An unusual season for *Helicoverpa punctigera*

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The closely related Helicoverpa species the cotton bollworm, *Helicoverpa armigera*, and the native budworm, *Helicoverpa punctigera*, are both major pests of cotton but their behaviour and pest status are markedly different. And, in the cotton growing season of 2003–04, *H. punctigera* at least did some unusual things.

Winter growing annual plants in the semi–arid areas of inland Australia provide food for several migratory insect species, including *H. punctigera*. When the weather warms up in spring, these plants start to die off which triggers the migration of *H. punctigera* into the cotton growing areas of south east Australia.

These moths provide the typical early season peak of *H. punctigera* (Figure 1) and the size of this generation is related to the rainfall in inland winter breeding areas. *H. punctigera* generally declines in abundance after the second generation (Figure 1).

In contrast, the first generation of *H. armigera* generally comes from pupae that have over wintered in the ground in the cotton growing areas. By mid-season, *H. armigera* is usually the predominant species (Figure 1).

But the 2002–03 and 2003–04 seasons have been different. In 2002, the early season peak in *H. punctigera* numbers was not apparent which was probably due to conditions in their inland winter breeding areas.

In 2003–04, *H. punctigera* arrived in early spring migration flights and persisted throughout the season. It constituted the majority of Helicoverpa moths that were reared from field collections of eggs and larvae (Figure 2). Early season (September–November) collections focused on chickpea, faba bean and weed/natural vegetation hosts.

Mid to late season, the focus was on transgenic cotton and associated refuges. *H. punctigera* were even present in sorghum refuges in 2003–04, which is

TABLE 1: Months sampled during 2003–04 season

Valley	December–January		February–April	
Darling Downs	Number of hatched eggs	1074	Number of hatched eggs	91
	% *Helicoverpa armigera*	61.67	% *Helicoverpa armigera*	61.64
Namoi/Gwydir	Number of hatched eggs	7242	Number of hatched eggs	5935
	% *Helicoverpa armigera*	9.82	% *Helicoverpa armigera*	22.78
Goondiwindi	Number of hatched eggs	1244	Number of hatched eggs	888
	% *Helicoverpa armigera*	9.80	% *Helicoverpa armigera*	57.18
Emerald	Number of hatched eggs	508	Number of hatched eggs	466
	% *Helicoverpa armigera*	45.65	% *Helicoverpa armigera*	1.10

From data supplied by Lisa Bird and Sharon Downes.

Numbers of *Helicoverpa armigera* expressed as percentages of the total numbers of successfully hatched *Helicoverpa spp.* eggs collected for Bt resistance testing in 2003–2004. Data are provided separately for four regions sampled, and have been divided into a 'December–January' sample and 'February–April' sample. The numbers show that, except for the Darling Downs, *H. punctigera* were present in high numbers relative to *H. armigera* through until at least January.

FIGURE 1: Helicoverpa occurrence recorded in pheromone traps around ACRI, Narrabri, averaged over the 10 years 1992–2002

unusual as sorghum is predominantly a host for *H. armigera*.

These results were supported by evidence gathered by Louise Rossiter (NSW Agriculture) in her insecticide resistance monitoring surveys and Lisa Bird and Sharon Downes (CSIRO) in their testing of field collected Helicoverpa eggs for resistance to Bt.

The insecticide resistance surveys showed higher than expected *H. punctigera* populations which dominated until at least January in most areas. The exception was the Darling Downs around Dalby. In Kingaroy, Griffith and the Upper Namoi, *H. punctigera* was also collected from maize which normally only yields *H. armigera*.

The Bt resistance surveys, using insects from field collected eggs, showed the same pattern. In the Namoi/Gwydir, Goondiwindi and Emerald areas, *H. punctigera* were present in high numbers relative to *H. armigera* through until at least January, with the exception again being the Darling Downs (Table 1).

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In 2003–04, even sorghum played host to *H. punctigera*.

FIGURE 2: Results of lab reared collections from various crops within the Namoi Valley illustrating *Helicoverpa punctigera*'s overall dominance throughout the 2003–04 cotton growing season

Pheromone traps did not show the same strong pattern as the collections of eggs and larvae. That is, *H. punctigera* did not dominate the pheromone trap catches to the same extent later in the season. This could be due to several reasons.

For example, Dr Peter Gregg from UNE suggests the *H. punctigera* lure may not be as reliable as the *H. armigera* lure. Pheromone trap catches are useful indicators of long term trends but, in the short term, need to be interpreted with caution.

There are several possible reasons why *H. punctigera* behaved so oddly during the 2003–04 season. The far inland of Australia, where *H. punctigera* originates, experiences erratic rainfall events to which this moth responds. Suitable habitats for breeding can occur patchily, in time and space, across a broad region extending from western Queensland, through the Northern Territory and South Australia to Western Australia.

Usually the spring migration into eastern cotton growing areas is a response to moths moving from inland regions as their plant hosts die off following heavy winter rains. This probably happened in 2003–04, but no studies were conducted to confirm it.

In addition, there were incursions of moist tropical air that produced heavy rains in some northern inland areas in summer that allowed significant flow through flood plains and waterways further south. This may have led to extra breeding of *H. punctigera* which then translated into additional eastward movements of the moth.

Many cotton growing areas in northern NSW and southern Queensland also experienced consistent summer rainfall. This would provide greater than normal availability of quality weed hosts for *H. punctigera* to continue to breed on. *H. punctigera* larvae were found on roadside weeds in southern Queensland during February 2004 — which is very unusual.

So the larger than usual numbers of *H. punctigera* in cotton growing regions in 2003–04 may have resulted from continued immigration from the inland, as well as higher levels of local breeding through the season. A very unusual year!

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