Helicoverpa spp. Insecticide Resistance Monitoring Results 2006/07

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Key points from the 06/07 season:

- Overall Helicoverpa pressure this season was extremely light, particularly in comparison to the pressure experienced last season. Collections therefore were greatest from the Gwydir and Lower and Upper Namoi Valleys which the egg collecting team at Narrabri focussed on.
- Early season *H. armigera* were collected from maize and sorghum which indicated their presence, but not a strong pressure. Collections from cotton in December indicated *H. punctigera* to be the dominant species, with increasing dominance from *H. armigera* through January and February, although *H. punctigera* continued to be collected.
- After February, light pressure subsided even moreso, making late season sampling very difficult, with pigeon pea freshened by rain yielding some, mainly larval, collections.
- No collections were obtained from the Lachlan, Macquarie, Walgett, Bourke and Emerald regions. Limited material was received from the Macintyre through a dedicated collector employed part time from January. Limited collections were also supplied from the Darling Downs via researchers, a few consultant contributions, and an extended field trip by the Narrabri team mid-late season. While good collections were obtained during the field trip, high levels of Trichogramma parasitism resulted in reduced numbers of eggs for testing.

Summary of results

***H. armigera*:**

- Resistance monitoring has concentrated on Steward®, Tracer® and Affirm®, with these chemistries being of greatest interest due to their strategic use in both cotton and other crops as part of an IPM approach to insect control. With the exception of Tracer, resistance has not presented a problem with these chemistries in the past and monitoring focussed on these to ensure they can continue to be used with confidence. This includes Tracer which in recent years has seen resistance decline significantly.
- With limited insect material available for testing, other insecticides were not tested to the same extent. Intrepid® (chlorfenapyr) and Prodigy (methoxyfenozide) were omitted this season from the monitoring due to the limited insect material available and the limited availability of these insecticides for commercial use.
- The results for all areas across the season have been collated and are summarised in Table 1, with comparisons to recent previous years graphed in Figure 1.
- While some survivors at very low frequencies have been detected to all three of the main IPM compatible chemistries of Steward®, Tracer® and Affirm®, these low frequencies are comparable with last season. There have been no 'hotspots' of increased resistance detected in particular areas, nor is there any indication of resistance development on a wider scale across any valleys.
- Pyrethroid (specifically bifenthrin, Talstar®) resistance continues to decrease, with very low level resistance detected this season. This continues a declining resistance trend for bifenthrin. With no discriminating dose assays available for other pyrethroids except fenvalerate it is difficult to determine the extent of cross resistance between Talstar and other

pyrethroids. These results therefore are to be interpreted as specifically for Talstar and do not apply broadly to all pyrethroids.

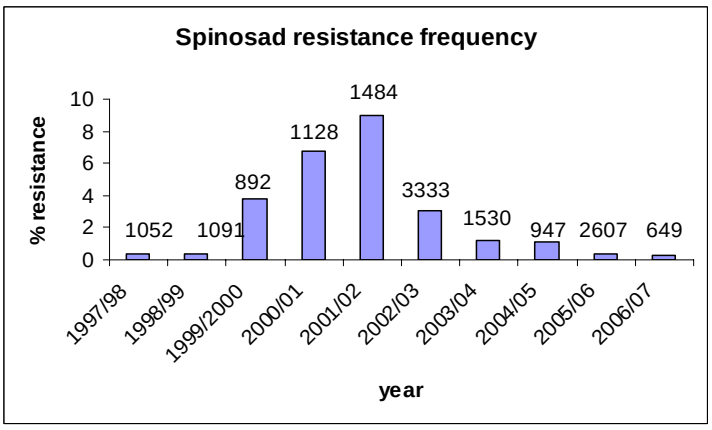
- Resistance monitoring to the other chemistries of endosulfan, profenofos, chlorpyrifos and methomyl was limited, however results indicate comparable results with previous seasons. Both endosulfan and methomyl resistance frequencies fluctuate both between areas and between seasons, however resistance is considered to be established within *H. armigera* populations.

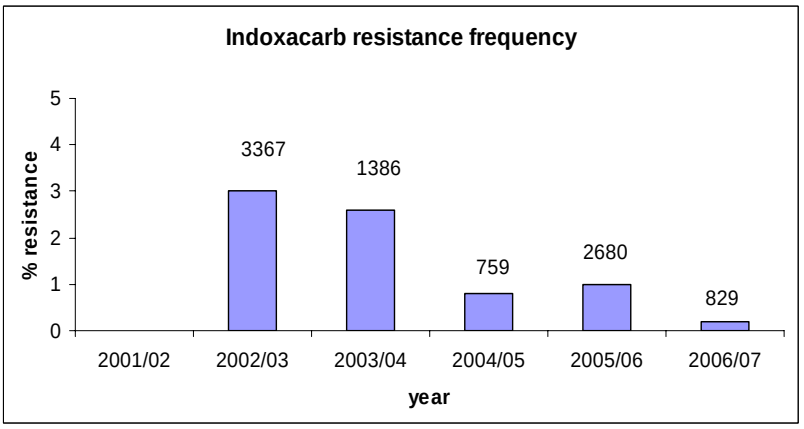
***H. punctigera*:** Over 1600 *H. punctigera* were tested for resistance to either endosulfan, pyrethroids or abamectin. There was less than 1 % resistance detected to each of the three insecticides.

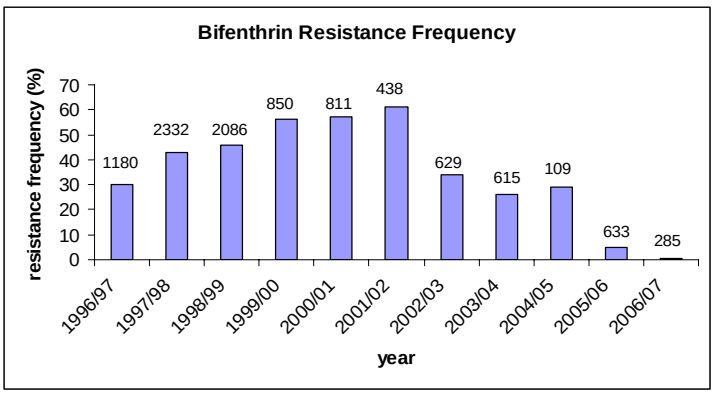
Table 1: Insecticide Resistance frequencies, Summary all areas, 2006/07, *H. armigera*

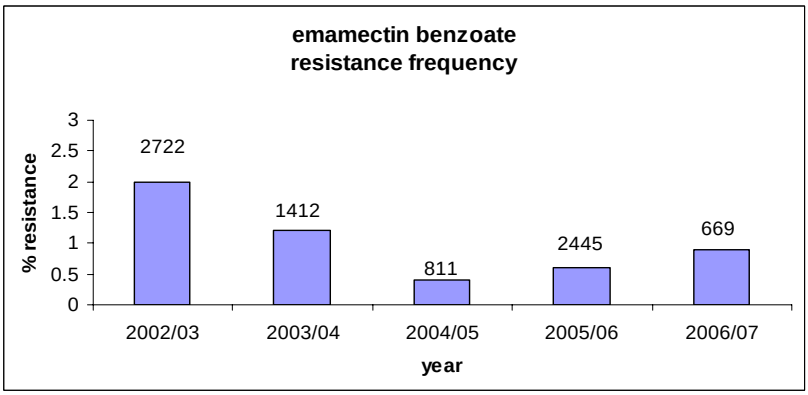
Insecticide	Resistance frequency % (no. tested)
Indoxacarb (Steward®)	0.2 (829)
Spinosad (Tracer®)	0.3 (649)
Emamectin benzoate (Affirm®)	0.9 (669)
Endosulfan	15 (66)
Bifenthrin (Talstar®) – pyrethroid	0.3 (285)
Methomyl – Carbamate	22 (126)
Chlorpyrifos – OP	1.5 (201)
Profenofos –OP	5.6 (197)

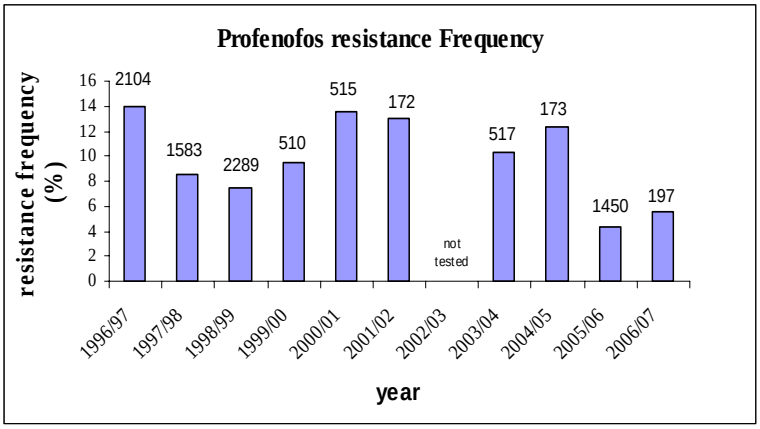
Figure 1 – Insecticide resistance trends for several insecticides from recent monitoring programs (numbers above plots indicate no. of insects tested).

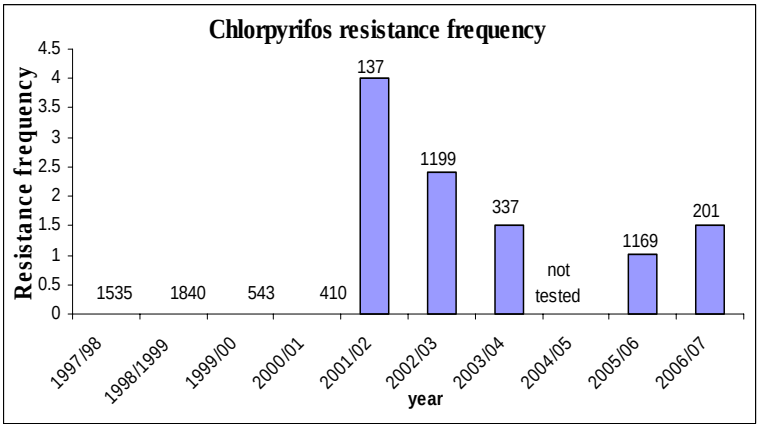












Conclusion

The results suggest positive effects on the insecticide resistance status of *H. armigera*. This may be due to various factors such as reduced and more strategic insecticide use, widespread uptake of Bollgard II, resistance management strategies, integrated pest management, and this season very light insect pressure have had positive effects on the insecticide resistance status of *H. armigera.* For some insecticides, such as bifenthrin, the reduction in resistance has been dramatic, whereas resistance appears more stable for other chemistries, such as profenofos, methomyl and endosulfan, possibly due to their long and extensive use in both cotton and other crops.

The continued detection of some survivors to all insecticides indicates that resistance is an issue that needs to continue to be considered and managed within the recommendations outlined in the IRMS. Future efficacy of these chemistries must be maintained, particularly if one or more of the factors that have helped to reduce insecticide resistance were to change in the future.

Acknowledgements

The Helicoverpa insecticide resistance monitoring program is supported by the CRDC and GRDC. While egg contributions from external sources were difficult to obtain this season due to the light pressure, the collections we did receive were greatly appreciated as was the contribution of information regarding insect pressure and co-ordination of access to field sites by consultants, agronomists, farmers and other researchers.