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Evaluation of antifungal and anti-aflatoxigenic properties of non-aflatoxigenic *Aspergillus flavus* strains' crude extracts against aflatoxigenic *A. flavus* in peanut kernels

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Abstract:

Peanuts (*Arachis hypogaea* L.) are highly susceptible to *Aspergillus flavus* colonisation and aflatoxin contamination. As an alternative to chemically synthesised fungicides, biological control agent using non-aflatoxigenic *A. flavus* have been developed and commercialised on the basis of nutrient and habitat competition against its aflatoxigenic counterpart. At present, there are interests in harnessing the inhibitory metabolites from non-aflatoxigenic *A. flavus*. From our previous studies, the crude extract of ethyl acetate and hexane from non-aflatoxigenic *A. flavus* strain A121R inhibited 100% of aflatoxigenic *A. flavus* strain A8R growth and AFB_1 *in vitro* at 75 mg/mL. Therefore, the present work aimed to evaluate the antifungal properties of hexane and ethyl acetate crude extracts from non-aflatoxigenic *A. flavus* A121R against aflatoxigenic *A. flavus* A8R growth and AFB_1 production on peanut kernels. A total of ten concentrations were prepared (150 mg/mL, 75 mg/mL, 35 mg/mL, 18.75 mg/mL, 9.38 mg/mL, 4.69 mg/mL, 2.34 mg/mL 1.17 mg/mL, 0.58 mg/mL, and 0.29 mg/mL). The antifungal properties of crude extracts were assessed by observing fungal growth on the treated peanut kernels for 7 d. On day 3, peanut kernels treated with 150 mg/mL of ethyl acetate crude extract showed aflatoxigenic *A. flavus* A8R growth, which sporulated on day 5. However, no sign of fungal growth was observed after 7 d of incubation on peanut kernels coated with 150 mg/mL of hexane crude extract. The anti-aflatoxigenic properties of the crude extracts were evaluated by HPLC against control (growth on untreated peanut kernels). The highest inhibition of ethyl acetate crude extract was 54% at 150 mg/mL, and the lowest was 41% at 2.34 mg/mL. No significant AFB_1 inhibition was observed at 1.17 mg/mL, 0.58 mg/mL, and 0.29 mg/mL of ethyl acetate crude extract. On the contrary, no AFB_1 was detected on peanut kernels treated with 150 mg/mL of hexane crude extract (100% inhibition). The hexane crude extract inhibited more than 90% of AFB_1 on peanut kernels treated with 75 mg/mL to 18 mg/mL, and 21% at 0.58 mg/mL. Therefore, hexane crude extract of non-aflatoxigenic *A. flavus* strain A121R showed promising bioactivity against aflatoxigenic *A. flavus* strain A8R growth and AFB_1 production.