

Silverleaf whitefly: Insecticide resistance update

■ By Jamie Hopkinson (DAF) and Sally Ceeney (CottonInfo)

IN the 2016–17 season, management of silverleaf whitefly (SLW) (*Bemisia tabaci*) proved challenging in most cotton growing areas, with many crops requiring an insecticide spray, and in some cases up to three sprays.

This year, as part of a CRDC-funded research project, the Queensland Department of Agriculture and Fisheries (DAF) team, with the support of agronomists, collected 17 whitefly strains from cotton farms across most regions and tested them for the presence of insecticide resistance, using laboratory-based bioassay techniques.

Pyriproxyfen (Admiral) resistance

In the case of pyriproxyfen, nine out of the 17 strains tested positive for resistance (ie. 53 per cent of strains tested had resistance to pyriproxyfen), which is a significant increase from the previous season when only one whitefly strain (5.8 per cent) was found to have resistance. In most cases the resistance detected was low, but there were a couple of strains with moderate resistance. The rapid change in resistance levels is very concerning, as the industry is heavily reliant on pyriproxyfen for the control of whitefly. Populations with resistance were all collected from the central production region – including St



Steph Pumpa and Jamie Hopkinson collecting whitefly at St George. (PHOTO: Jamie Street)

George, Boggabilla, Moree, Narrabri and Wee Waa – where SLW are becoming a pest of major concern.

Given the widespread presence of resistance in the central region, additional resistance testing was conducted on SLW collected off sowthistle in August near Moree, to determine if resistance could be detected in the overwintering population. During the cooler months of the year, whitefly development slows, but doesn't completely stop, so several generations can complete development during the autumn and winter months. Our bioassay results confirmed that resistance was present in both populations tested, one with low and the other moderate resistance. This demonstrates the challenge the industry will face going forward with resistance management, as SLW immigrating into crops sown in the 2017–18 season will be carrying varying levels of resistance alleles, with the potential for further increases when pyriproxyfen sprays are used.

This year, the DAF team has also monitored for the presence of resistance in other registered insecticides, including diafenthiuron (Pegasus), cyantraniliprole (Exirel), dinotefuran (Starkle), and acetamiprid and emamectin benzoate (Skope). Results show no evidence of resistance to these products.

Industry response to pyriproxyfen resistance

As a result of the rapid increase in the number of populations with resistance, the Transgenic and Insect Management Strategies (TIMS) insecticide technical panel has endorsed a more restrictive 30-day window for the application of pyriproxyfen, along with the insecticide resistance management strategy (IRMS) recommendation of a single application per season. The window aims to reduce the number of whitefly generations exposed to resistance selection. Repeat exposure rapidly selects for resistance and spray records from the 2016–17 season show that pyriproxyfen usage occurred during a period from early February through until the end of March.

Each regional Cotton Growers' Association was asked to nominate a voluntary preferred 30 day window for pyriproxyfen application, ideally between peak flowering and first open cotton. These dates are available on both the CottonInfo and Cotton Australia websites.



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Without any control from natural enemies, silverleaf whitefly are capable of rapid population growth.

The implementation of a window will reduce the potential for multiple generational exposure to pyriproxyfen as well as encourage greater communication and cooperation on SLW management decisions at a regional level. In some regions, area wide management groups have been formed for this and other purposes.

Revised matrix

Due to concerns with insecticide resistance, overall field efficacy, and risk of colour and stickiness downgrades, the SLW threshold matrix has been revised.

The control window for SLW has been brought forward by 100 day degrees to ensure management has taken effect prior to

open cotton. The new recommended use pattern for pyriproxyfen is between peak flowering and just prior to row closure, if control is warranted (approximately 1350 to 1550 day degrees).

It's important to remember that pyriproxyfen is an Insect Growth Regulator (IGR). It does not kill adult SLW, but provides population control by preventing eggs from hatching and blocks the progression of late instar nymphs to the adult stage, as well as sterilising adult female insects (requires ongoing contact with the insecticide every three to four days). This means it will take 10–14 days before the population declines. Sprayed whitefly continue to produce the sticky honeydew that contaminates cotton, so it isn't recommended to use pyriproxyfen where you have open cotton.

Pyriproxyfen provides up to two weeks residual protection and has been shown to be effective even on high populations of SLW. It would be expected to give four to six weeks of control.

Management of SLW populations must encompass more than just insecticide use. Effective SLW management involves a whole season, IPM approach. In particular:

- Control overwintering weed hosts including cotton volunteers and ratoons;
- Base all pest control decisions on industry-recommended sampling and thresholds;
- Avoid insurance sprays; and,
- Select the softest available product, based on target pest, beneficial population and IRMS.

The use of insecticides that disrupt beneficial insects will greatly increase the risk of having a SLW problem later in the season.

For further information please consult the 2017–18 Cotton Pest Management Guide. Additional information is available at www.cottoninfo.com.au and cottonaustralia.com.au

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