Is aflatoxin accumulation a response to increased reactive oxygen species?
Yu-Gyeong Ko, D. Bush, T. Musket, D. Davis, and G. Davis

Aspergillus flavus infects many crop species including corn where it can produce aflatoxin. Aflatoxin production occurs when the correct combination of the fungal and plant genes are present under favorable environmental conditions. In humans, aflatoxin exposure can cause aflatoxicosis or liver cancer and lead to lung infections. Livestock and poultry are also affected by aflatoxin exposure. No impact on plant health has been observed directly from the presence of aflatoxin leading to the question, why is aflatoxin produced by the fungus following plant infection? Aflatoxin is a polyketide secondary metabolite with structure suggesting it could provide antioxidant capability to the fungus. We hypothesize that aflatoxin is produced in response to an increase in reactive oxygen species (ROS) in the fungus to protect against cell damage. We present here two experiments to test whether aflatoxin levels are affected by the amount of ROS present in the fungus. Catechin and its derivatives are powerful antioxidants present in green tea leaves which protect against ROS. We tested the ability of (-)-epicatechin, (+)-catechin and (±)-catechin to alter aflatoxin production and growth in culture by supplementing Czepak’s media plus salt with 0 µM, 50 µM, 100 µM, 150 µM, 200 µM, 250 µM of each compound. Preliminary analysis indicates that (-)-epicatechin and (±)-catechin at 200 and 250 µM had significantly faster growth rates between 4 and 6 days consistent with less cell damage due to ROS. In a second experiment A. flavus cultures were treated with hydrogen peroxide at low concentration and were grown at either 37 or 42 degrees. Aflatoxin levels were determined at 14 days. Hydrogen peroxide treatment reduced fungal growth slightly compared to the control, however, temperature which is known to increase ROS had the most dramatic effect on fungal growth. Measurement of aflatoxin in comparison to ROS levels is in progress.