

Title Relationship of sphinganine analog mycotoxin contamination in maize silage to seasonal weather conditions and to agronomic and ensiling practices

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Citation Phytopathology 97(4): 504-511. 2007.

Keywords Fusarium ear rot; *Fusarium verticillioides*; *F. proliferatum*; *Gibberella moniliformis*; *G. fujikuroi*

Abstract

Sphinganine analog mycotoxins (SAMs) are reported in maize and maize based feeds. Our objectives were to detect and quantify fumonisins B₁ and B₂ and *Alternaria* toxins (AAL toxins) AAL-TA and AAL-TB and determine how agronomic practices, weather conditions, and ensiling affected the occurrence and levels in maize silage. Silage was collected at harvest and after ensiling in 2001 and 2002 from 30 to 40 dairies, representing four regions in Pennsylvania. SAMs were quantified using high pressure liquid chromatography (HPLC) with fluorescence detection and high pressure liquid chromatography-mass spectrometry HPLC-MS. The average concentrations and ranges were as follows: fumonisin B₁ 2.02 µg/g (0.20 to 10.10), fumonisin B₂ 0.98 µg/g (0.20 to 20.30), AAL-TA 0.17 µg/g (0.20 to 2.01), and AAL-TB 0.05 µg/g (0.03 to 0.90). Fumonisin B₁ was the most frequently detected toxin (92%) in all samples, followed by fumonisin B₂ (55%), AAL-TA (23%), and -TB (13%). Temperature during maize development was positively correlated with fumonisin occurrence and levels and negatively with AAL-TA, while moisture events were negatively correlated with fumonisins and positively with AAL-TA. Fumonisin levels were higher in silage harvested at later developmental stages (dough through physiological maturity). Ensiling did not affect toxin concentration nor did agronomic practices (tillage system, inoculant use, or silo type) or silage characteristics (dry matter, pH, or organic acid concentration). This is the first report of AAL-TB in silage and on factors that affect SAM frequency and levels in maize silage.