

Investigation of the presence of zearalenone and fumonisin in cereals from the Greek market applying rapid immunological detection methods (ELISA)

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The purpose of this study was to investigate the presence of two mycotoxins, fumonisin (FUM) and zearalenone (ZEN), produced by *Fusarium* spp., in cereals and cereal products, seeds, and herbs intended for human consumption or animal feed. In total, 34 samples were collected from Greek retail markets including oat, wheat, rice bran, maize, barley, and hops. The analysis was performed using a validated indirect competitive enzyme-linked immunosorbent assay (ELISA). The method had a limit of detection of 5 µg/kg and a limit of quantification of 10 µg/kg for zearalenone while the respective values for fumonisin were 0.015 and 0.05 mg/kg.

Of the 34 samples tested, 31 were found to be contaminated with ZEN. The three samples that tested negative for ZEN (< 10 µg/kg), were a raw barley sample and two different varieties of barley malt used in beer production. Maize had the highest average ZEN level (682.98±401.80 µg/kg), followed by oats, rice, wheat, and malt. A significant amount of ZEN was detected in the different varieties of hops (407.33±182.21 µg/kg). Two samples of maize intended for human consumption and two samples of maize flour exceeded the EU legal limits (350 µg/kg for raw maize and 75 µg/kg for processed cereals) and were deemed unfit for human consumption.

The results for FUM showed that the mycotoxin was absent in several cereal samples, including oat, malts, wheat flour, sunflower seeds, wheat pellets, soft wheat, durum wheat, rice, and barley. A total of 14 samples tested positive for FUM, with levels ranging from 0.05±0.03 mg/kg in oat flour to 10.46±1.14 mg/kg in maize kernels. Other positive samples included maize flour (5.76±0.54 mg/kg), all tested hops (max. 3.42±0.96 mg/kg), and rice bran (max. 0.12±0.01 mg/kg). It is noteworthy that no studies were found specifically investigating fumonisin levels in hops. The detection of fumonisins in all tested hops samples highlights a potential area for further research, as the presence of these mycotoxins in this commodity has not been extensively explored. The investigation of these mycotoxins in a wider range of cereal crops and conditions will help ascertain the impact of weather variability, in view of the emerging climate crisis.

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