Sorghum bicolor, Xanthomonas vasicola, and the Environment: An Interdependent and Dynamic Relationship

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Little is known about the complex plant-pathogen interactions between *Sorghum bicolor* (L.) Moench and the bacteria that infects it, specifically regarding the role of the environment and how sorghum acquires and maintains pathogen resistance. Breeding for applications like biofuel production may alter or decrease sorghum resistance to bacterial pathogens. To test this possibility, it is important to analyze the roles of the host, pathogen, and environment in the disease triangle, and how they contribute to either infection or resistance. We have identified a field-isolated strain of *Xanthomonas* that infects sorghum and causes disease symptoms through 16S ribosomal sequencing and multilocus sequence typing (MLST) as *Xanthomonas vasicola pathovar holcicola*. In order to examine the role of environment in the disease triangle, sorghum plants were inoculated with *Xanthomonas* and grown under various environmental conditions. Plant responses to inoculation in each setting were characterized either qualitatively, by observing the spread of disease symptoms, or quantitatively, by performing a colony forming unit (CFU) assay. Results from these experiments indicate that decreased relative humidity increases disease symptoms, and oscillating temperature conditions increase disease symptoms. However, this increase in symptoms observed in oscillating temperature conditions did not correlate with increased CFU counts. The effect of temperature was further examined with an *in vitro* study of the growth of *Xanthomonas* outside of plant tissue. Bacteria grown at oscillating temperatures displayed a longer growth period than bacteria grown at constant temperatures. Further research aims include determining the mechanisms behind the observed temperature and humidity effects on disease and bacterial growth, and altering the host side of the disease triangle using cell wall and sugar-accumulating mutants to determine how resistance can be maintained.