

Integrated Pest Management Hillsborough County Mosquito Control

Not so very many years ago, mosquito control consisted primarily of the use of thermal fog trucks that sprayed a mix of pesticide such as DDT or Malathion and diesel fuel which was vaporized with heat, and created a thick and smelly fog. This killed mosquitoes, but also released an unnecessarily large amount of pesticide into the environment. This was later determined to be a temporary fix, which was neither ecologically nor economically sound. Modern mosquito control methods favor utilizing a wide variety of control methods in what has come to be known as Integrated Pest Management (IPM). IPM involves surveillance, source reduction, biological controls, larviciding, barrier sprays, public education, and when necessary, adulticiding (pesticide).



TRAPPING AND SURVEILLANCE

Some valuable tools in mosquito control used today are trapping and surveillance. These methods help quantify the number and locations of local mosquito populations, identify them by species, and determine whether they are carrying any mosquito-borne diseases. These variables change from day to day, month to month and year to year, but keeping track of them helps to identify trends which are then used to determine daily mosquito control operations.

Hillsborough County maintains 52 mosquito traps placed strategically throughout the county, most of them of a type developed by the Centers for Disease Control (CDC). These traps use carbon dioxide emitted from slowly evaporating dry ice (in the purple cooler, right) as an attractant. Once the mosquito gets close, it is drawn to the small light below, whereupon a tiny fan sucks it up into the trap. Traps are emptied at least twice weekly, and the collections are brought back to the laboratory to be counted and identified. Hillsborough County is home to 47 of the 80 species and sub-species of mosquito found in Florida, and each has different flight ranges, host preferences, larval habitat, and potential for carrying and transmitting disease. Trapping results are not only used in



determining daily operations, but are reported to state agencies for monitoring purposes.

SENTINEL CHICKENS

Co-located with some of the mosquito traps in Hillsborough County are 13 flocks of Sentinel Chickens. Blood is drawn from the chickens twice a week and sent to state laboratories for testing. If a chicken comes up positive for a mosquito borne virus, usually *West Nile Encephalitis*, *Eastern Equine Encephalitis*, or *Saint Louis Encephalitis*, the blood is re-tested for confirmation, and the results reported immediately. This provides early warning that disease-carrying mosquitoes are present, and triggers an immediate ramping up of mosquito control activities in that neighborhood and the surrounding area.



SOURCE REDUCTION AND BIOLOGICAL CONTROLS

Source reduction involves finding and eliminating potential mosquito breeding areas. Mosquitoes need water for their eggs to hatch and for the larvae to survive until adulthood. In residential areas, these sources often include common backyard items such as bird baths, untended swimming pools, old tires, buckets, trash can lids, and



even hollow-stemmed plants and flowers like bromeliads. Anything that holds water is a potential mosquito nursery. Initial response to a citizen's request for service usually involves sending an inspector to the location to find the source of the mosquito breeding, and when applicable to educate the homeowner about keeping these

items clean and dry, or rinsing them periodically with fresh water. If the source is a new pond or other area that cannot or should not be drained, the inspector may elect to stock it with small, non-descript mosquito-eating fish called *Gambusia*. Using the mosquito's natural predator to reduce populations is a method of biological control. (Most established ponds already have some type of fish and are therefore not considered sources of mosquito breeding.)



LARVICIDING

Larviciding, as the term implies, is the act of killing mosquito larvae, while they are congregated in small areas of standing water, before they have a chance to metamorphose into flying biting insects. The choice of larvicide is based on location, amount and type of larvae, stage of development, meteorological conditions and environmental considerations. Larvicides may be chemical pesticides, insect growth regulators (IGRs), or microbial larvicides, which release naturally-occurring bacteria that are toxic when ingested by mosquito and black fly larvae. The microbial larvicides are preferred whenever practical, as they are environmentally safe and ecologically friendly.



Prior to larviciding, the larvae must be located by inspectors who travel throughout the county checking roadside ditches, storm-water runoff retention areas, and a variety of other sites of known or suspected mosquito breeding. For large and/or remote areas such as salt marshes and pasturelands, inspectors are transported by helicopter. Small areas like roadside ditches are treated by truck-mounted spray systems, while large and/or remote areas are treated by helicopter-mounted spray systems.

BARRIER SPRAYS

As development encroaches on more and more of Hillsborough County's natural cypress forests, citizens often find their homes besieged by swarms of aggressive mosquitoes that use these shady areas as natural resting places during the day. One method of providing some relief to the homeowner is to apply a barrier spray of pesticide/repellant to the underside of the foliage. This robs the mosquitoes of their resting place, and those that come in contact with the pesticide are killed. Depending



on meteorological conditions, the pesticidal activity of this spray can last up to twelve weeks (however, the chemical breaks down in sunlight, and can be washed away by rainfall).

ADULTICIDING

Adulticiding is the act of killing adult mosquitoes. Using truck and aircraft-mounted spray systems, a condensed plume of ultra-low-volume (ULV) insecticide is released into the air, where it spreads out and drifts over large areas until the individual micro-droplets come into contact with mosquitoes and kill them.



Recent breakthroughs in technology allow spray equipment to release uniform droplets in the optimum size range for killing mosquitoes, which reduces waste (overkill), minimizes the potential for harm to non-target organisms, and reduces the overall amount of pesticide needed, saving money and sparing the environment. Hillsborough County uses a Chlorpyrifos-based ground adulticide at the rate of .71 ounce per acre, and Naled organophosphate aerial adulticide at the rate of .75 ounce per acre.

Rule 5E-13.036 of the Florida Administrative Code, however, requires a “quantifiable increase in, or a sustained elevated mosquito population level as detected by standard surveillance methods, including citizen complaints” before adulticides may be used, and “a demonstrable three-fold increase over a base population” before adulticides may be sprayed aerially along beaches and bay shores. Additionally application “shall be timed to be most effective during mosquito activity periods” and “shall not be later than 2 hours after sunrise nor earlier than 2 hours before sunset.” Chemical labels further restrict treatment to when wind speeds are less than 10 miles per hour and during “cooler temperatures.” Applying pesticide in strong winds or during periods of thermal activity can cause the pesticide to leave the treatment area resulting in unnecessary release of chemicals into the environment without achieving the desired results.

For this reason Hillsborough County does not schedule adulticiding activities in advance. Once the criteria are met, and weather reports are favorable, areas to be adulticided are determined, usually just hours before treatment.

PUBLIC EDUCATION

One other, very important ingredient of Integrated Pest Management is public education. Several species of aggressive mosquito are what are known as “container

breeders.” They lay their eggs in standing water left in pots, pet water bowls, trash can lids, and bird baths – anything holding water in residential areas. They have a flight range of only a few blocks, and usually end up feeding on their hosts – literally! Educated homeowners can conduct their own source reduction activities, and reduce the mosquito population significantly.

Use of protective measures such as mosquito repellants containing Deet, wearing long sleeves and long pants during hours of dusk and dawn and/or reducing exposure during those hours can cut down on potential for disease transmission, especially when surveillance has detected the presence of an *Encephalitis* virus in the local mosquito population.

Hillsborough County makes every effort to get this information out to the general public, through participation in public events, town hall meetings, civic and educational institution presentations, and various forms of media.

To request mosquito control service, call (813) 635-5400.