

It works!

Several field trials have already provided evidence of the success of the SIT against *Aedes* mosquitoes. In China, a combination of the SIT with another method, the “Incompatible Insect Technique”, led to the successful suppression of *Aedes albopictus*. Another trial in Cuba managed to reduce the *Aedes aegypti* population by up to 90 per cent in a neighbourhood of the capital Havana. Other successful field trials took place in Germany, Greece, Italy, Singapore, Spain, Sri Lanka, and the USA.

Location of the
42 pilot trials

More than **90% reduction**
of mosquito density and human
biting rate in **7 countries**.



What comes next

The IAEA/FAO team continues to work on refining the technology and guidance material for SIT use on mosquitoes. This includes further automating the mass-rearing technology so that costs are brought down even more. Work will also continue on improving the distinction between mosquito sexes.

A crucial element of the roll-out strategy is to demonstrate, together with the WHO, the real-life impact of using the SIT in areas that are afflicted by dengue fever. This will be done through large-scale field trials over controlled areas. The IAEA/FAO team will assist Member States with their field programmes, to make sure that these are done as cost efficiently as possible.

If you want to know more about this initiative, visit <https://bit.ly/3wkSITf>.

Acknowledgements

This Joint FAO/IAEA project is supported by the governments of Japan, the United Kingdom and the USA, with a focus to support innovative Research & Development activities at the Insect Pest Control Laboratory and implementation of the pilot projects in the field.

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Stemming the Spread of Dengue Fever using Nuclear Techniques



While malaria certainly receives the most headlines when mosquito-borne diseases are mentioned, another illness is increasingly becoming a concern worldwide: dengue fever.

Most methods to control the mosquito species transmitting dengue are insecticide based. However, the International Atomic Energy Agency (IAEA) and the Food and Agricultural Organization of the United Nations (FAO) are working on expanding the use of an environment-friendly control method, the Sterile Insect Technique (SIT).

There is no specific treatment for dengue fever. Most of the infected show mild or no symptoms, but the World Health Organization (WHO) estimates that 500,000 people with severe dengue need to be hospitalized each year, and about 2.5 per cent of those affected die.

Dramatic rise worldwide

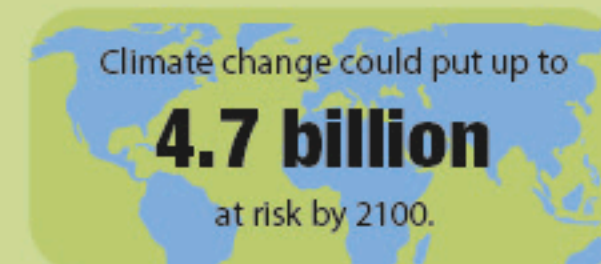
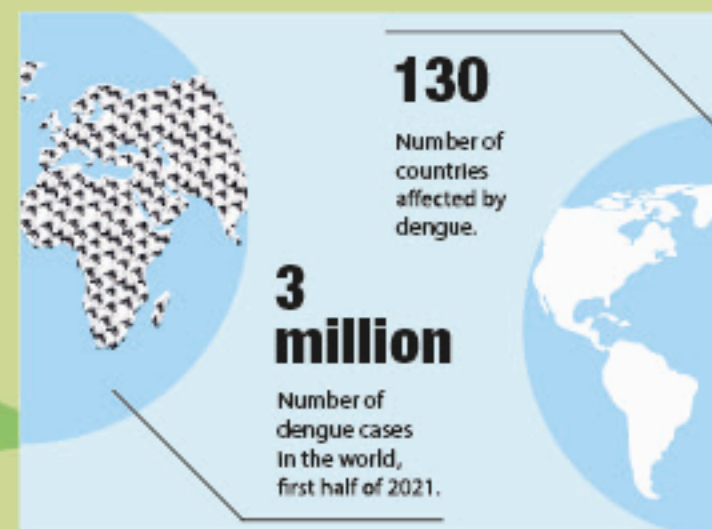
In 2016, the world witnessed large outbreaks of dengue fever, with more than 2.38 million cases in the Americas alone. In total, more than 3 million cases were reported that year globally but in 2021 this number was already overtaken in the first six months.



500,000

Number of people
hospitalised with
dengue every year.

Climate change is likely to further exacerbate the situation. A 2021 study by the London School of Hygiene and Tropical Medicine shows that up to 4.7 billion people could be at risk of being infected with malaria and dengue, should temperatures rise by 3.7 degrees Celsius by 2100.





Dengue fever is transmitted by the mosquito species *Aedes aegypti* and *Aedes albopictus*.

More cost effective, wider global reach

Producing large quantities of sterilized mosquitoes requires complex technology that is available at the IAEA/FAO's Insect Pest Control Laboratory (IPCL) in Selbersdorf, Austria.

Insects need to be reared, fed and sorted by sex, all of which has been largely automated. In the last years, new innovations have considerably brought down the 'production costs'. This allows the technique to be adopted by more countries across the globe. Feeding the insect larvae has also become cheaper.

Birth control for mosquitos

The SIT is a method that uses irradiation to sterilize insect males so they cannot produce offspring. These can then be released in large quantities over specific areas, where they effectively help bring insect pests under control. Male mosquitoes do not bite humans and cannot transmit diseases. The SIT is considered environment-friendly because it can precisely target certain insect species and because sterile insects, while breaking a pest's reproduction cycle, cannot become established in the environment.



Sexing the mosquito

To use the SIT method as safely as possible, it is important to sort the insects by sex so that only males are later released into the wild. This sorting by sex, or sexing, can be done at large scale using modern technologies, such as robots. The IPCL is testing sex-sorting robots that can sort 150,000 insect pupae every hour.

Sorting of mosquitoes relies on detailed information about them, such as their sex-specific traits. The IAEA/FAO team identifies such "phenotypic" traits that help improve the sorting efficiency.

Testing, testing, testing

Once sorting is done, sterilization comes next. One of the least expensive ways of doing this is by using X-ray blood irradiators, which are effective, easy to transport and readily available around the world. The IAEA/FAO team tests and verifies such irradiators in use by Member States, to ensure they abide by established safety and other standards.

The team supports more than 30 field trials worldwide, providing expertise, equipment and technology. This support is given in stages, to ensure that the required conditions are met for each milestone, in line with established protocols and guidelines.



It's raining men The final step of applying the SIT on mosquitoes is the release of the sterilized males into nature. This is mostly done with "automatic release systems" carried by drones.