Effects of low-powered RF sweep between 0.01-20 GHz on female *Aedes Aegypti* mosquitoes: A collective behaviour analysis

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Abstract

There are many products claiming to be an electronic solution towards repelling mosquitoes. Several reviews were published in debunking these claims. However, there is a lack of a systematic study on effects of electromagnetic (EM) or more specifically, radio frequency (RF) waves against mosquitoes due to the conclusions made in those years. Therefore, we attempt to establish a fundamental study on female *Aedes Aegypti* (Linnaeus) mosquitoes by quantifying the collective behavior of the mosquitoes against a continuous stream of low-powered RF signals via a broadband horn antenna using image processing methods. By examining the average lateral and vertical positions of the mosquitoes versus frequency and time, the data shows negligible consistency in the reactions of the mosquitoes toward the different frequencies ranging from 10 to 20,000 MHz, with a step of 10 MHz. This was done by examining 33 hours of spatiotemporal data, which was divided into three sessions. All three sessions showed totally different convolutions in the positions in arbitrary units based on the raster scan of the image processing output. Several frequencies apparently showed up to 0.2–70% shift in both lateral and vertical components along the spectrum, without repeatability for all three sessions. This study contributes to the following: A pilot study for establishing the collective effects of RF against mosquitoes, open-source use, and finally a low-cost and easily adaptable platform for the study of EM effects against any insects.

I. Introduction

A detailed understanding of the issues around mosquito control is crucial as current methods are still being put into question for further improvements [1]. Electronic mosquito repellents,