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Toxigenic Mycobiota of Small Grain Cereals in Korea

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Mycotoxins are toxic secondary metabolites produced by fungi. They can be present in where agricultural-based commodities are contaminated with toxigenic fungi. These mycotoxins cause various toxicoses in human and livestock when consumed. Small grains including corn, barley, rice or wheat are frequently contaminated with mycotoxins due to infection mainly by toxigenic *Fusarium* species and/or under environment favorable to fungal growth. One of the most well-known *Fusarium* toxin groups in cereals is trichothecenes consisting of many toxic compounds. Deoxynivalenol (DON), nivalenol (NIV), T-2 toxin, and various derivatives belong to this group. Zearalenone and fumonisin (FB) are also frequently produced by many species of the same genus. In order to monitor Korean cereals for contamination with *Fusarium* and other mycotoxigenic fungal species as well, barley, corn, maize, rice grains, and soybean were collected from fields at harvest or during storage for several years. The fungal colonies outgrown from the grain samples were identified based on morphological and molecular characteristics. Trichothecene chemotypes of *Fusarium* species or presence of FB biosynthetic gene were determined using respective diagnostic PCR to predict possible toxin production. Heavy grain contamination with fungi was detected in barley, rice and wheat. Predominant fungal genus of barley and wheat was *Alternaria* (up to 90%) while that of rice was *Fusarium* (~40%). *Epicoccum* also appeared frequently in barley, rice and wheat. While frequency of *Fusarium* species in barley and wheat was less than 20%, the genus mainly consisted of *Fusarium graminearum* species complex (FGSC) which known to be head blight pathogen and mycotoxin producer. *Fusarium* composition of rice was more diverse as FGSC, *Fusarium incarnatum-equiseti* species complex (FIESC), and *Fusarium fujikuroi* species complex (FFSC) appeared all at considerable frequencies. Prevalent fungal species of corn was FFSC (~50%), followed by FGSC (<30%). Most of FFSC isolates of corn tested appeared to be FB producer. In corn, *Fusarium graminearum* and DON chemotype dominate within FGSC, which was different from other cereals. Soybeans were contaminated with fungi less than other crops and *Cercospora, Cladosporium, Alternaria, Fusarium* etc. were detected at low frequencies (up to 14%). Other toxigenic species such as *Aspergillus* and *Penicillium* were irregularly detected at very low frequencies. Multi-year survey of small grains revealed dominant fungal species of Korea (barley, rice and wheat) is *Fusarium asiaticum* having NIV chemotype.