A LABORATORY EVALUATION OF *LAGENIDIUM GIGANTEUM* IN WATER FROM CONTRA COSTA COUNTY, CALIFORNIA MOSQUITO SOURCES

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ABSTRACT

The oomycetous fungus, *Lagenidium giganteum*, is a promising microbial control agent for mosquito larvae. It has been evaluated in a variety of habitats and has demonstrated the ability to recycle in nature. *L. giganteum* does, however, have some restrictive environmental limitations, such as a low tolerance of organic water pollution and salinity.

Given the environmental constraints of *L. giganteum*, the primary purpose of this study was to determine, through laboratory experiments, in which Contra Costa County habitats the fungus could potentially control mosquito larvae. A second objective was to correlate the efficacy of the fungus with certain water quality parameters.

The efficacy of *L. giganteum* was evaluated in six separate laboratory bioassays over a 3-month period. Water and mosquito larvae were collected from a variety of habitats, such as creeks, marshes, irrigated pastures, artificial containers, and a wild rice field. Water from each source was placed into six plastic cups, and 10 second or third instar larvae from the same source were added to the cups. Three of the cups were inoculated with from 2 to 10 ml of the asexual stage of *L. giganteum*, and three cups without inoculum served as controls. *Lagenidium giganteum* was also evaluated in distilled water during each of the six bioassays. Three days post-inoculation, dead larvae were individually examined under a compound microscope for fungal infection, and the mortality due to infection by *L. giganteum* was calculated. A sample of water from each source was analyzed during the last five bioassays.

The fungus infected 100% of the larvae from the one creek tested and the distilled water during the first bioassay. There was no larval mortality due to the fungus in water collected from the irrigated pasture or marshes.

During the second bioassay, more than 90% of the larvae in water collected from two of the five creeks tested, the wild rice field and the distilled water, were dead and packed with sporangia. There was no larval mortality in water collected from irrigated pastures or marshes. Infection of larvae by *L. giganteum* corresponded to low measurements of turbidity, conductivity, and total dissolved solids. The other water qualities analyzed (pH, hardness, salinity, phosphate concentration, and chemical oxygen demand) did not correspond to *L. giganteum* mortality rates.

No larval mortality due to *L. giganteum* infection was shown in water from any source or in the distilled water during bioassays 3 and 4.

Mortality due to *L. giganteum* was evident in larvae from three of the seven creeks tested, two of the three artificial containers, and the distilled water during the fifth bioassay. The fungus was not effective in water from the one irrigated pasture and marsh tested. Low measurements of water hardness corresponded to high levels of larval mortality due to *L. giganteum*.

During the final bioassay, *L. giganteum* infected larvae from 11 (nine creeks, two artificial containers) of the 14 sources with >90% mortality. There was no larval mortality due to the fungus in water from one artificial container, one creek, or the irrigated pasture. Five water quality parameters (hardness, total dissolved solids, conductivity, chemical oxygen demand, and ammonia nitrogen) were lower from sources with larval mortality due to *L. giganteum* than in water from sources with no fungal infection. There was little correlation between salinity, phosphate concentration, or turbidity and *L. giganteum* mortality rates.

Water quality clearly affects the ability of *L. giganteum* to release zoospores and infect mosquito larvae. Thus the fungus has the potential to control a wide range of mosquito species in creeks, artificial containers, and other sources with relatively clean water. The fungus was not effective in either irrigated pastures or marshes in Contra Costa County.