Silverleaf whitefly

PROJECT UPDATE

Issue 3: May 2009

Welcome to this third project update. This project is facilitated by HAL in partnership with AUSVEG and funded by the vegetable levy. The Australian Government provides matched funding for all HAL's R&D activities.

The main aim of this update is to keep vegetable growers and industry informed on what's new with silverleaf whitefly (SLW). Updates are available via email or as printed copies.

In this issue

New whitefly - Q biotype

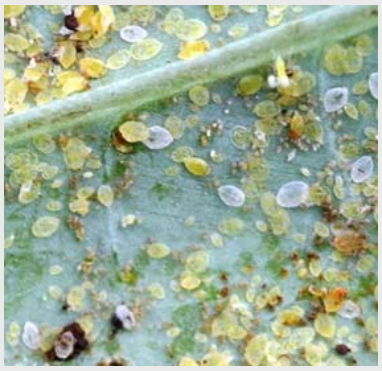
by Siva Subramaniam and Robin Gunning

A new whitefly, known as *Bemisia tabaci* Q biotype, that is closely related to silverleaf whitefly (B biotype) has been found in Queensland vegetable crops. Both whiteflies look the same and can only be separated using molecular techniques. They also have a similar life cycle and range of host plants.

The presence of Q biotype in whitefly samples collected from vegetables in the Bowen/Burdekin region during 2008 has been confirmed by Dr Robin Gunning, NSW DPI.

While to date, Q biotype has been found only in specific locations in the Bowen/Burdekin district, it is likely to be more widely distributed. Further surveys are being conducted to determine the pest's distribution.

Adult whitefly



Whitefly nymphs

Honeydew caused by Q biotype whitefly

Whitefly samples are being collected from other production regions such Bundaberg and Locker Valley for Q biotype testing. However, the samples collected during 2007 did not show Q biotype in these regions.

The presence of high densities of whitefly eggs and nymphs that are not readily controlled by insecticides is one indication that Q biotype is present. Q biotype has the ability to develop resistance quickly to some insecticide groups, particularly if they are used repeatedly. Overseas, Q biotype has developed high level resistance to insect growth regulators (IGRs) and neonicotinoids (e.g. imidacloprid). Increased levels of resistance to IGRs have been detected in a few locations in north Queensland.

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New whitefly - Q biotype (continued)

Q whitefly can transmit viruses, e.g. Tomato yellow leaf curl virus, as can SLW.

Q can disperse by short flights, and may also be capable of wind-assisted longer distance flights associated with SLW, but transportation on plants is the major means of spread over long distances.

Q biotype management recommendation:

While Q biotype whitefly has developed high level resistance to some chemicals, there are other chemicals and effective biological control agents to keep the pest at manageable levels.

- check crops for whitefly weekly and apply treatments only when whitefly numbers reach the spray threshold levels.
- avoid the use of broad spectrum insecticides such as organophosphates (e.g. methamidophos), carbamates (e.g. methomyl) and pyrethroids (e.g. bifenthrin) early in the crop's growth.
- don't continue with a whitefly insecticide treatment if it is obviously not working. For example if Admiral or Applaud did not work, don't repeat spray with the same insecticide.
- rotate insecticide groups and avoid the overuse of any single group of insecticides
- continue to practice a management strategy that preserves and encourages the activity of parasitic wasps and predators like brown smudge bugs, big-eyed bugs, lacewing larvae and ladybirds.

Silverleaf whitefly populations remain susceptible to Admiral® and have are more susceptible to neonicotinoid insecticides, compared to Q biotype populations. Table 1 compares silverleaf whitefly and Q biotype.

Table 1. Comparison of silverleaf whitefly and Q biotype

	Silverleaf whitefly (B biotype)	**Q biotype whitefly**
IGR resistance	Low to moderate	**High to Very high**
Neonicotinoid resistance	Low to moderate	Moderate
Whitefly population levels	Low to moderate numbers in well managed crops	Increase to larger numbers even after insecticide application
Physiological reactions in plants e.g. silver leafing, irregular ripening, fruit discolorations	Induces physiological reactions in sensitive crops	Not known to cause silvering or pod discoloration
Honeydew secretion	Moderate	High
Efficacy of introduced parasitoid	High	Not known but probably effective

A Fact sheet on Q biotype is available on the QPIF website at: http://www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/26_13554_ENA_HTML.htm.

For more information, visit our web site at: http://www2.dpi.qld.gov.au/horticultureresearch/18362.html.

How do the insecticides work?
by Iain Kay

A number of insecticides are registered or permitted for use against SLW in various vegetable crops. The insecticides work in different ways and on different stages of the insect's life cycle (eggs, nymphs, adults). It is important to understand how the insecticides work and when to use each one so that you get the best control of SLW.

Imidacloprid (e.g. Confidor and many other products) and **thiamethoxam** (Actara) are neo-nicotinoids. They act on the insect's nervous system so affect nymphs and adults but not eggs. They have contact and stomach action (i.e. they work if they contact the insect or are eaten by it). They are systemic, particularly when taken up by the plant's roots, and move through the plant to places where the SLW are feeding. Foliar application of imidacloprid is less effective.

Pyriproxyfen (Admiral) is an insect growth regulator (IGR). It affects how the whiteflies develop and mature. It stops eggs from hatching and prevents nymphs from developing into adults. It will not kill adults but may sterilise the females. Use against eggs and young nymphs to suppress the whitefly population over time. It will not provide rapid control as it takes 2 to 3 weeks to reduce numbers. It has translaminar activity, which means the product moves from the upper to the lower leaf surface to affect development of the eggs and nymphs.

Buprofezin (Applaud) is another IGR. It works by affecting development of the insect's outer skeleton so the nymphs cannot properly change from one stage to the next and so die. It may also reduce the number and viability of eggs laid by treated adults. It kills nymphs but will not kill adults.

Pymetrozine (Chess) is selectively active against aphids and whitefly. It acts by ingestion as well as by contact. It immediately stops a treated insect from feeding, resulting in death from starvation within 2 to 5 days. It affects adult whiteflies.

Bifenthrin (e.g. Talstar and many other products) is a synthetic pyrethroid with contact and stomach action that affects the insect's nervous system. It mainly controls adults, with some affect on nymphs. Some populations of SLW are quite resistant to bifenthrin, but mixing it with a synergist, piperonyl butoxide, increases its effectiveness.

Oils and **soaps** basically work by smothering the insect and damaging its outer protective coating. To be effective, very good coverage of the under-surface of leaves, where SLW lives, is essential.

Always check that the product you are planning to use is registered or permitted for use on your crop.

Regional roundup

Lockyer Valley

Silverleaf Whitefly (SLW) numbers in the Lockyer Valley continue the downward trend experienced over the last 3 seasons. Possible reasons for this include:

- The establishment of the parasitoid wasps *Eretmocerus* and *Encarsia*.
- The use of imidacloprid (Confidor) as a seedling drench during anticipated high SLW activity times.
- The adoption of IPM friendly crop protection strategies.
- The planting of non SLW host crops (e.g. sorghum) due to lack of water.

A Gatton Research Station trial, sprayed only with BTs, monitored a continuous planting of broccoli for SLW and parasitoid from January 2007 to June 2008.

Sampling for eggs, nymphs and adult SLW was carried out within the crop on a weekly basis.

Results showed peaks in adult and juvenile SLW populations from February to April during the 2007 season and December to February during the 2008 season . There was no SLW activity during the colder months of June – October.

Bundaberg

Silverleaf whitefly numbers in the Bundaberg district were much higher in the 2008-09 spring-summer-autumn season than in the past few years. Large numbers of adults migrating from harvested or senescent crops were frequently of concern to nearby younger crops. The reasons for the increased pressure are not known.

Tomato yellow leaf curl virus, which is vectored by SLW, was a problem in many tomato crops in the district.

North Queensland

Bowen/ Gumlu: Sampling results indicate very low numbers of whitefly (0.1 to 0.8 nymphs/ leaf) for February and March 09. Parasitoid levels were also low (0.1 – 0.5 parasitoids/ leaf) for February, probably due to low whitefly levels. Parasitism increased in March.

Most farms managed whitefly well in 2008, except for difficulties where Q biotype occurred. Monitoring showed parasitoids are well established, levels ranged between 36 and 95% in all release locations. Levels were higher in melon and pumpkin crops than tomato and eggplants, probably due to the use of broad spectrum insecticides.

Burdekin: During early 2008 several whitefly outbreaks in **Clare** and **Home Hill** caused economic losses and increased the insecticide inputs in pumpkin, zucchini and eggplants. This was an unexpected incidence and probably due to the

expansion of several crops in the regions. To stabilise the high whitefly populations, over 250,000 parasitic wasps were released in the outbreak locations by QPIF. A follow up monitoring program indicated a significant decline in whitefly numbers with increased parasitism levels between 45 and 80%. After Aug 08, the whitefly populations were under manageable levels in many Burdekin farms.

Whitefly sampling conducted since February 2009 across the Burdekin cropping area found very low numbers of whitefly on weeds, melons and other vegetable crops. So far no whitefly outbreaks were reported in the region. The level of parasitism declined over summer months, so additional releases are being conducted to boost parasitoid numbers in the regions.

Chemical update

Information about Permits for SLW control is available on the APVMA website http://www.apvma.gov.au/permits/permits.shtml and on page four (4) of Issues 1 & 2 of the silverleaf whitefly project updates on the project home page: http://www2.dpi.qld.gov.au/horticultureresearch/18362.html

The table below lists new Permits and chemicals registered for SLW management. In the electronic copies of this SLW Update, clicking on the bolded underlined links in the table will open the APVMA Permit as a PDF file.

APVMA Permits	Trade names	Chemical group	No. & expiry date	States	WHP (days)	Crops
buprofezin (440 g/L)	Applaud	chitin inhibitor (17A)	**8576** 30/08/12	QNW STNtA	3	leafy and woody herbs
pyriproxyfen (100 g/L)	Admiral Insect Growth Regulator	juvenile hormone mimic (7C)	**8601** 30/08/12	QNW STNtA	1	leafy and woody herbs
Imidacloprid (350 g/L)	Confidor Guard	chloronicotinyl (4A)	**9160** 31/12/10	Q	NA	potatoes
bifenthrin (100 g/L)	Talstar 100 EC & other 100 g/L bifenthrin products	pyrethroid (3A)	**10058** 30/04/10	QNW STNtA	7 3 2 1	broccoli, brussels sprouts, cabbage (head), cauliflower, lettuce cucumber (protected cropping situations only) beans peppers (sweet and chilli) and eggplant
piperonyl butoxide (800 g/L) plus bifenthrin (100 & 250 g/L)	Synergy & others plus Talstar 100 EC & others or Talstar 250 EC	Synergist pyrethroid (3A)	**10105** 31/03/10	Q	7 3 2 1	broccoli, cabbage (head), lettuce (head) cucumbers grown in protected environments green beans melons, pumpkins, squash, zucchini, tomatoes
potassium salts of fatty acids (285 g/L)	Natrasoap & others		**10184** 28/02/13	QNW STNtA	NS	Glasshouse and hydroponically grown capsicum, cucumbers and lettuce
emulsifiable botanically oil (850 g/L)	Eco-oil miticide / insecticide		**10311** 30/09/13	QNW STNtA	NS	Green house and hydroponic capsicum, cucumbers and lettuce
pymetrozine (500 g/L)	Chess	feeding inhibitor (9A)	**10678** 30/04/10	QNWNt	7 5 3	head broccoli cucurbits, eggplant, tomato
pyriproxyfen (100 g/L)	Admiral Insect Growth Regulator	juvenile hormone mimic (7C)	**10764** 30/09/12	QWNt	1	cucurbits, eggplant

Previous Permits still current for SLW control in various vegetable crops and in some or all states and territories include Permits:

8249 (D-C-TRON Plus oil); **8963** (Applaud); **9178** (Applaud); **9269** (Confidor 200 SC).

Registered chemicals

There are two formulations (200 SC for foliar spray and 350 SC for soil application) of imidacloprid registered for use against silverleaf whitefly on some vegetables.

Admiral is registered for use on rockmelons and tomatoes; Actara, and Talstar 100 EC and 250 EC are registered on tomatoes.

There are also a number of other chemicals registered on a range of vegetables for use against any of the many types of whiteflies. These chemicals may or may not be effective against silverleaf whitefly (*Bemisia tabaci* Biotype B) or Q biotype.

States: Q=Queensland; N=New South Wales; V=Victoria; S=South Australia; W=Western Australia; T=Tasmania; Nt=Northern Territory; A=Australian Capital Territory. NA = not applicable NS = none supplied

Note: All users should read, or have read to them, the details and conditions of the permit and/or product label before using the product.

For details contact a member of the SLW project team or visit the APVMA website at http://www.apvma.gov.au

This update was compiled and edited by Jerry Lovatt. The silverleaf whitefly IPM project is a collaborative project between the Department of Primary Industries and Fisheries and NSW Department of Primary Industries. If you do not wish to receive future updates, or to change your email or postal address, contact Jerry Lovatt on (07) 4155 6244.

Visit our SLW project web site: http://www2.dpi.qld.gov.au/horticultureresearch/18362.html

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