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Use of versicolorin A as an indicator in early evaluation of the risk of aflatoxin production

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As a measure to prevent potential damage to crops under storage conditions, there is a widely considered need to develop methods for the early identification of emerging hazards in stored crops. In the present study, we investigated the potential use of versicolorin A (Ver A), a precursor of aflatoxin B1, as an early indicator of aflatoxin contamination during storage. In this study, we observed the value of Ver A influenced by temperature and the water activity of corn. And discovered the relationships between the original value of Ver A and the later AFB1 value after storage. It has been found that the changes in the value of Ver A indicated the subsequent extent of toxic mold contamination of stored corn. The high accumulation of AFB1 (> 5ppb) is related to a threshold phenomenon of water activity in samples. The threshold of water activity is found to be 0.71 (at 18°C) and 0.72 (at 28°C) under storage condition with a moisture content of 13.8% ± 0.6%. A high initial value of Ver A (≥ 68 ppb at 18°C and ≥ 99 ppb at 28°C) implies an potential unsafe stored (AFB1≥5 ppb) after a period of storage. In samples containing highly aflatoxigenic molds, with a greater change in the value of Ver A (≥0.75 μg/kg/d) being related to a considerable accumulation of AFB1 and toxic mold metabolic activity. There was a moderate positive correlation ($0.5 < R < 0.8$) between the initial value of Ver A and value of AFB1 after 2 months (R=0.545), 4 months (R=0.608), and 6 months (R=0.564) of storage. By monitoring the value of Ver A the levels of aflatoxigenic molds contamination and the strength of toxic molds' activity can be observed of the sample under the storage condition before AFB1 is detectable. The study showed that a wide range in the variation of Ver A during storage is indicative of the active metabolism of aflatoxigenic molds, which was manifested in a shorter time interval to high aflatoxin accumulation. The positive correlations between the initial value of Ver A and the value of AFB1 after storage is potential to be applied in the prediction of the safe-storage-time under a certain storage condition (or a long-distance transportation). The results of the present study may provide a potential useful tool for the early detection of aflatoxin contamination in corn and other stored grains. However, other factors, such as insect infestation, which could play a role in the grain ecosystem, need to be considered. In addition, a fast and convenient detection method of Ver A is demanding.

Biography

Biyao Xie has completed her Bachelor Degree at the age of 23 years from Shaoguan University of Biological science. She is studying for master degree under the guidance of Prof Daling Liu in Ji-Nan University. Her research topic is the degradative production by aflatoxinoxidase.

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