Behind the Kernels III: An Evaluation of Fungal Endophytes of Maize and their Hypothesized Mitigation of Temperature Stress

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Maize is one of the most important crops on earth; however the increased temperature that comes with changing climate puts yields at risk. By the year 2100, maize yields are projected to decrease by up to 82% due to climate change. Currently, there are very few pragmatic strategies for mitigation of these projected yield decreases. Fungal endophytes are unique organisms that form mutualistic associations with their host plant. They have been found to decrease abiotic and biotic stress factors, and mutualistically increase plant growth. Fungal endophytes have previously been found to counteract some of the detrimental effects of increased temperature on their host. In this study, the ability of fungal endophytes to mitigate temperature stress was assessed. Maize plants were inoculated with the fungal endophytes Cladosporium, Bipolaris, and Alternaria. These plants were exposed to increased temperature conditions of 35 degrees Celsius and average temperature conditions of 24 degrees Celsius. It was found that none of the fungal endophytes had apparently mitigated temperature stress, but the endophyte Bipolaris was found to have a significant detriment on the growth of the maize plant when subjected to increased temperature. These findings provide further insight into the activation of fungal nutritional modes, as it shows that the latent pathogenesis of Bipolaris was somehow activated by increased heat.