

Title Early evaluation of mycotoxin contamination risk in maize

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Abstract

In north-east Italy the occurrence of mycotoxins, and particularly fumonisin, on maize infected before harvest is of great concern for food and feed safety. To prevent the introduction of contaminated grain lots into the food chain, there is an urgent need for rapid methods for early assessment of contamination, since extraction and analysis of samples is time-consuming, and not suitable for routine analysis of grain at the time of delivery to drying and storage services. Here, we report the development and the evaluation of methods for early assessment of contamination risk. They include: (i) aereobiological analysis of fungal spores with a cyclone-type air sampler during maize harvest; (ii) proximal imaging analysis with near infrared illumination; and (iii) electronic nose detection of volatile metabolites associated with *Fusarium* infection. The prediction data were correlated with the content of different toxins (fumonisin, aflatoxin, ochratoxin) in field-collected maize samples as determined by ELISA and HPLC, and with quantitative data obtained by Real Time PCR of *FUM1* (a gene involved in fumonisin biosynthesis) and by ELISA of *Fusarium*-specific exopolysaccharides. Agronomic and environmental data (hybrid, seed date, harvestdate, water content at harvest, irrigation, and pest management) were also integrated with the aim of developing risk assessment models and protocols for the Friuli Venezia Giulia region.