

# **Fusarium Head Blight in 2018: Serious in Some States; Low Impact in Majority**

By Don Lilleboe\*

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

*As is typically the case, in-season weather conditions played a big role during 2018 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 low this year because weather patterns were not conducive to the disease’s establishment and spread. However, certain areas in a few states were seriously impacted due to wet conditions during critical growth stages.*

*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 such a strategy.*

*Here’s an overview of the 2018 FHB situation, by region.*

### **New England & New York**

“Most of New England experienced below-average precipitation and hot temperatures throughout most of the grain growing season,” reports Heather Darby, University of **Vermont** extension agronomist. Mild temperatures aided winter grain survival, but above-normal precipitation and cool conditions in the spring of 2018 led to less-than-optimum planting dates for spring grains. Many farmers reported grain being planted well into the latter part of May.

However, “quickly the weather went from cold and wet to hot and dry,” Darby says. “When it finally warmed up, the conditions became very dry for most of the flowering period. These weather conditions likely kept the infection rates of *Fusarium graminearum* low.

“The levels of DON from samples submitted to our testing lab have been very low for the most part,” Darby adds. “Of hundreds of samples evaluated at the University of Vermont’s commercial grain quality testing lab, roughly only 10% of samples received had DON levels exceeding 1.0 ppm.” According to many farmers, 2018 was one of the best cereal grain growing seasons in some time, she says.

*Fusarium Head Blight* symptoms and DON contamination above 1.0 ppm were not widely encountered in soft winter wheat or in winter malting barley in **New York** State in 2018, reports Cornell University plant pathologist Gary Bergstrom. “The risk assessment tool accurately predicted low to moderate risk of FHB epidemics in the region, which experienced a relatively dry period from head emergence through early grain development,” he observes. “As always, there were local hotspots and microenvironments that resulted in higher DON; but overall it was not a problem.” Surveys of spring malting barley for grain quality also showed generally low levels of DON, although spring barley planted late due to wet conditions in April and May had recordable levels of DON — albeit below 1.0 ppm, Bergstrom adds.

Beginning in January 2019, Bergstrom notes, craft brewers registered under the New York Farm Brewery License need to document that their beer is brewed with a minimum of 60% of malt coming from New York-grown grains. “New York barley growers have met that demand for malt quality grain for 2019, but will need to expand barley acreage to accommodate the growing demand of the state’s craft beer industry,” he says. “There are now a dozen craft malt houses operating in New York State to service this industry. DON contamination continues to be a major concern of the state’s malting barley producers, and most are pursuing integrated management strategies that include triazole application at full head emergence.”

## Mid-Atlantic Soft Winter Wheat Region

Alyssa Collins, Penn State plant pathologist and director of the PSU Southeast Agricultural Research & Extension Center at Manheim, reports challenging conditions for small grain production this year in **Pennsylvania**. “Persistent wet weather resulted in high risk for scab development during the majority of anthesis and grain development period for both barley and wheat,” she says. “This left very little opportunity for any growers to escape infection via spaced maturity timing alone.”

The prolonged wet weather during ripening also allowed for secondary pathogens to invade and affect glume and straw quality. “Overall, this resulted in difficulty for growers to realize the best prices through sales of wheat and barley products in the region,” Collins states.

The Penn State plant pathologist says there is a small but growing contingent of farmers and crop consultants in the state who are very proactive about wheat production to achieve the highest quality. “These producers actively seek the information provided by the USWBSI, including risk forecasting, variety resistance ratings and fungicide trials,” she affirms. “In general, this group is able to reduce vomitoxin in harvested grain to a fraction of that seen by their neighbors who do not similarly prioritize management-intensive production of small grains. Moving forward, it will be important to engage these growers in the work to educate and drive production standards for the region.”

FHB reared its head in a big way in **Maryland** this year, reports University of Maryland crop pathologist Nidhi Rawat. “With extensive rains and warm temperatures in spring and summer in Maryland, wheat and barley crops were severely hit with FHB in most parts of the state,” she says, “[except for] a few early fields in the Eastern shore that flowered before the rains started.”

DON content exceeded 8.0 ppm in some of the worst-affected counties of the state, Rawat notes, and many farmers had to sell their grain discounted. “Due to the heavy losses caused by FHB this past year, results of the USWBSI-supported misted nursery, where resistance level and DON contents of popular cultivars of Maryland

and Delaware were tested in 2018, were in high demand by farmers for the next planting season of 2018/19,” she adds.

In addition to the wet weather, the cultural practice of planting wheat following corn in no-till systems further aggravates disease incidence in the state, the UM pathologist points out.

Hillary Mehl, plant pathologist at **Virginia** Tech’s Tidewater Agricultural Research & Extension Center, says that while scab risk in Virginia remained low in early May, rain events increased the risk in mid-May — which coincided with wheat flowering in much of the state. “Relatively high scab incidence was observed in fields in early June, and high levels of DON were reported from parts of the state, including the Shenandoah Valley,” Mehl observes. “Many fields were above 1.0 ppm, with a few exceeding 10.0 ppm.”

Though varieties with moderate resistance are available, scab-susceptible varieties are still grown in Virginia — and these are more likely to have extremely high levels of DON contamination, Mehl points out. “Overall, fewer fungicides are being applied to wheat due to low grain prices,” she relates, “and in many cases growers are using cheaper generic triazoles rather than the fungicides recommended for scab control (Caramba®, Prosaro®, Proline®).” Optimum timing of fungicide applications has also been an issue since relatively few Virginia growers have the ability to make aerial sprays, and rainy weather that increases scab risk prevents growers from getting into fields with ground sprayers.

## **Southern/Southern Atlantic Soft Winter Wheat Region**

**North Carolina** overall had low FHB risk in 2018, says Christina Cowger, plant pathologist with the USDA Agricultural Research Service at North Carolina State University. The only part of the state where the risk forecasting system showed moderate to high risk for a short part of the relevant time frame was the coastal area — and particularly the northeast corner of the state, which often has had elevated risk in recent years. Even in that district, however, “a county agent

told me he did not hear about significant problems with DON; maybe a load here and there, but nothing major,” Cowger says.

“We seem to have dodged the bullet in North Carolina.”

Fusarium Head Blight incidences were low across **Georgia** this year as well. “Limited FHB damage, if any, was observed this year in our research trials at Plains, Ga.,” reports Alfredo Martinez-Espinoza, University of Georgia extension plant pathologist. “Only one sample with confirmed FHB originated in Grady County in extreme southern Georgia.”

The dry 2018 winter and spring prevented infections from starting all across the state, Martinez-Espinoza relates. “These observations coincided nicely with the ‘low risk levels’ shown on the FHB risk map tool (<http://www.wheatscab.psu.edu>) throughout the season. However, we must remain vigilant, given that favorable FBH-inducing weather patterns in Georgia can return — coupled with an increased corn acreage and high inoculum reservoirs.”

The 2018 scab experience was also benign further west, in **Mississippi**. Tom Allen, plant pathologist with Mississippi State University (Delta R&E Center), says its “extremely limited” incidence paralleled with very low wheat acreage in the state.

Wheat acreage was also very low again this year in **Louisiana**, note LSU’s Trey Price and Boyd Padgett. Price, field crop pathologist, and Padgett, research/extension plant pathologist, say the state’s estimated acreage was just 15,000 — the lowest since 1955. Low wheat prices and “three years of impossible conditions (scab and rainfall at harvest)” were the primary reasons behind the small crop size. However, “a very cold winter along with adequate rainfall during the growing season led to an excellent crop, with little or no disease pressure,” Price and Padgett observe.

University of **Arkansas** (U of AR) wheat breeder Esten Mason says he did not observe any natural scab in the state in 2018 — nor did he hear of any. “In general, this followed the predictions of low risk around the time of flowering in the state,” he remarks. Adds U of AR wheat and feed grains extension agronomist Jason Kelley: “We had a wet April, but temperatures were cool, and that likely reduced the

development of head scab. Late April through May was exceptionally warm and dry, which also likely reduced scab development during grain fill.”

## **Midwest/Northern Soft Winter Wheat Region**

About 370,000 acres of winter wheat were planted in **Tennessee** in 2017, with 275,000 acres harvested in 2018, reports Heather Kelly, extension/research plant pathologist with the University of Tennessee. The crop averaged 70 bu/ac, up from 73 bu/ac in 2017. “The usual diseases were observed, including Septoria and glume blotch, along with very little stripe and leaf rust; but none were very impactful,” Kelly states. Fusarium Head Blight was present in some fields, she says, but had very little to no impact on yield, despite the warmer temperatures and moisture around bloom time. “In general, it was a low disease year for wheat in Tennessee.”

The FHB situation was similar to the north, in **Kentucky**. “Although there were a few instances of DON and scab problems in 2018, they were not major issues for the majority of Kentucky wheat farmers,” reports Carl Bradley, University of Kentucky plant pathologist.

“In 2018, the occurrence of scab was relatively low in **Missouri**, with little precipitation and cooler temperatures at flowering throughout much of the state,” observes Kaitlyn Bissonette, extension plant pathologist with the University of Missouri. For much of the state, it was the second coldest April on record, followed by the hottest May on record, which disrupted normal wheat developmental stages. Short plants with slightly delayed flowering timing and little to no precipitation likely contributed to low FHB and DON overall. “There were no known reports of high DON levels around the state. Due to extreme temperatures and dry conditions, disease levels remained relatively low overall,” Bissonette remarks.

University of **Illinois** extension plant pathologist Nathan Kleczewski says scab was not an issue in that state’s wheat, either, in 2018. “We had a stretch of hot, dry weather that allowed the majority of the crop to mature rapidly and avoid this

disease,” he notes. Nor were there any confounding issues with harvest in the majority of Illinois. “Consequently, DON was not an issue.”

Overall, FHB and DON levels in wheat were low across the state of **Ohio** in 2018, reports Pierce Paul, Wooster-based plant pathologist and extension state specialist with The Ohio State University. “This may seem surprising, given the wet weather we had during most of the growing season,” he says. “[But while] rainfall was frequent, most of it fell at a time when the crop was not at risk (before or after anthesis) or coincided with cool conditions.”

Some areas of Ohio turned red (based on the prediction center) during the third week of May, Paul notes, suggesting high risk for scab and vomitoxin. “But again, this either occurred before anthesis in northern counties or well after this critical growth stage in southern Ohio.” In addition, he notes, most of the areas identified as being at risk were in the eastern third of the state, close to the Pennsylvania border, where very little wheat is grown. “However, because of the wet conditions, several growers applied fungicides close to anthesis, which likely helped with other late-season disease such as rust; [and] yields were well above state average.”

Ohio barley growers did not enjoy the same luck, Paul observes. Although scab and DON levels were also relatively low in barley, the wet weather brought other problems that prevented some growers from making malting quality barley.

Damon Smith, University of **Wisconsin** field crops pathologist, reports that statewide, Fusarium Head Blight was the major disease of winter wheat in 2018. “FHB could be found in many fields in the southern and southeastern portions of the wheat-growing region of the state,” he says. “As one moved northward, levels of FHB quickly dissipated so that just trace levels could be found.

“In the variety trials throughout the southern and south central part of the state, FHB hit some varieties moderately hard, causing head damage and deformed kernels. Varieties with genetic resistance to the disease performed well, especially at the Sharon and Arlington variety trial locations. FHB was very mild at the Fond du Lac and Chilton locations. This was consistent in commercial fields in the north-central and northern locations where winter wheat is grown.”

Unlike in 2017 and 2016, stripe rust was nonexistent in Wisconsin variety trials, Smith continues. “We were also unable to find stripe rust in commercial fields that we scouted,” he notes. “This is likely due to the extremely cold winter of 2017/18 combined with hot and dry conditions in the summer of 2018, both of which were not conducive for stripe rust.”

Septoria leaf blotch and leaf rust were present in low levels in some fields throughout Wisconsin. However, these two diseases were not yield limiting in 2018, according to Smith. Powdery mildew was nearly nonexistent in the state for the sixth straight season, while *Cephalosporium* stripe was prevalent at the UW Fond du Lac location in 2018. *Cephalosporium* stripe is favored by cool, wet conditions and reduced tillage.

Most of **Michigan’s** 550,000 acres of wheat in 2018 avoided losses due to FHB. However, there were exceptions, reports Martin Nagelkirk, Michigan State University’s state extension educator for wheat.

“The greatest concentration of Michigan’s wheat crop is found in the east central area of the state, including the Saginaw Valley and Thumb regions,” Nagelkirk explains. “Here, excessively dry conditions persisted from flag leaf through flowering, precluding any chance of FHB development to any significant extent. Fortunately, this area’s acreage also supports most of the state’s soft white winter varieties, which tend to have greater susceptibility to FHB and bear more severe discounts for elevated DON levels. In these regions, nearly all of the soft white and soft red winter wheat fields had DON levels below 1.0 ppm.”

Other parts of the state did suffer some losses to the disease, Nagelkirk relates. These areas, including the southern tier counties and parts of western and north central Michigan, received excessive rainfall prior to flowering, and scattered showers from flowering through early grain fill. “On average, perhaps 1% to 2% of the wheat in these areas had elevated DON levels,” he says. “In some extreme cases, wheat was tested at levels above 8.0 ppm. Some growers elected to haul their compromised grain a significant distance to elevators where discounts were not being imposed.”



As in the past several years, nearly all of Michigan's soft white and most soft red acres were treated with Prosaro or Caramba at flowering to reduce the risk of FHB and foliar diseases, Nagelkirk adds.

## **Great Plains / Hard Winter Wheat Region**

This was another year with very minimal FHB in **Oklahoma**, "which makes me happy!" affirms Bob Hunger, extension wheat pathologist with Oklahoma State University.

Scab's impact was low in **Kansas** as well, reports Erick DeWolf, Kansas State University extension plant pathologist. "The 2018 wheat growing season in Kansas was dominated by drought conditions," DeWolf remarks. "There were some reports of low levels of FHB in the southeastern portion of the state, but there were no reports of serious problems with DON at harvest."

In **Nebraska**, due to dry conditions in the eastern half of the state prior to flowering, Fusarium Head Blight did not develop — or developed only to trace levels in most of the wheat growing regions in the state (except for an area in the west central and southwest covering Lincoln, Perkins and Keith Counties, where it developed to low levels in some fields). "DON levels were negligible in growers' samples submitted to the Lincoln Inspection Service," says Stephen Wegulo, University of Nebraska extension plant pathologist. "But in research plots at Lincoln and Mead in southeast Nebraska, they ranged from mostly 0 ppm in dryland plots to 4.34 ppm in irrigated plots."

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

The 2018 **South Dakota** wheat season saw moderate to severe scab develop both in winter wheat and spring wheat, says Emmanuel Byamukama, extension plant pathologist with South Dakota State University. "The season had been generally dry, and at the start of heading the risk was shown to be low. But soon

after, most central and eastern parts of the state received frequent rains throughout most of the remainder of the wheat flowering period,” he notes.

Disease warnings were sent out via extension articles and commentary, and some producers applied a fungicide to protect wheat against scab, Byamukama says, while others hesitated to apply a fungicide and made calls later after they had seen symptoms, inquiring if a fungicide could still be applied. “The advice was that this would be too late to apply a fungicide once the symptoms have developed,” he points out.

Scab was a consistent problem in **North Dakota** this year; however, DON levels generally fell below dockage threshold, reports Andrew Friskop, North Dakota State University cereal extension pathologist. “During the growing season, several areas of the state experienced elevated scab risk beginning June 27 in southwest North Dakota, and the highest risk across much of the state occurring on July 14,” Friskop says. “Although scab risk was apparent at different points in the growing season, several areas escaped FHB problems. In other words, heading (barley) and flowering stages (wheat and durum) did not coincide with high levels of scab risk.”

Friskop offers these additional comments regarding the specific grain classes:

- Winter wheat acreage in the state was less than 60,000 acres, and very few reports of FHB or problematic DON levels were reported.
- An average to above-average spring wheat crop was reported across most of the state. Most areas did not have problems with FHB or DON. Growers opted to apply a fungicide at flowering for the spring wheat crop, as susceptible varieties were in moderate to high scab risk at different points in the growing season. The top 10 varieties (by acreage) grown in the state are either moderate or moderately resistant to FHB. However, the southeast quarter of North Dakota had an influx of susceptible varieties being grown, resulting in yield loss and DON dockage at the point of sale. Late-planted spring wheat in the northern tier of North Dakota experienced elevated DON levels of around 3.0-4.0 ppm.

- Barley acreage decreased in North Dakota this year due to lack of malting contracts. Fungicide applications are a common practice on barley to help maintain DON levels below 1.0 ppm. Scab and DON reports have been mixed. Most barley fields in the state had low scab levels and DON levels below 1.0 ppm. However, some portions of North Dakota (e.g. the southeast quarter) observed higher levels of FHB and DON levels above 2.0 ppm.

- The area of the state with high durum acreage (northwest North Dakota) has suggested that FHB and DON problems were low. Early planted durum fields routinely had DON levels below 1.0 ppm. However, some of the later-planted areas have elevated scab reports, and DON levels are expected to be higher.

To the east, approximately 80,000 acres of barley were planted in **Minnesota** in 2018, with 67,000 being harvested, reports Madeleine Smith, small grains plant pathologist and extension specialist with the University of Minnesota at Crookston, and Jochum Wiersma, UMC extension agronomist. The average barley yield was 80 bu/ac. For wheat, 1,611,000 acres were planted this year and 1,567,000 harvested. The average wheat yield of 59 bu/ac was down from 2017's record level of 65 bu/ac.

Nearly 60% of Minnesota's 2018 wheat acres were planted by May 13, Smith and Wiersma note — one week behind last year and two days behind the five-year average. Eleven percent of the spring wheat crop had emerged by that date, nine days behind 2017 and 15 days behind average. By August 20, 76% of the spring wheat had been harvested (almost two weeks ahead of average), 78% percent of the oats for grain had been harvested (10 days ahead of last year) — and 89% of barley had been harvested (two weeks ahead of average).

With high relative humidity, despite lack of rain in some parts of the state, FHB was prevalent in both fall rye and winter wheat varieties in production this year in the southern part of the state, Smith and Wiersma observe. "As the season progressed and spring wheat headed out, awn infections of FHB were visible in many commercial fields around the state, showing that conditions were conducive and inoculum was widespread," they state. "The risk model trended high for many

parts of northwest Minnesota during the critical early flowering period for susceptible and moderately susceptible varieties.”

However, they add, “there have been few reports of grain being rejected at elevators due to high DON levels. This could be due to timely applications of fungicide, mixing of grain lots, and lighter-infected grain being blown out the back of combines, leaving healthier, heavier grain.”

## **Northwest (Idaho & Montana)**

“Disease pressure from FHB in **Idaho** was relatively low,” reports Juliet Marshall, Idaho Falls-based cereal specialist and pathologist for the University of Idaho. The disease was found in winter wheat in the Idaho Falls area, she says, and high DON was reported in a hard white spring variety (WB7328) that had been treated with appropriate fungicides. That field was excessively irrigated throughout the growing season. “Otherwise, there were few reports of problems associated with FHB or DON this year,” Marshall states.

**Montana** State University plant pathologist Frankie Crutcher says that while the state had plenty of moisture during the 2018 growing season, there was no major incidence of Fusarium Head Blight. “We attribute this to both the very warm temperatures at flowering and increased awareness and management of the disease,” she remarks. Her contacts with a commercial diagnostic lab and a barley contractor also indicated few problems with DON levels.

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