

Fusarium species on crop residues under conservation tillage

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Background

Fusarium fungi cause severe yield losses in cereals and maize. These fungi produce toxic compounds, that contaminate the harvested goods. These toxic compounds have immunosuppressive, estrogenic, cancerogenic and other activities, and they are the cause of severe mycotoxicoses in animals and humans.



With *Fusarium* fungi infected wheat (left) and maize (right) ears

Conservation tillage, cover crops and crop residues

Conservation tillage aims to maintain soil fertility and to avoid erosion. Cover crops between the main crops enhance the beneficial impact of conservation tillage.

Fusarium fungi overwintering on maize and wheat crop residues are an important source of inoculum for subsequent crops (Munkvold 2003; Vogelgsang *et al.* accepted). In addition, mycotoxins produced on these crop residues are emitted into surface water and may pose an environmental risk (Bucheli *et al.* 2008). Furthermore, *Fusarium* fungi were shown to be present on cover crop residues in spring (Dorn, unpublished).



Fusarium fungi on wheat (left), maize (middle) and cover crop residues (right)

Knowledge gap and aim

For residues of cover crops and wheat, nothing is known about the composition of *Fusarium* species and their survival under conservation tillage in Switzerland.

The aim of this study is to elucidate this gap and to estimate the role of wheat and cover crop residues as sources of infection of the main crop maize.

Material and Methods

From the harvest of wheat in August until the flowering of maize in the following season, wheat and cover crop residues from fields with conservation tillage were

collected periodically and then plated on agar to determine the occurrence and composition of *Fusarium* species. Additionally, spore traps were installed at the sampling dates to estimate the airborne inoculum.

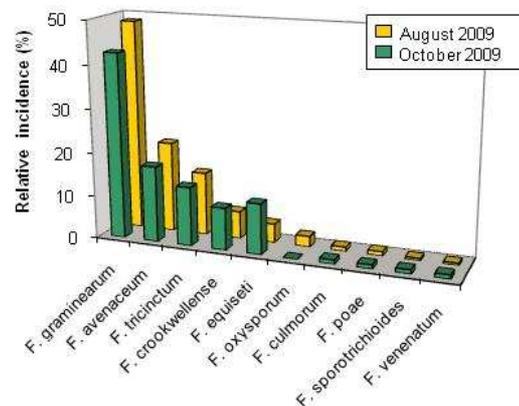


Spore trap (left) and sampling of crop residues (right) to assess the occurrence of airborne and residue borne *Fusarium* species

Results

At harvest of wheat in August 58% of the wheat residue samples were infected and 43% in October. For both sampling dates the most frequently *Fusarium* species recovered were *F. graminearum*, *F. avenaceum* and *F. tricinctum*. The corresponding data for the remaining sampling dates are not yet available.

Fusarium species composition on wheat crop residues in August (yellow) and October (green)



Summary and outlook

First results show that the occurrence of *Fusarium* species on wheat residues is high in fields cultivated under conservation tillage. The most frequently isolated species, *F. graminearum* and *F. avenaceum*, are well known as major pathogens of wheat and maize in Switzerland (Vogelgsang *et al.* 2008; Dorn *et al.* 2009). However, the impact of the third species, *F. tricinctum*, has to be elucidated. The results of the study will be used to optimize the succession of main and cover crops and to develop strategies to reduce the risk of *Fusarium* epidemics emanating from crop residues.

References:
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