

Managing Karnal Bunt

2K5

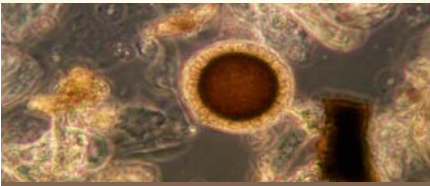
Federal Initiative Accomplishments

Purpose:

To conduct research that will provide regulatory agencies with data needed to develop a pest risk assessment for *Tilletia indica*, a quarantined pathogen that causes Karnal bunt (KB), a disease of wheat and triticale. Although its impact on crop yield and quality is extremely minor, *T. indica*'s quarantine status causes economic hardship to wheat farmers and the U.S. wheat industry. Development of a pest risk assessment is a prerequisite for federal deregulation. A second goal is to develop alternative cropping systems and resistant cultivars that will provide producers with management options.

Accomplishments/Impacts:

- Studies on the spatial distribution of *Tilletia indica* teliospores in naturally infested fields in Central and Northern Texas revealed that the pathogen is widespread throughout most fields and occurs in clumped distributions. Spore distribution was not correlated to soil chemical or physical characteristics.
- Research demonstrated that teliospores of *Tilletia indica* are not readily spread by conventional tillage equipment. The widespread distribution of teliospores in naturally infested fields in Texas and Arizona suggests the pathogen was likely in the United States for many years prior to its initial detection in 1997, or the pathogen was introduced uniformly across fields on infested seed or manure.
- Four genes associated with resistance to KB were identified in two bread wheat cultivars. Molecular markers have been developed for three of those genes that can be used for marker-assisted selection. These new sources of resistance have been incorporated in regional wheat breeding programs.
- Non-host annual small grain forage crops (oats, barley, and rye) were identified that consistently provide higher fall and season-long forage yields than wheat, a host for Karnal Bunt. Many of the varieties of these small grain forage crops are adapted to both areas in Texas where Karnal Bunt has been reported and have good forage quality. Cool-season legumes in these trials have also provided adequate forage yields and require no nitrogen fertilizer. Locations included McGregor, Olney, Lubbock and Archer City.
- New forage sorghum varieties continue to be evaluated as an alternative crop for farmers in the KB regulated areas of the state. Based on the past performance of the forage sorghum, the potential exists to substitute some wheat acreage with forage sorghums.
- Kansas, Oklahoma and Texas wheat breeding programs have a coordinated system to develop KB-resistant hard winter wheat varieties. F4 populations from crosses with known resistance sources are now in the field. Selections from these populations will be tested in field trials in 2007 and for KB testing in 2008. Populations with newly identified CIMMYT and PAU-resistant wheat lines are under development.
- The TAES hard red winter wheat experimental line TX01M5009 has shown good resistance to KB after three years of testing by CIMMYT and PAU. Selections from this line are now being screened for KB resistance to confirm genetic purity and a public germplasm release from this material is anticipated Fall 2006.



Lead Agency:

U.S. Department of Agriculture-
Agricultural Research Service

Partners:

Texas Agricultural Experiment Station,
Kansas State University, Oklahoma State
University, International Maize and
Wheat Improvement Center (CIMMYT)



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