FUSARIUM OXYSPORUM F. SP. *VASINFECTUM* RACE 4 SOIL INOCULUM QUANTIFICATION IN RESPONSE TO RESISTANT AND SUSCEPTIBLE COTTON CULTIVARS

Jennifer Chagoya
Texas Tech University and Texas A&M AgriLife Extension
Lubbock, TX
Mauricio Ulloa
USDA-ARS, PA, CSRL, Plant Stress and Germplasm Development
Lubbock, TX
Terry A. Wheeler
Texas A&M AgriLife Research
Lubbock, TX
Heather Elkins-Arce
Texas A& AgriLife Research
El Paso, TX
Joel Arce
Texas A&M AgriLife Extension
El Paso, TX
Cecilia Monclova-Santana
Texas A&M AgriLife Extension and Texas Tech University
Lubbock, TX

Abstract

Fusarium oxysporum f. sp. *vasinfectum* race 4 (FOV4) is a virulent soilborne plant pathogen that causes devastating losses in cotton. More research is needed to understand the soil inoculum dynamics and dispersal to manage this pathogen. The objective of this research is to evaluate the use of host plant resistance for the management of FOV4 by quantifying the pathogen and plant infection on susceptible and resistant or tolerant cultivar hosts using a molecular quantitative PCR assay. Two field trials were planted in El Paso, Texas, in 2020 and 2021, each consisting of both Pima and Upland cultivars varying in response to FOV4. Plant survival, root vascular necrosis, and yield data were collected in the field. Soil samples were collected at planting, midseason, and harvest for DNA extraction and quantification of FOV4 by real-time PCR using FOV4-specific primers (Davis et al., 2022). Resistant cultivars had higher survival, lower root necrosis, and higher yield than susceptible cultivars in both trials and years. Significant differences among cultivars were observed for FOV4 soil quantity at midseason and harvest, with DP 340 Pima, Pima 3-79, Pima S-7, PHY 72 Acala, and DP 357 Pima having significantly greater FOV4 quantities than other cultivars. Resistant Upland PSS-U77 (recently released as PSSJ-FRU14) had the highest survival and lowest root necrosis and was among the lowest FOV4 quantities observed. Field measures were correlated with FOV4 soil quantity at different time points, showing that survival and yield decreased, and root necrosis increased as FOV4 quantity increased. This research shows that planting resistant cultivars prevented an increase of FOV4 in the soil during the growing season, indicating that host plant resistance is an effective strategy to manage FOV4 populations in soils.

Acknowledgments

We thank USDA-ARS for their contribution and our sponsors Cotton Incorporated and the Texas A&M Chancellor's Research Initiative.