When Eggs Don't Hatch

The Benefits of the Sterile Insect Technique

Insect pests, such as the medfly, tsetse flies and carob moth can devastate crops and infect herds, causing severe economic hardship. To suppress the insect pest population and protect their livestock and crops, farmers usually use large quantities of pesticides. However, these pesticides are expensive, a risk to public health and cause environmental damage. Another technique, however, can reduce the insect pest population using natural means that do not require toxic chemicals: the sterile insect technique, or SIT.

When female insect pests mate with male partners that have been radiation sterilized, the insemination produces eggs that cannot hatch. Since mating does not produce offspring, the insect population decreases naturally. The pest population can be suppressed with little or no use of pesticides.

With the help of the IAEA, farmers have applied SIT successfully in over 20 countries on five continents, for over 15 insect species worldwide.

The Technique

Large numbers of insects are raised in specialized facilities, where the male insects are sterilized with gamma radiation. This radiation sterilization does not harm the males in any other way: they can fly, mate and transfer sperm to wild females. The sterile male insects are mass-released repeatedly in the regions affected by an insect pest outbreak. While the wild insect population decreases, the number of sterile male insects is replenished. Over time, the rate of decline of the insect population increases.

Case Studies

The island of Unguja in Zanzibar has been affected by the disease spread by the tsetse fly for decades. The tsetse feeds on the blood of humans and animals transmitting a deadly disease called trypanosomosis. This disease has taken its toll on agriculture for centuries, causing countries significant economic damage. With the help of the FAO/IAEA Insect Pest Control Laboratory, which employed the SIT in the region, the tsetse fly was eradicated from Unguja.

The world's most economically devastating fruit fly pest is the "Mediterranean" fruit fly, also called the medfly. Yearly, these flies attack fruit and vegetable crops worldwide, making them unsuitable for export or local consumption. Countries such as Argentina, Chile, Guatemala, Mexico and Peru use the SIT to reduce the medfly population and protect their crops. They produced and released billions of sterilized male medflies leading to a significant decrease in the wild medfly population and ultimately in the medfly population as a whole.

Lizette Kilian, Division of Public Information.
E-mail: L.M. Kilian@iaea.org