

6th Global Summit on

Toxicology & Applied Pharmacology

October 17-19, 2016 Houston, USA

Host-Induced Gene Silencing (HIGS) of aflatoxin synthesis genes in peanut and maize: Use of RNA interference and genetic diversity of *Aspergillus*

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Approximately 4.5 billion people are chronically exposed to aflatoxins, these are powerful carcinogens produced by *Aspergillus flavus* and *A. parasiticus*. High levels of aflatoxins in crops result in approximately 100 million metric tons of cereals, nuts, root crops and other agricultural products being destroyed or diverted to non-human consumption each year. We have targeted silencing of 5-genes in the aflatoxin biosynthesis pathway of *Aspergillus* by RNA interference (RNAi) from the plant host to reduce/eliminate aflatoxin accumulation in peanut and maize seeds. Given that no method existed to analyze the effectiveness of RNAi against aflatoxins, and that testing of hundreds of plants in the field under aflatoxin-conducive conditions is not an option in this case, we developed a method of challenging with aflatoxigenic *Aspergillus* the RNAi treated seeds, and then analyze those seeds by ultra-performance liquid chromatography (UPLC). In parallel, we developed a workflow to obtain information of those isolates at the DNA sequencing level. This workflow includes fungal isolation, 25 InDel fingerprinting followed by cluster analysis, and whole genome sequencing of clade representatives. This method also allows analysis of small seed pieces for gene expression by real-time PCR (RT-PCR) and small RNA sequencing. Solving the aflatoxin problem in crops would be equivalent to increasing food production by millions of tons that could be safely consumed instead of being discarded or diverted to other uses.

Biography

Renee S Arias was Quality Control specialist of inoculants based on symbiotic nitrogen fixing bacteria (*Rhizobium* spp. and *Bradyrhizobium japonicum*), and effect of fungicides on pre-inoculated leguminous seeds for Rhizobacter Argentina Co., Argentina during 1988-1992. He was Teaching Assistant on the topic Plant Microbial Interactions for two semesters at the Department of Plant Pathology, University of Hawaii, Spring 1995 and Spring 1997. From 2000 – 2002, he was Research Associate, HARC (Hawaiian Agriculture Research Center). From 2011 to present, he is a Research Pathologist, at the USDA-ARS-SAA, Peanut diseases with focus on Aflatoxin.

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