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MAGNET - COMMERCIAL ATTRACT-AND-KILL TECHNOLOGY FOR CONTROL OF HELICOVERPA MOTHS

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Abstract
Magnet Insect Attractant Technology is a new integrated pest management tool that has been developed for controlling *Helicoverpa* spp. (heliothis) and other lepidopteran pests in a wide range of crops. Unlike foliar applied insecticides that target eggs or larvae, Magnet targets the adult (moth) stage of the insect's lifecycle. By killing moths before they can lay their eggs, the reliance on foliar applied insecticides for egg and larval control can be considerably reduced. Results from the last 3 seasons in Australia have shown consistent reductions in egg lays of 50 to 75% as a direct result of Magnet use, with area-wide impacts seen up to 6 km from Magnet treated fields.

What is Magnet

Developed by the Australian Cotton CRC, the key ingredient in Magnet is a blend of plant volatile chemicals (patent under license to Ag Biotech Australia Pty Ltd). Volatile chemicals are released by plants into the air, and used by insects to locate feeding and oviposition sites. The blend of volatiles in Magnet was selected based on years of research to determine the most attractive combinations, and comparing them in the laboratory to the plants that moths find most attractive. The Magnet blend is as attractive to moths of *Helicoverpa* spp. as the most attractive crop and weed plants found in the Australian environment.

How Magnet works

When moths are active in crops, they require energy (in the form of sugars) to allow them to fly in search of mates and egg laying sites. The primary sugar energy source for moths in the environment is in the form of nectar from flowers. Laboratory study has shown that some heliothis host crops aren't very attractive to the moths as a food source. The plant volatiles in Magnet mimic the type of signals that moths look for when seeking nectar rich flowers. This makes Magnet treated crop rows highly attractive zones that moths will move toward when needing an energy source. The volatiles in Magnet attract insects from some distance. Once a moth arrives at a Magnet treated row, it is stimulated to feed on Magnet deposits due to their high sugar content. As a result, insecticide added to the Magnet mixture (sold and added separately) is ingested by the moth causing death. Female heliothis moths can lay up to 2000 eggs. By killing moths before they can lay their eggs, the number of eggs and larvae in the crop will be greatly reduced.

How Magnet is used

Magnet is applied in narrow (5 to 20 cm wide) bands on the crop with 72 (general rate) or 36 metre (high rate) spacing between the bands. This equates to 1.4 or 2.8% of the crop area being treated.

Figure 1 – Magnet mixture applied to cotton plants

Trial results

Local impact

Magnet Attractant Technology is effective in reducing *Helicoverpa* egg densities in the treated field. Data from egg and larvae counts shows that application of Magnet will reduce the numbers of eggs and larvae in the treated field compared to a neighbouring untreated. Data from one trial are presented below.

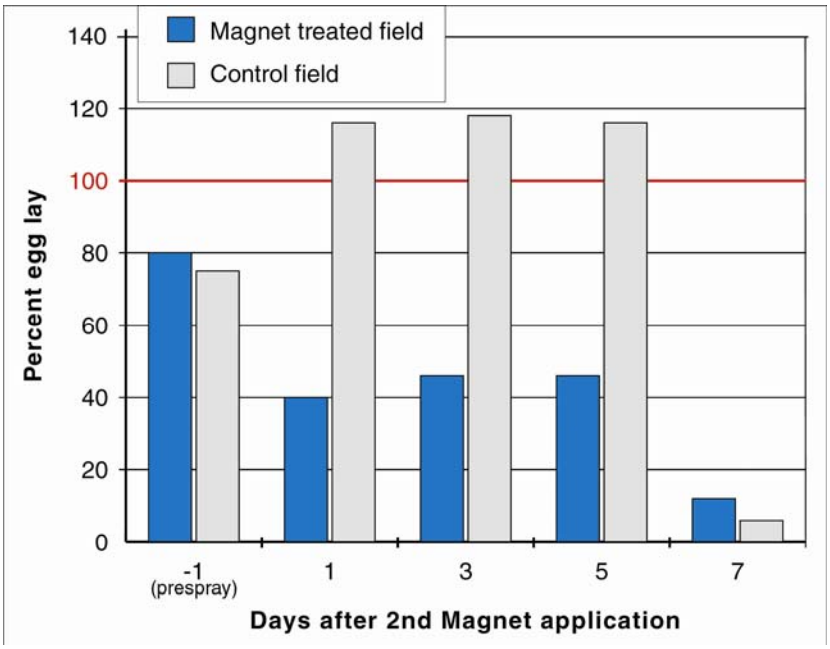

Figure 2 – Australia 2003/04

Area wide impact

While Magnet has an impact on egg and larvae numbers in the treated field compared to a neighbouring field, it also acts in reducing overall numbers in the local environment. This result has been shown in two consecutive seasons for both *Helicoverpa armigera* and *H. punctigera*. Data from two trials is presented below.

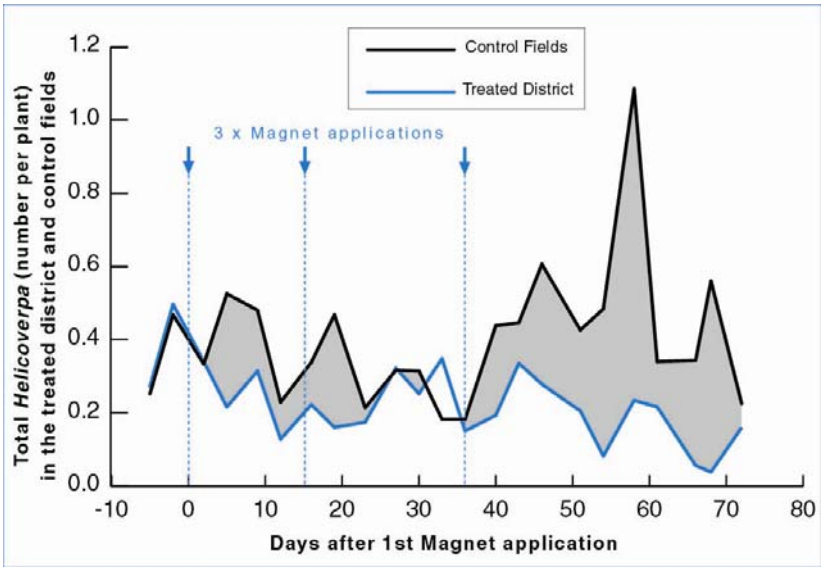

Figure 3 – Based on data from 10 Australian cotton fields – 2002/03

The grey shaded area in Figure 3 shows the difference between the total *Helicoverpa* numbers between 5 fields in a Magnet treated area (one Magnet treated field and four neighbouring fields) compared to 5 untreated fields greater than 5 kilometres distant. Each Magnet application results in the lines diverging

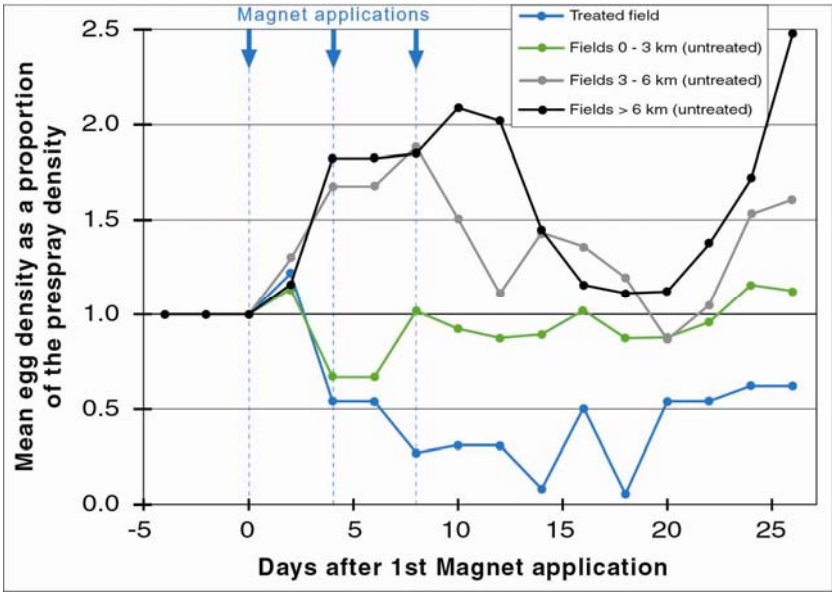

Figure 4 – Based on data from 74 Australian cotton fields – 2003/04

note 1: Mean egg densities for the treated field and fields from three distance categories (0-3km, 3-6km and > 6km from the treated field), expressed as a proportion of the starting density. Total number of fields assessed was 74

note 2: arrows indicate time of Magnet applications.

These results show that Magnet treated fields act as a regional "sink" for *Helicoverpa* moths, resulting in impacts at least 3 km away. This may have positive implications for area wide management of *Helicoverpa*.