



Diamond-back moth biology and control – an introduction

Rosemary Collier 24 January 2017





Diamond-back moth (Plutella xylostella)

- Pest of brassica crops only
- Sporadic and eggs are hard to find
- Newly-hatched caterpillars burrow into foliage to feed but then come out onto the leaf surface as they grow larger and cause characteristic 'windowpane' damage
- Completes life-cycle rapidly, particularly when temperatures are high - major pest in Asia and Africa.







Liu et al., 2001

Background biology

- Does not overwinter successfully in the UK although this may be changing as winters get warmer. Infestations in early summer are usually the result of migrations from continental Europe.
- Summer 2016 saw a very large migration, which started at the end of May.
- Many millions of moths arrived in the UK and were found in large numbers from south-west England to Orkney.
- The moths may have arrived in several waves and it is likely that they laid eggs soon after their arrival. Eggs and caterpillars were found on horticultural brassicas (cabbage, broccoli, cauliflower) and oil seed rape.

Monitoring

- Moths can be monitored using traps.
- The Rothamsted Insect Survey runs a network of light traps and similar traps are operated by moth enthusiasts around the country.
- Male moths can be captured in pheromone traps.





Female moths are laying eggs when male moths are being captured in pheromone traps

Diamond-back moth Kirton 1996



Both trapping approaches showed that the subsequent generations of the moth in 2016 were much smaller than the first migration



Twitter – mainly light traps

Pheromone traps

FV 440

- AHDB project FV 440 focuses on pest Lepidoptera principally silver Y moth and diamond-back moth but also turnip moth (cutworm)
- Infestations by all pests are sporadic
- Monitoring crops for eggs can be challenging



Activities – FV 440

Evaluating a system for monitoring moths remotely 'Trapview'	Colin Carter, David Norman (G's crops) and other growers
Comparing moth captures in 'Trapview' traps with 'ordinary' pheromone traps and with crop walking data – looking at 'timing' of activity	Colin Carter, David Norman and other growers
Insecticide efficacy trials – including capture and rearing of moths	Warwick, STC, ADAS, David Norman, Roma Gwynn - Biorationale Limited
Looking at historical data – light traps and radar – plus any grower data	Jason Chapman, Charlotte Wainwright, growers
Develop a risk-based spray-decision- making system linked to trapping of moths and measure its efficacy, via field trials, against normal pest control practice.	Colin Carter, David Norman and other growers



Trapview system evaluated in FV 440



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Trapview traps – FV 440









Deployment of traps – FV 440

- 30 traps set up in May-June 2015 and 2016
 - 18 traps for silver Y moth
 - 10 traps for diamond-back moth
 - 2 traps for turnip moth
- All traps were visible to all the trap hosts. Generally there were two 'replicate' traps in each area.
- Trap data were downloaded from the Trapview site and then checked and corrected using the images. The data were then plotted by date.



Diamond-back moth captures – Trapview traps 2016





Natural regulation of numbers

- Diamond-back moths do not overwinter very successfully in the UK. They do not have a specific overwintering stage like most native pests.
- Field sampling in 2016 and during the previous large invasion in 1996 showed high levels of parasitism by a small wasp.
- Diamond-back moths will also be subject to predation and viral, fungal and bacterial infections.



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Control

There were difficulties controlling diamond-back moth caterpillars in some crops in 2016

Rothamsted Research showed that at least some of the migrants were resistant to pyrethroid insecticides.

At Warwick Crop Centre we have investigated alternative strategies, including novel insecticides and biopesticides (SCEPTRE, FV 440) and biological control (PhD projects).

We have also been looking for sources of host plant resistance in the collections of *Brassica* varieties and wild species that we have in the UK Vegetable Gene Bank on the Wellesbourne Campus (Defra VeGIN project).

Insecticide efficacy – lab population P. xylostella

Live caterpillars

No. feeding holes





Caterpillar damage - cyazypyr versus other drench treatments (Tracer only applied in 2012)



DuPont trials at Warwick Crop Centre

Thank you!

To the AHDB

The FV 440 project team

My colleagues at Warwick Crop Centre especially Andrew Jukes, Marian Elliott and the Horticultural Services team

