

Nuclear technique helps Dominican Republic eradicate insect pest and resume fruit and vegetable exports

By Luciana Viegas and Laura Gil

These Mediterranean fruit flies collected from the field are undergoing identification to confirm that they are sterile. Irradiation used to sterilize these insects in the Dominican Republic led to the eradication of the pest in July 2017.

(Photo: L. Gil/IAEA)



“For us, it became a trauma. I would go to sleep thinking of the fly, I would dream of the fly, and in the morning, I would wake up with the fly on my mind.”

— Ángel Estévez, Agriculture Minister, Dominican Republic

In 2017, the Dominican Republic eradicated a major agricultural pest, the Mediterranean fruit fly, with the help of a nuclear technique and the support of the IAEA and the Food and Agriculture Organization of the United Nations (FAO). Two years after an outbreak led to considerable damage to its agricultural industry, the country declared in July 2017 that it was free of the insect.

Authorities used the sterile insect technique (SIT) to eradicate the fly (see The Science box).

The outbreak of the Mediterranean fruit fly in the Dominican Republic was first reported in March 2015 near the popular tourist city of Punta Cana, and rapidly spread to a 2000 square kilometre area in the east of the country. As soon as the Government announced the presence of the pest, the United States banned the import of 18 fruits and vegetables, severely affecting the country’s exports.

Fruits and vegetables represent approximately 30% of food exports, earning the Dominican Republic around US \$610 million per year, according to the country’s Central Bank. The ban resulted in an estimated loss of US \$42 million in fruit and vegetable exports in 2015 alone, putting thousands of jobs at risk. Thanks to

successful eradication efforts, the ban has now been completely lifted.

“The Mediterranean fruit fly is one of the most damaging agricultural pests in the world,” said Aldo Malavasi, IAEA Deputy Director General and Head of the Department of Nuclear Sciences and Applications. “The insect attacks several varieties of fruit and vegetable, and spreads very fast.”

A female fly can lay up to 400 eggs in its lifetime, and in as little as six months a significant population can establish itself in a country the size of the Dominican Republic.

“It was disastrous,” said Pablo Rodríguez, financial manager of Ocoa Avocados, the country’s leading exporter of green king avocado. “Almost all we do is export, so you can imagine our loss. We had our products ready for export by March, when the ban started. We lost all that and our next cycle of production, too.” Ocoa Avocados’ losses amounted to US \$8 million.

While most of the flies were discovered in non-commercial almond trees along the coast, there was a fear that they could also invade commercial fruit and vegetable farms. Any appearance of the fly is seen as high risk and often causes countries free of the pest to restrict imports of vulnerable fruit and vegetables.



Against the flies

When the Government detected the outbreak, it did not have the adequate institutional capacity to respond, said Agriculture Minister Ángel Estévez. “For us, it became a trauma. I would go to sleep thinking of the fly, I would dream of the fly, and in the morning, I would wake up with the fly on my mind.”

Upon the request of the Government, the IAEA provided assistance — through its technical cooperation programme — to adapt a facility in the town of Higüey to host sterile male flies brought in from Guatemala. Starting in October 2015, over 4 billion of these were released in the affected areas.

The IAEA, together with the FAO and the United States Department of Agriculture, also trained local personnel both in setting up surveillance systems throughout the country to trap and identify the fly and in using complementary pest-control methods such as pruning trees, destroying potential host fruits and using pesticides selectively.

Flies vs the Caribbean

The IAEA’s assistance, the coordinated emergency response and the Ministry’s containment of the outbreak have led to a number of knock-on benefits, not only for the Dominican Republic but also for the entire region.

“The project has also prevented the spread of the fly to other Caribbean and mainland countries, including Mexico and the USA, avoiding large economic losses,” said Walther Enkerlin, an entomologist at the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture.

The Ministry of Agriculture now has the necessary technical and human capacity to tackle this and other outbreaks and to share lessons learned and know-how, said Frank Lam, representative of the Inter-American Institute for Cooperation on Agriculture in the Dominican Republic. “It has been a costly experience that we want to share, so that it doesn’t happen to other countries. We don’t want others to face this without being prepared,” Lam said.

THE SCIENCE

Birth control for flies

The sterile insect technique is a form of pest control that uses ionizing radiation to sterilize male flies that are mass-produced in special rearing facilities. Millions of sterile males are released systematically from the ground or by air on a regular basis. They mate with wild females, which do not produce offspring. As a result, this technique can eventually suppress or, in some cases, eradicate populations of various types of wild flies, such as fruit flies and tsetse flies. SIT is among the most environmentally friendly control tactics available, and is usually applied as the final component of an integrated campaign to remove insect populations.

The Joint FAO/IAEA Division supports about 40 such field projects delivered through the IAEA technical cooperation programme in parts of Africa, Asia, Europe and Latin America.

