REDUCING FUSARIUM HEAD BLIGHT VOMITOXIN LEVELS THROUGH AGRONOMIC PRACTICES

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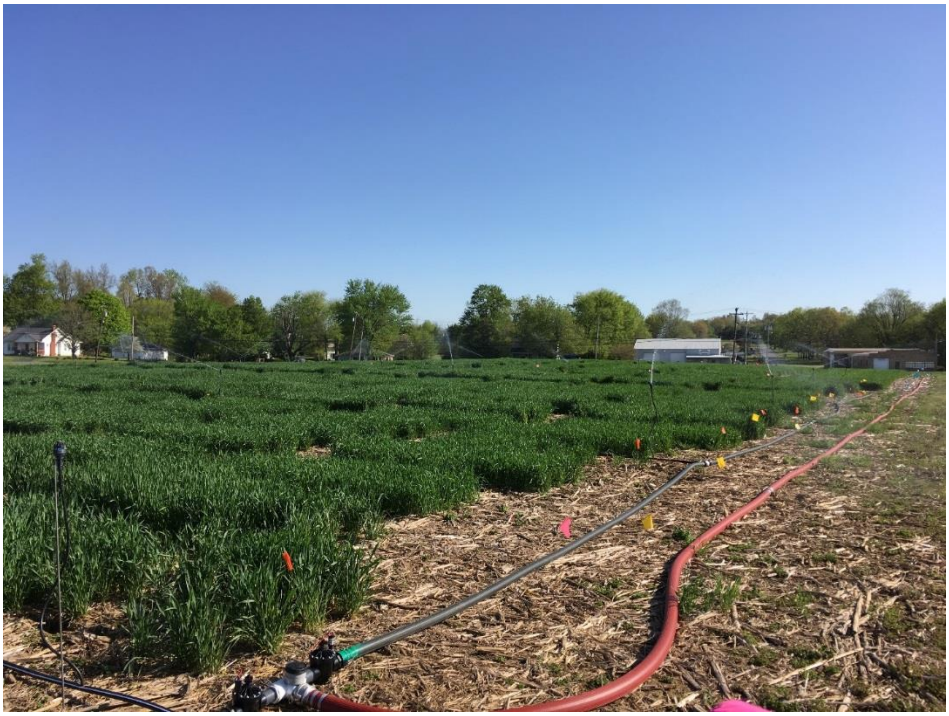
Vomitoxin (deoxynivalenol; DON) levels caused by *Fusarium graminearum*, in soft red winter wheat are of major concern to wheat producers and millers. Current agronomic practices to reduce vomitoxin levels include planting moderately resistant wheat cultivars and fungicide applications at beginning flowering (Feekes 10.5.1 growth stage). This project is examining whether additional agronomic practices may potentially lower vomitoxin levels. These practices include harvesting wheat at higher grain moisture (20-22%), in-furrow phosphorus applications at planting (42 lbs P_2O_5 per acre), and different seeding rates (35 viable seeds ft^{-2} and 56 viable seeds ft^{-2}).

The objectives of this study are to determine the effect of:

1) harvesting wheat at different grain moisture contents on vomitoxin levels and grain yield
2) in-furrow phosphorus applications on the uniformity of heading and flowering, vomitoxin levels, and grain yield
3) the profitability of these management strategies



Fusarium Head Blight nursery used to promote development of the disease and infection of wheat. (Photo: Carrie Knott)

METHODOLOGY

Experimental plots were established in the fall of 2016 and 2017 at the University of Kentucky's Research and Education Center in Princeton, KY. There was one field of natural infection of *F. graminearium* and one field that was inoculated with *F. graminearium* infested scabby corn. The inoculated field was irrigated to promote Fusarium Head Blight (FHB) development and infection of the wheat plants in the spring. Each of these fields had a normal (mid-October) and late (mid-November) planting date and an early (20-22% grain moisture) and normal (13-15% grain moisture) harvest timing. Within each of the planting and harvest timings there was eight treatments consisting of two cultivars (moderately susceptible to FHB [Pioneer 26R53] and moderately resistant to FHB [Pembroke 2016]), and two in-furrow phosphorus applications (0 lbs P_2O_5 per acre and 42 lbs P_2O_5 per acre), each planted at two seeding rates (35 viable seeds ft^{-2} and 56 viable seeds ft^{-2}). Wheat harvested at 20-22% grain moisture were placed into drying columns owned by UK's Biosystems and Agricultural Engineering, where the grain was dried to 12.5% moisture. The dried grain samples were used evaluated DON concentration.

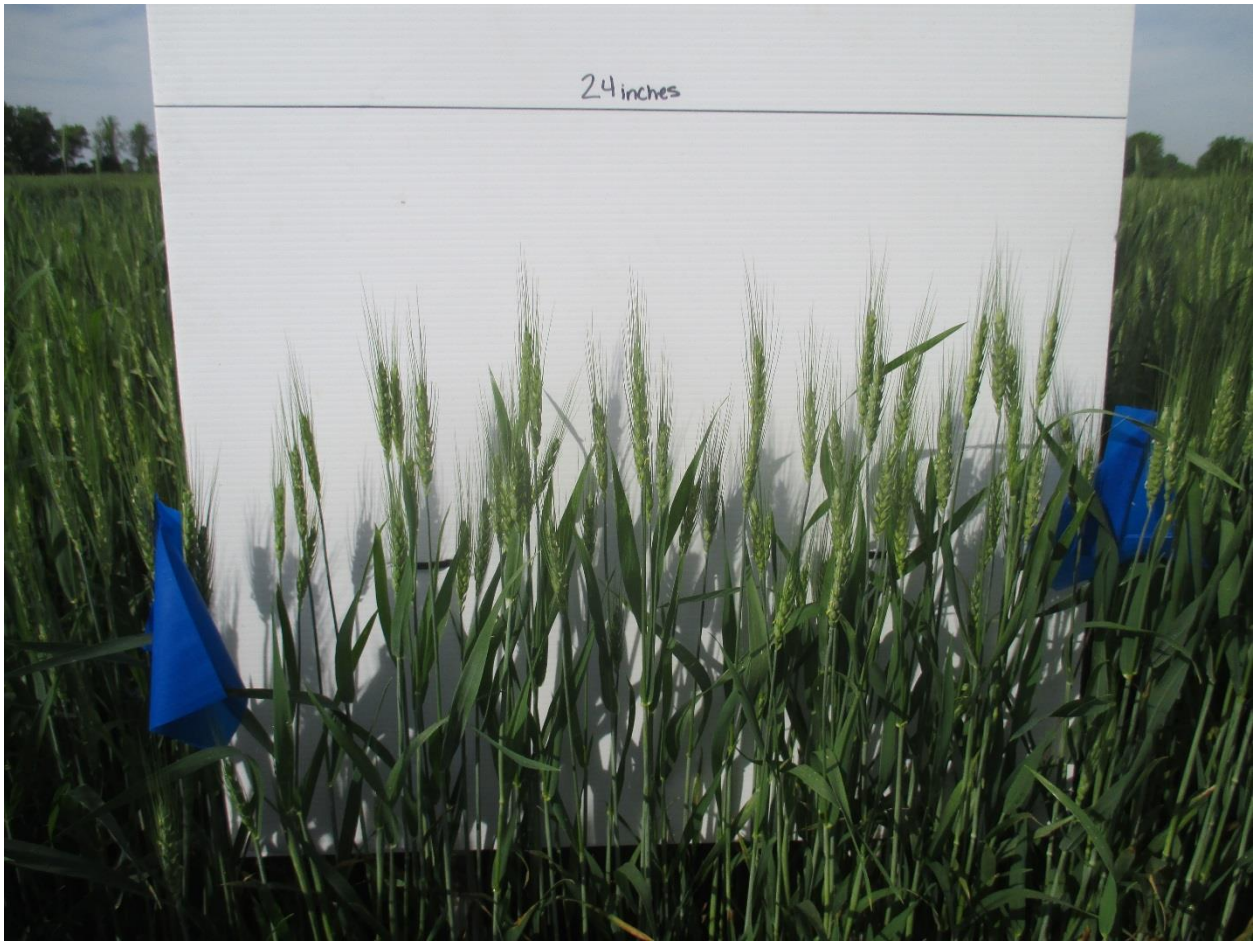
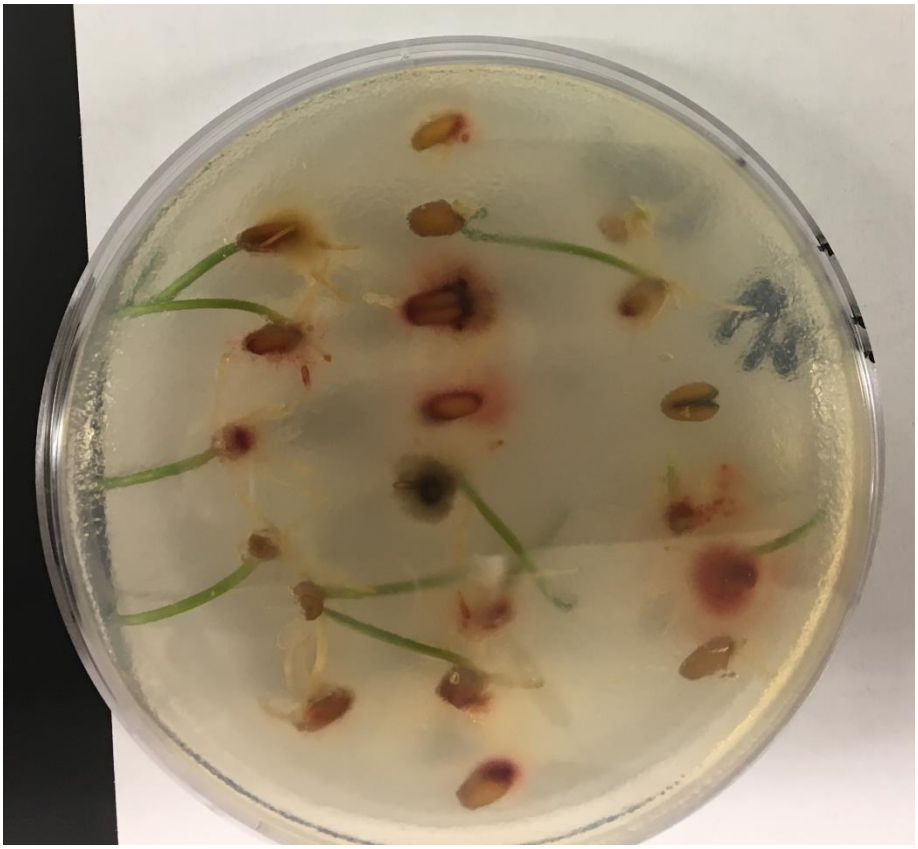


Photo of a wheat plot that will be used determine uniformity of heading and flowering. Photos were taken every day for 14 days. (Photo: Katherine Rod)

PRELIMINARY RESULTS

In preliminary data analyses of the past two years, grain yield in 2018 was consistently greater for the wheat that was planted in October and harvested at 20-22% grain moisture. In fact, there was an 11 bushel per acre increase in yield when grain was harvested at 20-22% grain moisture rather than 13-15% grain moisture: 86 bushels per acre compared to 75 bushels per acre. However, in 2017, consistent differences in yield due to grain moisture at harvest were not detected.

In preliminary analyses of the 2017 data, the presence of *Fusarium* in the harvested kernels, as determined by percent Fusarium Damaged Kernels (FDK), was less (7% FDK) for the early harvest (20-22% grain moisture) than the normal harvest (13-15% grain moisture) which had 11% FDK. Additionally, the percentage of normal looking seeds that were infected with *F. graminearum* were lower when grain was harvested at 20-22% grain moisture. However, DON concentrations were lower for the harvest that occurred at 13-15% grain moisture. Data from 2018 are still being measured.



Normal looking wheat kernels germinating in a petri dish containing selective growth media for *Fusarium graminearum.* The kernels with bright pink mycelia, fungal growth, are infected with *F. graminearum.* (Photo: Katherine Rod)

For the in-furrow phosphorus applications, the preliminary data from 2017 indicate that neither FDK nor DON concentration of the grain differed between the in-furrow phosphorus treatments. However, the percent of normal looking kernels that were infected with *F. graminearum* was reduced by 1% when in-furrow phosphorus was present (42 lbs P_2O_5 per acre). Data for the 2018 season will be measured in the winter of 2018.

Ideally, additional agronomic practices to reduce vomitoxin levels in winter wheat will be identified with this research. One more year, the 2019 season, will be examined to help us determine the consistency of the results we have found thus far and to determine the profitability of any additional agronomic practices to reduce vomitoxin levels.

ACKNOWLEDGEMENTS

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