



Insecticide resistance surveillance: Summary of results for 2022-23



A note on surveillance programs

To help maintain the sustainability of broadacre production systems, Research and Development Corporations (**CRDC** and **GRDC**) support insecticide resistance surveillance programs of major pest species, including heliothis, aphids, mites, mirids and whiteflies.

Focused on detecting resistance to key insecticides used against these pests, these programs provide growers and advisors with an early warning system for potential resistance outbreaks, help maximise the effectiveness of spray applications, and are essential for informing ongoing review and improvement of industry-endorsed resistance management strategies. This predictive capability means industries can implement management tactics for reducing economic losses well before spray failures occur, as well as minimising further spread of resistance genes throughout the wider pest population.

NSW DPI conducts ongoing heliothis insecticide resistance surveillance program in the major summer cropping regions of NSW and Queensland using F2 screening which is highly sensitive for all types of known and novel resistance even when resistance genes are recessive. NSW DPI also conducts resistance testing for aphids, mites and mirids.

Queensland Department of Agriculture and Fisheries staff make collections of silverleaf whitefly during the latter half of the cotton season on farms in Queensland and NSW, establishing and maintaining colonies for resistance testing of commonly used products.

Summary of results for 2022-23

Helicoverpa

Helicoverpa armigera showed no resistance to chlorantraniliprole or emamectin benzoate for 2022-23. Resistance to indoxacarb can vary significantly between regions and between seasons, but the average resistance by region in 2022-23 was:

- Central Queensland 5.9%
- Darling Downs 10.1%
- St George/Mungindi 11.9%
- Macquarie 4.5%
- Namoi/Gwydir 7.3%

Aphids

Populations of cotton aphids from NSW, and southern Qld were susceptible to sulfoxaflor and thiamethoxam with very low resistance to clothianidin. Low levels of reduced sensitivity to diafenthiuron were recorded in some regions.

In contrast to previous seasons, moderate to high levels of resistance to Group 1 insecticides was present in aphids from most growing regions. Of the 69 populations tested only 13% were fully susceptible to pirimicarb, with the overall industry average of pirimicarb resistance at 27.5%.

Mites

Resistance testing in two-spotted mites (TSM) confirmed that abamectin resistance remains stable at moderate levels in northern NSW with significantly lower levels than in the south of the state. There was very low resistance to propargite in all regions. However, diafenthiuron resistance was detected in several TSM populations from the Namoi/Gwydir valleys. In some cases, resistance was recorded at approx. 10% above baseline, a significant increase from previous seasons.

Mirids

No resistance was detected in green mirids to fipronil, sulfoxaflor or clothianidin.

Silverleaf whitefly

In total 19 *Bemisia tabaci* populations were collected, including for the first time from the Lockyer Valley and Chinchilla. To date, pyriproxyfen, spirotetramat, and buprofezin have been tested, with further testing with acetamiprid, bifenthrin and other registered insecticides to be completed soon.

- A moderate level of pyriproxyfen resistance was detected in one population from Mungindi, and lower-level resistance was present in two populations from the lower Namoi valley.
- Spirotetramat resistance was detected at a moderate level in the population collected from the Lockyer valley, while very low-level resistance was detected in five other populations from Emerald, St George, Mungindi, and Namoi valley.
- No resistance has been detected in the 11 populations tested to date with buprofezin.

Cross-resistance

Resistance to a particular active often confers resistance to others that utilise the same mode of action (MoA) against the pest. The table below lists the pesticides referred to above, their MoA group and some examples of their trade names in cotton.

Active	MoA group	Trade name examples
abamectin	6A	Agrimec + multiple names
buprofezin	16	Applaud
chlorantraniliprole	28	Altacor , Charisma, Chlorantrangen, Peacekeeper, Presticor, Shenzi, Vantacor
clothianidin	4A	Shield , Siphon
diafenthiuron	12A	Detonate, Difen, Pegasus , Receptor, Valkyrie
emamectin benzoate	6A	Affirm , Bingo, Neptune, Titan, Warlock, Warrior
fipronil	2B	Regent + multiple names
indoxacarb	22	Averto, Hoprole, Indostar, Indox, Jettison, Kingdoxa, Steward
pirimicarb	1A	Aphidex, Piri-ken, Pirimor
propargite	12C	Comite , Mitigate, Propamite
pyriproxyfen	7C	Admiral + multiple names
spirotetramat	23	Kersel, Movento , Speramet, Viento
sulfoxaflor	4C	Expedite, Transform
thiamethoxam	4A	Actara, Cruiser , Methoxam

Original or oldest registered trade name is bolded and included for reference purposes for actives with numerous trade names. Note that some manufacturers use the active ingredient as the product name. Products with multiple active ingredients are not included in this list.

Resistance management strategies

Minimise the risk of insecticide resistance development by incorporating the following strategies:

- Use economic thresholds to minimise insecticide use – do not apply ‘insurance’ sprays
- Avoid broad-spectrum insecticide use (particularly early in the season) where possible as these products reduce beneficial populations which can lead to flaring of other pests and place further selection pressure on pest populations
- Adhere to industry recommended application windows to limit exposure to any one MoA group
- Avoid the consecutive use of any one MoA group (including following a seed treatment with the same MoA foliar) – rotate between groups where possible and do not exceed the maximum number of sprays stated on the label
- Do not respray an apparent failure with a product from the same MoA group.

Further information

The cotton industry’s insecticide resistance management strategy is updated annually and published in the Cotton Pest Management Guide. A hard copy is posted out with the spring edition of Spotlight, and the pdf version can be downloaded from our [Publications section](#).

Users of Bollgard technology must adhere to Bayer’s [Resistance Management Plan \(RMP\)](#) for their region.

[The Beatsheet](#) contains detailed information on resistance mechanisms and surveillance programs.

Examples of other resistance management strategies for pests in the grains industries (including an explanation of the science behind them) are available at [IPM Guidelines for Grains](#).

Information on insecticide mode of action groups is available from the [Insecticide Resistance Action Committee \(IRAC\)](#).

Disclaimer:

This content has been prepared as a guide only in good faith on the basis of available information (which may be updated without notice). CottonInfo, the authors and contributors do not claim that the specific samples examined are representative of wider pest populations and do not accept any liability for any loss, damage or expense incurred or arising by using or relying on this information. Users must obtain their own advice and conduct their own investigations and assessments of any proposals they are considering, in the light of their own individual circumstances.

Product trade names are supplied as examples on the understanding that no preference between equivalent products is intended and that the inclusion of a product does not imply endorsement over any other equivalent product from another manufacturer. Any information regarding pesticides or their use in this publication does not constitute a recommendation for that particular use. All pesticide applications must accord with the currently registered label or permit for that particular pesticide, crop, pest and region.