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Occurrence of different *Fusarium* species in sugar beet.

ABSTRACT

Phytopathological studies in the United States have revealed an infection of sugar beet with different *Fusarium* species also pathogenic to wheat and related to Fusarium Head Blight (FHB). For Europe this relationship between the *Fusarium* infection of wheat and sugar beet has not been described yet. However, in a German field survey the comparison of mycotoxin content of wheat with different precrops (rapeseed, maize and sugar beet) resulted in elevated mycotoxin contents also when sugar beet was grown as a precrop.

Based on two field trials with winter wheat – sugar beet crop rotations in Germany (Lower Saxony) in 2006/07 we screened more than 3500 beets for their infestation with *Fusarium*. The beets were tested directly at harvest and subsequent to different storage-durations and -conditions (4, 8 and 12 weeks in a cool room and 16 weeks outside in a pile). Small pieces directly from the middle of the beets were surface-sterilized and placed on PDA. The isolates were identified based on morphological criteria and EF1 α -PCR-RFLP.

We isolated at least ten different *Fusarium* species from sugar beet. *F. redolens* was the most frequently isolated species from freshly harvested beets followed by *F. equiseti*. During storage we observed a shift in the species composition from *F. redolens* and *F. equiseti* to *F. culmorum* plus *F. cerealis*. This change was observable for the beets stored outside as well as for those in the controlled environment. Remarkably, *F. graminearum*, one of the major components of the FHB-complex in wheat, was only rarely isolated.

Seven most frequently isolated *Fusarium* species from sugar beet (*F. cerealis*, *F. culmorum*, *F. equiseti*, *F. graminearum*, *F. oxysporum*, *F. redolens* and *F. tricinctum*) were additionally inoculated back to wheat. Therefore the spikes were inoculated in BBCH 62-64 by spraying a macroconidial suspension onto the entire surface of the spike to the point of run-off with a hand atomizer.

To confirm the pathogenicity of the different isolates from sugar beet on wheat the FHB-Index was determined. As expected, *F. graminearum* caused the most severe symptoms. We found no significant difference between the FHB-indices of *F. graminearum* from sugar beet compared to the positive-control (*F. graminearum* from wheat). *F. culmorum* and *F. cerealis* also showed bleached spikes and systemic infection. *F. equiseti*, *F. oxysporum*, *F. redolens* and *F. tricinctum* caused no typical FHB-Symptoms. Nevertheless, discoloration of glumes, palea or lemma was frequently observed and all these species led to a higher percentage of kernels with "Black Point"-symptoms.

Due to the results obtained, it is suggested, that sugar beet residues left in the field after harvest might represent an additional source for saprophytic survival of *Fusarium* species. We could show that Fusaria isolated from sugar beet were able to infect wheat and therefore provide a possible inoculum in crop rotations.