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A practical evaluation of the risk of aflatoxin contamination in corn after storage

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Many prevention strategies to reduce the impact of mycotoxin in food and feed chains are based on using a hazard analysis and critical control points (HACCP) approach. Predictive microbiology is an effective mean to reduce the risk of exposure to AFB1 from food. Versicolor in A (Ver A) is the first intermediate metabolite with a furofran (bisfuran) structure in the biosynthesis pathway of aflatoxin B1 (AFB1) and not so toxic like AFB_1 (its minimum mutagenicity-causing concentration is 40 times higher than AFB_1). In this study, we investigated the moisture content (m. c.) of dry corn (between 12% m. c. and 14% m. c.) stored for one year and wet samples (about 15% m. c. and 16% m. c.) stored for 100 days at temperatures ranging from 15°C to 29°C. Under the storage condition of 18~28°C, when the moister content is beneath 14%, if Ver A is not more than 60 ppb, the safety storage time will not be less than eight months; while if Ver A is around 80 ppb, the safety storage time will be shortened to three months. When the moister content is around 15%, the 50 days of safety storage (AFB_1<5 ppb) of Ver A is lower than 20 ppb. The metabolic activities of toxin-producing mold were determined by measuring Ver A levels prior to the accumulation of AFB_1 (≥5 ppb). Based on these values, potential aflatoxin levels after storage as well as a safe storage interval time were predictable. High and variable levels of Ver A during storage were indicative of the vigorous metabolic activity of aflatoxigenic mold. Lower, steady levels of Ver A reflected the toxic mold was in an inactive state. Higher levels of *A. flavus* contamination increased Ver A content and increased the variation in Ver A values during storage. Higher levels of *A. flavus* in samples resulted in greater AFB1 values after storage. Greater moister content values increased the rate at which AFB1 accumulated during storage but did not increase the absolute value. Remarkably, high Ver A content and variations in Ver A content prior to the point at which AFB1 exceeded 5 ppb were significantly correlated with high AFB1 content during storage. Higher moisture and Ver A content implies a shorter safe-storage time. Ver A is recommended to set the safety permitting standard or/and one of the critical control point of the storage or long distance transporting crops.

Biography

Shuyao Zhang has completed her Bachelor Degree at the age of 21 years from Jishou University of Biological science. She is studying for master degree under the guidance of Prof Daling Liu in Ji-Nan University. Her research is focused on mycotoxins on storage crops.

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