

Dengue Branch Billet

Puerto Rico and tropical countries around the world suffer from epidemics of dengue and other arboviruses, such as chikungunya and Zika that are transmitted among people by the domestic mosquito *Aedes aegypti*. Advances in mosquito surveillance and control are urgently needed to prevent and control epidemics. Towards that purpose, it is necessary to understand components of the ecology of *Ae. aegypti* and the transmission cycle of arboviruses, such as where mosquitoes are produced, when the populations of mosquitoes are more abundant, effects of seasonal and inter-annual climate, urbanization, socioeconomics of inhabitants, among others. This implies investigating multiple factors influencing the eco-epidemiological landscape. To understand how mosquitoes and disease vary in space, we integrate many variables into Geographical Information Systems. One result from these analyses is the detection and characterization of historical hot spots of arboviral disease. A critical question is what factors determine the existence of hot spots, including mosquito abundance, human density, weather, and landscape elements.

The Entomology and Ecology Team at Dengue Branch conducts laboratory and field research on the biology, behavior, ecology, surveillance, and control of mosquito vectors of dengue and other arboviruses. We also provide consultation and assistance on mosquito surveillance and control to local, state, national, and international health agencies, as well as training on *Ae. aegypti* biology, behavior, ecology, surveillance, and control.

Some of our investigations are about the minimum abundance of *Ae. aegypti* mosquitoes that prevents arbovirus epidemics, what is the relationship between variations in insecticide resistance and socio-economic levels, how inter-annual climate affects mosquito populations and infections, and how we can improve mosquito surveillance and control. We are beginning to develop geo-spatial analyses to understand the impact of mosquito control in Puerto Rico and abroad. We could support projects addressing exploration and implementation of surveillance tools, ecological studies linking arbovirus transmission and mosquito populations, analytical studies of arboviruses in mosquitoes, and geo-spatial studies of the urban landscape, such as the detection of urban heat islands and their role in the transmission cycle or mosquito ecology. The applicant would be welcome to participate in these ongoing activities or in new projects related to improving surveillance and control of *Ae. aegypti*.