

## Melia azedarach extract and essential oils of Cinnamomun zeylanicum, Mentha piperita and Lavandula officinalis as a control of Paenibacillus larvae [Extracto de Melia azedarach y aceites esenciales de Cinnamomun zeylanicum, Mentha piperita y Lavandula officinalis como control de Paenibacillus larvae]

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### RESUMEN

In honey bees (*Apis mellifera* L.), American foulbrood is caused by the infection of the larvae and pupae with the bacteria *Paenibacillus larvae*. The antimicrobial activities in vitro of Chinaberry extract (*Melia azedarach*) and the essential oils of cinnamon (*Cinnamomun zeylanicum*), mint (*Mentha piperita*), and lavender (*Lavandula officinalis*) were evaluated against this bacteria. Immature fruits of crushed Chinaberry were treated with ethanol as a solvent with a Soxhlet extractor, being obtained a viscous solution which was posteriorly diluted with steriwater. The essential oils were extracted using a distillation with steam method and the distilled fluids were preserved at 50C. The antimicrobial activity was evaluated using the serial dilution methods to determine the minimum inhibitory concentration (MIC). To do this, it was used increasing concentrations from 200 to 10 000 ppm of Chinaberry extract and from 12.5 to 2 000 ppm of essential oils. The obtained results demonstrated that the essential oil of cinnamon exhibited the greatest antimicrobial activity against the pathogen, with a MIC values from 25 to 50 g/mL, while the Chinaberry extract had low antimicrobial activity with a MIC value of 5 000 g/mL. The essential oils of mint and lavender presented intermediate values of MIC. This work constitutes one of the first reports where the comparative use of natural substances is investigated as essential oils and vegetable extracts as Chinaberry for the

treatment of P. larvae to be used as natural and innocuous alternative for the treatment of American foulbrood in affected beehives.

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