

iiia Science & Engineering of Radiation Processing Series

# Advancing Sterile Insect Technique Using Co-60

June 19, 2026





# STERILE INSECT TECHNIQUE (SIT)

A method of biological insect control



Mass-rearing of insects takes place in special facilities.

Male and female insects are separated. Ionizing radiation is used to sterilize the male insects.

The sterile male insects are released over towns or cities...

...where they compete with wild males to mate with females.

These females lay eggs that are infertile and bear no offspring, reducing the insect population.



Joint FAO/IAEA Programme  
Nuclear Techniques in Food and Agriculture

# History of SIT

---

- American entomologists Edward Knippling and Raymond Bushland pioneered the SIT concept 1930-1950
- Initial radiation source was x-ray but moved to Co-60 for scale
- First large-scale application was New World Screwworm (NWS)
- Now used in 70 countries spanning 6 continents
- Currently used to control agricultural pests including a variety of fruit flies, codling moths, NWS, tse-tse flies
- Also used to control mosquitoes that carry human diseases like malaria, yellow fever and dengue fever

# Radiation Technology and SIT

- Dose ranges from 5-400 Gy; dependent on species, stage, age
- May be performed in hypoxic environment
- Large scale facilities can process 100s of millions to billions of insects per week (e.g. Guatemala 2B medflies = 20 tons per week)
- Self-contained low-energy x-ray, Cs-137 and Co-60 units for smaller volumes
- Full-scale industrial irradiation facilities (currently only Co-60) for larger scale
- Ideally irradiation capacity is co-located with rearing facility
- Use of e-beam/high-energy x-ray being researched



# New World Screwworm (NWS)

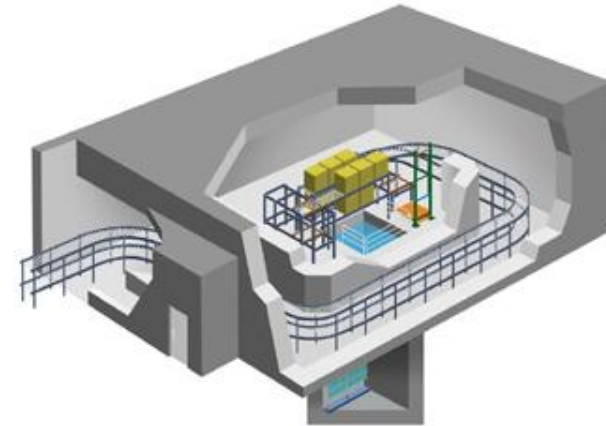
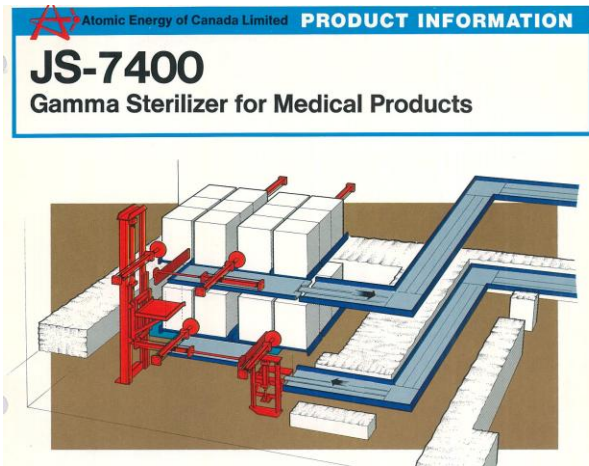
- *Cochliomyia hominivorax*
- First wide-spread application of SIT
- Eradicated in U.S. in 1960s, Mexico in 1970s
- Endemic to parts of South America
- Used to eradicate NWS from the southwest U.S. in 1966, cross-border Texas infestations in 1982, Mexico in 1991, all of North America in 2005.
- Eventually, parasite was held below a narrow geographic chokepoint — Panama’s Darién Gap — where a “living firewall” of continuously released sterile flies through Panama/U.S. cooperation (COPEG)





# Nordion-built SIT facilities in Mexico

- SENASICA (Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria) is Mexico's National Service for Agro-Alimentary Public Health, Safety, and Quality.
- Operates 2 gamma irradiation facilities for SIT near Metapa de Dominguez, Mexico
- Current Nordion project for upgrade of controls and mechanical equipment



GammaFIT Automatic Tote

# Resources

---

- [www.ans.org/screwworm](http://www.ans.org/screwworm)
- <https://www.iaea.org/topics/sterile-insect-technique>
- <https://www.gob.mx/senasa>
- <https://www.aphis.usda.gov/animals/animal-health/livestock-and-poultry-disease/current-status/us-confirmed-cases-new-world>
- <https://www.copeg.org/en/>