The importance of insect rearing

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Food security is a great concern with the growing global population, which in turn demanded an increase in food production. Because of this high demand, the impact that insect damage has on crop production needs to be reduced.

To produce food of high quality and quantity it is necessary to protect crops against the most economically important insect pests to minimise damage and crop loss.

By implementing an integrated pest management strategy, a sustainable method can be achieved to control key insect pests. In research, the insect pest must be investigated using high numbers of individuals to evaluate all potential control methods. That is why mass rearing of insects is such an important part of conducting research, to achieve the best results.

At ARC-Grain Crops a number of maize economical important insect pests are mass reared under controlled conditions with the purpose of evaluating chemical insecticides, seed treatments, cultivars and genetically modified crops against key insect pests.

In other instances, plants can be screened for resistance to insects, indicating plants that tolerate insect damage better. The insect pests reared are the four most important stem borer species in Africa, the Africa maize stem borer (*Busseola fusca*), Chilo borer (*Chilo partellus*), sugarcane borer (*Eldana saccharina*) and the pink stem borer (*Sesamia calamistis*).

The Africa bollworm (*Helicoverpa armigera*), common cutworm (*Agrotis segetum*), false wire worm (*Somaticus angulatus*) and the fall army worm (*Spodoptera frugiperda*) are also some of the common insect pests reared at this facility.

To enable insect rearing in the laboratory, insects must be sampled and collected in the field. Specific requirements such as temperature, humidity, photoperiod (day/night length), sanitation, food and population size are specific to each species and need to be regulated.

Artificial diets are implemented for the continuous rearing of insects all year round. However, contamination of these diets is often of huge concern that can only be curbed by limiting any human exposure and access.

Important information can be observed while rearing insects for example their lifespan, duration of life stages, feeding behaviour and preferences, reproduction and the effect of biotic factors such as cold on the insect.

Susceptibility to biological and chemical insecticides can be monitored and can give early warning if resistance develops within a pest species. Important discoveries are made by monitoring insect pests, for example the migration of different stem borer larvae vary significantly between species. One pest may spread across a greater distance faster than another species.

Some insect pests like the African maize stem borer have a short life cycle and may occur several times throughout a growing season. This stem borer species also have the ability to overwinter in maize stubbles and emerge after the first spring rain. Behaviour and preference studies give better insight to preferred conditions and host plants.

Insights into the reproductive preferences of insect pests assist with host plant resistance. This means that if it is found that a host plant is unacceptable to a female moth wanting to lay eggs, she would rather move to a more suitable host plant. Information such as this can be used in interference control methods to control that specific pest.

Biological control methods are a big part of integrated pest management. Therefore, insect mass rearing is also important to have great quantities for release of beneficial insects such as parasitoids and predators that can then suppress pest insect colonies.

An example of such beneficial insects can be observed in the field in stem borer populations where the small parasitic wasp *Cotesia flavipes*, parasitise larvae and supress pest numbers.

Knowledge obtained from insect rearing facilities are published to inform producers. With this information, the producer can take informed decisions regarding management strategies including biological control, as well as the use of resistant varieties. This knowledge enables producers to develop sustainable, integrated pest management programmes.

For more information contact Elrine Strydom at *strydome@arc.agric.za*. ■

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▲ 1: Africa maize stem borer (*Busseola fusca*).
▲ 2: Chilo borer (*Chilo partellus*).
▲ 3: Sugarcane borer (*Eldana saccharina*).
▲ 4: Pink stem borer (*Sesamia calamistis*).
▲ 5: Common cutworm (*Agrotis segetum*).
▲ 6: Fall armyworm (*Spodoptera frugiperda*).