Utilization of Cigarette Butt Waste as a Larvicidal Control Tool on Dengue Vector Aedes polynesiensis Mosquitoes

Mirasol, John Marcial (School: Manumalo Academy)

Cigarette butts (CBs) are the most abundant plastic waste and the number one littered item in American Samoa. Currently, there is an outgrowing interest in recycling CBs and developing methods to use it in a beneficial way. CBs can be used as a control tool on the most abundant and primary vectors of dengue and filariasis, Aedes polynesiensis mosquitoes, in the Samoan islands. This study was performed to examine whether the Ae. polynesiensis alters its ovipositional responses, larval eclosion (hatched rate), and mortality rate (percentage of dead larvae) with the presence of CB waste in its habitat. Two experimental setups were performed, Trial 1: 1CB1sol (grass infusion with 1 cigarette butt), 2CB1sol (grass infusion with 2 cigarette butts), and control (grass infusion only), Trial 2: 2CB2sol (grass infusion with 2 cigarette butts), 4CB2sol (grass infusion with 4 cigarette butts), and control (grass infusion only). Results indicated that gravid females showed a preference of depositing eggs in microcosms with higher concentrations of CBs than in those with grass infusion only. Similarly, there was a significant decrease in the hatch rate of eggs and increase in mortality rate of Ae. polynesiensis' larvae from microcosms with higher concentration of CB. Hence, these results prove the hypothesis correct and that CB waste can be turned into a larvicidal control tool. In conclusion, a higher concentration of CB waste in the habitat of Ae. polynesiensis decreased the hatching rate of eggs and increased the mortality rate of the larvae while attracting more gravid females for egg deposition. The results indicate the potential of using CB waste as a mosquito vector control strategy, which can reduce the CB burden and costs of current vector control methods.

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