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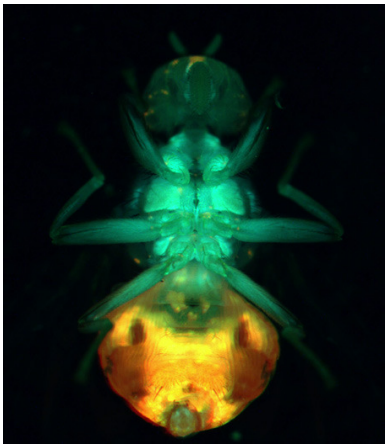

Telltale glow. Fluorescent markers reveal that this Medfly contains genes that make it sterile.

CREDIT: MARC SCHETELIG

Sterile Flies, Version 2.0

By Elsa Youngsteadt
*Science*NOW Daily News
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Swarms of impotent flies are busy protecting the world's livestock and crops. Bred, irradiated, and released by the billions, these mutants outcompete fertile males, reducing the number of pests in the next generation. The strategy is effective but inefficient. Now scientists have found a way to improve it by using genetic engineering to make sexier sterile flies.

The most economically devastating agricultural pest is the Mediterranean fruit fly (*Ceratitis capitata*), which infests more than 250 different fruits, nuts, and vegetables. It costs the world's growers billions of dollars per year. In the 1950s, researchers began fighting back by irradiating males so that they sire nonviable eggs. Since then, scientists have used the technique to eradicate the screwworm fly, which causes lesions on livestock, from North and Central America; the tsetse fly, which brings sleeping sickness, from Zanzibar; and the pink bollworm, a pest of cotton, from California.

But the gamma rays that sterilize the insects inflict massive chromosomal damage. Irradiated flies have trouble competing for mates--which means control programs must rear billions of flies and release 100 sterile males for every wild one. Today in *BMC Biology*, an international team led by developmental biologist Ernst Wimmer of Georg August University in Göttingen, Germany, report producing genetically engineered male Medflies that are both healthy and sterile.

The trick was to link a gene that tells a cell to commit suicide to a promoter, or genetic "on" switch, that is active only in embryos. The scientists still had to breed these modified flies in large numbers, so they added another genetic switch that turned the embryo killer off when the flies ingested an antibiotic, tetracycline. But when released into the wild, the flies would no longer have access to tetracycline, and the embryo killer would turn back on.

The strategy worked. In lab tests, not a single egg hatched in crosses between normal females and males from the team's best genetically modified strain. And those males competed well for mates--about 10 times better than irradiated males

would have. "It was even more effective than we expected," says lead author Marc Schetelig, a molecular geneticist now with the U.S. Department of Agriculture in Gainesville, Florida.

Researchers still need to refine the system and test it on a larger scale before the insects hit the front lines, Schetelig says. But geneticist Luke Alphey, founder of the Oxford, U.K.-based Oxitec Limited, a company that is also working to genetically modify insects for pest control, says the results are "a good step forward," proving that genetic engineering can make sterile males more efficient.

Government regulations need time to catch up with the technology, too. No genetically modified insect has yet been deployed beyond field trials, but entomologist Fred Gould of North Carolina State University in Raleigh says the new finding might spur progress: "It tells people, 'These things are coming, and we need to figure out what to do.' "