1992

Classes from Tulane University visited our facility and were given presentations including the new IPM tape, lecture, and a tour of the facility.

The Assistant Director and Public Education Specialist gave several lectures to classes at Tulane University, which included a slide show or video.

Verification and update of the fixed asset inventory were begun. The inventory needed extra attention this year since both the BioControl lab and the Hangar items need to be added. Actual sight verification of all inventory items was completed. Computer data entry and verification are projects for the winter months.

BIOLOGICAL CONTROL - GERRY MARTEN

The biological control program during 1992 included:

1. Deployment of cyclops in mosquito control operations for tires and ground pools.

2. Development of new techniques for storing cyclops.

3. Field trials with larvicidal algae.

4. Studies on the basic ecology of mosquito larvae.

5. Collaboration with international projects.

CYCLOPS IN TIRES

Mesocyclops longisetus is the species of cyclops that we use for tires. We treated several thousand discarded tires in New Orleans with *Mesocyclops longisetus* in April-May of 1992, before the summer buildup of *Aedes aegypti*, *Ae. albopictus*, and *Ae. triseriatus*. We only treated tires that were close enough to residences to be considered a nuisance.

A major factor when using any species of cyclops for mosquito control is the fact that they are killed if dried out completely. There was an unusually long period without rain from the end of April to the middle of June in 1992, during which some of the tires that we had treated with *Mesocyclops longisetus* dried up. It was therefore necessary to reintroduce *Mesocyclops longisetus* at the end of June. The tires did not dry out after that, and *Mesocyclops longisetus* was still in 95% of the treated tires when we inspected them nearly a year later (May 1993). This experience has taught us that we can expect *Mesocyclops longisetus* to last for a considerable time in tires, but reintroduction to some tires is necessary after long dry spells.

CYCLOPS IN GROUND POOLS

Pools that produce Ae. sollicitans, Ae. vexans, Culex salinarius, or Cx. restuans form in poorly drained woodlots or grassy areas primarily during the cooler months of the year. Since 1991 we have treated these pools with Macrocyclops albidus as an adjunct to routine inspection/larviciding operations. Each pool is seeded with approximately 1,000 Macrocyclops albidus at the same time Bti or larviciding oil is applied. It takes several weeks for the Macrocyclops to multiply to large numbers, and they remain at a site as long as it does not dry out completely.

We use Macrocyclops albidus only for pools that retain at least a pocket of moisture throughout the autumn-winter-spring period. The best time to introduce the Macrocyclops is October or November, as soon as the pools have enough water to last through the winter. It is helpful if a pool connects with a depression or ditch that retains enough water to provide a reservoir from which Macrocyclops can repopulate the pool whenever it forms.

Macrocyclops albidus that we introduced to pools during autumn of 1991 maintained a population through the winter at nearly all treated sites. They continued at some of the sites (the wetter ones) through 1992 and into 1993, but they disappeared from sites that dried up completely during the summer of 1992. It was necessary to reintroduce Macrocyclops albidus to those sites when they were wet again in November. Macrocyclops albidus does not eliminate all the mosquito larvae from these pools, but the number of larvae have usually been low enough to make larviciding unnecessary.

We have begun to devote more attention to Megacyclops virdis, a species that occurs naturally in woodland pools and appears to be exceptionally good at surviving when pools dry out. Megacyclops virdis has been a more effective predator of Culex larvae in laboratory experiments than any cyclops species that we have tested. We have not used Megacyclops much in the field, because its food requirements are different from other larvivorous species of cyclops and we have not been able to mass produce it in the laboratory. However, we now have a food system that works for Megacyclops, so we should be able to produce the supply that we need to use this species on a larger scale.

CYCLOPS STORAGE

We made a breakthrough on cyclops storage that will allow us to use them months after they are produced. It is difficult to store large numbers of cyclops in a small container of water because they eat one another when confined in a small space. Attempts to store the cyclops at temperatures low enough to reduce their appetite have not yielded practical results, but storing them on damp sponges has proved easy and effective. They cannot eat one another because they cannot move around on the sponge.

We store as many as 500 cyclops per square inch of sponge. Survival is nearly 100% for months. We keep the sponges in plastic containers to retain moisture because the cyclops will die on sponges that dry completely.

LARVICIDAL ALGAE

Last year's annual report described larvicidal microalgae that we collected originally from some of the discarded tires in New Orleans. Since then, we have identified the algae as *Chlorella protothecoides*, and we now have them in pure culture.

We introduced *Chlorella protothecoides* to several hundred tires during 1992. The first introductions were in April, before the summer growth of algae began in the tires. We used pure stocks of *Chlorella protothecoides* that we produced in 5-gallon bottles. We did a second round of introductions in June, using *Chlorella protothecoides* that we produced in a small outdoor pond. There were small numbers of other kinds of algae mixed with the *Chlorella* from the pond.

The introductions in April were successful. The water became green with *Chlorella protothecoides* in most treated tires that were not heavily shaded, and mosquito production was suppressed. If tires dried out, *Chlorella protothecoides* came back when they contained water again.

The introductions in June were not so successful. After *Chlorella protothecoides* introduction, most tires contained a mixture of the *chlorella* and other species. Often the mixtures did not kill the mosquito larvae. It is possible there were mixtures because other kinds of algae were numerous in many of the tires by the time *chlorella protothecoides* was introduced in June. It is also possible there were mixtures because we introduced other kinds of algae at the same time we introduced the *Chlorella*.

In collaboration with Louisiana State University, we plan to develop a production system to produce large quantities of pure *Chlorella protothecoides*.

ECOLOGY OF MOSQUITO LARVAE (COMPETITION BETWEEN AE. ALBOPICTUS AND AE. AEGYPTI)

Aedes albopictus quickly replaced *Ae. aegypti* in most parts of New Orleans when it invaded the city several years ago. We do not know exactly why, but understanding the process might suggest new approaches to controlling one or both of these species.

During 1992 we conducted experiments that suggest an important factor could be competition between the larvae of these two species. It is not unusual for natural populations of *Aedes* larvae to be so crowded that they consume all available food (e.g., decomposing leaves) in their