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Evaluation of contact toxicity of essential oils for *Sitophilus zeamais* control

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Abstract

The maize weevil, *Sitophilus zeamais* (Coleoptera: Curculionidae), is a pest responsible for significant damage to stored grains worldwide. Currently, it is managed through chemical control. This study aimed to evaluate the effectiveness of *Cordia verbanancea* and *Protium heptaphyllum* resin essential oils, and *Piper macedoi* hydrolate in controlling *S. zeamais* adults. The study was conducted in the extreme south of the state of Bahia, in the northeast of Brazil, a region known for its large number of small farmers, which makes production losses even more impactful for the local economy. Tests were performed in B.O.D. chambers (T°: 25 ± 3°C, RH: 65 ± 5 %, and photoperiod: 12 h) to evaluate the mortality of the pest in a completely randomised experimental design. In the first bioassay, Petri dishes containing 13 adult insects each, were submitted to a 20 μl dosage of the corresponding essential oil. The percentage of insect mortality was evaluated after 0, 12, 24, and 48 hours of incubation. In the second bioassay, Petri dishes containing 20 adult insects and 10 g of maize were used, to test four different dosages of *P. heptaphyllum* essential oil (62.5, 125, 500, and 1000 ppm). The number of dead individuals was evaluated after 0, 12, 24, 48, 72, and 96 h of incubation. Positive and negative controls were performed for both assays. The data obtained were analysed with R® software. In the first experiment, it was found that the essential oil of *P. heptaphyllum* resin presented 38.5 % efficacy in controlling *S. zeamais* compared to the essential oil of *C. verbanancea* and *P. macedoi* hydrolate. In the second experiment, no statistically significant differences ($p > 0.05$) were observed in the insecticidal effect among the dosages tested for *P. heptaphyllum* oil, although it was evident after 48 hours of incubation and gradually increasing until 96 hours. During the first hours of exposure, a repellant effect was observed, evidenced by the insect's behaviour. It led to the conclusion that **P. heptaphyllum** resin essential oil has toxic action against *S. zeamais* adults. However, further investigation is required to determine the ideal concentration of that essential oil for *S. zeamais* control.

Keywords: Corn storage, insecticidal, maize weevil

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