

Biological Control Case Study

Desert Locust

The desert locust, a grasshopper, is the most feared pest of farmers living around the world's major deserts. It has caused incredible devastation in the tropical world. Normally it lives in what is called a solitary phase, a scattered individual that feeds on wild plants but does not act en masse.

Challenge

The real problem arises when the insects transform into the gregarious phase and form locust swarms, moving collectively to devour entire fields in a few hours before moving on. Broad-spectrum synthetic insecticides, often sprayed from the air have been the only effective control but at a terrible ecological price and with the potential to harm human health. Scientists have looked at many strategies for management, including looking for the trigger mechanism that causes the locusts to swarm in the first place.

Intervention

In the late 1980s, an IITA research team, together with scientists from CABI Bioscience, took a very different approach. They focused on a natural pathogen that was specific to the desert locust, or at least to the grasshopper family. Their candidate was a fungus called *Metarhizium anisopliae*. It worked very well against several types of grasshoppers, including the desert locust. Extensive tests also showed that the fungus did not affect non-target species including several groups of beneficial and economically important insects. The fungus occurs naturally in Africa and has no effects on humans or animals. The trick was to produce it in quantity and then develop a delivery system to target the grasshoppers and locusts. The scientists found that mixing live fungal spores with oil would keep the spores from drying out. The mix can be sprayed from the air during locust swarms or from the ground using small, hand-operated sprayers.

Impact

Unlike chemical sprays, which act almost immediately, the fungal spray, now trademarked under the name Green Muscle (the oil-fungus mix has a dark green colour), takes longer as the fungus has to colonize the host grasshoppers first. Six days after a single application in test plots the grasshoppers began to die. Unlike many chemical insecticides, the fungus remained active for a long time and after two weeks up to 95% of grasshoppers had been killed. There was no reinvasion of the treated plots. In fact the dead grasshoppers provided the perfect medium for the fungus to continue to multiply, thus prolonging the protection it gave to the fields.

The story is not over. While the new biopesticide, which has been duly tested and registered, is effective, it is still relatively expensive to produce and cannot be produced in quantity by small-scale, artisanal methods. Commercial companies, including one in South Africa, have now been licensed to produce Green Muscle in quantity but there is still much work to be done. The Food and Agriculture Organization of the United Nations has ranked Green Muscle as the top insecticide in the two categories of human and environmental safety. In the absence of desert locust swarms, the product is being used on a large scale against other locusts and grasshoppers in Africa and as another product in Australia.