Biological Control — Session Summary

Convener: D.P. Rees

Four papers including the keynote address were presented concerning the biological control of *Prostephanus truncatus*. The major development since the 5th IWCSPP has been the release and subsequent establishment in Togo and Benin, West Africa of the predacious beetle *Teretriosoma nigrescens* to control *P. truncatus*. It has also been introduced into Kenya. On-farm studies in Togo suggest some reduction in loss may have occurred since introduction. Other work was presented showing the relative specificity of *T. nigrescens*. Given the poor understanding of its interactions with other insects and its movement between natural and anthropogenic habitats, difficulty has been encountered in measuring the impact of *T. nigrescens* in the field.

Two papers were presented on functional response and host finding by the tiny wasp *Uscana lariophaga,* an egg parasitoid of *Callosobruchus maculatus*. This parasite has potential, especially in subsistence agriculture where losses due to *Callosobruchus* are high, and where farmers and consumers are tolerant of some insects in beans prior to cleaning and cooking. Parasites could be produced by farmers using caged *Callosobruchus* cultures that keep the beetles in but allow the wasps in and out. *Trichogramma evanescens* was found able to parasitise eggs of *Ephestia kuehniella* buried in up to 55 cm depth of wheat. This small wasp, which is produced commercially for a wide number of uses, has considerable potential for controlling residual populations of such moths in factories, warehouses and shops.

Field studies in the USA showed that the wasps *Cephalonomia waterstoni* and *Choetospila elegans* could penetrate a 27.2 t bulk of wheat and suppress the *Cryptolestes* and *Rhyzopertha* present. Control obtained may be acceptable for feed grain or for grain for local processing or fumigation before export. A computer simulation was presented which examined interactions between *Sitophilus zeamais* and the wasp *Anisoptermalus calandrae*. Such programs help in design of release strategies and augmentation of parasitoid populations.

The hempiteran *Lyctocoris campestris* was found to be a voracious predator of many storage insects. Acceptance may be more difficult to obtain than for wasps, because of its size and foraging habits.

Two papers were presented on use of microbial control agents. While there may be difficulties in registering such materials for direct use on stored food, they may have potential for control of residual populations.

The adage that biological control is of no use in grain storage and related industries because people will not accept insects is simplistic. There are many situations worldwide where the presence of a low level of insects could be tolerated. Even when unwelcome in finished goods or export grain, there are situations earlier in a product's life when zero tolerance is not needed. Biological control agents are useful against residual populations living in the fabric of stores and other buildings which are hard to get at by other means.

Use of biological control requires a close understanding of the pest problem, current control practices, economics and market, consumer and cultural expectations and preferences. Perceptions change, but generally are moving in favour of 'non-chemical' methods. Clever marketing can help. Food processors might be surprised by consumer reaction, especially young consumers, if they state that, instead of insecticides, they now use little wasps with 'stings in their tails' to stop moths getting into their product. More work needs to be done to integrate biological control with methods of pest control such as cleaning, aeration, and trapping, as well as with pesticides and fumigants.