More than just another fungal virulence factor: multiple roles for patulin in plant-fungus- microbe interactions

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Abstract

Mycotoxin contamination is a leading cause of food spoilage around the world. Among one of the top mycotoxins of global concern is patulin, which is found in processed apple products (e.g. juice, sauce, and butter). Produced mainly by Penicillium and Aspergillus species, patulin is a lactone polyketide that has cytotoxic effects in humans, survives pasteurization, and is not destroyed following fermentation. While much has been discovered regarding the impact of patulin on human health, there are significant knowledge gaps for how it impacts the host and other fungi. Here, we have utilized purified patulin to determine if the toxin could mimic blue mold symptoms. Directly inoculating apple fruit with different amounts of patulin revealed a cultivar-independent susceptibility, as well as a dose response where blue mold symptoms and toxin concentration coincided. Patulin biosynthesis was recently discovered to be produced outside of the fungal cell, so understanding how it impacts other phytopathogenic fungi was investigated.

Preliminary results show that conidial germination for postharvest pathogens Colletotrichum fiorinae and Alternaria alternata were inhibited. Additional studies will be performed to understand its impact on nonhost plants, other fruits, and microorganisms on the fruit carposphere that participate in host-pathogen interactions. We also seek to determine the mode of action of patulin-mediated cell death in the fruit and if it is conserved across kingdom Fungi. By elucidating the mechanism for patulin- mediated cell death in fruit, and impacts on nonhosts, intervention technologies can be applied to improve postharvest storage regimes and shift the carposphere composition to a disease-suppressive situation serving as next-gen class of postharvest decay control measures.

Biography:-

Holly P. Bartholomew is a postdoctoral researcher with the USDA-ARS Beltsville Agricultural Research Center with Drs. Wayne M Jurick II and Jorge M. Fonseca in the Food Quality Lab . Her fellowship is supported by an appointment to the Agricultural Research Service (ARS) Research Participation Program administered by the Oak Ridge Institute for Science and Education (ORISE) through an interagency agreement between the U.S. Department of Energy (DOE) and the U.S. Department of Agriculture (USDA). She holds a B.S. in Microbiology and a Ph.D. in Biological Sciences from Virginia Polytechnic Institute and State University. She is passionate about improving food quality and reducing waste through understanding postharvest storage practices and pathogen proliferation.

Note:- This work is partly presented at international conference on Plant Pathology on November 24, 2020 in the Time zone of London, UK