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Larvicidal action of the essential oil of *Piper tuberculatum* (Piperaceae) against *Anopheles* spp. (Culicidae)

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Malaria is a disease caused by the *Plasmodium* parasite, transmitted by mosquitoes of the genus *Anopheles*, with *Plasmodium falciparum* being the most lethal species (1). The effectiveness of essential oils (EOs) in mosquito control has gained attention due to the emergence of populations resistant to chemical insecticides. Research indicates that EOs from the Piperaceae family may serve as effective larvicides, offering a promising alternative to synthetic insecticides (2,3). Therefore, this study aimed to evaluate the larvicidal activity of *Piper tuberculatum* EO against *Anopheles* spp. larvae. Plant material was collected from the Museum of the Amazon (MUSA), located in Manaus, Amazonas. The EO was obtained through hydrodistillation using 200 g of dried and ground leaves. The chemical profile was analyzed by gas chromatography–mass spectrometry (GC-MS) and gas chromatography with flame ionization detection (GC-FID) (3,4). *Anopheles* spp. larvae were collected from a fish farming tank in a peri-urban area of Manaus and tested at concentrations of 20, 40, 60, 80, and 100 µg/mL of EO diluted in 1% DMSO, in quintuplicate, in 100 mL of water (5). The synthetic insecticide *α*-cypermethrin at 0.21 µg/mL was used as a positive control, and water as a negative control. The total volume of EO obtained was 1.5 mL, with a yield of 0.0075%. GC-MS and GC-FID analyses revealed that the EO was primarily composed of *β*-caryophyllene (57.5%). The EO exhibited larvicidal activity with an LC_{50} of 40.56 µg/mL and an LC_{90} of 68.93 µg/mL, while no larval mortality was observed in the negative control, indicating that mortality occurred due to the action of the EO. The study demonstrated that the essential oil of *P. tuberculatum*, with a high *β*-caryophyllene content, exhibited effective larvicidal activity against *Anopheles* spp. larvae, indicating its potential as a promising alternative to synthetic insecticides in the control of malaria transmission.

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