

Fusarium Head Blight in 2010: An Overview

By Don Lilleboe*

The incidence and severity of Fusarium Head Blight (FHB) during the 2010 U.S. small grains production season was — when summarized across the major wheat and barley growing areas — fairly low.

Yet ‘hot spots’ did develop in various states, according to a recent U.S. Wheat & Barley Scab Initiative (USWBSI) survey of university small grains specialists.

Here’s an overview, by region.

Mid-Atlantic Soft Winter Wheat Region

Greg Roth, Pennsylvania State University agronomist, reports that scab was a “spotty problem” in 2010, with a few hot spots — but generally much less than in 2009. Numerous growers applied fungicides to their wheat fields (Prosaro or Caramba). Those applications “seemed to reduce late-season Stagonospora Glume blotch and suppress FHB symptoms by 30-50%,” Roth observes.

A very dry growing season in Delaware meant no scab in that state’s wheat fields, according to Robert Mulrooney, extension plant pathologist with the University of Delaware. “Hardly any fungicide was used for anything [in 2010] since we had such poor stands from late planting last fall,” he adds.

Next door, Maryland wheat growers largely dodged the scab bullet this year as well. “There were low-level infections in some parts of the state, depending on maturity and environment,” reports University of Maryland field crops plant pathologist Arv Grybauskas. Grybauskas says he did hear about a few truckloads of wheat with deoxynivalenol (DON) levels of up to 2.0 parts per million (ppm), but expects they were “most likely due to a late-season infection in a susceptible variety.”

Grybauskas says seed suppliers in Maryland are actively selecting for wheat varieties with higher levels of resistance to scab, so “the supply of really susceptible varieties is being reduced.” But the low infection levels of 2010 “were primarily due to environment.”

Some Maryland producers used fungicides (mainly Prosaro) prophylactically without regard to FHB forecasts, Grybauskas notes. Others appeared to base their applications (or lack thereof) on forecast models. Most Maryland wheat fields did not need a fungicide treatment for scab this year.

Christina Cowger, USDA-ARS plant pathologist at North Carolina State University, says scab was not a significant problem in that state's wheat or barley fields this year. "The state was gripped by drought in April, which is the critical time period for scab infection," she points out. "We were surprised to see a trace of scab 'here and there' in the south central part of the state, demonstrating that plenty of inoculum is available, should a stray thunderstorm strike a farm or two.

"But we heard no reports of DON troubles or yield or test weight effects of scab in North Carolina" in 2010.

Midwest/Northern Soft Winter Wheat Region

The big story in the region occurred in Ohio, where scab incidence levels ranged from 3% all the way up to 60%, with vomitoxin (DON) levels from less than 1 ppm up to 18 ppm. A survey of 145 wheat fields in 32 Ohio counties revealed that 16% had scab incidence below 5%; 21% of the fields had incidence levels between 5 and 10%; 33% of fields were between 10 and 25%; and 30% of the surveyed fields incurred scab incidence levels above 25%.

Ohio State University plant pathologist Pierce Paul says it's not known how many Ohio wheat growers planted scab-resistant varieties this year or how many acres were sown to such varieties. "However, we do know that the farmers we have talked to who had scab and planted one resistant variety in particular (Malabar) reported seeing the benefit of planting varieties with resistance," Paul remarks.

Malabar is a new variety coming out of OSU's wheat breeding program (with support from the U.S. Wheat & Barley Scab Initiative). Its level of scab resistance is comparable to that of Truman, which has been the "resistant standard" for soft red winter wheat areas. Paul says that in the 2010 OSU Extension Wheat Performance Trial, 13 entries had FHB values that were equal to or less than Truman. That group included five of the top 15 yielding varieties in the trial.

While statistics are not available on the number of Ohio wheat fields that were sprayed with a fungicide this year for scab, Paul says “the farmers we have talked to who did apply a fungicide were very happy with the results.” Even in areas where scab levels were high, “some of the fields with the lowest levels of vomitoxin, highest yields and [highest] test weights were those that received a fungicide application at flowering,” Paul notes. “In some cases, growers even reported seeing differences in fungicide efficacy when Malabar was treated [as compared to] when a susceptible variety was treated.”

Given this year’s experiences, “I anticipate that more growers will be planting resistant varieties and applying a fungicide if scab threatens in 2011 and beyond,” Paul states.

Over in Indiana, Purdue University extension plant pathologist Kiersten Wise says wheat fields in the state’s southern district typically had light to moderate levels of scab infection this year, though some later-flowering varieties did incur higher levels. “Wheat in central and northern Indiana had moderate to high levels of scab present, due to favorable weather conditions and high humidity at and following flowering,” Wise adds.

The amount and type of fungicide used varied by producer and district. “My guess is that more fungicides were flown on in southern Indiana [than in the north], since scab is typically more of a problem there,” Wise remarks.

Wise says she’s aware of DON levels ranging from less than 1 ppm up to 11 ppm in northern Indiana, so some growers obviously incurred substantial dockage.

West of Indiana, scab was not as severe in southern Illinois (that state’s major wheat production district) as it was the prior year, according to Carl Bradley, University of Illinois extension plant pathologist. However, “the small acreage of wheat in central and northern Illinois did appear to be affected much more severely by scab in 2010,” he notes.

“Due to the severe scab epidemic that growers faced in Illinois in 2009, I’m positive that picking a variety with a high level of scab resistance was high on their priority list for the 2009/10 winter wheat growing season,” Bradley observes. “From our research in 2010, varieties with a high level of scab resistance did perform well.”

As elsewhere, small grains specialists in Illinois have been emphasizing to growers the importance of an integrated approach to scab management — including the use of fungicides as warranted. “In our field trials, Caramba and Prosaro appear to be the best products currently available for reducing both scab and DON,” Bradley reports. “Because of the high levels of scab in 2009, scab was certainly on growers’ minds for the 2010 season — and the

percentage of acres [treated] with a fungicide was likely higher in 2010.” Folicur and other tebuconazole fungicides also were applied this past season to some acreage.

University of Kentucky extension plant pathologist Don Hershman says that fungicide use in his state’s wheat districts was quite widespread in 2010, “primarily due to producers still stinging from the 2009 FHB epidemic.” Hershman estimates that about 30% of the state’s wheat acreage was treated with a fungicide this year. “In key production areas in southern Kentucky, that number is probably 70%,” he adds.

Fusarium Head Blight was not nearly as severe in Kentucky in 2010 as it was in 2009, Hershman notes, although FHB levels were significant in southern parts of the state. “Most farmers felt they got an acceptable level of control of FHB symptoms and DON” this year, he relates, with Stagonospora leaf blotch and leaf rust also managed by the fungicides.

All in all, the 2010 Kentucky wheat crop, while not a record breaker, was “far superior” to 2009, Hershman concludes.

Laura Sweets, extension plant pathologist with the University of Missouri, says estimating the amount of scab in that state was complicated by the significant reduction in wheat acreage this past season (due mainly to wet conditions last fall). “Then, because much of the wheat was planted late and conditions were still wet, stands were poor and uneven, and plants were quite small going into winter.” Harvested wheat acreage in Missouri was down more than half from 2009.

“Scab did occur in most areas of the state,” Sweets adds. “It was probably more severe in central and northern Missouri than in southern Missouri.”

University of Missouri wheat breeder Anne McKendry says that a wet spring contributed to significant scab in her breeding nurseries — particularly at Columbia and in the Bootheel (up to 30% in susceptible varieties). “Resistant varieties did well; and based on seed sales of certified seed, varieties such as Truman and Bess (both from the UM program) were widely grown,” McKendry observes.

Up in the Great Lakes vicinity, University of Wisconsin extension plant pathologist Paul Esker reports overall “fairly low” levels of scab in 2010. “We had scattered reports, but levels were not as bad as in previous years,” he says.

While he doesn’t have firm estimates of fungicide use for scab in Wisconsin, Esker says reports he’s received indicate Prosaro was the fungicide of choice where applications did occur. “We have seen good results with Proline and now Prosaro in our trials,” he says.

Next door, Michigan State University Sanilac County extension director Martin Nagelkirk says there were some initial concerns regarding late-developing Fusarium Head Blight and potential hot spots for DON. While some of it did indeed materialize, it was generally less than predicted. Statewide, Nagelkirk believes perhaps 2% of the Michigan wheat crop had DON levels above “the usual limit” (1 ppm for soft wheat and 2 ppm for soft red wheat). “What was interesting,” he adds, “is that nearly all elevators across the state reported receiving numerous loads having low DON levels — interrupted by an occasional and unpredicted load having a relatively high DON level.”

One hot spot of note was in southeastern Michigan (especially Lenawee County). “This red wheat area exhibited many fields having lots of heads exhibiting FHB,” Nagelkirk relates. “However, the number of loads having high DON was surprisingly low.” The second hot spot was in Isabella County (central Michigan). “Here, both red and white wheats tested very high for DON,” Nagelkirk reports, “with perhaps 10 to 20% subjected to discounts or rejection.” Several growers experienced losses from DON levels despite having used Caramba or Prosaro, he adds.

Fungicide treatments consisted almost entirely of Prosaro or Caramba. Nagelkirk estimates that about 60% of the state’s soft white winter wheat acreage and about 15% of the soft red winter wheat was treated at flowering, with the dual purpose of protecting against FHB and minimizing losses from foliar diseases.

In New York, “2010 was a banner year for growing and marketing soft winter wheat,” reports Cornell University plant pathologist Gary Bergstrom. “The crop was consistently ahead of typical development by two or more weeks, due to an unusually warm spring and early summer. Yield and grain quality were high.”

Winter wheat in the state flowered during a sustained dry period in late May, according to Bergstrom, “resulting in very few visible symptoms of scab and generally low levels of DON contamination in harvested grain.”

Very little spring wheat is produced in New York, and that may have been fortuitous in 2010, Bergstrom adds. Experimental fields of spring wheat, located in the vicinity of winter wheat fields that displayed no scab, showed high levels of FHB. Those spring wheat fields initiated flowering during a brief rainy period in mid-June.

“We were also reminded just how important adequate numbers of *Fusarium* spores are to FHB epidemics,” Bergstrom notes. “In our integrated management experiments in central

New York, inoculation of wheat heads with spore suspension at flowering — and with no supplemental irrigation — resulted in about one-quarter of those heads developing FHB symptoms, as compared to no visible FHB in non-inoculated border plots.”

Great Plains / Hard Winter Wheat

In Nebraska, scab developed at moderate levels in isolated fields, says University of Nebraska extension plant pathologist Stephen Wegulo. Affected fields mainly consisted of those with surface corn stubble, irrigation, highly susceptible varieties and/or those not treated with fungicides for this disease. Fields with significant levels of scab were observed in the southeastern, south central and southwestern districts of the state.

“Overall, scab damage was minimal statewide,” Wegulo reports. “There were no reports of discounts at elevators due to *Fusarium*-damaged kernels or DON.”

Scab was a problem in Kansas for a third straight year, reports Kansas State University extension plant pathologist Erick DeWolf. “The disease was most severe in northeastern Kansas, where [the] FHB index ranged from 2 to 10%,” he says. Several major wheat-producing counties were affected by scab in 2010. “Wheat acres were down in these counties relative to recent years,” DeWolf states, “and the overall impact of scab was 0.9% of the wheat production in Kansas — or, 3.3 million bushels valued at nearly \$13 million.”

Among commercial producers in Kansas, “the epidemics of stripe rust were the major target of fungicide use this year,” DeWolf explains. “Seed producers were more likely to target scab.” Folicur, Prosaro and Caramba were the predominant fungicides utilized.

On a positive note, Kansas wheat acreage planted to susceptible varieties has decreased dramatically in the past two years, DeWolf says. The KSU variety Everest is the newest release with substantial resistance to scab. Other varieties with moderate or intermediate resistance to FHB include Hitch (WestBred) and Art (AgriPro). Everest just went to certified seed producers in 2010, DeWolf adds, so its impact on disease this year was minor. Combined, Art and Hitch currently represent about 4.5% of Kansas wheat acres. The highly susceptible variety Overley dropped to less than 10% of Kansas wheat acreage this year.

While scab historically has not been a concern in Oklahoma, it was a problem during 2008 and moreso in 2009 due to extended cool, wet weather patterns while the wheat was

flowering. Weather this year reverted to a more-typical pattern, “and less scab was reported in Oklahoma in 2010 than was seen in 2008,” says Oklahoma State University extension wheat pathologist Bob Hunger.

Because scab typically is not an issue in Oklahoma, the reaction of the winter wheat varieties grown in the state is largely unknown, Hunger adds. While much of the state’s wheat crop received fungicide treatments this year, those applications targeted leaf rust, stripe rust and powdery mildew, not scab or other diseases.

Northern Great Plains Hard Spring Wheat / Hard Winter Wheat / Malting Barley

Scab was a severe problem for some parts of South Dakota in 2010 — particularly on popular yet more-susceptible winter wheat varieties such as Wesley and Smoky Hill. Some areas escaped major infection, however, according to Larry Osborne, South Dakota State University plant pathologist.

“Growers are using fungicides for scab much more frequently now than just three or four years ago,” Osborne reports. “Many growers have chosen to use tebuconazole because of the low cost; however, growers in scab-prone areas are using Caramba or Prosaro at flowering.”

The SDSU risk monitoring system received hundreds of visitors during the peak part of the season. “For those growers who have begun to manage scab in an integrated way (variety, forecasting, fungicide), FHB is much lower than for the unmanaged fields nearby,” Osborne reports. “We expect and think we achieve around 60-80% reduction in disease and DON versus untreated — and perhaps even 80-90% less disease and DON than under similar environments 10-15 years ago.”

New moderately resistant spring wheat varieties available to South Dakota growers include Brick (SD-08), and Select (SD-09). Several other recent releases from the region are in regular use, including Lyman, a moderately resistant HRWW from SDSU, and Art a moderately resistant HRWW line from AgriPro. Arapahoe and Darrell winter wheats also performed well against scab in 2010, Osborne reports.

“These and other improved varieties are beginning to overtake the wheat acres in areas prone to regular and severe FHB,” the SDSU pathologist observes. “I would estimate nearly

all of the spring wheat [presently] planted in South Dakota has some level of improved FHB resistance, and perhaps about 40-50% is planted to those varieties with FHB1 or other strong sources of resistance. That figure is increasing each year.”

Winter wheat acreage in South Dakota remains dominated by varieties (*e.g.*, Wesley) with poor resistance to FHB. Growers in the eastern half of the state have encountered FHB and DON more frequently, however, and thus have begun seeking more-resistant lines (*e.g.*, Overland and Lyman) with comparable agronomic qualities to fill that need.

North Dakota enjoyed a relatively benign scab year in 2010, according to North Dakota State University extension plant pathologist Marcia McMullen. This year’s NDSU field survey program found pockets of scab infection (typically in more-susceptible, nonsprayed varieties), but overall scab severity across the state averaged less than 2%. “Some late-planted durum fields in the northwest corner of the state, if not sprayed with fungicide, had slightly higher levels with field severities from 3 to 5%,” McMullen reports.

How common were fungicide applications for scab in 2010? “Based on calls received, sprayer tracks observed after heading and rumors in the industry that some products were sold out, it is believed that a considerable number of wheat, barley and durum acres were treated for scab and/or leaf diseases,” McMullen remarks. Tebuconazole, Prosaro and Caramba were the products of choice, with the former being a considerably less expensive option.

Glenn, one of the most resistant varieties available, was grown on 25% of this year’s North Dakota hard red spring wheat acreage, followed by Faller on 15% of the acres. Kelby and RB07 were grown on another 11% of the acres — for a total of 51% of the state’s spring wheat acres being planted to varieties that North Dakota State University rates as “moderately resistant” to “moderate”, and the University of Minnesota rates as a 3 or 4 (“best available” resistance).

North Dakota spring wheat producers also planted another 16.5% of their acres to varieties that Minnesota or North Dakota rate as “intermediate” in scab response. So 67.5% of the 6.7 million acres of hard red spring wheat planted in the state in 2010 were to improved scab-tolerant varieties.

In the durum arena, 26.6% of North Dakota’s 1.8 million durum acres this year were planted to Divide, the durum variety with the best scab resistance available.

All barley varieties currently grown in North Dakota are considered susceptible to scab. However, scab levels were relatively low in barley this year, and as of September 1, no reports of barley DON discounts had been received by McMullen.

“Overall, it appears that even though the risk of scab was often indicated by the FHB forecasting risk map tool, growers had grown more-resistant varieties and used fungicides, which minimized their risk,” McMullen says in summarizing the 2010 season. “Also, periods of risk were often followed by days of very high winds, which may have arrested the development of the fungus.” In some NDSU research plots, initial infections did not spread much because of “gale-force” winds following infection events.

The scab outlook in Minnesota looked quite threatening early in the 2010 season. “Risk models and weather forecasts were pointing to moderate to high risk for damages due to FHB during the week that much of the spring wheat crop reached Feekes 10.51 [growth stage],” notes Jochum Wiersma, small grains specialist with the University of Minnesota’s Northwest Research & Outreach Center. Ultimately, however, overall scab damage in Minnesota spring wheat was light and only slightly higher than in 2008 or 2009.

Minnesota’s winter wheat crop was not as fortunate. “Winter wheat, which relies on ‘escape’ rather than ‘resistance’ to FHB, showed significant levels of FHB — despite very early heading dates,” Wiersma states. “Field severities approaching 20% were not uncommon if no fungicides were used to suppress FHB.”

The state’s small grain producers employed fungicides more extensively this year than in 2009, Wiersma relates. The higher the scab risk indicated by forecast models, the more likely growers were to go with Prosaro or Caramba, he adds.

Wiersma says varieties rated as moderately resistant to Fusarium Head Blight accounted for about 40% of Minnesota’s wheat acreage this year. Varieties rated as susceptible to very susceptible constituted less than 15% of acreage.

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