Ecology and Epidemiology of *Tilletia indica* teliospores from Texas Wheat Fields

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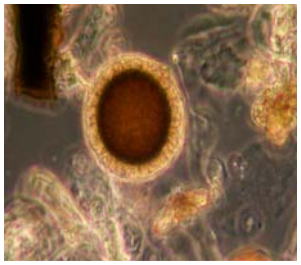
BACKGROUND

Tilletia indica, the causal agent of Karnal bunt of wheat, was discovered in railroad cars in Arizona in 1996. Since this time, the fungus has also been found in wheat fields from California, New Mexico and Texas. After its discovery, the USDA – APHIS quickly initiated a zero tolerance quarantine and the destruction of fields planted with seed lots shipped from the contaminated railcars, as a precaution. San Saba County, in central Texas, was the first to have fields quarantined. In 2001, grain from fields in northern Texas, including Archer, Baylor, Young and Throckmorton counties, were found to be infected with the fungus. The quarantine was extended to fields within those counties, affecting even more wheat producers within Texas. The discovery of *T. indica* in northern Texas has given many producers in the Great Plains cause for concern. If this pathogen were to move further north, it would enter into a region where the majority of the U.S. wheat is produced. This would cause significant economic losses for U.S. wheat producers, mainly due to the quarantine restrictions that would be placed on the region. Because of the economic importance of this fungal pathogen, it is evident that more needs to be understood about the ecology and epidemiology of *T. indica* to help with the development of a risk assessment model, as well as an integrated management program for Karnal bunt.

OBJECTIVES

- Determine the relationship between soil physical characteristics and the incidence and distribution of *T. Indica* teliospores in the Karnal bunt quarantined regions of central and northern Texas.
- Determine the viability of teliospores extracted from these field soils.
- Determine how soil matric potential affects the survival of *T. indica* teliospores.



***Tilletia indica* teliospore (center) under reverse phase contrast microscopy**

RESULTS / BENEFITS

- Analysis of one field in central Texas, using the inverse distance weighting technique, has shown a distribution with three distinct teliospore aggregation levels: less than 1, 3.4, and greater than 6.2 teliospores / 25 g of soil. The two lower density levels accounted for approximately 90 to 95 percent of the field. Teliospore distribution in the field was best described by a linear-to-sill model (R^2= 0.91). Teliospore recovery ranged from 0 to 42 teliospores / 25 g of soil with a mean of 4 teliospores / 25 g of soil. This information can lead to the development of a risk assessment model.
- Knowing the inoculum viability that has been present in Texas fields for at least four years will improve our knowledge of *T. indicia's* soil longevity, as well as help in the development of a risk assessment model.
- Studies on teliospore survivability buried in soil have been shown to decrease as depth increases, but what soil factors cause the decrease is still unknown. Soil water could be the cause of a decrease in survivability and if it is shown to be the cause, it will improve our knowledge of this pathogen.

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