

FHB in 2013: From Benign to Serious

By Don Lilleboe*

USWBSI Survey of University Specialists Reveals Wide Range of Scab Incidence and Severity

The importance of weather in the development, or lack thereof, of Fusarium Head Blight (FHB, also known as “scab”) was again evident during the 2013 small grains production season. After a generally benign scab year in 2012, reports provided to the U.S. Wheat & Barley Scab Initiative by small grains specialists in a number of states reveal a broad range of scab incidence and severity — from “nonexistent” to “serious.” The same applies to the degree of deoxynivalenol (DON), the vomitoxin associated with Fusarium Head Blight.

Farmers in several states increasingly appear to be utilizing an integrated approach to scab management, planting scab-tolerant or –resistant varieties, spraying appropriate fungicides on a timely basis and reducing rotations conducive to scab development. However, in some states, the employment of scab-resistant varieties appears to be lagging.

Here’s an overview of the 2013 scab scenario, by region.

Mid-Atlantic Soft Winter Wheat Region

“Scab was a spotty problem in our state in 2013, says **Pennsylvania** State University agronomist Greg Roth, “with most fields having low amounts of visual symptoms early in grain fill.” Vomitoxin seemed to be more prevalent than expected, however — perhaps due to infection associated with the heavy rain that fell during the grain fill period. “Millers reported that about 20-30% of our wheat had a vomitoxin issue,” Roth observes.

The PSU agronomist says several wheat varieties stood out in 2013 as having higher vomitoxin. Though the state’s wheat growers generally have been slow to adopt scab-resistant varieties, he expects the 2013 experience to result in more attention to scab resistant in varietal selection for 2014.

While producers and agribusiness personnel concur that a properly timed fungicide treatment can reduce toxin levels by upwards of 50%, “timing of fungicide applications remains a struggle in areas with less-intensive wheat production” Roth explains, “as many fields are scattered and vary in heading dates.” In some areas with intensive wheat production, however, nearly all fields are sprayed with Prosaro® or Caramba® — and many also receive an application of Tilt or a related product at the tillering or early jointing stage.

“Growers also are paying more attention to cultural practices [such as] avoiding no-tilling into corn stubble,” Roth indicates. He says Pennsylvania wheat growers in general are doing an increasingly better job of using an integrated approach (fungicides, cultural practices and variety selection) to manage scab in the state’s wheat fields. “But we do need more information on variety ratings.”

University of **Delaware** extension plant pathologist Nathan Kleczewski reports moderate to severe FHB through his state in 2013. “Disease index ranged from 4 to 80% in the fields I personally observed,” he says. “To add insult to injury, prolonged rains [delayed] harvest by over three weeks, resulting in low statewide test weights. Consequently, growers were being docked for test weights, and elevators often did not test for DON levels.”

Some Delaware wheat growers planted moderately resistant varieties this season, and Kleczewski’s assessment of scab in those fields correspondingly reflected a lower FHB index compared to fields with susceptible varieties. Yield being the primary consideration in growers’ varietal selection, however, “if resistant varieties in our variety trials do not yield well, they are unlikely to be planted by our growers.”

Fungicides (mainly Prosaro and Caramba) were commonly applied in Delaware wheat fields this season. “In fields where I was confident that the growers applied fungicides properly (i.e., at Feekes 10.51 — the beginning of flowering), there was a clear reduction in scab levels,” Kleczewski reports. “Many Delaware wheat growers utilize one of two crop dusting services for late-season fungicide applications. This places further strain on our ability to make well-timed sprays around Feekes 10.51.”

Widespread and protracted rainfall from heading through harvest was a major factor in the presence and severity of FHB in **Virginia** in 2013, says Wade Thomason, Virginia Tech grains specialist. “Growers reported 5 to 50% incidence of scab in fields, depending

on cultivar resistance and fungicide application,” Thomason relates. “This level of disease, along with low test weights, drastically limited our markets for the 2013 wheat crop.”

“At Warsaw, Va., scab reached an epidemic level in wheat tests around May 23, and the tests were visually rated for severity,” adds Virginia Tech wheat breeder Carl Griffey. “One week later, scab severity increased dramatically, and the plots were rated for percentage of white heads. Entries in the state wheat test varied from 0 to 23% white heads, with an overall entry mean of 8% white heads.” Grain samples from the Warsaw state wheat test — grown with and without treatment with Prosaro fungicide — will be analyzed this winter for DON contamination, Griffey says, to ascertain the impact of the epidemic.

“Scab epidemics also were very severe in wheat tests conducted at Blacksburg,” Griffey notes. “This, combined with leaf and stripe rust epidemics and a harvest delayed for one week due to rain, resulted in scabby, very low test weight grain ranging from 49.6 to 56.1 lbs/bu, with an overall test average of 52.9 lbs.”

“In **North Carolina**, this was a year of widespread but localized scab damage that was mainly confined to the northwest and northeast of state,” reports Christina Cowger. “A rainy week in early May caused problems where they occurred,” says Cowger, plant pathologist with the USDA Agricultural Research Service at North Carolina State University. The issue was most serious in the central and northern Piedmont and northern Tidewater districts of the state. “A lot depended on whether there was substantial corn residue and whether susceptible varieties were being used,” Cowger relates. “Some growers in danger zones applied scab-targeted fungicides; some did not.”

Southern Soft Winter Wheat Region

University of **Georgia** plant pathologist Alfredo Martinez says Fusarium Head Blight was confirmed in a wheat field in extreme southern Georgia in 2013 — this following several years during which no scab incidence had been reported in the state. “Unusually wet spring weather coinciding with wheat at flowering stage may have elevated the risk of FHB infections” this year, Martinez states. As of late June, the period when the wheat

season was winding down, he had received no reports of scab in central or northern Georgia.

Austin Hagan, extension plant pathologist with Auburn University, says **Alabama's** 2013 wheat fields showed no evidence of scab. "Most growers in the main wheat production areas treated with Prosaro or Caramba" fungicide, he adds.

To the west, University of **Arkansas** plant pathologist Eugene Milus says that as of mid-June, there was "scattered scab in fields across Arkansas, just as the wheat was turning." Notable differences were observed in terms of scab incidence and severity across the spectrum of planted wheat varieties. Late June revealed some scab, "but fortunately it came late enough that it has not caused any adverse issues," Milus says.

Midwest/Northern Soft Winter Wheat Region

"The level of scab and corresponding DON contamination of grain was very low in **Ohio** in 2013," reports Ohio State University plant pathologist Pierce Paul. "This was very consistent with predictions made by the forecasting system. Throughout the season, we had fairly consistent rainfall (including at harvest time, which delayed the harvest considerably). However, with the exception of a few weeks in June when the crop was already beyond anthesis, conditions were cool throughout the spring and early summer, which likely reduced the risk of scab."

Reports from OSU extension personnel and Ohio wheat producers underscored that with the exception of a few fields with five to 10 heads out of 100 showing evidence of scab, the disease's presence was very low across the state's wheat-producing areas. Some wheat loads were tested for DON at elevators, due to concerns of late infection as a result of the post-anthesis rainfall and delayed harvest. Again, however, with the exception of a few samples testing between 3.0 to 5.0 ppm, levels of the DON mycotoxin were consistently below 2.0 ppm.

To the south, University of **Kentucky** extension plant pathologist Don Hershman says Fusarium Head Blight and DON were generally not severe in 2013. "Certain fields in west Kentucky were significantly impacted; but the window for infection was very narrow, and the disease was problematic only in very early flowering fields," Hershman reports. There was somewhat more FHB and DON in the eastern part of the state, he adds, but the

lower wheat acreage and highly variable occurrence of the disease in that region limited any overall impact.

Heather Kelly, extension/research plant pathologist with the University of **Tennessee's** West Tennessee Research & Education Center in Jackson, also reports low scab levels overall this growing season. "Tennessee had plenty of moisture from rain during wheat flowering, but it was a very cool spring, and temperature seemed to be the limiting factor for scab this year," Kelly notes.

The highest reported percentage of infected heads in a Tennessee commercial wheat field was 10%, and "even in some research plots that were inoculated by an industry collaborator, I did not see more than 12-13% of heads infected," Kelly relates. She says country agents reported more fungicide application by plane than ever before — "which might account for the little to no reports of scab in Tennessee" in 2013.

Scab incidence in **Illinois** ranged from "light to severe" this season, according to University of Illinois extension plant pathologist Carl Bradley. "Fortunately, where we grow the majority of our wheat — in southern Illinois — scab was present but tended to be light to moderate in severity," Bradley says. Scab was quite severe in central Illinois and moderate to severe in the northern part of the state, but again, wheat acreage is lower in those areas compared to southern Illinois.

Next door, "**Indiana** experienced moderate levels of FHB and DON in 2013," reports Purdue University extension specialist Kiersten Wise. "Frequent rainfall, mild temperatures and humidity prior to and during anthesis created conditions favorable for FHB across the state," Wise says. "Many fields received a fungicide application at early flowering, but FHB was still moderate to severe in susceptible varieties and fields where no fungicide was applied." DON levels varied across Indiana, but Wise knows of only a few instances where dockage and/or rejection of grain occurred.

Scab was a light problem in **Wisconsin** this season, reports University of Wisconsin plant pathologist Damon Smith. While scab incidence on a statewide basis was probably below 5%, where it was present, severity reached as high as 50%. But Smith knows of only a small number of incidences where wheat loads were rejected for higher-than-allowable concentrations of DON.

While some scab-resistant varieties doubtlessly were planted in Wisconsin this year, that was not a significant consideration for most of the state's wheat producers, Smith

states. Fungicide applications are viewed as the major vehicle for scab control. “Some progressive growers and consultants access the U.S. scab forecasting system and make scab-spray decisions based on the system — or on recommendations of extension personnel who are using the system,” he adds.

Michigan soft winter wheat growers experienced significant losses due to head scab during 2013, reports state extension educator for wheat Martin Nagelkirk. This was particularly true for growers across the central portion of the state, where the majority of Michigan wheat is grown. “Though most DON levels ranged from 0.1 to 3.0 ppm, levels in excess of 5.0 ppm were not uncommon,” he adds.

Michigan wheat growers generally chose varieties based primarily on yield potential, and almost all of the high-yielding varieties in the state are either susceptible or moderately susceptible to scab, Nagelkirk indicates. So while some new varieties have shown a modest improvement in scab resistance, “varietal improvements have had only a modest impact on the state’s losses due to scab,” he says. That’s a particular concern for soft white wheat, which accounts for one-third of Michigan’s wheat production (compared to two-thirds for soft red).

Nearly all of Michigan’s soft white winter wheat and most of the soft red winter acreage receives a fungicide treatment (typically Prosaro or Caramba) at early flowering, “This appears to have reduced scab and DON levels by half for many growers,” Nagelkirk says.

Off to the east, Cornell University plant pathologist Gary Bergstrom says that **New York** winter wheat and barley flowered primarily in late May/early June — a rainy but unseasonably cool period during which the Fusarium Risk Assessment Tool indicated a low risk for FHB. “More precipitation and warmer temperatures were encountered in mid-June when the crop was past flowering but the risk for late infections was increased,” Bergstrom says. While scab symptoms were slow to appear, they did become obvious in many fields at low to moderate incidence at kernel dough stages in late June, he adds. Higher incidences were observed in wheat fields planted into corn stubble.

Yield reductions due to FHB were generally not severe, Bergstrom says — perhaps due to the lateness of infections. “There was a mosaic of DON contamination levels in wheat grain,” he relates — with DON concentrations between 0.5 and 1.5 ppm being common. “Relatively few loads trucked to elevators and flour mills had high DON levels

(>4.0 ppm),” the Cornell plant pathologist reports, but a significant number of loads with DON above 2.0 ppm were rejected.

“The value of moderately resistant varieties in reducing toxin levels below 2.0 ppm was demonstrated in 2013,” Bergstrom affirms.

Great Plains / Hard Winter Wheat Region

Scab was not a big problem in the High Plains wheat region this year. In **Oklahoma**, in fact, it was strictly a non-issue. “Our diagnostic lab received no wheat samples that had FHB, and I did not receive any phone calls or inquiries about FHB,” says Bob Hunger, Oklahoma State University extension wheat pathologist.

The situation in **Kansas** was quite benign as well, according to Erick De Wolf, extension plant pathologist with Kansas State University. “Drought was the predominant issue in western Kansas this year, and the dry conditions eliminated the risk of FHB” in that region of the state, he says. In eastern Kansas, “the disease could be found at low levels (generally less than 2% incidence),” while in the central part of Kansas it was present only a trace levels. “To date, there have been no reports of grain contaminated with DON in Kansas in 2013,” De Wolf indicated in late July.

While rainfall prior to and during flowering favored the development of scab in south central and southeastern **Nebraska** this year, actual occurrence was sporadic — “mainly due to the timing of rainfall and flowering in individual wheat fields,” reports University of Nebraska extension plant pathologist Stephen Wegulo. “Prevalence was generally low, and incidence and severity ranged from ‘trace’ to ‘moderate’ in affected fields,” he adds. The overall economic impact of scab in Nebraska was minimal in 2013, Wegulo concludes.

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

Scab presence was widespread in **South Dakota’s** 2013 winter wheat crop, says South Dakota State University extension plant pathologist Emmanuel Byamukama.

However, the degree of severity was low. “Scab on spring wheat and barley was at very low incidence,” Byamukama relates. Most wheat tested for DON had levels below 0.5 ppm.

“Scab-resistant/tolerant varieties are becoming increasingly popular in South Dakota, especially for spring wheat,” notes the SDSU plant pathologist. “Fungicides (triazoles) are routinely used by growers for scab management in South Dakota.”

In **North Dakota**, “warm and dry weather at flowering resulted in low incidence of scab this year,” reports North Dakota State University cereal extension pathologist Andrew Friskop. However, he adds, “risk maps indicated that the northwest and north central portions of the state had higher risks of scab development during anthesis for hard red spring wheat and durum. Also, the southeast part of the state had pockets with higher incidence of scab.”

The three most widely planted wheat varieties in North Dakota this year — Barlow, Glenn and Sy Soren — are moderately resistant to FHB, Friskop notes, as is Divide, the top durum variety.

Friskop believes the number of fungicide applications across North Dakota for scab control in 2013 was probably on par with that of recent years. “Areas that were at high risk for FHB development most likely used a fungicide application at anthesis,” he says, “based on their past history with the disease and the effectiveness of fungicides when risk maps indicate high risk.”

To the east, scab was present in the **Minnesota** small grains production region this year. “But I would not class it as ‘severe,’ ” says Madeleine Smith, extension plant pathologist with the University of Minnesota’s Northwest Research & Outreach Center at Crookston. As in 2012, the fairly benign impact this season was due at least in part to drier conditions up to and through anthesis. However, there were pockets with higher humidity, and scab incidence corresponding increased there as well.

Numerous Minnesota small grain producers plant moderately resistant varieties. The two top wheat varieties grown in the state in 2013 were Prosper and Faller, which have scab ratings of 5 and 4, respectively (1-9 scale, with 1 being “most resistant”). Together, these two varieties accounted for about 35% of Minnesota wheat acreage this year. “Although we have a few varieties with a scab rating of 3, Rollag was the only one of these to be planted in a significant amount of acreage,” Smith says.

“Growers will grow these varieties in addition to application of fungicide at Feekes 10.51,” Smith notes. “As a combined approach, this is instrumental in reducing the incidence and severity of scab.” Prosaro and Caramba typically are the most widely used products. “However, this year with scab levels predicted as not being severe, many growers opted for generic Folicur products,” Smith observes.

** Don Lilleboe is an agricultural writer/editor based at Fargo, N.D.*