



Tropentag, September 17-19, 2013, Stuttgart-Hohenheim  
“Agricultural development within the rural-urban continuum”

## Multi-Mycotoxin Contaminations in Fish Feeds from Different Agro-Ecological Zones in Nigeria

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### Abstract

Fishes are known to be very sensitive to mycotoxicoses, a leading cause of low productivity and death in the fish farming industry in Nigeria. Mycotoxicoses caused by moulds and multi-mycotoxin contamination of fish feeds have resulted in losses of income to farmers, processors, traders and short supply of fish, hence aggravating the problem of malnutrition and food insecurity in Nigeria. Random sampling of fish feeds were carried out across different agro-ecological zones (AEZs) of Nigeria. Quantification of the multi-mycotoxin contamination levels in the fish feed samples were assessed using high sensitive liquid chromatographic tandem mass spectrometry method (LC-MS/MS). Eighty-four different mycotoxins were detected from the fish feed samples. Results showed that fumonisin B1 had the highest toxin value of 6097  $\mu\text{g kg}^{-1}$  from Guinea savannah AEZ. Enniatin B, equisetin, beauverucin, emodin, alternaric methylether, methyl sterigmatocystin and averufin toxins were detected in all samples from the AEZs. Data also revealed highest mycotoxin occurrence from fumonisins (FB) ranging between 0.800–6097  $\mu\text{g kg}^{-1}$ . Guinea savannah had the highest contamination level of mycotoxins followed by the derived savannah while the least contaminated AEZ was the humid forest. Derived savannah zone had more mycotoxins but their levels were relatively low as compared to the Guinea savannah AEZ. All samples analysed were contaminated with various mycotoxins which were produced by *Aspergillus*, *Penicillium* and *Fusarium* moulds. They are considered to be the moulds producing mycotoxins of great concern in the food and feed industries. The high levels of mycotoxins call for concern as multi-mycotoxin contaminations are very hazardous to the development of aquaculture in Nigeria. Considering the lack of information on fish feeds multi-mycotoxin contamination from African countries, this work contributes to the global data on multi-mycotoxin contamination of fish feeds in various agro-ecological zones of Nigeria.

**Keywords:** Agro-ecological zones, contaminations, fish feeds, multi-mycotoxins