MYCOTOXIN PRODUCTION AND COLONIZATION PATTERNS OF DIFFERENT *FUSARIUM* SPP. IN SUGAR BEET

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ABSTRACT

During long-term storage in outdoor piles, sugar beets are affected by various degrading and mycotoxin producing fungi. In a two year study, the occurrence of *Fusarium* mycotoxins in freshly harvested and stored sugar beets was analyzed. Sugar beet roots were stored under controlled conditions at outside temperature, 8°C and 20°C for zero, five and twelve weeks. A significant reduction of root yield and sucrose concentration was observed after long-term storage at high temperature. Freshly harvested sugar beets contained only beauvericin and enniatins, which are i.a. produced by *F. redolens*. High amounts of deoxynivalenol (DON) and zearalenone (ZEA), mainly produced by *F. graminearum*, *F. culmorum* and – in case of ZEA – *F. cerealis*, were only detected in sugar beets subjected to high temperature and long-term storage. These results were confirmed by a survey of commercially grown sugar beets which were stored for five weeks in outdoor piles: neither DON or ZEA were detected, except in minute amounts in three samples. Additionally, colonization patterns and species specific mycotoxin production of five *Fusarium* spp. were studied. In greenhouse experiments, the roots of five months old sugar beet plants grown in pots were mechanically injured, inoculated with mycelial plugs and kept for 30 days. At harvest, roots were divided into three parts: necrotic tissue, surrounding discolored tissue and sound tissue. After hand sections of each part were stained with WGA Alexa Fluor 488 and propidium iodide fungal colonization was visualized by confocal laser scanning microscopy. Different colonization patterns were observed depending on the inoculated species. The most severe root rot symptoms were caused by *F. graminearum* followed by *F. cerealis*, *F. culmorum* and *F. tricinctum* while *F. equiseti* inoculated plants did not differ from the control. Fungal growth of all isolates was detected in the necrotic tissue, while inter- and intracellular growth in the surrounding discolored tissue was only observed for *F. graminearum, F. culmorum* and *F. cerealis*. Higher amounts of mycotoxins were only detected in the necrotic tissue independent of the inoculated species.