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Maize host resistance to *Aspergillus flavus* infection/aflatoxin contamination through breeding and omics

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Aflatoxins are secondary metabolites produced by the fungus *Aspergillus flavus* that can contaminate maize and cause toxic and carcinogenic effects in higher organisms that consume the contaminated commodities. Therefore, aflatoxin contamination of maize is a serious food safety problem that affects the competitiveness of agricultural production in both domestic and export markets. Post-harvest management of these toxins is only marginally effective. Therefore, pre-harvest control of aflatoxin contamination, especially through host resistance, is a desirable goal. Research collaboration between the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria and the USDA-Agricultural Research Service in new Orleans developed six aflatoxin-resistant maize inbreds that are currently being used by national programs in Africa and which have demonstrated resistance in US Environments. To investigate the mechanisms responsible for resistance and identify breeding markers for commercial development of these lines, several studies have been undertaken. Implicated in resistance is marked accumulation of constitutive proteins. Comparative proteomics identified constitutive resistance-associated proteins (raps) belonging to either antifungal, stress-related or storage categories. The potential of selected raps as resistance genes was further highlighted in characterization studies. The importance of constitutive accumulation of resistance factors was also supported by a microarray investigation of two closely-related maize lines varying in aflatoxin accumulation and demonstrating a ten-fold difference in the number of induced genes between the resistant and susceptible genotype. To discover target genes for enhancing resistance in maize, RNA-Seq is being employed to investigate gene expression network differences in defense response between resistant and susceptible kernels.

Biography

Robert L Brown completed his PhD in Plant Pathology from Rutgers University and Post-doctoral studies from Southern Regional Research Center (SRRC), USDA-ARS in New Orleans, Louisiana. He is a Research Plant Pathologist in the Food and Feed Safety Research Unit at SRRC and also Adjunct Associate Professor at both Louisiana State University and Southern Illinois University-Carbondale. He is an Editorial Board Member for several journals and has published over 110 research, review, proceedings papers, book chapters and over 160 abstracts.

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