

Effects of organic acids on mycotoxigenic fungi that produces aflatoxins and Ochratoxin A

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Mycotoxins are toxic fungal secondary metabolites that occur frequently in a great diversity of agricultural commodities and processed foods. Two of the main mycotoxins that can be found in foods are aflatoxins (AFs) and ochratoxin A (OTA). Some important producers of these mycotoxins are respectively *Aspergillus flavus* and *Penicillium nordicum*. *Aspergillus flavus* occurs mostly on corn, peanuts, spices, cottonseed and tree nuts; *P. nordicum* occurs on dry-cured meat and cheese products. In this study several organic acids were tested for the inhibition of *A. flavus* and *P. nordicum* growth and for the inhibition of the production of AFs and OTA. Experiments were done using the poisoned food technique and mycotoxins production was assessed by HPLC with fluorescence detection. Lactic acid (LA), phenyllactic acid (PLA), hydroxyphenyllactic acid (OH-PLA), indole lactic acid (ILA), propionic acid (PA), acetic acid (AA) and butyric acid (BA) were added to MEA or YES culture medium to achieve concentrations of 0.1 to 8.0 mg/mL. Fungi were inoculated on the centre of petri dishes with a spore suspension (10^6 spores/mL) and incubated at 25 °C in the dark, in triplicate. Fungal colony diameters were measured daily and mycotoxins contents were analysed after 7 days of growth. The concentration of each organic acid, which inhibited by 90% the fungal growth and the production of mycotoxins (IC₉₀) was derived from non-linear fit of Log doses versus normalized data using the Hill equation. The stronger effects on fungal growth were obtained with butyric, propionic and acetic acid. IC₉₀ were between 1.1 and 1.9 mg/mL for both fungi. PLA and ILA also inhibited the growth of fungi but IC₉₀ were considerably higher (8.2-23.9 mg/mL). For the inhibition of AFs, BA, PA and PLA were the most active organic acids with IC₉₀ of 0.25, 0.38 and 0.87 mg/mL, respectively. Concerning the inhibition of OTA, BA, PA, AA, ILA and PLA had the strongest effect. Their IC₉₀ were of 0.95, 1.53, 1.66, 3.15 and 4.50 mg/mL, respectively. These organic acids may be of interest to complement the action of commercial fungicides already available in the market to suppress the production of mycotoxins in crop fields.