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Influence of Farming Systems on Aflatoxin Contamination of Groundnut Crops under Field Conditions in Zambia

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Abstract

Groundnut is one of Zambia's cash and food security crop, and yet it is highly susceptible to pre- and post-harvest aflatoxin contamination. Aflatoxins are carcinogenic, immune suppressant and growth retardant substances that often undermine improved nutritional health status and livelihoods of smallholder farmers in Africa. However, limited information exists on the effect of farming systems on aflatoxin occurrence in Zambian agricultural commodities. This study assessed, on-farm, the impact of agronomic practices on aflatoxin contamination of groundnut. Groundnut samples were collected from different agro-ecological zones of Zambia from the field at harvest and from local markets. Of the 300 analysed samples, the occurrence of aflatoxin was found to be very high with 53% of harvest and 98% of market samples testing positive for the contaminant. Total aflatoxin was noted to vary from 0.4–6,095ppb (harvest samples) and 0.1–5,325ppb (market samples). Mean aflatoxin contamination level in harvest samples (246ppb) was higher than the market samples (180ppb). Contamination of harvest samples, however, was enhanced by the farming practices. The groundnut variety Chalimbana (438ppb) and Kamulomo (454ppb) appeared more susceptible than MG5, MG4 or Njute varieties (1.3–203ppb). Timely planting at the onset of rains (mid-November to mid-December, 67ppb) reduced aflatoxin contamination by over 5 times when compared to late planting (beyond 20 December, 396ppb). Growing groundnut in a virgin land or after a fallow period supported less contamination levels (1.4–20ppb) than when the crop was cultivated in a field where maize (202ppb) or other legumes (247ppb) were previously grown. Mono-cropping (311ppb) doubled aflatoxin contamination in harvested groundnuts compared to those collected from intercropped fields (132ppb). The present study confirms the role of good agronomic practices in reducing aflatoxin contamination of groundnut in the field. Farmers need to integrate variety selection with good agronomic practices if they are to consume and market healthy groundnut commodities.

Keywords: Aflatoxin, Agronomic practices, groundnut, Sub-Saharan Africa

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