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In This Issue:

CONTROL OF FUSARIUM HEAD BLIGHT AND DEOXYNIVALENOL REQUIRES MORE THAN FUNGICIDE USE: INTEGRATED CONTROL OF FHB USING FUNGICIDES AND FHB-RESISTANT VARIETIES

Don Hershman and Bill Bruening

Fusarium head blight (FHB: Figure 1) and associated contamination of grain by deoxynivalenol (DON) are major concerns for Kentucky wheat producers. FHB reduces grain yield, test weight, and seed germination/vigor. Excessive DON reduces marketability and end use of harvested grain. Experience managing FHB and DON with fungicides in Kentucky (and elsewhere) is clear: Fungicides do a good job when disease conditions are light. However, when disease pressure is moderate to severe, unacceptable levels of FHB and DON often result, even if the best available fungicide targeting FHB/DON is applied.

Figure 1. Typical symptoms of wheat Fusarium head blight (a.k.a head scab).

Since 1998, the U.S, Wheat and Barley Scab Initiative (USWBSI) has supported Uniform Fungicide Trails (UFT's) across the U.S., covering all classes of wheat. These studies involve cooperating scientists testing a common set of fungicide treatments on FHB-susceptible wheat varieties, under significant FHB pressure. In 2008, Paul *et al*. summarized and published* the results of 10 years of UFT's. They concluded that the combination of prothioconazole plus tebuconazole (Prosaro®) was the most efficacious fungicide for suppressing FHB (52%-compared to the non-treated check), followed by metconazole (Caramba®; 50%), prothioconazole (Proline®; 48%), tebuconazole (Folicur® and generic products; 40%), and propiconazole (Tilt®; 32%). For DON, Caramba®,Proline®, and Prosaro® provided similar levels of DON suppression (42-45%), followed by Folicur® (23%), and Tilt® (12%).

The above levels of FHB and DON control (what scientists term "suppression") would not translate into acceptable results in, say, a situation where FHB incidence is 60% (i.e., six in 10 heads have FHB symptoms), average severity is 40% (i.e., heads with symptoms have an average 40% of their total surface area diseased), and DON in harvested grain is 8.0 parts per million (ppm) - all of which are reasonable levels when FHB is severe. Said another way, if the aforementioned FHB incidence, severity, and DON levels were reduced by about one-half (maximum expected when a fungicide is applied), one would still experience significant yield and quality reductions, and perhaps have grain rejected at the point of sale (due to excessive DON), even after applying the best fungicide available. This is simply unacceptable, but this scenario is a common in a big FHB year.

There has been tremendous progress in recent years in developing varieties that resist FHB and DON. However, just like fungicides, relying on resistant varieties to control FHB and DON, to the exclusion of fungicides, often gives poor results in a high disease environment.

Due to frequently unacceptable results when fungicides or resistant varieties are used as the sole weapon against FHB and DON, several years ago scientists began to study if FHB/DON suppression could be improved when a fungicide is applied to the best available FHB-resistant varieties. As a result, the USWBSI began to fund Uniform Trials on Integrated FHB Control. The results, thus far, have been very promising and suggest that up to 74% control of FHB and DON is possible when fungicides are applied to the best available FHB resistant varieties.

The decision to apply a fungicide for FHB/DON suppression is made in the spring, depending on the risk of FHB. FHB risk, in turn, can be monitored, on-line, by going to the Wheat FHB Prediction Center maintained by Penn State University (http://www.wheatscab.psu.edu/). However, the decision to mitigate the risk of serious FHB/DON by planting a resistant variety must be made before fall planting, many months before the resistance is actually needed.

The University of Kentucky Small Grain Variety Testing Program annually publishes disease ratings for all wheat varieties tested. Varieties are rated for the level of disease susceptibility or resistance based on visual observation of prevalent diseases at two non-fungicide test locations. For the past three years, FHB has been prevalent at one or both test locations and disease ratings have been made. The variety test results for this year are available on-line at: www.uky.edu/Ag/WheatVarietyTest . Printed bulletins are also available at county Extension offices. Archived data from past years is also available online at the above web address.

It is important to note that no variety is fully resistant to FHB, but in recent years, some new varieties have shown better resistance than in years past. For a number of years, only a couple of Missouri public varieties (Truman and Bess) consistently showed some level of FHB resistance under field conditions. But these varieties only have average yield potential and seed has not been readily available for Kentucky growers. This scenario is slightly better for varieties developed by private companies, but there, too, varieties only have moderate levels of FHB resistance. In recent years, breeders have been more focused on releasing varieties with FHB resistance. The utilization of new molecular marker technologies has accelerated the screening process for FHB-resistance genes and increased the potential for releasing varieties with FHB resistance. The 2010 wheat variety test results, for example, had several new varieties from seed companies with FHB-resistance levels comparable to or better than Bess. The 2011 test results indicate that this trend is continuing with more high yielding varieties showing decent FHB-resistance.

Growers can minimize risks by planting several varieties with good yield and test weight potential that complement one another for disease resistance and maturity. Selecting varieties differing in maturity is important to insure that the varieties are actually different and not the same line licensed under different brand names, as well as to compliment planting dates and spread out harvest dates. But maturity is also important when considering disease, and FHB is no exception. In years when FHB is a problem, early flowering varieties may be hit hard, while later flowering types often face less pressure, or vice versa.

As previously mentioned these varieties are not truly FHB-resistant and under heavy disease pressure will still be affected by FHB. But when utilized with the right fungicide at the proper time, FHB damage can be greatly reduced under heavy disease pressure and almost entirely eliminated under low to moderate pressure. Disease reaction, like other varietal characteristics (test weight, height, maturity, & obviously yield potential) is important component of the variety selection decision. Though multiple characteristics need to be considered, variety selection is widely recognized as the simplest and most cost effective way to maximize production profitability.

*Paul, P. A., Lipps, P. E., Hershman, D. E., McMullen, M. P., Draper, M. A., and Madden, L. V. 2008. Efficacy of triazole-based fungicides for Fusarium head blight and deoxynivalenol control in wheat: a multivariate meta-analysis. Phytopathology 98:999-1011.

WHEAT YIELD RESPONSE TO WIDE ROWS

Chad Lee and Jim Herbek

Many farmers in Kentucky and surrounding areas are interested in planting wheat in 15-inch rows. In general, a planter does a better job of seed placement than a drill. Many producers who grow wheat occasionally no longer own drills. If wheat could be successful in 15-inch rows, then these producers could avoid the additional cost of a drill. For three seasons, the Kentucky Small Grain Growers have sponsored a research project on wheat in 15-inch rows.

Jim Herbek and Chad Lee, extension agronomists, for the University of Kentucky, planted wheat in Princeton and near Lexington, Kentucky in 2008, 2009 and 2010. In all cases, the studies were no-tillage and followed corn. In the first two seasons, three wheat varieties were tested. AgriPro Coker Branson, Beck's 122 and Pembroke were seeded the first two seasons. There were no interactions between variety and row width for the first two seasons, so only Pembroke was seeded for 2010-2011. All varieties tested were considered to tiller well, so the lack of differences between varieties may be attributed to the tillering capabilities of all three varieties.

In each season of the study, there were no interactions between study location and treatments, so yields were averaged over locations. In the 2008-2009 season, wheat in 7.5-inch rows yielded about 7.7 bushels per acre (or 8.5%) greater than wheat in 15-inch rows. In the 2009-2010 season, wheat yields were not significantly different in any row width or at lower seeding rates in 15-inch rows. In the 2010-2011 season, wheat yields in 3.75-inch rows and 7.5-inch rows were 9.0 and 8.4 bushels per acre, respectively, greater than wheat yields in 15-inch rows.

Wheat in 15-inch rows provided excellent yields in this study with seasonal averages at 78 or more bushels per acre. However, in two of the three years, the wheat yields in 15-inch rows were about 8.5 to 10% less than wheat yields in 7.5-inch rows. Wheat in 3.75-inch rows yielded similarly to wheat in 7.5-inch rows.

For wheat in 15-inch rows, reducing the seeding rate did not reduce yields. Wheat in 15-inch rows seeded at 25 seeds per square foot yielded similarly to wheat seeded at 35 seeds per square foot. This is a 28% reduction in seeding rate with no significant yield losses.

In the 2010-2011 season, the researchers also examined the impact of corn residue on wheat yields. In some treatments, the loose residue was removed from the test plots before planting, while in most treatments, the residue remained on the soil. There was no difference in yield with and without the corn residue.

Producers with 15-inch rows most likely would be pleased with yields above 70 bushels per acre. Producers who want to use 15-inch rows should consider reducing seeding rates to save a little more on seeding costs. However, the reduction in seeding rates from 35 to 25 seeds per square foot only saves about $10/acre. The yield losses of 8.5 to 10% cost about $40/acre under current pricing. So, as long as the commodity price of wheat remains high, producers will make more money most years by planting wheat in 7.5-inch rows. If wheat commodity prices drop, there may be a time when planting wheat in 15-inch rows is as profitable as wheat in 7.5-inch rows.