Project CSE51C: The dynamics of beneficial insect communities in cotton agroecosystems and the role of alternative crops in producing natural enemies for cotton

SUMMARY

Seasonal phenology and abundance of cotton beneficials in crop and non-crop habitats in the Namoi Valley agroecosystem

The seasonal phenology and abundance of cotton beneficials was determined in over 20 crop and non-crop habitats in the Namoi Valley agroecosystem between 1995 and 1998. Irrigated lucerne crops supported the most diverse and abundant cotton beneficial community. The presence of lucerne throughout the year, abundant prey, constant irrigation and long flowering period provided beneficials with a stable habitat in which they could feed and reproduce. Other crops, particularly grain sorghum, often supported high numbers of cotton beneficials but only for a short period of time compared to lucerne. Grain legume crops were poor sources of cotton beneficials but good trap crops for *Helicoverpa* spp.

Of the non-crop habitats sampled, burr medic (*Medicago* spp.) was found to support the largest populations of cotton beneficials, particularly brown lacewings and hoverflies. However, the ability of all non-crop habitats to support cotton beneficials was severely limited by rainfall which was highly variable in the study area.

Nursery crops for producing beneficial insects of cotton

Small plot trials, conducted during the first two years of study, confirmed the value of lucerne as a nursery crop for cotton beneficials. After lucerne, grain sorghum consistently had the highest populations of beneficials, while grain legume crops had the lowest. In the final year of study, the value of Ingard refuge crops as sources of cotton beneficials was compared. Grain sorghum supported a more diverse and abundant community of beneficials than cotton, pigeon pea, corn or lab lab.

Parasitism of Helicoverpa *larvae and pupae*

Analysis of a large database, containing records of *Helicoverpa* larvae and pupae collected from a variety of crop and non-crop habitats over a nine year period, showed that larval parasitism was highest in native Asteraceae and lowest in chickpeas. Pupal parasitism was highest in grain sorghum and lowest in maize. The majority of larvae collected from lucerne failed to pupate and it is suspected that this crop may act as an important reservoir of *Helicoverpa* disease, particularly NPV virus.

Parasitism of Helicoverpa *eggs in the Namoi Valley*

Over 138,000 *Helicoverpa* eggs were placed in various crop and non-crop habitats in the Namoi Valley to compare rates of parasitism. Less than 2.0% of eggs were parasitised and levels were too low to compare habitats. Reasons for the low level of egg parasitism in the Namoi Valley are discussed and are woprhty of further investigation.

Recommendations for Best Management Practices

1. Cotton farms should maintain permanent areas of irrigated lucerne, away from sprayed fields, to provide a stable habitat for cotton beneficials.
2. Where feasible, areas of burr medic and Asteraceae should be preserved and set aside from grazing to promote the establishment of beneficials during the spring.
3. Sorghum should be utilised as an Ingard refuge crop in order to increase cotton predator and parasitoid numbers as well as provide sufficent moths to act as an effective refuge.