- Technology Presentation #3 -

"DeCIFRing a Population Genetics Approach to Biological Control of Mycotoxin Production"

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Abstract:
Toxins produced by fungi (mycotoxins) are an enormous problem in agriculture, particularly the aflatoxins produced by Aspergillus flavus. The economic cost resulting from direct losses due to aflatoxins are estimated at $240 million annually in the United States alone. Using non-aflatoxigenic A. flavus strains as biological control agents to reduce aflatoxin concentrations in both seeds and grains has shown promise but much remains to be learned about these fungi in agricultural settings. Ongoing research in the Carbone lab has increased our knowledge of fungal population genetics as well as leading to the development of new bioinformatics tools. In combination, these advances are being used to answer two important questions: 1. What happens to the applied biocontrol strain in the field over time? 2) Can we use the population genetics of Aspergillus flavus to improve on the efficacy and sustainability of biological control methods for aflatoxins? Technologies resulting from this research to date include the commercially available software T-BASV1, part of the DeCIFR bioinformatics toolkit, and a population genetics approach to mycotoxin biocontrol.

Biography:
Megan Andrews, Ph.D., is the Project Manager for both the Plant Soil Microbial Community Consortium (PSMCC) and the Center for Integrated Fungal Research (CIFR) at North Carolina State University. She received a B.S. in Biology from the California Institute of Technology and Ph.D. in Geology/Geochemistry from Yale University before embarking on postdoctoral research experiences in the UK and at NC State. This interdisciplinary background has served her well in her current role as liaison between industry and academic scientists, as well as managing a multidisciplinary center.

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Selected Publications:

Ojiambo, P. S., Battilani, P., Cary, J. W., Blum, B. H. and I. Carbone. 2018. Cultural and genetic approaches to manage aflatoxin contamination: Recent insights provide opportunities for improved control. Annual Review of Phytopathology. In Press. https://doi.org/10.1094/PHYTO-04-18-0134-RVW

Drott, M. T. Lazzaro, B. P. Brown, D. L. Carbone, I. and M. G. Milgroom. 2017. Balancing selection for aflatoxin in Aspergillus flavus is maintained through interference competition with, and fungivory by insects. Proc. R. Soc. B., doi: 10.1098/rspb.2017.2408.

Moore, G. G., Olarte, R. A., Horn, B. W., Elliott, J. L., Singh, R., O'Neal, C. J. and I. Carbone. 2017. Global population structure and adaptive evolution of aflatoxin producing fungi. Ecology and Evolution, DOI: 10.1002/ece3.3464.

Carbone, I., White, J. B., Miadlikowska, J., Arnold, A. E., Miller, M. A., Kauff, F., U'Ren, J. M., May, G. and F. Lutzoni. 2017. T-BAS: Tree-Based Alignment Selector toolkit for phylogenetic-based placement, alignment downloads, and metadata visualization; an example with the Pezizomycotina tree of life. Bioinformatics 33: 1160-1168. DOI: 10.1093/bioinformatics/btw808