Estimating Aflatoxin in Farmers' In-Shell Groundnuts by Testing Various Groundnuts-Grade Components in Malawi

E. LIWONDE*,Lilongwe University of Agriculture and Natural Resources, Bunda College Campus, Department of Food Science and Technology, P.O Box 219, Lilongwe, Malawi; L. MATUMBA, Food Technology and Nutrition Group, Lilongwe University of Agriculture and Natural Resources (LUANAR)-NRC campus, P.O. Box 143, Lilongwe, Malawi; T. WHITAKER, Biological and Agricultural Engineering Department, North Carolina State University, Weaver Laboratories, Box 7625, Raleigh, NC 27695-7625, USA; W. KASAPILA, Lilongwe University of Agriculture and Natural Resources, Bunda College Campus, Department of Food Science and Technology, P.O Box 219, Lilongwe, Malawi; J. RHOADS and D. HOISINGTON, Peanut Innovation Lab, University of Georgia, 217 Hoke Smith Building, Athens, GA 30602, USA.

This study was set to develop a reliable sampling strategy for estimation of aflatoxin in small-holder farmers' in-shell groundnuts by testing various grade components. Ninety five, 2.0-2.5kg of in-shell groundnut test samples from various lots were shelled and partitioned into 5 grade components namely: loose shelled kernels (LSK), sound mature kernels plus sound splits (SMKSS), shriveled and immature kernels (SI), moldy kernels (M), and pest damaged (PD). Kernel mass, aflatoxin mass, and aflatoxin concentration were measured for each of the 5 component samples. Correlation analysis was performed and regression equations were determined as predictors for aflatoxin concentration in a groundnut lot. SKMSS, SI, M, PD and LSK had mean aflatoxin concentration of 17, 28, 9, 10 and 2 µg /kg and yet they accounted for 71, 23, 3, 2 and 1 % of the total mass respectively. Therefore, SKMSS contributed only 26% of the total (sum) aflatoxin mass in the test samples. The SI contributed the highest (43%) of the total aflatoxin mass of the samples while PD, M and LSK contributed 15, 13 and 3% respectively. Among the five different components, SI yielded the highest correlation (r=0.956 and r=0.945 for aflatoxin concentration and aflatoxin mass respectively) prediction of aflatoxin in the test sample. The lowest correlation was observed in LSK component with r=0.325 and r=0.26 for aflatoxin concentration and aflatoxin mass respectively. However, the combination of risky components (SI+PD+M+LSK) provided the strongest correlation with aflatoxin in the test sample (r=0.969 and r=0.991 for aflatoxin concentration and aflatoxin mass, respectively. This model would reliably be used for quantitation of aflatoxin concentration in small-holder farmers' groundnut lots in Malawi.