Response of Peanut Genotypes to Pre-Harvest Aflatoxin Contamination in Ghana

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Peanut production is predominant in rain-fed regions of the semi-arid tropics with a characteristic unpredictable drought. This exposes the crop to end-of-season drought, resulting in pre-harvest *Aspergillus* infection and subsequent aflatoxin accumulation. As a consequence, the potential for aflatoxin post-harvest management becomes limited, leading to further accumulation in farmers' stores. Development of varieties with reduced *Aspergillus flavus* infection and aflatoxin contamination in the field is critical in addressing the groundnut aflatoxin contamination menace. It is imperative to identify groundnut genotypes with resistance or tolerance to infection by local strain of *A. flavus* and aflatoxin production to facilitate development of resistant varieties. The objective of the study was to identify groundnut genotypes with reduced *A. flavus* infection and aflatoxin contamination in the field. The experiment was conducted at Fumesua (Deciduous Forest) and Nyankpala (Guinea Savanna) with 27 genotypes (22 from ICRISAT and 5 adapted varieties from CSIR-CRI, Ghana). The experimental design was a 9 × 3 alpha lattice with 3 replications. Plot size was 4 rows (50 cm apart) with a length of 3 m. *A. flavus* strain inoculum was isolated from peanut and toxigenicity determined at the Mycotoxin Laboratory of the Kwame Nkrumah University of Science Technology, Kumasi, Ghana. Inoculum of *A. flavus* was prepared using the organic-matrix method. Planting was delayed at both locations to expose genotypes to 27-30 days terminal drought. *A. flavus* infested corn was broadcasted to groundnut plots at rate of 200 kg/ha at 60 days after planting. Fertilizer (NPK, 15:15:15) at 130 kg/ha was applied at 2 weeks after planting. Ground oyster shells (100 kg Ca/ha) was also applied at 40 days after planting. Manual weeding was done twice at three and six weeks after planting. Kernel infection by *A. flavus* (%), aflatoxin concentration (ng/g) at harvest, haulm yield (kg/ha), and pod yield (kg/ha) were recorded. Data for aflatoxin and kernel infection were log [log (y + 1)] and angular transformed, respectively. Analysis of variance was performed for each location and across locations following homogeneity of variance test using PROC GLM of SAS version 9.4.

Significant genetic variation existed among groundnut genotypes for aflatoxin contamination, seed infection by *A. flavus*, pod yield and haulm yield, indicating possible selection for improvement of these traits. Genotypes ICGV 03331, ICGV 03401, and ICG 4729 consistently showed low aflatoxin levels (<20 ng/g) and low to moderate seed infection by *A. flavus* across contrasting locations, suggesting that their use as parents for improvement of adapted varieties for the aflatoxin reduction traits is possible. Genotypes ICGV 03331 and ICGV 03401 had low aflatoxin levels and appreciable pod and haulm yields and could serve as potential varieties in Ghana following further evaluation in multiple locations.