The prospects for biocontrol augmentation in cotton and soybean systems

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The biological control concept has received favourable reception in most scientific circles in Australia. The practical implementation of the concept is far from reality, however, except in a few well-known cases, e.g. prickly pear/ Cactoblastis.

Virtually the only approach to biological control in this country has been through introduction of exotic agents to combat what are essentially exotic pest insects and weeds accidentally introduced into Australia. Theoretically, this approach offers much potential in rearranging long-term population equilibria but may offer little potential in tactical, day-to-day biological control of indigenous and some exotic pests.

The University of Queensland has been conducting trials in cotton and soybean systems aimed at:

1) Identifying significant predators of *Heliothis* eggs and small larvae.

This trial involved P^{33} labelling of *Heliothis* eggs, attachment to foliage, subsequent sampling of beneficial arthropods and use of X-ray film exposure.

2) Determining the quantitative control effect of the predator combination. This trial involved predator exclusion studies using field cages.

In addition to the field trials above the Department of Chemical Engineering has constructed a device to produce artificial pest moth eggs using synthetic diet. The mass production of these eggs is inexpensive and can be used in two approaches;

1) As a food source for the mass production of predators and as an ovipositional source for egg parasites;

and

2) As direct food augmentation in the agroecosystem. It is envisaged that diet-enriched artificial eggs could be applied to crops in the field at strategic intervals at appropriate egg densities to enhance reproduction of the beneficial predators located in the crop. Releases would coincide with the troughs between real egg-laying peaks.

Biological control through importation will only be successful if the shift in pest density equilibrium is significant in terms of economically determined amplitudes. The necessity to resort to insecticides will negate any benefits associated with this form of biocontrol. Although published information is difficult to obtain the record of success in recent years is proportionately less, indicating a decreasing benefit from an increasing investment. This trend may be rectified to some extent by more efficient source-country search programmes and/or the development of selection and breeding programmes aimed at the improvement of one or a combination of desirable characters.

Considering the lack of flexibility of the above approach it is considered opinion that biocontrol augmentation will become the preferred tactical weapon with beneficials mass produced, packaged and delivered to the target system in much the same way as currently employed chemical insecticides.