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Preparation and insecticidal performance of sustained-release cinnamon essential oil microemulsion

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Abstract

Background: To improve the utilization rate of cinnamon essential oil and compensate for the shortcomings of its easy decomposition and oxidation, the microemulsion of cinnamon essential oil was prepared using Tween 80 and anhydrous ethanol as surfactant and cosurfactant, respectively. The effects of the surfactant type, K_m value, preparation temperature and aqueous pH on the quality of the microemulsion were studied via a pseudo-ternary phase diagram. The slow-release performance of cinnamon essential oil microemulsion and the control performance of the insect repellent package on the rice weevil were characterized.

Results: The results showed that, when Tween 80 was used as a surfactant and anhydrous ethanol was used as a cosurfactant, the K_m value was 3:1, preparation temperature was 40 °C, aqueous pH was 5 and prepared cinnamon essential oil microemulsion was of the O/W type. The microemulsion had strong stability and a 81.5-nm concentrated particle size distribution, and possessed excellent embedding and sustained-release effects. The prepared insect repellent active package prolongs the use time and the effect of cinnamon essential oil. The repellent rate of the rice weevil was as high as 100% after 48 h, and the contact mortality and fumigation mortality rates of the rice weevil also reached 96.67% and 86.67%, respectively, after 96 h.

Conclusion: The prepared cinnamon essential oil microemulsion and active packaging had a good sustained-release effect. © 2021 Society of Chemical Industry.

Keywords: cinnamon essential oil; microemulsion; rice weevil; slow-release.

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