

MALDI-TOF-MS as a Tool for Soybean Fungal Pathogen Identification

Soybean crops accounted for \$860 million of Mississippi agricultural commodities in 2011. In order to effectively manage soybean and other crops across Mississippi and the country, identification and characterization of plant pathogens is crucial. Of particular importance, two species of soybean pathogens, *Macrophomina phaseolina* and *Thielaviopsis basicola* cause significant damage to soybean crops every year. These two species of filamentous fungi are relatively obscure, yet pose a significant threat to crop security.

Matrix Assisted Laser Desorption Ionization Time of Flight Mass Spectrometry (MALDI-TOF-MS) has emerged in recent years as a practical means in the identification of many species of filamentous fungi, yeasts, and bacteria. With this growing technology, identification of obscure microorganisms becomes possible due to the unique spectral profiles produced from the ribosomal proteins that are isolated from cells by the use formic acid extraction. In contrast to this strenuous process, presentation of results from the use adaptive focused acoustics (AFA) in cell lysis will be presented. The use of AFA in theory could be used to break apart cell walls in an organic solvent containing small amounts of trifluoroacetic acid (TFA). Trifluoroacetic acid in this context would be used as an aid in the liberation of samples from the MALDI plate to the TOF detector. Preliminary results will also be presented in the characterization of volatiles from both species of fungi. This information could be used to elucidate the infection pathways for each fungus, and have the potential to also identify the fungi on the basis of the volatile profiles. Overall, characterization of these fungi is of great importance due to the economic importance these fungi represent and a better understanding of these fungi is needed due to their relative obscurity in literature.

Monitoring Catfish Quality with Mass Spectrometry

Food safety poses many economic and health concerns at the state and federal levels. Triple Quadrupole Mass Spectrometry is a useful tool for quickly, accurately, and reliably alleviating these concerns through a vast array of applications. Examples of this are the intentional misbranding and use of illegal antibiotics in imported fish species which pose many health risks. Triple-Quadrupole LC-MS/MS has been used to quantitate levels of nitrofurans, chloramphenicol, and dyes in fish tissue. Concentrations as low as one part-per-billion were accurately detected with recoveries ranging from 70-110 percent. To curb intentional misbranding of imported fish, a method was developed using Triple-Quadrupole Gas Chromatography to create lipid profiles unique to each species of fish tested. Fatty Acid Methyl Esters derivatized from fish fillet lipids were analyzed and compared. Channel Catfish (*Ictalurus punctatus*) and Swai (*Pangasianodon hypophthalmus*) fillets were found to be significantly different. In tandem, these methodologies can be used to rapidly and correctly identify imported fish fillets and products contaminated with these agents.