Message

From: David Danelski [david.danelski@iscatech.com]
Sent: 8/23/2017 2:13:35 PM
To: David Danelski [Ex. 6]
Subject: Fatal attractions for disease-carrying mosquitoes

Fatal attractions for disease-carrying mosquitoes

Mosquitoes, mostly through the transmission of malaria, are the deadliest animals on Earth, claiming hundreds of thousands of lives each year.

A Riverside, Calif., biotech firm is working on several innovations to stop outbreaks of malaria-spreading mosquitoes before they occur. One exploits the mosquito's hunger for nectar to attract and kill them before they suck blood. A second tricks mosquitoes into biting cows that are immune from malaria and carry a medication that kills these pests. A third attracts and kills young mosquito larvae.

Agenor Mafra-Neto, the CEO of ISCA Technologies, presented these and other innovations under development Wednesday, Aug. 23, at the American Chemical Society conference in Washington, D.C.

These breakthroughs - funded with federal and private grants - put to work pheromones and other attractants already found in nature to manipulate the deadliest disease-carrying pests without harming the environment. These innovations reduce pesticide applications by orders of magnitude or in some cases completely replace them.

"We want to help eradicate vector borne diseases and all the suffering that they cause. We are contributing by creating inexpensive smart green products that change the way vectors like mosquitoes, ticks and flies behave, killing them before they will bite and transmit diseases." said Agenor Mafra-Neto, CEO, and founder of ISCA Technologies, who will be presenting at the ACS conference.

Climate change is creating a greater urgency for such innovations:

- As the planet warms, greater expanses of the globe will not freeze in the winter and eliminate in many areas an important check on mosquito populations.
- More extreme storm events increase flooding, which will result in ideal conditions for mosquito breeding since their larvae hatch and grow in stagnant water.
- Extreme weather also will damage roads and other infrastructure and make it more difficult to respond to mosquito outbreaks.

Too often, curbing mosquito outbreaks with traditional pesticide sprays is like trying to put out a wildfire that is already out of control, as their populations spike following rainy weather. However, by targeting immature mosquitoes, an ISCA formulation called SPLAT BAC stops mosquitos before their numbers grow. It works preemptively by applying treatments to floodplains and other known water-gathering spots before the rainy seasons begin. An inert substrate containing the natural behavior-modifying attractants and a minute dose of a green larvicide sticks to vegetation, gravel, and rocks when applied to the dry, future mosquito breeding sites.

The formulation goes to work just after the rain arrives, which forms puddles and other aquatic habitats that mosquitoes need to reproduce. It then floats to the surface of the water, where one attractant lures pregnant mosquitoes, and induces them to lay their eggs in the treated areas. As the larvae hatch, another attractant compels them to eat the naturally occurring bacteria species, Bacillus thuringiensis israelensis, or Bti, also in the formulation. The bacteria kills mosquito larvae but leaves unharmed all of the other non-target species.

The strategy stops the mosquito life cycle before the adult population can spike and efficiently spread diseases such as malaria, West Nile Virus, filariasis, Zika, and dengue. The environment is left unharmed because the substrate mixture is benign and the bacteria is not harmful to beneficial species, such as honey bees. Malaria alone in 2015 afflicted some 214 million people worldwide, causing an estimated 438,000 deaths, according to the World Health Organization.

ISCA's home facility in Riverside, Calif., has completed the laboratory work. Most of the field work will be done in California and Florida. Field trials also will be done in Tanzania in East Africa, Côte d'Ivoire in West Africa, and in Brazil, where mosquito-vectored diseases such as malaria, lymphatic filariasis, Zika and dengue are prevalent.

Another ISCA strategy is called the "Trojan Cow." This works by treating cattle and goats with a formulation that makes the livestock smell like people to mosquitoes. The odor entices malaria-carrying mosquitos to bite these animals, which are immune to the disease. A deworming medication in the cattle then kills the mosquitoes.

Mafra-Neto also will present on a sprayable attract-and-kill product called Vectrax that mimics the sweet smell of nectar that mosquitoes feed upon. This lures adult mosquitoes to a small quantity of insecticide that, upon being ingested, kills them without harming other wildlife, including bees and other pollinators. Since female mosquitoes must feed on nectar several times before seeking blood, Vectrax can eliminate them before they have the chance bite people, and spread diseases, such as malaria. However, unlike most other attractants, Vectrax also attracts and has an effect on male mosquitoes, potentially doubling its efficacy. Large fields trials are now ongoing in the Muheza district of Tanzania, a region hit hard by endemic malaria.

Closer to home, deer ticks common in North America spread Lyme disease and other pathogens. So ISCA is developing a technology, SPLAT TK, that employs an attract-and-kill strategy similar to Vectrax. Using a blend of deer tick pheromones, it attracts ticks to a very small but still highly effective amount of pesticide. By attracting the ticks to small isolated point sources of pesticide, this attract-and-kill strategy stands to dramatically reduce the volume of pesticides used to control ticks, making for far safer controls in backyards, near schools, parks, trails and sensitive wildlife habitats.

About ISCA: ISCA Technologies is a biotech company based in Riverside, Calif., that develops, tests and commercializes safe, economical and environmentally-friendly integrated management solutions to crop-destroying and disease-spreading pests worldwide. ISCA synthesizes pheromones and other naturally occurring chemicals that affect the behaviors of specific pests for mating-disruption, attract-and-kill, and repellant strategies. These methods don't harm other creatures and reduce pesticide applications by orders of magnitude or in some cases completely replace them.

Acknowledgements: The technology presented here has been funded, at least in part, by the generous support of the Bill and Melinda Gates Foundation, National Science Foundation, National Institutes of Health, U.S. Department of Agriculture and the U.S. Department of Defense, with grants and contracts to Agenor Mafra-Neto and ISCA Technologies.

Key words: Malaria, Lyme disease, pheromones, pest management, ticks, mosquitoes, semiochemicals, pesticides.

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