FIELD EVALUATION OF TWO INSECT GROWTH REGULATORS AGAINST CHIRONOMID MIDGES IN WATER SPREADING BASINS

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Chironomid midges have been a nuisance problem for many years within the Southeast Mosquito Abatement District. The District covers a large urbanized portion of Los Angeles County and the majority of the breeding sites are located adjacent to homes and industry. Sites are found primarily in concrete and natural flood control channels, recreational lakes including water hazards on golf courses, and water conservation spreading basins.

The control methods used have consisted mainly of the application of various species of benthic foraging fish in impounded water areas, water management in areas such as water spreading basins, and chemical control in areas such as flood control channels, forebays involved with water spreading operations, and street gutters.

Various organophosphorous compounds have been used to control chironomid midges in those areas where physical and biological means were not feasible. Usually, chemical control of midges requires higher dosages to achieve reduction below nuisance threshold levels than is needed for mosquito control. In many cases several midge species were present in one source, and control would be directed at the species with the highest population. Frequently the midge population could not be kept below the nuisance threshold for any reasonable length of time, due to differential susceptibility of the various species of midges present to the toxicant applied. This problem was compounded by the development of resistance by several species to many of the compounds. Also, a new species of Chironomous (not yet given a species name) occurred in the Southeast Mosquito Abatement District which was highly resistant to all of the organophosphorous compounds used by the District except malathion (Pelsue and McFarland, 1971). The District discontinued the use of malathion for midge control in the early 1960's due to the development of resistance by mosquitoes, and its high toxicity to fish. Fish normally do not occur in the sources where the target species is located, but many of the sources empty into the tidal net where fish kills could occur.

With the occurrence of this highly resistant species, the District had to resume the use of malathion to provide relief to the residents during the midge season. During the summer season the new species predominates in most of the flood control channels and water spreading forebays in the District.

In 1970, the Southeast Mosquito Abatement District initiated research for the control of chironomid midges by granting $10,000 to the University of California at Riverside to fund research headed by Drs. Mir Mulla and Fred Legner to explore chemical and biological means of controlling chironomid midges in the particular habitats common to Los Angeles County. At this same time, Orange County Mosquito Abatement District also granted research funds to UCR for the same purpose. These Grants have produced much valuable data, and new chemical and biological control agents have been discovered that show promise in the control of chironomid midges.

With the emergence of insect growth regulators (IGR's) as mosquito control agents (Schaefer and Wilder, 1972), it appeared that these might be active against chironomid midges. Preliminary laboratory and field data by Mulla and Kramer (in press) and Norland (1973) indicated that Altosid® (ZR-515) showed a high level of acitivity against several species of the Chironomidae. During the early part of 1973, a new compound called TH-6040 became available for experimentation. Preliminary laboratory results of this compound also indicated a high level of activity against chironomid midges.

The purpose of this study was to field test Altosid SR-10 and TH-6040 for the control of midges in water spreading basins. The project was begun during the summer of 1973 and the results presented are of a preliminary nature.

MATERIALS AND METHODS.–Experiments were performed at the Rio Hondo Spreading Grounds of the Los Angeles County Flood Control District, located in Pico Rivera. These plots of simulated water spreading basins were made available by the Flood Control District for this research. Test plots were approximately 40 feet square and 2 feet in depth. The bottom substrate was sandy loam to gravel. This soil type allows rapid penetration of water into the underground aquifers. Since these simulate water spreading basins, water is continually flowing into the basins and being percolated into the ground.

Initially four of the available eighteen basins were chosen for the tests. Three were used as test basins and one as a check. The basins were filled in early July and midge sampling was begun in the latter part of July. Samples were collected in cone-shaped emergence traps each of which sampled an area of approximately 50 square centimeters. Two emergence traps were placed per test basin and samples were collected two to three times a week with each sample representing a single trap night. Data presented showing adult emergence are an average of the two traps per test basin. The traps were moved after each sample night and were removed from the basins when no samples were taken. The samples were returned to the laboratory, identified and counted. The number of samples collected pre- and post-treatment varied but at least three samples were collected pre- and post-treatment.

Experiment 1: Three basins were treated with TH-6040, 1-(4-chlorophenyl)-3-(2, 6-difluorobenzoyl)-urea, (25% wettable powder) at the rate of 0.05 pounds actual per acre. One basin was used as a check. July 31, 1973. Water temperature ranged from 26°C - 31°C; pH range was 8.3-8.9.

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