

Title Can phenolic compounds be used for the protection of corn from fungal invasion and mycotoxin contamination during storage?

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Abstract

The effect of natural phenolic compounds (vanillic and caffeic acid) and water activity (a_w) on the growth and mycotoxin production on corn by *Fusarium* and *Aspergillus* isolates was investigated. Large differences were observed in the response of the *Fusarium* and *Aspergillus* isolates to the phenolic compounds, mostly determined by their genus. Generally for both *F. verticillioides* and *F. proliferatum*, an increase in concentration of either caffeic or vanillic acid resulted in a decrease in the colony growth rate and increase in the lag phase duration. Growth of the *Fusarium* isolates was not completely inhibited at the highest a_w value evaluated of 0.967, with complete inhibition only being observed at combinations of high phenolic acid concentrations ($\geq 2000 \mu\text{g g}^{-1}$) and low a_w values (≤ 0.948). Within the experimental limits investigated, growth of the *Aspergillus* species was not affected by the phenolic compounds. Application of the phenolic compounds significantly reduced fumonisin B₁ and aflatoxin B₁ production. Although the effects noted in artificial media appear to be carried over to corn, rather high concentrations are required to observe similar effects on corn and to completely inhibit growth where possible. This implies the occurrence of interactions of the phenolic compounds with some matrix components which may reduce their overall effectiveness.