

***In vivo* control of *Aspergillus flavus* on stored rice by slow-release formulations of cinnamon and lemongrass oil**

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Aspergillus flavus is one of the major storage fungi producing aflatoxins on stored grains. Consumption of such foods causes serious health problems in humans due to aflatoxin contamination. The use of plant essential oils is gaining increased attention due to their wide acceptance by consumers and their natural and safety and efficacy. In this study, cinnamon leaf oil and lemongrass oil were microencapsulated using chitosan to obtain controlled release of the oils. Essential oils were microencapsulated using ionotropic gelation method with sodium tripolyphosphate as the crosslinking agent. Both oils were obtained from the local market and analysed using GC-MS. The paddy samples (Bg11-11) were obtained from the Rice Research Institute Bathalgoda, Sri Lanka. *A. flavus* was isolated from an old rice sample and identified based on morphological and molecular characteristics. The minimum inhibitory dose and the minimum lethal dose of each oil against *A. flavus* was determined on stored rice. According to GC-MS analysis, the major constituents of cinnamon oil were eugenol (56.49%) and beta-caryophyllene (9.03%) whereas lemongrass oil has Citral-A (45.55%) and Citral-B (36.26%) as major constituents. According to the *in-vivo* assay, the antifungal activity of both free oils was higher than that of corresponding microencapsulated oils, indicating the controlled-release of oils from microcapsules. Cinnamon oil chitosan microcapsules (CNO-CS-MCs) showed higher antifungal activity against *A. flavus* than that of lemongrass oil chitosan microcapsules (LGO-CS-MCs). The minimum inhibitory dose of CNO-CS-MCs was 5 mg per 2×10^7 spores, and that of LGO-CS-MCs was 7.5 mg per 2×10^7 spores. The minimum lethal dose of CNO-CS-MCs was 12.5 mg per 2×10^7 spores. Furthermore, the inhibition duration of the fungi by CNO-CS-MCs was longer than that of LGO-CS-MCs, indicating the bioavailability of CNO-CS-MCs is higher than the LGO-CS-MCs. These slow-release formulations have a great potent as green pesticides against *A. flavus* on stored grains.

Keywords: *Aspergillus flavus*, Chitosan, Cinnamon leaf oil, Lemongrass oil, Microcapsules

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