

Title The influence of modified atmospheres and their interaction with water activity on the radial growth and fumonisin B₁ production of *Fusarium verticillioides* and *F. proliferatum* on corn. Part I: The effect of initial headspace carbon dioxide concentration

Author S. Samapundo, B. De Meulenaer, A. Atukwase, J. Debevere and F. Devlieghere

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Abstract

The effect of modified atmospheres on the growth and fumonisin B₁ production of *Fusarium verticillioides* and *Fusarium proliferatum* on corn is presented in a series of two papers. In this, the first part, the effect of initial headspace (IH) carbon dioxide concentration and its interaction with water activity (a_w) on growth and fumonisin B₁ production was evaluated. It was observed that at all a_w values studied, increase in the IH CO₂ concentration generally resulted in a decrease in the colony growth rate (g , mm day⁻¹) and maximum colony diameter (D_{max} , mm) and an increase in the lag phase duration (λ , day). Although both a_w and IH CO₂ concentration had significant and synergistic effects on g , a_w had the largest effect. As little as 10% IH CO₂ completely inhibited the production of fumonisin B₁ by *F. verticillioides*. *F. proliferatum* was more resistant and required 40, 30 and 10% IH CO₂ at a_w 0.984, 0.951 and 0.930, respectively, to completely inhibit fumonisin B₁ production. These results demonstrate that modified atmospheres containing high CO₂ levels could potentially be employed for the protection of corn from fungal spoilage and mycotoxin contamination during the post-harvest period.