

Fusarium Head Blight in 2017: Generally Not a Significant Impact

By Don Lilleboe*

USWBSI Survey of Small Grains Specialists Again Indicates Weather Plays Key Role in Presence or Absence of This Disease

As is usually the case, in-season weather played a prominent role during 2017 in the development, or lack thereof, of Fusarium Head Blight (FHB, also known as “scab”). Reports provided to the U.S. Wheat & Barley Scab Initiative (USWBSI) by small grains specialists in a number of states indicate that FHB incidence and severity levels were generally quite low this year, commonly because weather patterns were not conducive to the disease’s establishment and spread.

The reports also underscore once again that an integrated approach to FHB management — planting scab-tolerant or -resistant cultivars, applying appropriate fungicides at the proper time, and avoiding crop rotations conducive to scab development — usually pays off for those farmers who employ that strategy.

Here’s an overview of the 2017 FHB situation, by region.

New England & New York

“Most of New England experienced excessive precipitation and cool temperatures throughout the entire growing season,” reports Heather Darby, University of **Vermont** extension agronomist. Mild temperatures aided winter grain survival, and Spring 2017 had above-normal precipitation and cool conditions, leading to less-than-optimum planting dates for spring grains. Many farmers reported grain being planted well into the latter part of May.

“Wet weather persisted through flowering and into harvest,” Darby adds. “There wasn’t a break all season. Some areas reported over 30 inches of precipitation from May to August!” Numerous New England locales reported accumulated GDDs to be 300 to 400 below normal. “This cool weather may have actually helped to keep *Fusarium graminearum* levels from completely exploding,” Darby notes. “The levels of DON in our testing lab have not been as bad as we would have thought, considering the constant wet weather. Of 400 samples evaluated at the University of Vermont’s commercial grain quality testing lab, roughly only 50% of samples received had DON levels exceeding 1.0 ppm.” Most of the winter wheat samples were between 1.0 and 2.0 ppm. Spring grains, however, tended to have higher DON levels — with that development perhaps related to elevated temperatures and moisture during flowering, Darby suggests.

Though he would have bet against it as of May and June, “Fusarium Head Blight and deoxynivalenol contamination turned out to be only minor problems in soft winter wheat and winter malting barley in **New York** State in 2017,” says Cornell University plant pathologist Gary Bergstrom. “The operator of New York’s largest wheat flour mill commented that most truckloads of wheat tested at or below 0.3 ppm of DON and that only about 1% tested above 1.0 ppm of DON,” Bergstrom relates. “We conducted grain quality surveys of commercial fields of winter malting barley in 2017, and nearly all showed barley grain with less than 1.0 ppm of DON — and most were of sufficient high quality for purchase by regional malt houses.”

Large areas of New York experienced record rainfalls from May through July that would ordinarily favor FHB, Bergstrom says. However, cooler temperatures prevailed, and that factor may have reduced inoculum production according to the FHB risk models. Precipitation also occurred in heavy downpours that may have tended to wash out spores from the atmosphere and off of cereal spikes. “It is also worth noting that some of the predominant varieties planted by New York growers were moderately resistant to FHB,” Bergstrom adds. “Heading- and flowering-timed

sprays with Prosaro or Caramba are also standard practice now for most New York cereal producers.”

Fusarium Head Blight was not so benign for a number of New York’s spring malting barley growers, however. “Though some spring barley grain showed low levels of DON, many others showed extensive FHB incidence and DON levels well above 1.0 ppm,” Bergstrom reports. Warmer temperatures were experienced during flowering and early grain filling for spring barley.

“My observation over a few seasons now is that we see less reduction in DON accumulation following an application of triazole fungicide at full head emergence of barley than we generally observe with the same triazoles applied at anther emergence in wheat,” Bergstrom states. “This underscores the need for the USWBSI to continue to evaluate infection processes in barley and the best fungicide materials and application timings for barley.”

Mid-Atlantic Soft Winter Wheat Region

Alyssa Collins, Penn State plant pathologist and director of the PSU Southeast Agricultural Research & Extension Center at Manheim, says the greater wheat growing regions of **Pennsylvania** experienced unusually cool and relatively dry conditions during the majority of the 2017 flowering period. The weather began to warm and rains became more frequent at the end of May, putting those growers with late-flowering wheat at higher risk for infection. “Overall, wheat yields and quality were much improved over recent years due to good management, cooperative weather and timely harvests,” Collins says. “Where detectable, levels of DON were relatively low.”

Despite rainy weather preceding and during wheat flowering, scab was “largely not an issue” in **Delaware** during the 2017 season, says Nathan Kleczewski, University of Delaware extension plant pathologist. “We ran into some colder temperatures around flowering, followed by significant swings between hot and cold days immediately after flowering,” he notes. “I suspect the low temperatures

and temperature fluctuations were the main reason FHB was not widely observed here this season.”

FHB incidence and DON presence in the 2017 **Maryland** wheat crop were low, reports Nidhi Rawat, crop pathologist with the University of Maryland. “This is surprising, considering we had a rainy spring season this year, with frequent heavy showers during wheat flowering, leading to the scab risk forecast being high at that time,” Rawat says. “Major factors contributing to the low scab and DON, in spite of the wet season, were the extreme temperature fluctuations after flowering.”

Hillary Mehl, plant pathologist at **Virginia** Tech’s Tidewater Agricultural Research & Extension Center, says scab and DON were low, overall, in Virginia in 2017, with a few sporadic instances of disease and mycotoxin contamination. “Disease pressure was highest on the Eastern Shore of Virginia, but scab risk remained low in other regions of the state for most of the growing season,” Mehl states. “Dry weather prior to flowering likely reduced the amount of inoculum in fields during the susceptible flowering stages of the crop. Dry weather also delayed the need for fungicide applications for foliar diseases, so in many fields a flowering application of a triazole fungicide was made to control both foliar and head diseases.”

Though integrated management of scab using a combination of moderately resistant varieties and well-timed fungicides is recommended in Virginia, susceptible, high-yielding varieties such as Shirley remain popular, Mehl relates. “Fields planted to susceptible varieties are where scab and DON contamination most frequently occurred.” The majority of Virginia’s 2017 wheat crop had DON levels below 1.0 ppm.

Southern/Southern Atlantic Soft Winter Wheat Region

Dry weather during flowering allowed most **North Carolina** wheat fields to escape attack by scab in 2017, says Christina Cowger, plant pathologist with the USDA Agricultural Research Service at North Carolina State University. “In

northeastern North Carolina, which frequently has wetter springs than the rest of the state, there was some elevated risk toward the end of the wheat flowering period,” Cowger notes. “However, even there, DON levels generally were not problematic this year.”

Fusarium Head Blight incidences were low across **Georgia** this year as well. “After several years of FHB being observed at high levels on wheat fields, the dry spring prevented widespread infections,” says Alfredo Martinez-Espinoza, University of Georgia extension plant pathologist. An untimely frost in early April caused widespread damage across the state, affecting early headed varieties and possibly preventing early FHB infections. However, the scab reprieve should be viewed as temporary, Martinez-Espinoza suggests, “as high corn acreage is going to ensure that a ready supply of inoculum is available when climatic conditions are more favorable for FHB development.”

The 2017 scab experience was also benign further west, in **Mississippi**, where Tom Allen characterizes it as “extremely limited.” Allen, plant pathologist with Mississippi State University (Delta R&E Center), says FHB was observed at four locations in MSU’s variety trial system; however, only one of those sites, near Learned, had any measurable FHB — “likely as a result of an extended period of conducive environmental conditions.” Wheat acreage in Mississippi was very low this year, Allen adds, due to market prices and poor conditions at planting time.

Wheat acreage was also down sharply in **Louisiana** in 2017, to its lowest point in 38 years, says Trey Price, field crop pathologist with LSU AgCenter’s Macon Ridge Research Station near Winnsboro. As in Mississippi, low prices and poor planting conditions were the primary reasons behind what was a 60% acreage decline from 2016.

“Rainfall during flowering resulted in moderate to severe scab epidemics across the wheat-producing regions of the state,” Price reports. “The average yield losses in the state over the past three seasons ranged from 10 to 25%.” Absent improvement in weather patterns and commodity prices, Louisiana wheat acreage “will likely remain low for the foreseeable future,” he affirms.

Wheat acreage in **Arkansas** also declined again this year, with scab being “fairly scarce,” says Terry Spurlock, extension plant pathologist with the University of Arkansas. Some fields were impacted in the southern portion of the state – most notably Little River County (southwest) and Ashley County (southeast). “Overall, the scab model wasn’t favorable for scab development until approximately April 4, and this continued through the third week of April,” Spurlock states. “Wheat flowering during this time did develop some scab, but it wasn’t a significant problem.” He is not aware of any rejected loads or significant dockage in the state’s 2017 wheat crop.

University of Arkansas wheat breeder Esten Mason concurs with Spurlock’s assessment, adding, “I followed the scab forecasting tool fairly closely, and it was very predictive of the situation in Arkansas this year — including the infection seen in the southwest part of the state.”

Midwest/Northern Soft Winter Wheat Region

About 400,000 acres of winter wheat were planted in **Tennessee** this year, with 335,000 acres harvested. The crop averaged 73 bu/ac, up from 68 bu/ac in 2016. “The usual diseases were observed, including Septoria and glume blotch along with some stripe and leaf rust; but none were very impactful,” reports Heather Kelly, extension/research plant pathologist with the University of Tennessee. Fusarium Head Blight was present in some fields, Kelly says, but had very little to no impact on yield, despite the increased risk in May. “Most wheat fields were in bloom in April instead of the May due to warmer spring temperatures. Isolated showers may have increased FHB in some fields as well as later-planted wheat blooming in May,” she observes.

To the north, **Kentucky** experienced very few problems with scab and DON during the 2017 growing season, according to Carl Bradley, University of Kentucky plant pathologist. “I think some cooler weather and wheat flowering timing allowed much of the wheat to escape infection,” he remarks.

Likewise, there was no appreciable FHB in **Missouri** in 2017, says University of Missouri wheat breeder Anne McKendry. “We had cool temperatures and very little rainfall during the heading window. Very susceptible lines showed less [than] 5% FHB in the field, but this was a reasonably rare occurrence,” she reports. McKendry is not aware of any high DON levels around the state, adding that in her own research nurseries, levels generally were under 1.0 to 2.0%, even under inoculated conditions.

“We did have issues with stripe rust in the southeast (Bootheel) region and a freeze that differentially impacted varieties in the test; and we had severe barley yellow dwarf virus in central Missouri,” McKendry observes. “But otherwise, yields were good in the state, and no appreciable disease levels due to fairly dry conditions throughout the growing season.”

University of **Illinois** wheat breeder Fred Kolb says scab problems were minimal in his state’s commercial wheat production in 2017. “Although there were quite a few rain events near flowering and just after flowering, low temperatures — and especially night temperatures in the 40s in many areas — kept scab incidence low,” he states.

Wheat quality in Illinois was excellent this year, Kolb relates, adding that “more acres planted to moderately resistant varieties and a higher percentage of acres sprayed with effective fungicides may have helped to reduce damage due to scab.”

Scab was essentially a non-event in **Indiana** in 2017 as well, according to Kiersten Wise, former Purdue University extension specialist (now with the University of Kentucky). “Overall, levels of FHB and DON were low across the state,” Wise advises. “There were a few isolated pockets I heard of, but it was mostly quiet this year.”

In **Ohio**, the FHB forecasting system predicted low and, very occasionally, moderate-high risk of scab in 2017. “Although it rained for two to four days during the flowering window at a few locations, conditions were generally cool and dry across the state during this critical growth stage, likely reducing infection and

disease development,” says Pierce Paul, Wooster-based plant pathologist with The Ohio State University. Subsequent surveys of fields and assessments of grain quality at the time of harvest confirmed the low predicted risk of FHB and DON. “There were no reports of major DON contamination or other grain quality concerns,” Paul reports. In fact, both yield and test weight were well above state average, exceeding 100 bu/ac and 58 lbs/bu, respectively, in several fields.”

Localized outbreaks of *Septoria tritici* blotch early in the season and stripe and leaf rusts after flowering prompted the application of fungicides, Prosaro and Caramba included; but even fields with low scab risk and foliar disease levels were treated, Paul notes.

The major disease of **Wisconsin** winter wheat in 2017 was stripe rust, says Damon Smith, University of Wisconsin field crops pathologist. As for scab, “for the second year in a row, low levels of FHB were identified throughout all locations scouted in the state,” Smith relates. “DON levels were expected to be low in finished grain, statewide. This is likely due to the fact that the weather was very hot and mostly dry during the anthesis period throughout much of the state.”

Septoria leaf blotch was present at low levels in some fields throughout Wisconsin, though not yield-limiting in 2017. Also, powdery mildew was nearly non-existent in the state for the fifth straight season, Smith says.

In **Michigan**, weather conditions resulted in very low DON levels for the second year in a row, reports Martin Nagelkirk, state extension educator for wheat with Michigan State University. “These conditions, coupled with fungicide use, made it difficult to find any heads exhibiting FHB symptoms in the vast majority of fields,” he states, noting that a limited field survey revealed usually less than one scabby head in 100 feet of row.

“Testing of harvested grain eventually confirmed the disease’s minimal impact, with DON levels well below discount schedules,” Nagelkirk adds. “In fact, most receivers discontinued testing for DON early on during the harvest period. However, there were grain quality issues in a minority of the state’s grain as testing

revealed some low falling number scores (particularly in some soft white winter varieties) and low test weights.”

Most of the Michigan wheat acreage received a fungicide at flowering despite an encouraging scab forecast, particularly for soft white wheat varieties, as they are generally more susceptible to FHB, Nagelkirk observes. Fungicides are also used on at least half of the state’s soft red winter wheat acreage (which accounts for two-thirds of the state’s 400,000 harvested acres).

Great Plains / Hard Winter Wheat Region

Late April, May and June of 2017 were relatively wet and cool across **Oklahoma**, note Bob Hunger and David Marburger, extension wheat pathologist and extension small grains agronomist, respectively, with Oklahoma State University. “These are the months when wheat likely is flowering somewhere in Oklahoma — which means there were conditions favorable for Fusarium Head Blight when wheat was flowering,” they point out. “This was especially true in northeastern Oklahoma where FHB is of biggest concern.”

Still, OSU specialists received only a few calls regarding FHB, and the OSU Plant Disease & Insect Diagnostic Lab did not receive any samples for diagnosis. “Some fungicides were applied in northeastern Oklahoma for FHB management, but no reports of scabby wheat or high DON levels were received. We estimate less than 1% of the crop was affected,” Hunger and Marburger conclude.

Scab’s impact was low in **Kansas** as well, reports Erick DeWolf, Kansas State University extension plant pathologist. “Most areas of the state saw only trace levels of FHB; but there were reports of fields with moderate symptoms of disease in the southeast and south central regions,” he says. DON levels did not appear to be a problem at most elevators within those regions, however.

The story was similar in neighboring **Nebraska**. Stephen Wegulo, University of Nebraska extension plant pathologist, says only trace levels of FHB developed in growers’ fields in the south central and southeastern parts of the state. DON levels

in grain tested at the Lincoln Inspection Service in Lincoln, Neb., were very low or insignificant, according to the manager. “As in 2016, economic losses due to FHB and DON in growers’ fields were negligible,” Wegulo states. Low to moderate levels of FHB did develop in inoculated and irrigated UNL research plots at Lincoln and Mead.

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

The wheat growing season in **South Dakota** was characterized by drought conditions in 2017 — especially in central South Dakota, the state’s largest wheat growing region. “The drier conditions meant there was no risk for Fusarium Head Blight for winter wheat in this region,” points out Emmanuel Byamukama, extension plant pathologist with South Dakota State University

South Dakota’s eastern region also experienced very low rainfall during the winter and spring wheat flowering period; hence, very limited FHB developed. The low level of FHB in 2017 was also reflected in the FHB prediction models, Byamukama says, which showed the entire state in green (low FHB risk) throughout the season. “A few DON test reports from grain elevators indicated less than 2.0 ppm, which is not surprising, given the limited moisture and low humidity when wheat was at flowering.”

“A majority of the wheat (hard red spring wheat and durum) production acres in western **North Dakota** did not receive sufficient rainfall for a harvestable crop, and many were taken out of production due to low economic value,” reports Andrew Friskop, North Dakota State University cereal extension pathologist. “Therefore, these areas did not experience problems with Fusarium Head Blight (FHB) due to an unfavorable environment.”

The greatest risk for FHB in small grains was in northeastern North Dakota, Friskop observes. “Sporadic rain and frequent high humidity values elevated risk (moderate to high) during the heading process of wheat and barley. Most growers

in this area applied fungicides and used moderate to moderately resistant varieties, thus limiting the risk for FHB and deoxynivalenol (DON).” Though a few acres of susceptible spring wheat varieties were still grown in this area, planting date differences and fungicide applications alleviated most concerns of FHB and DON in susceptible varieties, Friskop says.

Minnesota experienced another very mild spring with temperatures allowing planting of small grains roughly two weeks earlier than normal, says Madeleine Smith, small grains plant pathologist and extension specialist from the University of Minnesota at Crookston. “High relative humidity abounded, which led to a prevalence of early awn infections of FHB,” Smith states. “However, as the season progressed into July, conditions became very dry in many parts of the state, and these infections did not progress.”

Although areas of Minnesota did trend at moderate to high risk for FHB on the risk model, “it seems that timely spray applications, sound varietal selection and unfavorable conditions for development of the disease resulted in FHB not being a major issue this year,” Smith observes. “This was true for many other diseases such as rusts as there was simply not enough moisture to aid disease development. This made for a good year for yield for small grains in the state.”

Northwest (Idaho & Montana)

FHB was found in few **Idaho** fields this year, reports Juliet Marshall, Idaho Falls-based cereal specialist and pathologist for the University of Idaho. “Many wheat and barley growers were heeding recommendations and spraying fungicides at appropriate growth stages to protect the crop,” she says. “Temperatures were very warm and above average; but it was also less humid than in the previous two years.”

The mist irrigated, inoculated USWBSI trials at Aberdeen had excellent results, Marshall notes. But few growers had high FDK or DON levels. “Only a few fields of barley in the Magic Valley were rejected for high DON; one had greater than

1.0 ppm DON following corn,” she says. “Another two fields north of Rupert, Idaho, had levels at 3.4 ppm DON and were rejected. Those fields were also in a heavy corn producing area.”

Wheat fared much better, as low DON levels did not result in rejection of loads. Low DON levels (mostly below 1.0 ppm) were detected, but at low frequency. Fungicide use at flowering has become a standard practice in Idaho wheat. “Overall, a good year for our growers,” Marshall concludes.

Luther Talbert, spring wheat breeder with **Montana** State University, says the Montana Diagnostic Lab received no samples of FHB in 2017. “A few samples of irrigated barley with very low amounts of DON from central Montana were identified according to Dr. Frankie Crutcher at the Eastern Agricultural Research Center,” Talbert relates.

“The general lack of FHB was likely due to drought conditions over much of the state. Even in irrigated conditions, relative humidity was likely too low to allow disease development.”

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