Novel Mosquito Control: A Chemical-free, Low-Cost Approach for Aedes aegypti Reduction via Specific Range Frequency Sweep

Jakhete, Shantanu

Mosquito control is crucial to fighting diseases, such as zika, malaria, and dengue. Extensive research has been done on chemical-free control, such as the use of sound as a means of mosquito control. Prior research, however, single tone sound was used to repelling female mosquitoes. This project explores the novel use of a frequency sweep to attract male mosquitoes to a sound source. This device generates frequency sweep through a pre-set range using a microprocessor controller. This frequency range is determined by the wingbeat frequency of the female mosquito, specifically during the mating phase of the life cycle. The frequency sweep allows the device to emulate the sound of a female mosquito, attracting sexually-active males in the population, to the sound source. In addition, this concept compensates for any extraneous environmental factors affecting mosquito control. To evaluate efficiency of the concept, a high-voltage mesh was fitted on the device which terminates the mosquitoes caught. In the study, a population of Aedes aegypti was investigated. The study was successful, as it was proven that a variable frequency sound sweep can be used to target male Aedes aegypti. The device achieved an average death rate of 23.5 mosquitoes per minute, by reducing the male population (of 300) in cages by 29% in only 200 seconds. With this efficiency, the device can be deployed to target male mosquitos so that over time, the rate of reproduction is lowered, and the overall mosquito population is controlled, mitigating the risk of disease transmission. More importantly, since the concept exploits an inherent insect behavior, it can be applied to most insect species, and can reduce insect populations without the use of harmful chemicals, ultimately saving lives.

Awards Won:

U.S. Agency for International Development: Fourth Award of $500