samples collected daily for bioassay in the laboratory. At the lowest rate (0.1 ppm), control averaged 81 percent (range 53 to 100 percent), and bioassay of the water 24 hours after treatment showed 25 percent mortality. At 1 ppm, 100 percent control was obtained, and 24-hour bioassay activity was 86 percent. At 10 and 100 ppm, residual action was effective for 1 and 3 days, respectively. Thus, even the exaggerated rates yielded limited residual effects.

Ponds

Populations of *Culex tarsalis* in ponds in southern California were effectively controlled (90 to 100 percent) with dosages as low as 0.1 to 0.25 kg/ha of formulated material. In ponds with more basic conditions (pH 9.5) about 2 to 2½ times more inoculum was required for effective control; however, this amount is still within the limits of practical control.

Dairy lagoons

Waste waters rich in organic matter and low in oxygen content, such as dairy lagoons, have always been difficult sites in which to control mosquitoes. Nonetheless, *Culex peus*, a common inhabitant of these areas, was effectively controlled with about 1/2 to 1 kg/ha of BTI. Similar results for *Culex pipiens* were obtained in other dairy waste lagoons.

Salt marsh

Populations of *Aedes dorsalis* and *Culex tarsalis* were effectively controlled in salt marsh potholes and salt water in entrapped channels. Applications of BTI at 1 kg/ha produced 90 to 100 percent control despite some dilution from untreated water. Salt concentrations in these sites were approximately 3 percent.

These small field trials indicate that BTI is effective against a variety of mosquito species in widely differing water quality conditions, thus enhancing its potential usefulness.

An important consideration in the use of any toxic agent is its impact on organisms other than the target species. A toxic agent with a high degree of specificity to the pest species may be used safely in sensitive areas, because it leaves unharmed such desirable biota as invertebrate and vertebrate predators and the various aquatic animals that form their food chain.

A toxin that is selective also can be used in combination with predator release programs for immediate and longer term control. Preliminary tests indicate that BTI possesses that attribute. Acute toxicity tests have been conducted against approximately 30 species of aquatic animals at concentrations much higher than those required to kill mosquito larvae. Fish, frogs, salamanders, snails, crustaceans, flatworms, and a number of families of aquatic insects have been tested. The only animals thus far affected, other than mosquitoes, have been certain nonbiting and biting gnats in the families Dixidae, Chironomidae, and Simuliidae. Of these three families, the simuliids, or blackflies, are frequently targets for control, because a number of species are important vectors of disease as well as vicious biters of humans and livestock. The chironomid midges, although nonbiting, also are included in control programs because of public complaints of annoyance.

The research to date indicates that BTI is an effective bioagent. If expanded studies continue to confirm the preliminary results, this pathogen may be recommended for registration for use in mosquito control programs in the near future.

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