Resistance update – mites, aphids, helicoverpa, mirids and SLW

By Lisa Bird[1], Jamie Hopkinson[2] and Paul Grundy[2,3]

IN collaboration with various research partners, CRDC continue to invest in resistance testing across a range of species so that the industry's pest management practices remain sustainable over the long term. Resistance testing for the 2019–20 season has shown only minor changes to resistance levels for a number of pests, which is reflective of the low acreage sown. With an increase in planting expected in some regions this season and the likelihood of greater pest activity due to a wetter winter, it will be important to maintain coordinated industry action to keep a lid on resistance levels and prevent some of the increases observed only a few years ago.

Mites

Two-spotted mite (TSM) populations were collected from a range of sites, predominantly in the Namoi and Gwydir regions due to low mite activity in other valleys during the 2019–20 season. No resistance was found to propargite (Comite) or diafenthiuron (Pegasus). But, as in previous years, survival was detected at the discriminating dose of abamectin (Vertimec) with all populations collected in 2020 showing a level of resistance to this pesticide. Four populations had moderate resistance while six populations had high resistance which would likely have contributed to field failures of abamectin.

Despite increased prevalence of strawberry spider mites (SSM) in recent years the level of resistance detected in TSM is still of concern particularly in the lower Namoi and Gwydir regions where this species remains problematic and could become an industry wide issue if conditions favour the re-emergence of TSM as a dominant mite species.

It is important to keep in mind that management practices that lead to development of resistance in TSM could also select for resistance in SSM, which would make it a more problematic pest in the cotton farming system.

Aphids

Aphids have been an infrequent pest during the past decade, although outbreaks of cotton aphid in northern Australia occurred during 2020. Testing conducted on populations from central and northern New South Wales and the border rivers regions of southern Queensland has detected no resistance to diafenthiuron (Pegasus), sulfoxaflor (Transform) and pirimicarb (Pirimor). Very low resistance was detected to the neonicotinoids clothianidin (Shield), thiamethoxam (Actara or Cruiser) and dinotefuran (Starkle), indicating these insecticide groups can be used with confidence in traditional southern and central growing areas.

Populations of cotton aphids collected from cotton in north Queensland and Kununurra in northern WA during June and July 2020 were found to be susceptible to sulfoxaflor and neonicotinoid insecticides including clothianidin, thiamethoxam and dinotefuran.

But these northern populations were resistant to pirimicarb and dimethoate at levels that would likely result in unsatisfactory control. These levels of resistance have not been seen in cotton aphids collected from southern growing regions in over 10 years and highlights the management challenge when pests such as cotton aphids can cross over to cotton from other crops.

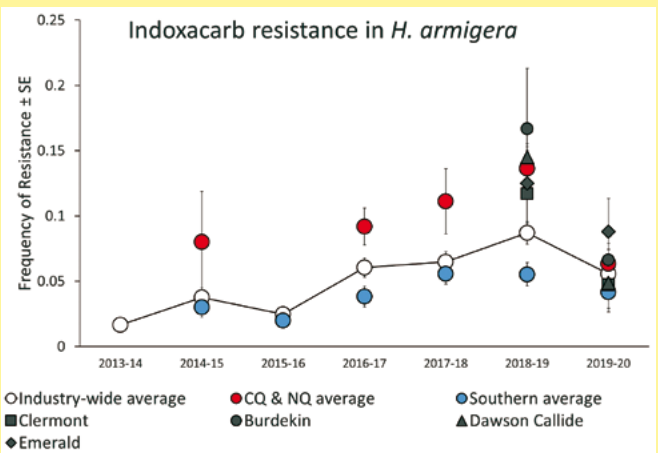
The capacity for aphids to develop resistance remains high and when cotton production is introduced to new regions that have a mix of cropping commodities, thought needs to be given to the possible exchange of pests between those crops from both an IPM and resistance management perspective. In this case, in crop use of dimethoate for mirids and other sucking pests has been followed at several locations by aphid outbreaks. The levels of resistance identified in these flared populations largely explain the outbreaks as natural enemy populations are disproportionately impacted compared to the resistant aphids present.

Helicoverpa

As in previous seasons, screening for emamectin benzoate (Affirm) and chlorantraniliprole (Altacor) found no evidence of resistant individuals indicating that genes conferring resistance to these insecticide groups remain exceedingly rare. Resistance levels to indoxacarb (Steward) declined from 9.8 per cent in 2018–19 to 5.7 per cent this year with the most marked reductions in central and northern Queensland (Figure 1).

The decline in resistance has likely been driven by the downturn in pulse production due to the severity of drought conditions experienced in 2018–19 which has resulted in reduced spraying and reduced selection pressure for resistance. Although this decline in resistance is a positive sign for the industry it will be important for people not to be complacent because it's highly likely that resistance will increase rapidly to indoxacarb if there is

FIGURE 1: Shows the industry wide trend for Indoxacarb (Steward) resistance since 2013 together with regionalised results. Resistance levels have fallen in the past 12 months because of reduced product usage associated with drought related acreage reduction



Bars denote standard error of the mean.

eChem crop protection

Ground Up Protection for the Australian Cotton Industry

eChem Australia Pty Ltd is;

- 100% Australian owned company
- Australian Products for Australian conditions
- Longstanding relationships with the highest quality manufacturers
- Fully QA tested
- Committed to Australian cotton growers

Our Products

PGR'S & Defoliants

- e-Oil Cotton Insecticide & Defoliant Oil
- Ethephon 900
- Mepiquat 38
- Thidiazuron 500 SC
- Thi-Ultra SC

Herbicides

- Dicamba 500
- Glyphosate 450
- Glyphosate 540 K
- Halox 520
- Paraquat 250
- Pendimethalin 330
- S-Metol 960
- Staroxy 200 EC
- Staroxy 400 EC
- Triclopyr 600

Insecticides

- Abamectin
- AceTam 225
- Alpha-Cyp 100 Duo.
- Amitraz 200 EC/ULV
- Bifenthrin 100 EC
- Chlorpyrifos 500
- Difen 500
- Indox 150
- Pyrip 100

Seed Treatments

- Genero 600 SC
- Methoxam 600

Contact us now

www.echem.com.au **1300 781 649**

Jacob Balzer and Jamie Hopkinson collecting whitefly near Moree. (PHOTO: Janelle Montgomery)

high usage of this insecticide when the drought breaks and crop production increases again.

Silverleaf whitefly

Resistance to pyriproxyfen (Admiral) continued to decline suggesting that industry stewardship measures, an increasing choice of alternatives and perhaps reduced acreage from the drought are all acting to reduce selection pressure for this product. Of note there were two collections this season, from Goondiwindi and Moree that had low levels of resistance.

The 30 day window for pyriproxyfen will continue in the 2020–21 season. The commencement date can vary between regions with each CGA eligible to nominate a date range that best suits local crop development. The 30 day window can be amended through a CGA request to the Cotton Australia TIMS committee.

This year, the neonicotinoid, imidacloprid (Confidor) was included in our testing program, and widespread, low to moderate resistance has been detected in most regions. Theodore was the only locality without resistance. While not used as a foliar insecticide for whitefly control, incidental exposure occurs each year, from the widespread use of seed treatments based on imidacloprid. There are varying levels of cross-resistance within the neonicotinoid group and also to pymetrozine (Chess), which has been confirmed by bioassay in our lab.

But testing of acetamiprid (Intruder/Skope) and dinotefuran (Starkle), has not provided any evidence of cross-resistance. While there is no evidence of resistance to these two neonicotinoids, it's advisable to avoid consecutive foliar sprays from this group during the season (when targeting any pest) and to use higher rates if targeting whitefly.

Spirotetramat (Movento) resistance was discovered in north Queensland in 2016, and based on our understanding of the resistance mechanism at that time, we thought individuals carrying this resistance would already be present in all cotton regions. Testing this season has confirmed this suspicion with the detection of resistance to Spirotetramat from Emerald and Dalby at very low levels. While the current level of resistance will not affect field efficacy, it strongly reinforces the need to take care with the use of this product. It will need to be used in rotation with other SLW insecticides.

Changes made to the insecticide resistance management strategy (IRMS) last season for spirotetramat will be continued with limits of one application per season. The double application strategy for Solenopsis mealybug control when warranted is an allowable exception, but an IPM approach focused on good farm hygiene and conserving natural enemies will provide a better result for the long term management of this pest.

SLW populations from across all regions still retain widespread but low levels of resistance to pyrethroids suggesting that this product should not be used except in instances where populations of displaced adult whitefly have infested crops just prior to defoliation and a fast knockdown option is required.

Testing with buprofezin (Applaud) which is expected to be registered this season for SLW control has found no resistance and no evidence of cross-resistance with pyriproxyfen. When registered, this product will be a useful addition for SLW management having a different mode of action and will reduce selection pressure on pyriproxyfen and spirotetramat.

Testing of the other commonly used product, diafenthiuron (Pegasus) found all populations are still susceptible.

Mirids

Green mirids were collected from throughout most cotton valleys and tested with fipronil and sulfoxaflor. Bioassays using a discriminating dose produced 100 per cent mortality with no evidence of resistance in green mirids to either of these insecticides.

The importance of IPM for leaf feeding sucking pests

Mirid management presents challenges with the potential to flare aphids, SLW, mealybug and mites in the cotton farming system. Natural enemies that help to suppress pests such as SLW and mealybugs if they establish in the crop early season can be disrupted by sprays such as firponil and dimethoate. Parasitoids like Eretmocerus are particularly sensitive to broad spectrum insecticides.

Important actions that can assist include:

- Control of overwintering hosts to limit seasonal carry-over of sucking pests.
- Effective sampling and use of thresholds (see latest Cotton Pest Management Guide) that limit spraying to when control is necessary, thus assisting with resistance management.
- Flexible sampling that allows for greater checking frequency when highly mobile pests may move (such as at defoliation).
- Correct timing of product application, particularly with insecticides like pyriproxyfen and spirotetramat that are slower-acting (pyriproxyfen takes at least 14–20 days before the full results can be seen).
- Conservation of beneficial insects where possible. Beneficials can exert over 90 per cent mortality on mealybug and SLW populations if given the chance. Use the most selective chemistry for mirid management that you can afford.

The most up to date information for resistance management can be found in the recently released Cotton Pest Management Guide for 2020–21. If you have not received your copy, please contact your local CottonInfo extension officer.

Finally we would like to acknowledge and thank the CottonInfo team who collected a range of insects for resistance testing from Emerald to Griffith. We are also grateful to the agronomists who supported us in finding suitable sites from which to make collections. This work is conducted in partnership with support from CRDC – projects DAN2003; DAQ2001 & DAQ1902.

1 NSW DPI, 2 DAF and 3 CottonInfo.