

Mosquito Control: We all fight mosquitoes, but ways vary

By JEFFREY STIVERS, Special to the Daily News

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To many people, the terms "mosquito control" and "mosquito-borne disease control" or the more technical "vector control" are synonymous and are accomplished using the same techniques. In reality, good mosquito control can lead to mosquito-borne disease control, but good mosquito-borne disease control doesn't necessarily equate to mosquito control.

Residents of Naples should be familiar, by now, with the techniques used by the Collier Mosquito Control District (CMCD) to perform mosquito control operations. To reduce the hordes of adult mosquitoes that plague residents, the CMCD applies a microscopic mist of insecticide using fixed wing aircraft and helicopters. To control mosquito larvae we use trucks and a helicopter to apply a biological product to standing water. In either case the intention is to reduce the total number of mosquitoes buzzing around residents as they enjoy themselves outdoors.

In reducing the total number of mosquitoes available to feed on residents, the CMCD also provides a degree of protection against the transmission of mosquito-borne diseases like Saint Louis encephalitis and West Nile virus.

Presentations made at mosquito meetings in the US focus on research to support this type of broad scale control of mosquito populations. In contrast, programs charged with solely protecting the public from mosquito-borne diseases, commonly called vector control as opposed to mosquito control are not interested in reducing the total number of mosquitoes. Rather, vector control programs are interested only in those mosquitoes that have the potential for transmitting a particular disease to people.

I was reminded of the distinction between the two objectives when I was invited to speak at the 40th National Congress of Entomology in Tapachula, Mexico. At that meeting a number of professionals from Mexico, as well as other countries in Central and South America, made scientific presentations concerning mosquito-borne disease control operations and research. Presentations there reflected this more narrow focus on sub-populations of mosquitoes.

Those presentations covered the same general topics as presentations made at meetings of the Florida and American Mosquito Control Associations. The specifics, however, distinguish between those made where the emphasis is on mosquito control and where it is on mosquito-borne disease control.

The talks in Mexico reflected the importance of dengue fever and malaria as the primary mosquito-borne diseases in Latin America. These diseases are transmitted by several

different mosquitoes in different environments and require specific control techniques for each disease/vector combination.

The vectors of dengue fever are *Aedes aegypti* and *Aedes albopictus*, both considered to be domestic or urban mosquitoes. These mosquitoes breed in artificial containers like bottles, cans, tires, flower pots, rain gutters, buckets, water tanks, cisterns, and anything else that can hold water. Operations to control dengue fever are primarily directed at preventing the vector mosquitoes from breeding around the home, which is where the disease is transmitted.

One major control method in other countries is the use of government employees to visit each and every house every three months to physically eliminate potential breeding sites or treat them with a larvicide that stays active for many months

Public education and participation programs are also used to involve the public in neighborhood cleanup programs aimed at eliminating potential breeding sites. Natural predators such as fish, turtles, frogs, and beetles can also be introduced into drinking water storage containers to prevent breeding. Fog trucks are frequently used to control adult mosquitoes, especially during dengue fever epidemics.

These sound like simple tasks, but the control of dengue-transmitting mosquitoes is more complicated than it seems. Presentations at the meeting in Mexico concerning dengue focused on the molecular biology of the vectors in relation to their ability to transmit dengue fever, new chemicals, biological agents and predators to control the larvae, public education programs, and ways to involve the public in cleanup programs.

Control of malaria is considerably more complicated and may involve a wider variety of control options. Malaria is transmitted by several species of *Anopheles* mosquitoes, frequently by more than one species in a given country. Since factors such as elevation, temperature, water quality and vegetation type may influence which particular species serves as the malaria vector in a given area, considerable research is dedicated to varying control needs.

Researchers in Latin America are using genetic research, combined with basic biological investigations, to define which species serves as the primary malaria vector in a given area, and why. This is invaluable to the people responsible for malaria control since it allows them to better focus limited resources. After all, why spend scarce resources to eliminate a breeding site for a species of *Anopheles* that does not transmit malaria in that region?

The primary malaria control technique for many years was to spray the interior walls of all the houses in a malaria zone with a residual insecticide every three to six months, depending on the insecticide used. This technique wasn't aimed at killing large numbers of mosquitoes, only those that flew into houses to feed on the residents as they slept. This is an expensive proposition and requires considerable manpower to execute properly.

While house spraying is still used, other techniques have been developed that are used individually and in various combinations. One of the more popular techniques recently has been the use of insecticide- or repellent-treated bed nets. These nets are distributed, at little or no cost, to the residents in areas where malaria transmission takes place.

The nets need to be retreated periodically, but this is something that the residents do themselves, with minor assistance from malaria control personnel. This frees malaria control personnel for other duties and reduces the cost of operations.

Mass drug treatment programs are also used, especially in areas where the population is transitory or to eliminate the malaria parasite in the human population. Mass curative treatment involves giving everyone a curative dose of malaria drugs to completely eliminate the parasite from the entire population of a village. This is generally done in existing villages where malaria rates are high, usually in conjunction with some vector control operation such as wall spraying. Prophylactic treatments are generally done when people move into a malaria area for a short time, such as during harvests or as a result of natural disasters.

The strategies used in these "vector control" programs are very different, not just from the "mosquito control" program operated by the CMCD, but from each other. The CMCD uses "mosquito control" strategies that help protect residents from the large number of nuisance mosquitoes found in the area. These strategies also provide a degree of "vector control" to help protect residents from mosquito-borne diseases. The "vector control" strategies used in Latin America help protect the population from mosquito-borne diseases, but do little to protect people from nuisance mosquitoes. These differences in control strategies are reflected in the focus of the research performed by the different groups.



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