

# FHB in 2015: A Vexing Year, Overall

## USWBSI Survey of Small Grains Specialists Shows Wet Conditions Again a Key Contributor to Scab Problems in Several States

By Don Lilleboe\*

*As in previous years, in-season weather played a big role during 2015 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 by small grains specialists in a number of states reveal a mixed bag when it comes to FHB incidence and severity levels. However, it’s apparent that more states wrestled with significant scab problems this season, compared to 2014. The same conclusion applies to levels of deoxynivalenol (DON), the vomitoxin associated with Fusarium Head Blight.*

*The reports also confirm once again that an integrated approach to FHB management — i.e., planting scab-tolerant or -resistant cultivars, applying appropriate fungicides at the proper time, and avoiding crop rotations conducive to scab development — continues to pay off for those farmers who follow that tact.*

*Here’s an overview of the 2015 FHB situation, by region.*

### Mid-Atlantic Soft Winter Wheat Region

The **Pennsylvania** wheat and barley crop experienced very cold conditions this past winter, followed by a relatively dry spring, reports Alyssa Collins, director of Penn State’s Southeast Agricultural Research & Extension Center at Manheim. That led to the lower half of the state incurring only low to moderate levels of Fusarium Head Blight (FHB) pressure. However, “as the crops matured in the northern part of Pennsylvania, rain events and humidity increased,” Collins notes, “resulting in higher disease incidence for those later-maturing crops.”

Collins says that mills and buyers who tested for DON in 2015 found low levels overall — “likely due to a combination of the dry spring as well as widespread

use of fungicides at flowering by many farmers.” Pennsylvania wheat and barley producers generally are very aware of the potential for FHB infection and subsequent toxin production, she observes, and commonly use the scab forecasting system and/or their own assessment of environmental conditions to gauge the need for fungicide application. “More awareness and interest is growing in the selection of resistant varieties as well,” Collins adds.

Fusarium Head Blight was not an issue for most **Delaware** growers in 2015, reports Nathan Kleczewski, University of Delaware extension plant pathologist. Hot, dry weather persisted throughout the growing season and during flowering for the majority of fields. “Field surveys and DON data from grain elevators indicated few DON-associated issues,” Kleczewski says. “Most loads were well under the 2.0 ppm threshold.” In those cases where growers used overhead irrigation prior to and during flowering, levels of both FHB severity and Don appeared to elevate slightly, he adds.

Arv Grybauskas, associate professor emeritus/field crops pathologist for the University of **Maryland**, says that rainfall during the 2015 harvest reduced seed quality considerably. “The weathering of grain and sprout damage was the most significant problem of wheat production in Maryland in 2015,” he states. “Conversely, Fusarium Head Blight (scab) in wheat was not significant” this season. It was generally too dry from heading through soft dough for all but low levels of infection — even for susceptible cultivars.

There were a few reports from elevators that some wheat loads had DON levels greater than 2.0 ppm, Grybauskas says, with certain loads as high as 6.0 ppm. “These were most likely the result of very susceptible cultivars grown under high-risk management practices,” he suggests (e.g., wheat following corn with minimum tillage).

Carl Griffey, **Virginia** Tech wheat breeder, says that from his observations in wheat tests at Warsaw and Blacksburg this past spring, “we had trace to perhaps 5% FHB-infected heads.” But since Virginia Tech sends in grain samples only from its inoculated and mist-irrigated scab nurseries, Griffey was not aware of DON levels in commercial fields around the state in 2015.

Hillary Mehl, plant pathologist at Virginia Tech's Tidewater Agricultural Research and Extension Center, says FHB incidence in southeastern Virginia overall was relatively low, with only trace amount in most fields. "However, there were some hotspots in the region with higher levels of FHB and a few reports of fields with high levels (>2.0 ppm) of DON," she adds.

C.J. Lin of Mennel Milling Company says that local wheat received at the company's West Point, Va., elevator (southeastern part of the state) averaged just 0.3 ppm DON, with only 1.8% of the deliveries being higher than 2.0 ppm.

"The 2015 scab epidemic in **North Carolina** was of intermediate severity, and less severe than the epidemics of 2003, 2008 or 2009," reports Christina Cowger, plant pathologist with the USDA Agricultural Research Service at North Carolina State University. "It was locally specific, depending a lot on when the wheat was in flower relative to a rainy period in the latter part of April." The risk forecast looked bad the week of April 18-24 for the entire state and on April 27-29 for the Piedmont region. "However, as we had a late spring, most North Carolina wheat ended up flowering too late to be severely affected.

"The North Carolina situation this year illustrates how large-scale reliance on a susceptible variety is like playing Russian roulette with the weather," Cowger observes.

"In the southern tier of the state, from Union County east, scab was prominent in early maturing test plots, but fortunately not in medium- or late-maturing varieties grown commercially," Cowger continues. "In the Coastal Plain, scab severity was generally low, with a few patches of moderate severity. But there was another rainy period May 9-14 in the Tidewater, and that region ended up with widely scattered scab damage."

North of the Albemarle Sound, county agent Al Wood reported scattered problems with DON, including some rejected loads — particularly with Shirley wheat. "I have come to the conclusion that we are going to have to place more emphasis on the resistance of wheat to scab when selecting varieties," Wood wrote in an August newsletter.

## **Southern Soft Winter Wheat Region**

University of **Georgia** extension plant pathologist Alfredo Martinez-Espinoza says incidences of FHB were numerous across Georgia this year, though not as prevalent as in 2014. “Incidence and severity were particularly high in the southernmost part of the state,” he relates. “For example, surveyed fields in Sumter County had severity of 50-60%. Environmental conditions at the time of wheat flowering provided conditions conducive for FHB infections in the state of Georgia in 2015.”

To the west, **Louisiana** wheat producers experienced the worst year on record for Fusarium Head Blight, according to Louisiana State University’s Trey Price (LSU AgCenter, Winnsboro), Steve Harrison (small grains breeder, LSU, Baton Rouge) and Boyd Padgett (director, LSU AgCenter, Alexandria). Conditions were ideal for disease development, with rain and warm temperatures during flowering.

“Given the history of little-to-no-scab in Louisiana, fungicide applications have rarely been recommended for scab in the state,” they note. “Nevertheless, the disease [was] reported statewide, with the hardest-hit areas near the central portion of the state.” Some loads were rejected at grain elevators; and in the worst areas, a few producers decided not to harvest. Later-maturing varieties fared better because of drier weather during flowering.

On average, losses due to scab alone were estimated at 25% in Louisiana. “To compound scab problems, harvest conditions were horrible (rainy and windy), resulting in lodging and even lower test weights,” the LSU professors report. “If conditions are favorable for disease development next year, application of fungicides for management will be considered.”

**Arkansas** wheat acreage and yield were down in 2015 compared to previous years. An estimated 335,000 acres were planted with 240,000 acres harvested. “The unusually large difference between planted and harvested acres reflects the poor growing conditions this spring, and several thousand acres were flooded or had yield and quality too low to justify harvesting,” note Jason Kelley and Terry Spurlock (extension wheat/feed grains agronomist and extension plant pathologist,

respectively, University of Arkansas). The average yield was 56 bushels per acre, which was down from the record yield in 2014 of 63 bu/ac.”

Fusarium Head Blight in Arkansas was more severe in 2015 than in recent years, Kelley and Spurlock report. “Ample rainfall from March-May provided good conditions for scab development,” they note. “Corn acreage has also greatly expanded in the region in the past few years, which may increase likelihood of scab problems.

“In general, scab at mostly low levels could be found statewide,” they continue. “The highest levels seemed to be in the Arkansas River Valley region of western Arkansas and areas of east-central Arkansas. In these areas where scab was prevalent, wheat heading date played a significant role in level of scab seen in the state. In general, early heading varieties had more scab than later-heading varieties.”

Commercial grain terminals tested incoming loads of grain. One terminal indicated they rejected approximately 5% of the loads for vomitoxin levels greater than 3.0 ppm. “In general, wheat quality was lower this year than desired, with low test weight being the most common complaint along with concerns about vomitoxin,” Kelley and Spurlock observe. The outlook for wheat in 2015-16 indicates the likelihood of a further reduction in acreage for the state.

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

“For the most part, the risk of scab itself was low in **Ohio**, based on the forecasting system; and the resulting disease levels were consistent with the predicted risk, with very few exceptions,” reports Pierce Paul, Wooster-based plant pathologist with the Ohio State University. There were a few scattered pockets with scab incidence in the 20s and 30s, he says, but those were the exceptions.

“However, contrary to scab, grain quality issues were much more widespread,” Paul observes. “This was largely due to the harvest being delayed by frequent, and sometimes heavy, rainfall. In some parts of the state, harvest was delay by as long as two or three weeks; and during that time it rained every few

days, preventing fields from drying — even when the grain itself was dry enough to be harvested. The result was sprouting and saprophytic mold grown on spikes in some fields, leading to low test weight, scab- and no-scab-related shriveling of kernels — and, most importantly, higher levels of vomitoxin than one would have expected based on the overall low levels of scab.”

Paul says that some fields that were harvested before it started raining had yields in the upper 80s and 90s, above the Ohio state average. “High yields and excellent grain quality were expected in 2015, since early season conditions were cool, disease levels were low, and the grain fill period was extended. But then it rained and rained and rained, leading up to and during harvest.

“Unfortunately, to cap off what ended being a bad season for wheat, some grain buyers applied heavy discounts across the board. So even producers who had decent quality grain were affected. Growers are still unhappy and disgruntled, and this led to concerns about a substantial reduction in wheat acres in 2016. However, once the dust settled and the fact that soybean is being harvested much earlier this year than the last several years, wheat planting intentions increased.”

The FHB story in **Kentucky** is much shorter and much more benign. University of agronomist Carrie Knot and extension plant pathologist emeritus Don Hershman indicate that FHB and DON were not problems of significance for the state’s wheat producers in 2015.

University of **Missouri** extension plant pathologist Laura Sweets says scab was prevalent in all regions of the state, except in the southeastern district. Wet conditions, which delayed harvest in many locales, likely contributed to the severity of FHB this season. “There have been numerous reports of loads docked or rejected at elevators due to high levels of scabby kernels and/or high DON levels,” Sweets notes. “Also, there have been numerous questions related to using scabby seed lots for planting this fall.”

It was a mixed bag in **Illinois**, where wheat yields were on good on average, but grain quality problems popped up following wet spring weather. Measurable rainfall on about half of the days in May made conditions nearly ideal for scab development in most areas of the state, reports University of Illinois agronomist

Emerson Nafziger. “It rained even more in June,” he continues, “with the monthly rainfall total of more than 9.0 inches setting a new Illinois record” for that month. Along with the rains delaying wheat harvest by days or even weeks, the cycles of wetting and drying of the grain prior to harvest dropped test weights, produced widespread sprouting damage — and resulted in high levels of DON in some grain.

A voluntary wheat vomitoxin survey coordinated by the Illinois Department of Agriculture showed that of 264 wheat samples tested in 2015, 23 had DON concentrations below the limit of detection (0.5 ppm); 26 tested between 0.5 and 1.0 ppm; 59 had concentrations between 1.1 and 3.0 ppm; 59 others had DON concentrations between 3.1 and 5.0 ppm; and 97 samples had DON levels of 5.1 ppm or higher. “Of the 74 counties from which samples were submitted, 41 counties had one or more samples with DON concentrations of 5.1 or above,” Nafziger relates. “In 15 counties, all of the samples had DON concentrations of 5.1 ppm or above.”

To the east, “most wheat in **Indiana** looked very good this year, and Fusarium Head Blight was low to moderate across the state,” says Purdue University extension specialist Kiersten Wise. However, she adds, “harvest was substantially delayed in many areas due to constant rain and saturated soil conditions before and after typical harvest time.” That caused DON levels to increase in some areas of the state to the point where the grain was not sellable. “Many farmers had grain rejected or docked severely,” Wise reports, “and (as of September 1<sup>st</sup>) still struggle to find uses for this grain.

“Overall, what looked like a promising wheat year has ended on a disappointing note for many wheat farmers.”

Fusarium Head Blight was the most widespread disease in **Wisconsin** wheat in 2015, according to Damon Smith, field crops pathologist with the University of Wisconsin. At the Sharon variety trial site (southern Wisconsin), “some plots had high (>20%) incidence of FHB, with average severity ratings on heads near 50%,” Smith reports. FHB incidence was lower and more variable at the Arlington, Fond du Lac and Chilton trial sites, though some scab could be found in most plots at those three locations.

“Dockage because of the presence of DON was widespread throughout the state,” Smith adds, “although the strategy for dockage was inconsistent from one elevator to the next.” Though rare, a few loads of wheat were rejected, he says.

In **Michigan**, FHB symptoms were evident in all fields within the major soft winter wheat growing regions, reports Martin Nagelkirk, state extension educator for wheat with Michigan State University. “While the disease incidence may have averaged only one to two heads per 10 feet of row (< 1% of heads), and most DON level test results were well below 2.0 ppm, there were many exceptions,” he says. “Perhaps 10% of fields had DON levels above 2.0 ppm, and most elevators received grain containing levels exceeding 5.0 ppm.”

The worst hit area of Michigan was the southern tier of counties. “Here, along with northern Ohio, excessive rainfall repeatedly injured the crop and certainly encouraged Fusarium development through the grain-fill period,” Nagelkirk states. “It was not uncommon to have fields testing well above 5.0 ppm and, in some cases, 10.0 ppm.”

There also were pockets throughout central Michigan that nearly rivaled those levels of loss, Nagelkirk adds. But in the Michigan Thumb region, which contains the highest density of both soft white and soft red wheat acreage, the disease was not as severe as anticipated, and the vast majority of the crop avoided a DON discount. While that was partly due to more-favorable weather, aggressive fungicide spraying programs also played an important role. (Nagelkirk estimates that 98% of the soft white crop was treated at early flower, as was probably 65% of the soft red wheat acreage.)

“In visiting with growers and elevator operators, most attest to the importance of using fungicides to avoid DON discounts,” Nagelkirk remarks. “It was also apparent that the most extreme cases of DON were where wheat followed corn.” He adds that there’s a growing awareness among growers that varieties with stronger resistance to FHB can help protect their bottom line in years like 2015.

The majority of **New York’s** 2015 soft winter wheat and winter malting barley crops flowered during a fairly dry period and developed relatively few symptoms of Fusarium Head Blight, says Cornell University plant pathologist Gary



Bergstrom. Some individual winter cereal lots did incur high levels of DON contamination, however. “To our knowledge, less than 10% of the winter wheat crop was rejected at elevators or flour mills due to DON levels above 2.0 ppm,” Bergstrom remarks. “Preharvest sprouting damage was a bigger concern overall, with roughly 20% of winter wheat grain lots rejected for falling number scores below 250.”

Warm and extremely wet conditions characterized the mid-June through July period in New York, such that later-flowering winter cereals and many spring cereals experienced FHB development and harvested grain with DON in excess of market limits for flour and malting.

## **Northeastern Malting Barley Region**

There presently are seven small-scale, craft malt houses buying malting barley in **New York**, notes Cornell’s Gary Bergstrom, with at least three more in development. “The past three-year experience shows that less than half of the barley produced will meet the quality standards for malting,” he says. “Surveys of malting barley growers and craft maltsters identified DON contamination as a top quality concern and production challenge for the fledgling malting barley industry in New York.”

New York craft brewers and maltsters are showing a strong preference for two-row malting barleys of both winter and spring types, Bergstrom explains, adding that this presents a significant challenge for disease management since there is inadequate FBH resistance available in two-row malting barleys adapted to the moist, humid growing environments of New York. “Barley growers are utilizing triazole fungicides for scab suppression,” he notes. “But, as a solo tool, they are still inadequate to suppress DON to under 1.0 ppm demanded for malting barley.”

University of **Vermont** agronomy specialist Heather Darby says the weather varied considerably during the 2015 New England barley growing season. May was extremely dry and cool, she notes, which contributed to some barley being planted a little later than usual and also to slower germination. “Winter barley suffered from

winter injury, and in some places (such as Vermont) all of the winter barley was terminated due to the extremely long and cold winter,” Darby adds. Some of the barley fields that did survive had uneven growth and flowering.

Rainy conditions began in June and continued well into July, with many farmers in the Champlain Valley receiving in excess of 20 inches during June. The rain seemed to be focused in parts of New York and Vermont, Darby says, with less rainfall in northern Vermont — and far less rain in Massachusetts. “Needless to say, FHB levels were higher than 1.0 ppm in over 50% of samples that were sent to the UVM Cereal Grain Testing Laboratory from Vermont, Maine, New Hampshire and New York,” Darby reports. “Less than 20% of the samples from Massachusetts and Connecticut were over 1.0 ppm in DON.

“Overall, yields were considered average. But for many farms in the hardest-hit areas, they had all seed lots testing over 1.0 ppm DON.”

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

Scab was strictly a “non-issue” in **Oklahoma** in 2014 and 2013 due to drought conditions. But the story was somewhat different in 2015 because of wet and cool weather that persisted across the state from early April through June — weather that also hurt yield and test weight of wheat. “Initial reports of FHB came in from eastern and northeastern Oklahoma early in May, and continued to spread west across Oklahoma as the season progressed,” says Oklahoma State University extension wheat pathologist Bob Hunger. “Fungicides were used, especially in eastern/northeastern Oklahoma, with the hope of preventing and/or limiting FHB and vomitoxin presence.”

After a benign 2014, “Fusarium Head Blight re-emerged as a major problem in **Kansas** this season,” says Kansas State University extension plant pathologist Erick DeWolf. Though the 2015 growing season started out abnormally dry, frequent rainfall and extended periods of high relative humidity at critical growth stages stimulated major problems with Fusarium. “The disease was most severe in eastern Kansas, where disease incidence exceeded 40% in susceptible wheat

varieties,” DeWolf advises. “Estimated regional yield loss for southeastern, east central and northeastern Kansas was 11.8%, 16.7% and 18.8%, respectively. Toxin levels of 10.0 ppm were not uncommon in eastern Kansas, with extreme values topping out at above 30.0 ppm”

FHB also occurred in northwestern Kansas in 2015, where the disease has, historically, been very rare. In most cases, disease incidence in the northwestern region was below 5%. “This level of disease was enough to get peoples’ attention, but didn’t appear to cause the concerns with toxin that occurred in the east,” DeWolf observes.

Severe scab epidemics occurred in 2015 winter wheat fields across the entire southern part of **Nebraska**, reports University of Nebraska extension plant pathologist Stephen Wegulo. Trace levels of the disease also showed up in the Panhandle region.

While scab outbreaks had been expected, given the excessive and frequent rainfall before and during wheat flowering, the high incidence, severity and large affected acreage did come as a surprise. “It is estimated that at least half of the 1.7 million acres planted to winter wheat in Nebraska in 2015 were affected to some degree by damaging levels of scab,” Wegulo states. “Incidences of near 100% and severities of over 80% on more than 70% of infected heads in entire fields were common.”

Many affected growers baled their wheat to plant another crop, since yield potential was extremely low due to a double blow: (1) the most severe scab epidemics in recent memory, which followed on the heels of (2) the most severe stripe rust epidemics ever observed by current UN-Lincoln researchers. “Insurance adjusters estimated yield in many affected fields at 10 to 20 bu/ac due to scab and stripe rust,” Wegulo relates. Yield loss due to scab alone was estimated at 30%.

Growers who sprayed for stripe rust and scab saved a significant amount of yield that otherwise would have been lost. But due to discouraging market prices, some growers opted to not spray a second time (for scab suppression).

DON levels exceeding 66.0 ppm were measured at one grain inspection facility in southeastern Nebraska, according to Wegulo. At an elevator in the south

central part of the state, DON of grain received ranged from about 2.0 ppm up to 16.0 ppm. Grain with DON levels of over 5.0 ppm was rejected at this particular elevator, with discounts of \$1.00/bushel of accepted wheat being common.

In an unsprayed University of Nebraska scab variety development trial funded by the U.S. Wheat & Barley Scab Initiative, DON concentration ranged from 7.2 to 86.7 ppm, with 96% of the 220 tested samples having >10.0 ppm DON; 56% having >20.0 ppm; and 19% having >30.0 ppm DON.

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

**South Dakota's** 2015 wheat growing season brought moderate to high incidence and severity of Fusarium Head Blight to some areas, reports Emmanuel Byamukama, extension plant pathologist with South Dakota State University. Specifically, moderate levels occurred in the eastern, north central and west central counties. "This was due to frequent rains in these areas that coincided with the flowering growth stage of wheat," Byamukama points out. Spring wheat generally was more impacted than was winter wheat, as it's flowering coincided more closely with rainfall events.

Susceptible cultivars of winter and spring wheat in untreated SDSU plots had between 60-90% scab incidence, according to Byamukama, and severity of more than 70%. DON tests had not yet been conducted as of his report, though high levels were anticipated.

**North Dakota** State University cereal extension pathologist Andrew Friskop says scab was common across small grain acreage in the state this year — but severity was low. In a similar vein, DON was routinely detected, though below market class dockage levels. Several areas of North Dakota were in elevated scab risk situations when barley was heading and wheat was flowering, Friskop notes, with the highest amount of pressure in the southwestern and northeastern districts. "This prompted a majority of the growers to apply a fungicide," he says.

Here's Friskop summary of the 2015 North Dakota scab situation in each small grain class:

- **Winter wheat** acreage decreased this year (down 70%), and winterkill was minimal. Most reports indicate DON levels have been low, with the exception being southwestern North Dakota, where DON levels as high as 20.0 ppm have been reported. This district was under chronic moderate-high scab risk for much of the growing season, especially when winter wheat was flowering.

- A great looking **spring wheat** crop has been reported for much of the state. Most growers opted to apply a fungicide at flowering for the spring wheat crop since most of the crop was in moderate scab risk. DON levels have been low (less than 2.0 ppm) with late-planted spring wheat having higher DON levels.

- **Barley** acreage increased in the state this year as desirable malting contracts were available. Similar to wheat, fungicide applications to help manage scab were included in most production systems. Scab and DON reports have been mixed. Most barley fields had low scab levels and DON levels below 1.0 ppm. However, some portions of North Dakota (north central, northeast, southeast) observed higher levels of scab and elevated DON levels above 2.0 ppm.

- Though scab and DON were detected in areas of the state with high **durum** acreage, DON levels have been low, with a majority of the crop falling between 1.0-4.0 ppm. Fungicide applications for scab were budgeted for durum, especially in areas that were devastated by scab in 2014 (north central and northwestern North Dakota).

FHB was common across a number of areas of **Minnesota** in 2015, says Madeleine Smith, extension plant pathologist with the University of Minnesota's Northwest Research & Outreach Center at Crookston. "Very high humidity led to widespread awn infections in commercial fields (something we normally only observe in the irrigated FHB nursery)," Smith reports. "Control was hampered by uneven emergence in many areas resulting from dry conditions at seeding. This led to uneven head emergence and, therefore, reduced efficacy of fungicides in some cases." The FHB forecasting model correspondingly underestimated somewhat for moderately resistant varieties in some areas of the state, she adds.

## Montana & Idaho

Mary Barrows, extension plant pathologist with **Montana** State University, reports that the state had significant Fusarium Head Blight in traditionally impacted irrigated acreage for both wheat and barley in 2015. “Areas with the worst problems included the ‘Fairfield’ bench in the north central part of the state and the intermountain areas of the Flathead and Gallatin valleys,” she says.

Incidence of FHB continues to increase in southern **Idaho**, reports Juliet Marshall, Idaho Falls-based cereal specialist and pathologist for the University of Idaho, with some 2015 spring wheat fields having as high as 50% of spikelets infected. Elevators were reporting higher levels and more frequent occurrence of DON compared to 2014, she adds.

“While hard white wheats are the most susceptible, hard red wheat (Kelse, WB9668) were also consistently infected, with DON levels as high as 9.0 ppm,” Marshall says. Around the Blackfoot area, 20% of hard white wheat had 0.5 or less DON, while 40-50% had 0.5 to 1.0 ppm. In the Idaho Falls area, wheat yields in ‘affected’ fields ranged from 100 to 108 bu/ac with test weight averaging 59 lbs/bu. “Yields in ‘unaffected’ fields (no DON detected) ran 110-130 bu/ac with >62-lb test weights,” Marshall reports.

Further up the Snake River Valley (on the Egin bench and toward Newdale), the hard white spring wheat Paloma tested at 3.0 to 8.8 ppm DON in several fields, Marshall notes, and the hard red WB9668 frequently had detectable levels of DON within the same area. “A few growers [who] reported never having had problems prior to 2015 are seeing up to 4.0 ppm without a prior history of corn production,” she relates.

While numbers are not directly available from the malt industry, barley is also showing greater levels of FHB and DON than in prior years, according to Marshall. Higher humidity and higher temperatures during heading resulted in substantially higher levels of FHB in barley this season. In addition, testing of straw

and green chop is indicating DON accumulation in barley products heading to dairies, she notes.

“While we have not been as concerned about DON in winter grain, FHB was seen in winter wheat in the Magic Valley,” the UI specialist continues. “Usually, the temperatures during flowering of winter grain are too low for FHB infection. In fields near Rupert, Idaho, winter grain was consistently showing the orange sporodochia of sporulating *F. graminearum* resulting from an unusually warm May and June. As almost all of the grain in the Magic Valley is produced under irrigation, humidity conducive to infection occurs at all times in some portion of the fields. Warmer temperatures occurring during flowering and grain fill as a result of changing climate will now threaten a new crop sector”.

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