

End-of-Year Report

TITLE: Diseases of grain and sweet sorghum hybrids

INVESTIGATORS: D.O. TeBeest, Department of Plant Pathology, Division of Agriculture, University of Arkansas.

COOPERATORS: Don Dombek, UAF Variety Testing Program, B. Bluhm, T. Faske, Y. Wamishe, Division of Agriculture, University of Arkansas.

CROP: Grain Sorghum

STATUS: New project; Year 1, 2012

PROJECT DESCRIPTION

VALUE TO THE GROWER IN ARKANSAS:

Sorghum once was and could again be a valuable crop to Arkansas row-crop producers. Its value to producers results from high quality and marketable grain with minimal input costs from the best hybrids. It is also a valuable rotation crop that usually requires little input and irrigation. In 2010, production records show that Arkansas produced 35,000 acres of grain sorghum for a production value of \$11 million.

Sorghum has continued to have interest and support in the agricultural industry. Companies such as Pioneer and DeKalb continue to release high yielding cultivars each year. Industry representative (W. Dolezal, Pioneer) continues to see a need for grain sorghum research and see a place for grain sorghum in the future due to its tolerance to drought conditions and heat. Our lab has been recognized for its research on grain sorghum diseases as a potential threat to this commodity for Arkansas producers and we proposed research to identify the best hybrids in terms of resistance and if biologically based products based on *Trichoderma* can reduce disease levels.

PROGRESS BY OBJECTIVES:

1. Determine impact of diseases and screen hybrids and cultivars of grain sorghum and sweet sorghum for resistance to the diseases.

Two planned disease surveys of diseases on grain sorghum was completed in 2012. Inspection of the data shows that anthracnose, leaf blight, target spot and zonate leaf spot were already present and evaluated using the Horsfall-Barret scale by mid June and all increased in severity by mid July. Of the 26 hybrids examined, all showed the presence of three diseases at Rohwer and at Marianna with anthracnose reaching 9-12 % leaf area infected on several hybrids at Marianna, suggesting that the inoculum was available for further increase of these diseases. Target spot was found on several hybrids at Marianna. A summary of the occurrences and incidences of the diseases was sent to cooperators. Several production fields were also surveyed. Anthracnose was the predominant disease in all surveys.

2. Determine if biologically based fungicides (based on *Trichoderma*) can reduce disease losses, and gather information on the interactions of pathogens and strains of pathogens with *Trichoderma* on grain sorghums at the genomic levels.

Since the efficacy of seed treatments with biological based agents results from the interactions of agents with host genotypes and soil characteristics, we collected and analyzed five soils through the Soil Lab at Fayetteville. Results show significant differences in pH (5.5 to 7.9), E.C. and in trace elements (as mg/mhos). Greenhouse tests showed that anthracnose caused by an Arkansas isolate was highest on selected hybrids and breeding lines grown in soils collected from Newport and Marianna with the lowest levels found on plants grown in soil from Pine Tree and Rohwer. Laboratory tests have shown that the isolate of *Trichoderma* in the lab overgrew 4 of the 5 anthracnose isolates while the fifth isolate unexpectedly inhibited *Trichoderma* while being inhibited by *Trichoderma* (or, mutually inhibitory). A procedure that we recently developed to study seed borne diseases of rice has been modified to be used to treat seeds of sorghum with *Trichoderma*. Results of these preliminary tests have identified the specific soils, host genotype (BTX623) and pathogen isolate (SS-1) to be used in further investigations. Greenhouse investigations concentrating on the susceptibility of the white seeded hybrids grown in Arkansas in 2012 are underway within space made available in the Rosen Center Greenhouses.