

Using Bacteria, Mamaroneck Begins to Triumph Over Mosquitos

By Lynne Ames

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LEAD: A MOSQUITO-CONTROL program in which bacteria are used to kill mosquito larvae has been judged a success in the village of Mamaroneck in two trial seasons. The project, believed to be the only one of its kind in the county, uses bacteria that are toxic only to the larvae of mosquitoes and a handful of fly species.

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Mamaroneck has long had a problem with mosquitoes, particularly in the marsh areas near Long Island Sound. Although no mosquito-borne illnesses have been reported, the insects have sent residents into frenzies of swatting, slapping and scratching, and have driven many from their backyards, according to Seymour Weingarten, a self-described anti-mosquito activist and a member of the Coastal Zone Management Commission, a five-member board that deals with coastal issues in the village. How the Process Works

A search for an alternative to chemical sprays, which may have harmful side effects, began several years ago, said Mr. Weingarten, whose house is on Guyon Creek, one of the most infested spots.

The bacteria - *Bacillus thurengiensis israelensis* - excretes a toxin lethal to the mosquito larvae, explained Robert Anderson, a research assistant in entomology at the University of Massachusetts in Amherst and a consultant on the project.

The toxin is extracted by the manufacturer of the larvacide and injected into clay granules. These granules must then be deposited in areas where mosquitoes breed at an exact phase in their life cycle. The granules are placed in the soil of the swamp; the larvae eat them and the toxin becomes a fatal dose for the larvae.

"Bti, as it is known, is great because it is species specific and is safe," Mr. Anderson said. "But for it to work, you've really got to know your marsh."

The bacterium, he added, was discovered in Israel in 1978 and is now being used extensively in the United States and in Africa.

"It can be 100 percent effective, or it can be zero," Mr. Weingarten said. "If you get them as larvae, great. Once the mosquitoes are on the fly, you've lost the battle."

Town officials said they believed the fight was being won. Mayor Paul J. Noto of the village of Mamaroneck described the project as "cost effective" and the "overall mosquito situation" as

"much better." The Village Manager, Joseph P. Fraioli, reported that there had been "fewer complaints" from people living near the marsh than in previous years.

There are hundreds of mosquito species worldwide, Mr. Anderson said. Although 10 types have been identified in Mamaroneck, the most prevalent are *Aedes sollicitans* and *Aedes cantator*. Because these species breed only in marshlands, they are easier to control than some other types, which may lay eggs in any tiny bit of water that they find, like a bird bath or an old tire filled with rainwater. Eggs Hatch in the Water

As with other mosquitoes, only the females of *Aedes sollicitans* and *Aedes cantator* bite. The protein found in blood is necessary for the development of their eggs. After mating in flight, each female deposits 200 or so eggs on the marsh ground during low tide.

When the tide rises and floods the area, the eggs hatch in the water and tiny, worm-like larvae wriggle out. Each larva goes through four growth stages, until it becomes encased in a hard shell-like pupa, which bounces up and down on the water. The pupa breaks open and the adult mosquito emerges.

The entire cycle takes one week, and the average lifespan of an adult mosquito is one month, Mr. Anderson said. Chemical sprays that are known as adulticides can be used at any time during the adult mosquito's life, but Bti must be applied during the early stages of larval development, when the squiggly creatures will feed on the toxin-laden clay granules, according to Mr. Anderson.

The areas in Mamaroneck most affected by mosquitoes are Otter Creek and Guyan Creek in the Shore Acres neighborhood and Florence Park, near Rye Neck and Harbor Heights, close to the Harrison border, Mr. Noto said.

In 1987 Mr. Weingarten, who works in publishing, and other Shore Acres residents became interested in forming a panel to address the problem. Eventually, the mosquito situation came under the aegis of the Coastal Zone Management Commission, said Paul Ryan, the commission president and owner of a mailing business in the village. "We were the logical choice," he said, noting that the commission dealt with all problems related to the Mamaroneck coastal area.

Mr. Weingarten and others involved first got in touch with Dr. Durland Fish, director of the medical entomology laboratory of New York Medical College in Valhalla. Dr. Fish suggested Bti but recommended applying it from helicopters. When village residents and officials balked at that proposition, he put them in touch with entomologists at the University of Massachusetts who do consulting work in mosquito control and who spread Bti by hand-held equipment. Marsh Water Is Sampled

Two years ago, Mr. Anderson and John Edman, chairman of the entomology department at the University of Massachusetts Amherst, came to Mamaroneck with a team of researchers to do a mosquito survey.

"Some poor sucker actually went out into the marsh and deliberately got bitten to get a bite count," Mr. Weingarten recalled. The research assistant also took samples of marsh water to determine the concentration of larvae. Additionally, researchers and residents set up devices known as New Jersey light traps, lanterns especially designed to attract and snare mosquitoes for closer observation.

Late that summer, the village applied to the state's Department of Environmental Conservation and to the county's Health Department for a permit to apply Bti to the marsh. Although the first applications had some success, "torrential rains" drove the mosquito population up, Mr. Weingarten said.

The following year, counts were conducted and larval development was studied. Bti applications were made on a regular basis, although the results were still considered inconclusive.

This summer, Mr. Weingarten said, "We have a good indication that it really is working, that mosquitoes are controlled by Bti."

Sheryl Munro, an entomologist based in Garden City, L.I., paces the marsh about twice a month, spreading clay granules impregnated with Bti. She also makes periodic checks to see if these substances are effective. "I've seen lots of dead larvae," she said. It's Working in Marsh Areas

The total cost of the program, including initial research, has been \$26,000, Mr. Weingarten said. The regular yearly program is expected to cost \$3,000.

Mr. Ryan said he believed the program was working "fantastically well" in the marsh areas, although mosquitoes could still be a problem in some spots, particularly if the weather was hot and damp. (The village occasionally sprays with chemical adulticides in these areas if there is a "sudden peak" in mosquito numbers, Mr. Ryan said.) Lately there have been compliments from residents in the form of letters and phone calls. "We've even heard from some people in neighboring towns," Mr. Ryan said. "They tell us they're calling their councilman, and saying 'Get with it.' "

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