

Title *Penicillium verrucosum* occurrence and Ochratoxin A contents in organically cultivated grain with special reference to ancient wheat types and drying practice

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Abstract

This study addresses the relationship between the ochratoxigenic strains of *Penicillium verrucosum* and ochratoxin A (OTA) contents in organically cultivated grain. It included 37 combined, non-dried grain samples from farmers with no drying facilities as well as 19 non-dried and 22 dried samples from six farms with on-farm drying facilities (Case studies 1–6). The study focused on the ancient wheat type spelt but also included samples of wheat, rye, barley, oats, triticale, emmer, and einkorn. All 78 samples were analysed for moisture content (MC) and occurrence of *P. verrucosum*. The latter was assessed by plating non-disinfected kernels on DYSG agar and counting those contaminated by the fungus. Fifty-five samples were analysed for OTA. Most of the combine harvested samples (82%) were contaminated with *P. verrucosum* prior to drying. This was ascribed to difficult harvest conditions and many samples of spelt, which was significantly more contaminated by *P. verrucosum* than oats, wheat and barley. Though not statistically significant, the results also indicated that spelt was more contaminated than rye, which is usually regarded the most sensitive small grain cereal. No correlation was found between number of kernels contaminated by *P. verrucosum* and OTA content. Despite many non-dried samples being contaminated by *P. verrucosum*, only two exceeded the EU maximum limit for grain (5 ng OTA g⁻¹), both being spring spelt with 18 and 92 ng g⁻¹, respectively. The problems were most likely correlated to a late harvest and high MC of the grain. The case studies showed exceedings of the maximum limit in a batch of dried oats and spring wheat, respectively, probably to be explained by insufficient drying of late harvested grain with high MC. Furthermore, our results clearly indicate that OTA is not produced in significant amounts in samples with MCs below 17%. All dried samples with MCs above 18% exceeded the 5 ng OTA g⁻¹ limit in grain. However, no correlation between MC and the amount of OTA produced was found.