LARVICIDAL EFFECT OF COFFEE (Coffea arabica) EXTRACTS ON Aedes aegypti: AN ECOLOGICAL ALTERNATIVE FOR VECTOR CONTROL

PEDRO HENRYQUE DE CASTRO[1]; INGRID MARCIANO ALVARENGA[2]; ISADORA ANTONIA FERNANDES[2]; ARTUR METZKER SERRAVITE[1]; KAROLINA GOMES DE FIGUEIREDO[2]; LEONARDO BARBOSA KOERICH[1]; MARIA DAS GRAÇAS CARDOSO[2]; GRASIELLE CALDAS D'AVILA PESSOA[1]; GERALDO ANDRADE CARVALHO[2]; JOZIANA MUNIZ DE PAIVA BARÇANTE[2*]

[1]Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brasil; [2]Universidade Federal de Lavras, Lavras, Minas Gerais, Brasil.

* joziana@ufla.br

Aedes aegypti is a vector of DENV, ZIKV, and CHIKV, which cause diseases with a significant impact on global health. Mosquito control is primarily conducted through insecticides; however, resistance has reached alarming levels, necessitating the discovery and/or development of new molecules. In this context, botanical products are gaining prominence, with this study focusing on coffee (Coffea arabica). A. aegypti larvae (Rockefeller strain, L3, n=15; quadruplicate) were subjected to gold-standard bioassays. The larvicidal effect of extracts obtained from green (ECV) and roasted (ECT) coffee beans diluted in Tween or DMSO with dechlorinated water (0.12 to 4 mg/mL) was evaluated. Control group larvae were exposed only to Tween/DMSO and dechlorinated water. Results were analyzed using PROBIT regression and ANOVA. The LC50 values in mg/mL were observed for ECV (DMSO 2.53±0.1; Tween 2.57±0.25) and ECT (DMSO 1.43±0.05; Tween 0.33±0.22), with the best effect observed for ECT in Tween (99.2%). Characterization of ECV and ECT by HPLC revealed caffeine (73.9 and 6.1 mg/g) and caffeic acid (43.8 and 4.5 mg/g) as the major compounds, demonstrating the impact of roasting on composition. The larvicidal effect of pure caffeic acid in Tween (0.26 mg/mL) was 25±0.5%. Despite being the major compound in ECT, the observed mortality suggests that caffeic acid is not the primary active component or acts synergistically with other compounds. Histological analyses suggest that the larvicidal effect is related to tissue damage in the mosquito's midgut. Based on these results, ongoing investigations include: i) the effect of the major compounds individually and in combination on populations susceptible and resistant to deltamethrin; ii) larvicidal effects related to midgut destruction and/or the involvement of adenosine and esterases; iii) the potential impact of coffee on vector physiology, with emphasis on reproductive capacity and vector competence.

FINANCIAL SUPPORT: UFLA, ICB/UFMG; CAPES; INCT-Entomologia Molecular; EMBRAPA-Café.
KEYWORDS: Aedes aegypti; Coffea arabica; Biopesticide.