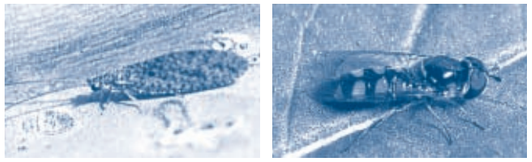
The simplest way to enlist natural enemies is to avoid using sprays that kill them. Older 'hard' products that include organophosphates and pyrethroids as active ingredients, often kill more natural enemies than pests. When these pesticides are sprayed, it can take a long time for natural enemies to recover. Hence there is a need to spray pests more frequently since only the sprays are killing large numbers of pests. Even some herbicides and fungicides can kill natural enemies, so be sure to check if a pesticide is toxic to natural enemies before using it. A resource to help with this is listed at the end of this article.

'Soft' pesticides, like those that incorporate Bt as the active agent, selectively kill caterpillars but not other insects. Bt is an abbreviation for the bacterium Bacillus thuringiensis and it is found in products like Delfin®, Dipel®, Full-Bac® and Xentari®. Newer pesticides like Success® and Avatar® also kill more pests than natural enemies. Natural enemies can continue to kill pests after a soft spray is applied, so growers are essentially using two methods to suppress pests - pesticides and natural enemies. This is one of the 'integrated' parts of IPM. When natural enemies are conserved, they should reduce the need to spray frequently. In this way the benefits of saving the natural enemies is compounded. Fewer sprays also reduce the chance that insecticide resistance will develop.

Many natural enemies need food and other resources to thrive. For example, most parasitic wasps need to feed on sugar that is found in nectar. Those that do feed on nectar live longer and are more active in killing pests. When there is good weed control in a vegetable crop, parasitic wasps may have to fly long distances to find flowers that provide food. Likewise predators need insects as food. In order to have large numbers of predators when pests arrive in a crop, there must already be some insect food available for predators to survive and breed. Also, hover flies that are predators of aphids need pollen from flowers in order to reproduce.

The DBM project is conducting research to see if certain flowers or other plants can be planted alongside crops to promote the activities of parasitic wasps and predators. Plants are being evaluated that can be a source of food for



The Brown Lacewing at left, is a DBM natural enemy while this Hover Fly is a predator of aphids.

predators and parasitic wasps. These plants must promote the activities of the natural enemies, but not insect pests, plant diseases or weeds. One aim of the research is to identify the best plants to provide nectar to parasitoids. The plants that seem to work best have clusters of small flowers and long flowering periods. To date, plants like Queen Anne's lace have shown promise, but this garden plant is known to be weedy in some farming systems. Late flowering broccoli provides a good source of nectar and pollen for natural enemies, but may promote DBM numbers too. The challenge is to find plants that selectively promote natural enemies in a cost effective manner. If this research is successful, then farmers will be able to make natural enemies more active and reliable in the fight against insect pests.

Additional information about the toxic effects of pesticides on natural enemies (and other IPM information) can be found in the Good Bug Book (2nd edition), edited by R. Llewellyn and published by Integrated Pest Management P/L, which can be purchased at the Good Bugs web site (www.goodbugs.org.au) or by phoning 02) 4570 1331.

NEXT ISSUE

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For the contact details of the State DBM Team members, refer to issue one of this newsletter or contact Dijana Jevremov below.

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This newsletter compiled and edited by Dijana Jevremov. Items for future editions are welcome from other Brassica Horticulture Australia funded projects. Contact Dijana using details above.

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Brassica IPM

NATIONAL NEWSLETTER

Issue 4 April 2004

Welcome to issue four. This newsletter is an initiative of the National Diamondback Moth (DBM) Project Team of researchers and extension personnel, who operate with levy funding from Horticulture Australia. The aim of this newsletter is to inform growers, consultants and resellers about research, tools, events and ideas to do with an integrated approach to Brassica pest and disease control. Items for future editions are welcome from other Brassica related projects. Contact Dijana Jevremov using details at the back of this issue.

The 3 growers that volunteered their properties for IPM demonstration were from left to right – Edgar Grech, Sam Galea, Eddie Galea with Paul Horne and Jessica Page of IPM Technologies, Victoria. The native vegetation behind them provides refuge for natural enemies.

Ten growers of the Camden area observing the contents of a trap with entomologist Dr Paul Horne.

THIS ISSUE

DEMONSTRATION OF IPM IN CAMDEN, NSW

By Dijana Jevremov - IPM Adoption Coordinator, South Australian Research and Development Institute and Dr Paul Horne – Director of IPM Technologies Pty Ltd., Victoria.

In November and December 2003, ten Brassica growers in NSW participated in a pilot demonstration of how IPM can work on their farms as part of the national IPM for Diamondback moth control project.

In three field sessions held over six weeks on the same plots, participants saw for themselves the potential of IPM in a way they had not previously experienced. The project engaged Dr Paul Horne and Jessica Page of IPM Technologies Pty Ltd in Victoria to show growers how they monitor crops and make decisions in their business in order to implement IPM. Dijana Jevremov and Dr Mike Keller of the DBM Project also attended the sessions.

Three growers - Eddie Galea, Sam Galea and Edgar Grech volunteered their properties each session to be used in the demonstrations, with other growers in the region invited to come along and share in the learning on-farm.

Three visits by the IPM specialists were organised at two weekly intervals with telephone contact in between if needed. Growers could see for themselves how decisions were made based on the level of beneficial species as well as on the level of pests. Growers were able to see the effectiveness of insecticides they didn't normally use, and also learn how to integrate careful insecticide selection so as to minimise harm to the beneficial insects present on their properties.

One of the three property volunteers - Edgar Grech, who grows brassica's and potatoes, commented "Growers who want to see value for their levy should have attended this course. I made time to attend and each time it was paid for by the saving in spraying that week!"

Key learning outcomes were - understanding the significance of the life-stages in pest and natural enemy development to guide when to sit back and observe, and when to take action. Growers saw for themselves if crop growth or quality is different with an IPM approach. ALL participants now intend to use IPM as their means of pest control. They have seen it 'in action', realise the benefits and can see how it will also apply in other crops they grow such as lettuce and potatoes.

Paul Horne described the three farms and the different problems that each faced:

Farm 1 had quite a high level of Plutella and some aphids and other pests. We recommended BT sprays unless the weather was unsuitable. We found a very high level of both predators and parasites at this farm. After 2 weeks, the beneficials were largely controlling the pests and only one BT spray was needed. On the third visit, no insecticide was needed and control was good. The crop had been grown using IPM principles.

(Story continued on page 2)

Farm 2 had a very high level of parasites of DBM but almost no predators. Bt sprays were recommended but not for the next week. After that, the spray worked well. On the second visit, caterpillars were under control and no further sprays were needed. The crop was harvested with no damage.

Farm 3 had both aphids and caterpillars, and required a selective aphicide and a caterpillar spray. Instead of using one broad-spectrum insecticide that would kill all the beneficials we used two selective sprays. Subsequently, no more aphid sprays were needed and on the third visit no insecticides were needed.

Jessica Page commented that "These growers have seen what is involved in an IPM approach and now recognize what is required to implement IPM. They don't want to be entomologists, but they now understand which insects are helping them as well as which ones are pests".

Some comments from growers at the demonstrations were:

- o "*This is the best thing we can do with the levy money*"
- o "*I would recommend that these demonstrations go to other growers because if farmers would use Bt sprays and IPM, the industry would have a better name*"
- o "*I have been helped to identify pests from beneficials, and also to decide if spraying was needed on a crop for the amount of grubs present*".

The end result of these sessions is that the growers are keenly pursuing getting a crop monitor who is IPM trained to work in their area and service all the growers monitoring needs for a variety of crops.

Program Outline

The demonstration program consisted of the following:

Visit 1

2 hour slide show and talk about the principles of IPM:
- What is IPM?
- Does it work?
- Where are the examples?
- Why do we have pests?

Biological control agents:
- Where do they come from?
- How to keep them
- What do they look like?
- Can they be relied on?

Cultural Controls (Management):
- Flowering Weeds
- Trash
- Varieties
- Planting Sequence

Chemical Controls:
- Supporting the other two control options
- Selective versus broad-spectrum.

Field Demonstration 1

- Begin controlling pests in brassica crops using an IPM approach:
- Select new plantings (1 - 2 weeks old)
- Monitor for pests and beneficials
- Make decisions on actions required.

Visit 2

Field Demonstration

- Continue controlling pests in brassica crops using an IPM approach
- Continue monitoring of plantings (now 3 - 4 weeks old)
- Begin monitoring of new plantings (1 – 2 weeks old)
- Monitor for effects of previous actions recommended
- Monitor for pests and beneficials
- Make decisions on actions required.

Visit 3

Field Demonstration

- Continue controlling pests in brassica crops using an IPM approach
- Continue monitoring of plantings (now 5- 6 weeks old)
- Continue monitoring of plantings (now 3 - 4 weeks old)
- Begin monitoring of new plantings (1 – 2 weeks old)
- Monitor for effects of previous actions recommended
- Monitor for pests and beneficials
- Make decisions on actions required.

Final recommendations and summary of what has been achieved and what to do next.

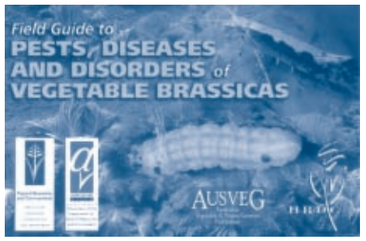
VALUABLE RESOURCES

There are several resources that Brassica growers and their consultants need to be aware of to equip themselves with easy access to information to make implementing integrated insect pest and disease management, that much easier. All three resources listed below have been funded in part by AUSVEG and Horticulture Australia, so readers are urged to ensure they take advantage of these levy funded products. Most readers will already have these copies so check your resources before ordering.

The first is the '**Field Guide to PESTS, DISEASES AND DISORDERS of VEGETABLE BRASSICAS**'. This handy glovebox sized flip booklet was produced in 2000 and mailed out to all Brassica growers nationally in that year. It was produced by members of Agriculture Victoria and the Australian Quarantine and Inspection Service. If you haven't looked at your copy for some time, it is worth keeping handy for identifying the natural enemies and the pests of your crops as well as environmental and nutritional disorders and diseases, along with control guidelines.

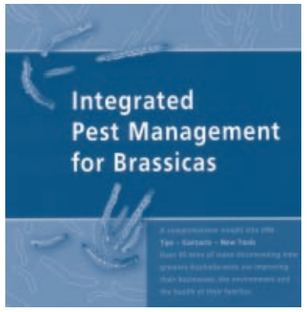
The second is the '**IPM for Brassicas**' CD or VHS Video. Brassica growers nationally were mailed the CD in Sept 2002. Both the video and CD were filmed entirely in Australia and show what growers and researchers have to say about putting IPM into practice.

More copies of each can be ordered through:
Crop Health Services Bookshop
Agriculture Victoria
Phone: 03 9210 9356
Fax: 03 9887 3166



Cover of 'Field Guide to PESTS, DISEASES AND DISORDERS of VEGETABLE BRASSICAS'

Costs are: Field Guide, $25.00 each plus $2.50 GST, plus $3 postage within Australia. CD is $30 including GST and the VHS video is $25 including GST, postage is around $3 for each item.



Cover of 'IPM for Brassicas' CD, also available as a VHS video.

PROPERTY-TO-PROPERTY MOVEMENT OF MOTHS AND BENEFICIAL INSECTS

By Dr Nancy Schellhorn - Senior Entomologist, South Australian Research and Development Institute (SARDI)

Information on moth and beneficial insect movement between adjacent properties is important for the adoption of Insecticide Resistance and Integrated Pest Management strategies. Growers are often concerned that their efforts at practising a resistance and pest management strategy will be undone if they receive immigrant moths from their neighbours who may be less diligent than them in their practices.

We conducted experiments to determine if DBM and key beneficial insects move between adjacent properties. The study was conducted on two properties in Virginia, South Australia at 1,245m apart with a river and native scrub in between.

To mark the insects from each property, a different colour of fluorescent dye was sprayed on a crop plot at each property. Then traps were placed around the landscape to capture marked insects. Next, the sprayed portion of the crop was rotary hoed as a means to mimic grower practice, and force insect movement. The process was repeated three times until there were no more brassicas left on one of the properties.

We found that moths moved between properties, and in both directions, however they moved at a low frequency ranging between 1-5%. Key beneficial insects such as the main parasitic wasp, Diadegma, the Transvers ladybird beetle, and the Brown lacewing also move between properties. However, with the exception of Diadegma where 10% of individuals moved from one property to the other, the beneficial insects usually moved at a low frequency.

The implications of these results are that moths from neighbouring properties (and further afield) will often travel, and in some cases those moths could be carrying genes that are resistant to insecticides. Therefore the best way to delay resistance is to follow an IRM strategy, such as the AIRAC Two-Window strategy, and the best way to control moths is by targeting sprays for grubs, not the moths, and to select insecticides that preserve the natural enemies.

Although these results show that some beneficial insects move to the neighbours, on-going work with the national DBM project is investigating ways of building up and maintaining their populations on-farm.

A NEW DBM CROP MONITORING GUIDE

The hard work of Dr Andrew Hamilton of DPI Victoria and Dr Nancy Schellhorn of SARDI, has resulted in the development of a new monitoring guide for DBM in Brassicas that consists of several sampling plans for monitoring broccoli, cauliflower and cabbage crops. These sampling plans should ultimately reduce the frequency of spraying, while still maintaining control of the pest population.

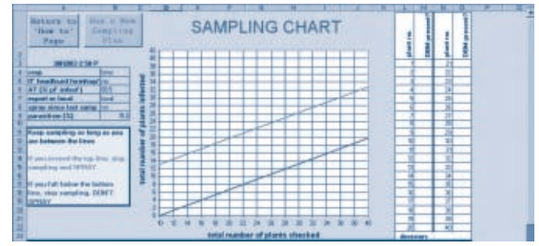
What Is Unique About This Monitoring Guide?

For most crops, the level of pest infestation that the grower is prepared to accept is likely to fluctuate depending on several factors. This new monitoring guide takes those factors into account.

For example, for DBM on broccoli, it is the presence of grubs (larvae) in the floret at harvest that is the major concern, rather than feeding damage. So a conservative approach needs to be taken. The sampling plans differ to take crop stage into account. A less conservative approach can be taken for a crop that is destined for the domestic market rather than the high value export or processing markets, with their requirements for low levels of infestation. This new monitoring guide constructs a tailor-made sampling plan for the grower's particular scenario.

A copy of the monitoring guide which links to IRM strategies in each State as well as an insecticide toxicity chart, can be obtained free of charge, at www.dpi.vic.gov.au (follow the links: Agriculture & Food, then Plant Disease and Pests) or by contacting either Dr Nancy Schellhorn (ph: 08 8303 9543, Schellhorn.Nancy@saugov.sa.gov.au) or Dr Andrew Hamilton (ph: 03 9210 9282, Andrew.Hamilton@dpi.vic.gov.au). Feel free to contact either of them with questions about running the plan.

This work was funded by the AusVeg levy, Horticulture Australia Limited, the South Australian Research and Development Institute, and the Department of Primary Industries Victoria.



After answering a few short questions, a Sampling Chart like this will be produced. It can then be printed out and taken into the field.

ENLISTING NATURAL ENEMIES IN THE FIGHT AGAINST DBM

By Dr Mike Keller - Senior Lecturer, University of Adelaide.

A range of natural enemies can assist in the control of pests like the Diamondback moth. These include predators, parasitic wasps and diseases. Many growers are aware of natural enemies but ask, "What can be done to get the best performance from them?" This article is concerned with ways to conserve and enhance the activities of predators and parasitoids in the fight against DBM and other insect pests.

(Story continued on back page)