Systematic investigation of aflatoxins and associated fungi in soils: An example of Kenyan maize fields

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Maize soils in hot-spot regions have been described as habitat for aflatoxigenic fungi, but also as an environmental source for aflatoxins. Investigation of aflatoxins in soils are difficult because of the complexity of soil as matrix determined by land use, climate and geography. Therefore, a systematic investigation is needed which includes a proper sampling strategy as well analysis of aflatoxins and associated fungi. Within the framework of the AflaZ project we focus on addressing these aspects in an interdisciplinary way. We analyzed 4 different maize growing areas in Makueni, Kenya, with different treatments: Conventional, conservation, *Trichoderma* or push-pull. We developed a strategic plan, in form of a Standard Operating Procedure (SOP), for aflatoxin sampling in soils and maize cobs considering the treatments and also the possible mobility of the mycotoxins and *Aspergillus* colonization (CFU) in the soil column. Molecular and chromatographic analysis were used to evaluate the occurrence of aflatoxin producing species.

No mycotoxin could be detected in the investigated soil samples. Here, we assume a degradation because of the long storage and transport period (> 3 months). However, analysis in fresh soil samples showed a significant effect of the treatment on CFU values for *Aspergillus* in that order: conventional < conservation < *Trichoderma* < Push-pull. In all treatment, CFU levels were approximately 2x higher in upper (0-15 cm) than in lower soil layer (15-30 cm). The depth effect was more evident in push-pull. CFU levels were in general higher in soil than in the maize cobs. After ITS sequencing, chemotype profiling and microscopic examination, *A. parasiticus, A. flavus* and *A. minisclerotigenes* species were identified. Preliminary data confirm the mycotoxin producing potential of the identified species, with AFB_1 and CPA being the toxins produced with the highest abundance and concentration.