Fumonisin B_1 contamination in kharik grain sorghum in India

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Sorghum [*Sorghum bicolor* (L.) Moench] is the fifth most important cereal crop in the world after rice, wheat, maize and barley. It constitutes the main grain food for over 750 million people who live in the semi-arid tropics of Africa, Asia and Latin America. Sorghum is grown in *kharif* (rainy), *rabi* (post rainy) and *summer* seasons in India. Sorghum is a truly dual-purpose crop; both grain and stover are highly valued outputs. Sorghum is the preferred staple food in states of Maharashtra, Karnataka and Andhra Pradesh in India. Grain moulds cause significant losses in both grain yield and its nutritional quality (Ratnavathi & Sashidhar, 2003). Mycotoxins are a group of chemically diverse secondary metabolites of fungi that have a wide range of toxic effects on humans and animals. Among numerous mycotoxins, aflatoxins (AFs), fumonisins and ochratoxin A (OTA) are of high priority for control because of their frequent and worldwide distribution in agricultural products. According to the CODEX Committee (2011), worldwide occurrence of mycotoxins in grain sorghum was reported in twelve different countries, of which Fumonisins were reported in Brazil, Ethiopia, India and the USA. These mycotoxins, discovered in 1988 in South Africa, have been shown to exhibit unique toxicological properties that differed with different animal species (Marasas, 1996). Fumonisins may contribute to liver and kidney damage and cause esophageal cancer in human beings. Natural contamination of food grains is greatly influenced by environmental factors such as type of storage structure, temperature, rainfall, pH, moisture etc. The present study was carried out to estimate the fumonisin B_1 contamination in kharif grain sorghum collected from different geographical regions of India over a period of three years and also to determine the safety of sorghum as food and feed (Das, Kumar, Ratnavathi, Komala, Annapurna & Seetharama, 2010) A total of 835 kharif grain sorghum samples were collected over a period of three years. In the years 2006–07 368 sorghum samples, in the years 2007–08 255 sorghum samples, and in the years 2008–09 212 sorghum samples were collected for assessment of Fumonisin B_1 contamination. These samples were grown in different locations Parbhani, Akola (Maharashtra), Hyderabad, Palem (Andhra Pradesh), Dharwad (Karnataka), Udaipur (Rajasthan) and Coimbatore (Tamilnadu). Sorghum is consumed as human food, animal feed and as an industrial raw material in these states. The detection of FB_1 from sorghum grains was estimated by deploying the method of indirect competitive ELISA (Devi, Mayo, Reddy, Emmanuel, Larondelle, & Reddy, 2001). Fumonisin B_1 content varied over locations. The highest fumonisin B_1 percent contamination was recorded during 2008 and the lowest in 2006. The study conducted for three years showed that natural contamination of Fumonisin B_1 was at a minimum. 74.97% (626) of total number of samples were positive for toxin as compared to highly susceptible crops like rice, maize and groundnut. However, 7.30% (61) samples contained fumonisin above the safety limit (200 μg/kg). From this study it is observed that, contamination of fumonisins in sorghum is low to medium in kharif produce and grain is mostly safe for consumption.

Keywords

fumonisins; sorghum; contamination; ELISA; safety limit.

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