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National Vegetable Industry Centre Newsletter

Potential UV Screens

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It has been demonstrated repeatedly during this project that a range of naturally occurring beneficial species can control lettuce aphid. The range of beneficial species that are of interest include lacewings (*Micromus tasmaniae*), ladybird beetles (*Coccinella transversalis* and *Hippodamia variegata*) and hoverflies (Syrphidae). Since lettuce aphid was detected in Victoria there have been growers who have not used Confidor drenches and who have used IPM instead, relying totally on these species of predators.

However, one concern of growers using IPM has been the treatment of caterpillar pests of lettuce, including Heliothis and cutworm. There are IPM compatible insecticide sprays that can be applied effectively but there are severe restrictions on when (time of day) these sprays can be applied. UV degradation of the sprays concerned (BT-based sprays such as Dipel, Delfin, XenTari, and virus-based sprays such as GemStar or Vivus) means that there are real concerns about whether such sprays can be used in practice. If the sprays must be applied when UV levels are low (after 4:00pm) then many growers will find problems with such a recommendation. If these recommendations are not followed then there is likely to be severe disruption to the biological control of lettuce aphid because of the loss of beneficial species.

IPM Technologies and La Trobe University undertook a study to determine whether or not an additive to the spray tank could allow growers to apply UV sensitive sprays before 4:00pm. The aim was to mix a sunscreen with the spray and see if it protected the pesticide from UV degradation.

The study was performed in a laboratory with a UV lamp. It determined the level of UV that would degrade BT sprays and then looked at the impact of additives. It was found that the additives Nufilm-P and Nufilm-17 provided additional protection to the BT sprayed onto cabbage leaves. We suggest that the level of protection provided may be significant but this needs to be supported by field evaluation in a high pressure situation in Summer. IPM Technologies P/L attempted to assess the results of these trials in commercial situations in the 2009-2010 growing season but without clear results. Field trials are the obvious next step in evaluating the value of such UV protectants, but would certainly be worth doing given the positive results from the laboratory.

IPM case studies

Tony Colloti of Gingin, and Damien Rigali of Wanneroo are two lettuce growers in the south-west of Western Australia that supply the domestic Perth market. Whilst Colloti has adopted IPM strategies over the last two years, Rigali has maintained traditional management techniques. However, Damien is motivated for economic and environment reasons to incorporate a more sustainable approach. The main pests that require management on both properties are thrips, aphids, diamondback moth and heliothis.

At the Rigali property, spraying practises are consistent with traditional methods; spraying every two weeks regardless of any pest activity, and twice a week when visible damage is occurring. In the past they have used *Nasonovia*-resistant lettuce varieties (resistant to Currant lettuce aphid). However, they found that *Nas*-resistant varieties took longer to grow and offered no thrips resistance. The crop had to be sprayed as a result, and any potential benefits were outweighed by the associated costs of labour and the higher prices of *Nas*-resistant varieties. Other insecticides used on the property include Confidor® (imidacloprid), Nitofol® (methamidophos) and Movento® (spirotetramat).

Recently Damien has become interested in adopting some IPM strategies, with the decision mainly influenced by a desire to take a more preventative approach with the aim of reducing cost in pesticides, time and labour. There is also a philosophical desire to use fewer chemicals to benefit the environment and end-consumer. Whilst he has recently started monitoring crops, and has a rough idea of what and when certain pests will be around, he described his knowledge of pest and beneficial lifecycles as poor. Having access to an IPM scout, proper training in the identification and monitoring of both pest and beneficial populations, and establishing a pest prediction model for the property would all aid in future changes in management techniques. Limiting factors in the adoption of IPM strategies was the changing of old ideals, through new generation more willing to change and adopt.

Above: Damien Rigali and David Cousins inspecting a crop

On the Colloti property, IPM strategies have been employed over the last two years. The primary objective has been to maintain beneficial populations through the use of newer, 'softer' chemistries, in an effort to save money on spraying by reducing the number of applications. Management practises have been to use softer chemicals first, and if that failed, to use harder ones. Insecticides used include Dimethoate, Lannate® (methomyl), Maldison®, Success® (spinosad), Coragen® (chlorantraniliprole) and Movento®. Main advantages are saving time by fewer applications and using less insecticides. This has provided Tony with cost savings. Cost savings are the main motivator, though Tony is also motivated by ethical

reasons such as the effects of insecticides on the environment. Tony Colloti has a good understanding of the lifecycles of pest and beneficial insects, and has consulted with Lachlan Chilman of Manchil IPM Services, who has provided a lot of information on lifecycles, worse times in the season, and was readily available for advice to queries.

Tony considers that the drawbacks to using IPM are where the end consumer is adverse to insects in end-product, whether they be beneficials such as ladybirds, or parasitic wasps, with possible rejection of a consignment. Whilst Tony endeavours to implement IPM, 3 days prior to harvest he uses a knock-down spray, to reduce potential insect contamination as requested by his buyer. However in some crops, the use of 'harder' insecticides may become necessary as plant fruiting structures become more susceptible to attack. Tony considers that a major limiting factor to the uptake of IPM is a lack of knowledge/understanding. Younger growers were also more open to change; "Can't teach an old dog new tricks".

Chemical Permit Update

PER 10233 – Flumetsulam – Lettuce – Brassica weeds. 15 Nov 2007 – 31 Dec 2010. Valid for NSW, SA, Tas.

PER 10276 – Filan fungicide (boscalid) – Brassicas & Brassica leafy vegetables, Lettuce & Beans - Sclertonia rot 01 Feb 2010 – 31 Jan 2013. All States

PER 11651 – Acramite Miticide – Lettuce – Two-Spotted (Red Spider) mite. 22 Jan 2010 – 31 Dec 2012. SA, WA, Qld.

PER 11952 – Amistar 250SC (azoxystrobin) – Brocolli, Brussells sprouts, Cauliflower, Lettuce & Beans - various fungal diseases. 01 Apr 2010 – 30 Sep 2011. All States

PER 11988 – Chess (pymetrozine) – cucurbits, eggplant, tomato, lettuce, broccoli, chicory, endive, radicchio & pistachio - silverleaf whitefly, Lettuce aphid & green peach aphid. 26 May 2010 – 30 Apr 2011. All States

PER 12177 – Switch (cyprodinil + fludioxonil) strawberries – Stem end rot and Leaf blotch (*Gnomonia comari*). 26 May 2010 – 31 Mar 2012. Valid for NSW, Qld, WA.

What's that bug in my lettuce?

~ Consumer attitudes to insect contamination of fresh vegetables ~

Background

Over the last 10 years HAL and the Australian vegetable industry have invested $43 million on plant health related projects. The underlying approach of many of these projects has been based on Integrated Pest Management (IPM). IPM involves good farm hygiene, careful monitoring of crops for pests and beneficial insects and use of sprays only when necessary[1]. This means that a few of these pests or beneficial insects may still be present on the crop.

One of the main barriers to adoption of IPM practices is the perception, real or otherwise, that consumers will not tolerate any insects in the vegetables. Both processors and retailers have previously rejected lettuce consignments which contained live insects. However, it is not clear whether this concern is truly justified.

We don't know:

- How consumers REALLY react to finding an insect
- Whether this reaction is different if the insect is inside a bag of mixed salad vs on a whole head lettuce
- How reactions vary depending on the type of insect found
- Consumer understanding of and response to the IPM concept and growing practice
- Whether marketing IPM grown lettuce with an "Eco" label makes them more tolerant of finding an insect.

Actions

A two part study has been conducted. Part one involved a series of six focus groups in two locations and is complete. Part two was a National online survey of >1,000 main grocery buyers.

In part one, as well as discussing fruit and vegetable purchasing, focus group participants were asked to examine and score the quality of bagged salads, some of which had been deliberately contaminated with various insects. Most failed to notice the bugs, and many could not find them even after they were told they were there. When they did find an insect – mostly ladybeetles, they being the easiest to spot - they were usually interested and curious, rather than disgusted.

The participants were then shown pictures of various insects and asked how they would feel about finding one of these on fresh lettuce. The results are summarised in the attached table. The key point is that most were unconcerned about finding an occasional small bug in fresh vegetables. People understand that insects are a natural part of farming. They don't expect the farmer to remove every insect before sending the products to market.

The concept of "zero tolerance" for bugs such as aphids, ladybeetles and other small insects was universally rejected as ridiculous, unrealistic, and likely to increase chemical use. However, the participants had totally different attitudes to insects that might get into the product after harvest, such as flies and cockroaches. These were "dirty" and showed the product had been badly handled.

The results of the focus groups were tested in the online survey. This method was used because people are likely to be more honest doing a survey anonymously on line than face to face or even by phone. Participants were asked questions designed to find out how easily disgusted they were, their attitude to environmental issues, and their purchasing habits.

1 IPM should not be confused with "organic" production, which rules out any synthetic chemicals or fertilisers

"This project is facilitated by HAL in partnership with AUSVEG and is funded by the National Vegetable levy. The Australian Government provides matched funding for all HAL's R&D activities." For editorial comment contact: Sandra McDougall, I&I NSW, Ph (02) 6951 2728, Fax (02) 6951 2692
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Table 1 - Acceptability of some insects in lettuce as generally agreed by each focus group; ✓ = OK, easily washed off; ~ maybe OK, so long as only 1; ✘ = not OK, would result in product rejection

	Groups at Crows Nest			Groups at Harris Park		
	A1	**A2**	**A3**	**B1**	**B2**	**B3**
Ladybeetle (adult) 	✓	✓	✓	✓	✓	~
Lacewing (adult) 	✓	✓	✓	✓	✓	✘
Praying mantis 	✓	✓	✓	✓	✓	✘
Rutherglen bug 	✓	✓	✓	✓	✓	✘
Whitefly 	✓	✓	✓	✓	✓	✘
Lacewing (larvae) 	✘	✓	~	✘	~	✘
Ladybeetle (larvae) 	✘	✓	~	✘	~	✘
Caterpillar 	✘	✘	✘	✘	✘	✘
Slug 	✘	✘	✘	✘	✘	✘

Outcomes

The survey results are still being analysed. However, it seems the information will provide a valuable insight into how consumers view the vegetable industry as well as their attitudes to insects and willingness. For example, 32% of respondents thought that fruit and vegetables are not grown in an environmentally friendly way and 31% that many growers are not responsible in their use of pesticides. More than 77% of all respondents agreed that supermarkets should favour suppliers who can show they use environmentally friendly production methods. Combining this information with demographic data can help the industry change incorrect perceptions and profit from others.

It is planned to present the full results to interested growers, processors and retailers and discuss what to do next at ½ day meetings in Sydney and Melbourne. It is hoped that this process will lead to real changes in the way vegetable industry value chains manage the issue of insect contamination.

Meetings will be held in **late July 2010** – dates to be determined to suit interested participants.

For enquiries / meeting dates / further information please contact: **Jenny Ekman** *Ph:* 02 4348 1942 *Mob:* 0407 384 285 *Email:* jenny.ekman@industry.nsw.gov.au

National Vegetable IPM Coordinator (VG09191)

A team has recently (April 2010) been appointed to work on the Integrated Pest Management (IPM) Sub-program of the Vegetable Industry Development Program (VIDP). Specifically the role of the IPM Coordination team is to plan, coordinate, monitor and support the development and adoption of best practice IPM technology. In the 12 months the project is contracted for the team which is equivalent to one full-time person will:

1. Develop an over-arching **Strategic Plan for Vegetable IPM RD&E**, building on the previous IPM reviews and planning meetings.

2. Develop guidelines on quantifying the benefits of investing in IPM RD&E; endeavor to collect some baseline data on IPM adoption and review of on-line **benchmarking** tools.

3. Collate existing resource materials on management of **Western flower thrips (WFT) and Tomato spotted wilt virus (TSWV)** and make available via the AUSVEG website, review the associated RD&E and develop an Action Plan for RD&E.

4. Work with the project leaders of the **Pathology Program** to develop a plan for communicating the project outcomes, determine the gaps for extension and communication and ensure pathology-related resources and tools are incorporated into information packages.

5. Scope the production of a range of **Integrated Information Packages**

6. **Review of IPM and Chemical Access** - work with the Minor Use Coordinator and the Pesticide Regulation Coordinator, on development of a database matrix of pests x crops x currently available chemistry, chemistry that may become available and cultural & biological control options.

7. Liaise closely with the rest of the VIDP particularly with Knowledge Management (Website developers) and Innoveg (Coordinators of extension delivery to growers) to IPM information resources are accessible to growers and that the information is easily found on the website, and that the Chemical and IPM areas of the website are integrated.

IPM Team includes: Lauren Thompson (Scholefield Robinson) as project leader, Sandra McDougall (NSW I&I) as IPM specialist, Gerard McEvilly(Horticulture Supply Chain Services) will facilitate the strategic plan, Natasha Wojcik (Arris) will scope the development of resource packages, Leanne Orr (NSW I&I) and Jim Kelly (Arris) will be involved in the benchmarking, Prue McMichael will assist with Pathology extension component and and she and Jenny Ekman (NSW I&I) will oversee market access aspects of the project. Rick Roush (University of Melbourne and former leader of California Statewide IPM program) will provide high-level input as well as an overarching review of project areas.

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Western Flower thrips, *Franklienella occidentalis* WFT

Why is it such a problem?

Because:

1. it transmits a virus: Tomato spotted wilt virus (TSWV)
2. feeding damage
3. it readily develops resistance to insecticides
4. it breeds successfully on a wide range of crops and weeds

Tomato spotted wilt virus (TSWV)

In Australia TSWV can be transmitted by Tomato thrips, Onion thrips, Melon thrips and Western flower thrips. Since WFT arrived in Australia the frequency and severity of TSWV has increased particularly in the intensive greenhouse production areas.

Not all thrips carry TSWV. Plague thrips never transmit the disease.

Larvae of vector thrips must feed on infected plants to acquire the virus which they pass on to uninfected plants when they mature into winged adults

A large range of crops and weeds can be infected by TSWV and not all show symptoms.

Vegetables most severely affected by TSWV are the solanaceous crops- capsicums, tomatoes, potatoes, also lettuce. Once a plant has TSWV it can not be cured. Symptoms may not be obvious until 2-3 weeks after infection. The best management strategy is to prevent infection.

Tomato spotted wilt virus on lettuce

Direct feeding damage

Thrips are 'sucking' insects - they pierce plant cell walls to drink the sap. The cell dies and appears as a white spot on the leaf. Large numbers feeding cause silvering of leaves. If large numbers of thrips feed on seedlings they can stunt growth or kill them. Large numbers of thrips in flowers can cause the flower to abort and similarly large numbers of thrips on small developing fruit can cause them to drop off or cause deformations.

Insecticide resistance

Relatively few insecticides are particularly effective on WFT and of those that once were effective synthetic pyrethroids (3A) and now spinosad (5A) Success® show high levels of resistance. Hydroponic lettuce growers have Success® as the only permitted insecticide for WFT. Chemicals cannot be the main management option for WFT and TSWV.

See:http://www.dpi.nsw.gov.au/agriculture/horticulture/pests-diseases-hort/multiple/thrips/wft-resistance for information on resistance management.

Management Options

A TSWV infected plant cannot be cured. Management options focus on preventing infection and minimising spread:

- Source control
  - Avoiding contaminated or infected seedlings
  - Weed management within and surrounding crops
  - Roguing and destroying infected plants
  - Removing or cultivating in crops after harvest
  - Screening greenhouses with thrips-grade mesh [particularly important for seedling nurseries]
- Monitoring crops for WFT and TSWV
- Biologically based Integrated Pest Management
  - Using local native predators or commercially sourced predators [usually for greenhouses]
- Foliar insecticides sprays to control WFT

Capeweed and sowthistle are both common hosts of TSWV and WFT

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