RESUMO SIMPLES - ECTOPARASITOS: SISTEMÁTICA, EPIDEMIOLOGIA E CONTROLE

ASSOCIATION OF METARHIZIUM ANISOPLIAE AND ILLICIUM VERUM ESSENTIAL OIL IN THE CONTROL OF AEDES AEGYPTI LARVAE UNDER SEMI-FIELD CONDITIONS

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The mosquito Aedes aegypti is present throughout Brazil, and along with this insect comes the issue of Dengue, Zika, Chikungunya, Yellow Fever and other diseases of public health importance. The control of this vector has been mainly associated with the use of chemical insecticides, such as pyrethroids, which already pose risks due to the vector’s history of resistance and environmental contamination. Entomopathogenic fungi, like Metarhizium anisopliae, have been studied as viable alternatives for safer and more sustainable control of this arthropod, as well as essential oils, such as the essential oil of Illicium verum (EOIV), popularly known as Star Anise. In this study, the larvicidal effect of the M. anisopliae s.l. LCM S01 and EOIV was evaluated in different combinations

and concentrations applied under semi-field conditions. Fungal suspensions were prepared and conidial concentrations were quantified in a Neubauer chamber, while oil solutions were prepared by weighting the EOIV and diluting in a 0.03% Tween 80® solution. The study tested different conidial concentrations of the isolate (10^6, 10^7, and 1×10^8 conidia/mL), EO concentrations (40, 60, and 80 ppm), and their associations. Control treatments were exposed to water containing Tween 80® at 0.03% concentration. Larvae were separated in plastic cups (n=10), exposed to the treatments and allocated under semi-field conditions, protected from direct sunlight. The bioassay was conducted in triplicates and in a total of three repetitions. The LCM S01 isolate demonstrated independent efficacy, with a dose-dependant reduction in larval survival. The concentration of 1×10^8 showed the highest larvicidal activity ($P<0.0001$; $X^2 = 243.7$), followed by concentrations of 1×10^7 ($P<0.0001$; $X^2 = 158$) and 1×10^6 ($P<0.0001$; $X^2 = 111.6$), reducing survival rates to 16.6%, 33.1%, and 44.3%, by the seventh day, with mean survival times of 2, 2.5, and 5 days, respectively, when compared to the control group. The EO by itself reduced larval survival to 0% ($P<0.0001$; $X^2 =351.1$) in 24 hours at the highest concentrations (80 and 60ppm), while 40ppm reduced survival to 2.77% ($P<0.0001$; $X^2 =371.1$) in 7 days. The association of the LCM S01 isolate with EOIV further enhanced larval mortality. The combination 1×10^6 + 40 ppm ($P<0.0001$; $X^2 = 396.6$) reduced the survival rate to 0% by the sixth day; 1×10^6 + 60 ppm ($P<0.0001$; $X^2 = 366.7$) reduced survival to 0% within 48 hours; and 1×10^6 + 80 ppm ($X^2 = 351.1$) achieved 0% survival within 24 hours. The fungal concentration of 1×10^7 ($P<0.0001$; $X^2 = 724$) associated with EO concentrations of 40 and 60 ppm ($P<0.0001$; $X^2 = 358$) reduced survival to 0% within 48 hours, while the association 1×10^7 + 80 ppm ($P<0.0001$; $X^2 = 351.1$) achieved 0% survival within 24 hours. Likewise, the fungal concentration of 1×10^8 ($P<0.0001$; $X^2 = 708.4$) combined with all three oil concentrations (40, 60, and 80 ppm) ($P<0.0001$; $X^2 = 351.1$) reduced survival to 0% within 24 hours. All combination treatments reduced mean survival to 1 day. The results suggest that the LCM S01 isolate alone has significant potential for the biological control of Ae. aegypti, and when associated with the essential oil of I. verum, even more promising results can be achieved. Therefore, further studies are needed on application techniques for this type of combination in urban and domestic environments.

Palavras-chave: biocontrol; mosquito; public health; one health; environmentally friendly; entomopathogenic fungi.