicals. The results of this project will indicate which combinations of treatments may be worth exploring in more detail in future in trials on specific crop/pest combinations.

Summary

A literature review was undertaken to summarise the combinations of biopesticides, conventional pesticides and 'potentiators' that have been evaluated in previous studies and to understand the mechanisms involved in achieving improvements in pest insect control. A potentiator is a compound that is not pesticidal but which causes an increase in pest mortality when used with a pesticidal agent. Improvements in control as a result of treatment combinations can occur for a number of reasons associated with changes in the susceptibility or behaviour of the target insects.

The approaches to combining treatments vary considerably and may, for example, involve combining two microbial biopesticides (e.g. a fungal pathogen with *Bt*), a microbial biopesticide with a reduced dose of a chemical insecticide or a biopesticide based on a plant extract with a microbial biopesticide. The two main 'mechanisms' by which control is improved are, simplistically, where application of one treatment increases an insect's susceptibility to another, or where the application of one treatment increases the uptake of the second treatment and therefore the effective dose.

Biopesticides, pesticides and potentiators have been identified that can be tested in combination against a number of important pest insects of vegetables that are maintained in culture at Warwick Crop Centre, Wellesbourne. The test species and types of potential control agent/potentiator are shown in Table 1. Because many of these materials are being used in the SCEPTRE project a number of the individual materials must also be coded in this project.

Table 1. Potential control agents and potentiators for pest insects in current project.

	Insect cultures	**Potential control agents/potentiators**
Flies	*Cabbage root fly (Delia radicum), onion fly (Delia antiqua)*	Insecticide e.g. spinosad (drench or foliar application) Plant extract (drench, phytodrip or foliar application) Microbial Sugar/protein bait
Aphids	Cabbage aphid (*Brevicoryne brassicae*), peach-potato aphid (*Myzus persicae*), currant-lettuce aphid (*Nasonovia ribisnigri*)	Insecticide e.g. imidacloprid (phytodrip or drench application) Plant extract (drench, phytodrip or foliar application) Microbial
Caterpillars	Diamond-back moth (*Plutella xylostella*), large white butterfly (*Pieris brassicae*)	Insecticide e.g. spinosad (drench or foliar application) Sugar Plant extract (drench, phytodrip or foliar application) Microbial
Thrips	*Thrips nigripilosus, possibly* onion thrips (*Thrips tabaci*)	Insecticide (foliar application) Sugar Plant extract (foliar application) Microbial

The data obtained from preliminary tests on cabbage root fly, cabbage aphid, peach-potato aphid and diamond-back moth indicated considerable variability in the performance of biopesticide treatments between replicates. One of the biopesticides tested alone appeared to reduce egg-laying by female cabbage root flies (but did not increase mortality) and the same treatment also reduced aphid numbers. None of the biopesticides tested alone increased mortality of adult diamond-back moths compared with the untreated control.

Further tests are underway. Because of variability between replicates, it will be necessary to replicate tests in both space and time. It will also be important to make observations on insect behaviour during certain tests to determine the effects of different individual treatments and treatment combinations.

Financial Benefits

The results of this project will be relevant to the pests that infest a wide range of field vegetable crops (and protected and ornamental crops) and will indicate which combinations of treatments may be worth exploring in more detail in trials on specific crop/pest combinations in future. The proposed project is complementary to the LINK project submitted by a consortium led by HDC: Sustainable Crop and Environment Protection - Targeted Research for Edibles (SCEPTRE).

Action Points

- The results of this project are preliminary at present and there are no action points for growers.