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Evaluation of Mycotoxin Contamination in Black Bean Production in Costa Rica

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Abstract

Common bean (*Phaseolus vulgaris* L.) is an important staple food in Mesoamerica, including Costa Rica. Like any other food commodity, fungal infections during the field or storage phases threaten its quality. Some of these fungi are capable of producing secondary metabolites, called mycotoxins, which can cause acute toxicity and chronic diseases in humans and animals. Costa Rican law demands only imported commodities to be analysed for mycotoxins, leaving the national production without inspection. Bean harvest in the Northern and Central Pacific regions usually occurs during the dry season (January to April), while harvest in the Southern Pacific region is conducted during the rainy season (August to September). In this work, black bean samples from the three regions were collected from small producers, cooperatives, and commercial food processors. They were analysed by means of ultra-high-performance liquid chromatography coupled with a triple-stage mass spectrometer (UHPLC-MS/MS) using a method that detects eight mycotoxins simultaneously. Only two samples out of 102 showed contamination by aflatoxins (B1, B2, G1, and G2). It is important to note that this country is influenced by the ENSO (El Niño Southern Oscillation) phenomenon, which results in years with fluctuating cumulative rainfalls. During the collection of samples, the country was facing a dry year, which probably favours the producers during the drying phase of beans. A second sample collection will be made in the year 2021, which is predicted to be a rainy year, to compare if there is an effect of the sample collection year over the production of mycotoxins in beans.

Keywords: Aflatoxin, pulses, UHPLC-MS/MS, weather influence