**Minutes of the NCERA – 184 Wheat Diseases Technical Committee Meeting**

**March 7, 2016 – Pennsacola Beach, FL**

**Administrative Advisor**: Dr. Kendall Lamkey, Iowa State University

**Chair**: Dr. Andrew Friskop, North Dakota State University

**Secretary**: Dr. Nathan M. Kleczewski, University of Delaware

**Immediate Past Chair**: Dr. Damon Smith University of Wisconsin

**Members and guests in attendance:**

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| --- | --- | --- |
| Andrew Friskop | North Dakota |  |
| Nathan Kleczewski | Delaware |  |
| Bethany Grabow | Kansas |  |
| Scott Isard | Pennsylvania |  |
| David Salgado | Ohio |  |
| Patricia Bollich | Louisiana |  |
| Forrest Nutter | Iowa |  |
| Damon Smith | Wisconsin |  |
| Martin Nagelkirk | Michigan |  |
| Terry Spurlock | Arkansas |  |
| Shaukat Ali | South Dakota |  |
| Heather Kelly | Tennessee |  |
| Carl Bradley | Kentucky |  |
| Tom Allen | Mississippi |  |
| Clayton Hollier | Louisiana |  |
| Paul (Trey) Price | Louisiana |  |
| Bob Hunger | Oklahoma |  |
| Erick DeWolf | Kansas |  |
| Laura Sweets | Missouri |  |
| Bill Bockus | Kansas |  |
| Kiersten Wise | Indiana |  |
| Pierce Paul | Ohio |  |
| Hillary Mehl | Virginia |  |
|  |  |  |

The meeting of the NCERA 184 Small Grain Diseases Committee was held in Pensacola Beach Florida at the Hilton Pensacola Beach Hotel on March 7th 2016. Dr. Andrew Friskop welcomed those in attendance at 9:00am. Group introductions followed the welcome. Brief oral reports on the status of the wheat crop and prevalent diseases were given for each state with a member in attendance. Written reports were also provided and compiled into a PDF document.

**The following topics were discussed at the meeting:**

**Barley Disease Management Guide**

* Dr. Friskop brought up the potential need for a more comprehensive barley management guide to account for new or emerging issues and also to address the emerging malting winter barley industry in the East. The group agreed that a barley guide should be developed and Dr. Friskop volunteered to help lead the effort, suggesting individuals provide him with images throughout the growing season to use in the future guide.
* Members of the group mentioned that there will be a need to explore organic barley production and develop these resources for producers.
* Dr. Paul mentioned that the group should consider developing a national booklet or guide when RFP’s are released this season.

**Important Diseases to Address in Winter Barley**

* The group discussed important diseases that need to be better defined in winter barley.
* Spot and net blotch were discussed. Dr. Friskop suggested that those in the East starting to work with winter malting barley send him isolates to help better characterize the fungal population in these regions.
* Concerns of the appropriate timing for Fusarium head blight were discussed. One item was flowering in winter barley vs spring barley. A second item discussed was fungicide efficacy in winter Barley. Dr. Bradley agreed to develop a protocol to generate preliminary fungicide efficacy and timing data for head blight management in winter barley.
* Other diseases discussed included powdery mildew, which is a significant issue in Thoroughbred barley, and barley yellow dwarf.

**High Input Wheat Production Systems in the mid-Atlantic**

* Dr. Kleczewski discussed ongoing research at Delaware examining alternative fungicide programs, irrigation, and Palisade for improving wheat yield and quality
* The variable rate irrigation pivot system at Delaware was discussed, as well as opportunities to collaborate on projects that may include irrigation

**Blending Fungicides and Economics**

* Dr. Salgado discussed ongoing research at The Ohio State University concerning fungicide use and economics across different production systems

**Management of Barley Yellow Dwarf on Winter Wheat in Kansas**

* Dr. Bockus discusses research concerning the use of insecticide seed treatments and planting date on controlling barley yellow dwarf virus in Kansas

**Fungicide Efficacy Table for Wheat Diseases**

* Dr. DeWolf led a discussion on the fungicide efficacy tables
* Fungicides to include this season include Trivapro, Fortix
* Potential issues with footnotes and recommendations for QoI applications vs vomitoxin were discussed
* Dr. DeWolf will send the group the updated sheet and will ask for suggestions in the near future

**NCERA 184 Business Meeting**

**Call with Administrative Advisor**

* The group called Kendall Lamkey, administrative advisor for NCERA 184
* The NCERA-184 5 year period is ending and a new proposal must be drafted and submitted
* The project expires in September, 2017
* Dr. Kleczewski must organize a writing group to draft a new proposal by September 15th
* Dr. Friskop volunteered to be on the group and Dr. Kleczewski will contact Dr. Esker about previous drafts of the proposal to use as a guide. The incoming secretary will also be on the committee
* Kendall will contact Dr. Kleczewski with instructions and deadlines in the near future
* Important topics to include in this draft are importance of emerging barley industry, stripe rust, scab, wheat blast, and the scab forecasting system

**Call with USDA**

* The group contacted Marty Draper at USDA
* Discussion on RFP’s logjam due to new provision required in the Farm Bill
* Discussed the CARE program, and encouraged those in attendance to apply. These are stakeholder driven, applied projects with short term outcomes expected
* ARDP RFA will be released in April. This replaces the RIPA program, and covers research and extension programs

**Discussion of Uniform FHB Protocol**

* Dr. Paul discussed the protocols for validating the decision support system for Fusarium head blight in wheat
* Goal is to determine the value of applying a fungicide when the model is yellow or red and seeing if there are other factors that we should be taking into consideration
* Data is collected from multiple states over two years
* Participants simply apply or do not apply a fungicide to a MS/S variety and a MR variety at FGS 10.5.1 or not.
* Collect visual severity, vomitoxin, weather data

**Dr. Friskop opened the floor for nominations for incoming secretary**

* Emmanual Byamukama had discussed wanting to serve as chair of the group.
* Dr. Friskop nominated Dr. Byamukama and Dr. Bradley seconded motion.
* All in attendance approved the nomination.

**Dr. Friskop moved to approve the minutes.**

Dr. Paul seconded the motion; minutes were approved by the group.

**Future Meeting and Location**

Dr. Kleczewski suggested having the meeting at Wooster, Ohio in 2017. The group could meet with the Great Lakes Wheat Workers group and tour the wheat quality lab. Dr. Paul mentioned that he would be willing to assist Dr. Kleczewski in setting up the meeting. Dr. DeWolf seconded the location suggestion and the group unaminously agreed to hold the 2017 meeting in Wooster, OH. Dr. Young-Kelly noted that the meeting should be in the first 2 weeks of spring. Dr. Smith also suggested that the meeting cannot be held the first two weeks in March, due to commodity classic and SSDW / NCERA 137 meetings.

**Dr. Friskop concluded the meeting at 2:48 pm.**

**State Reports and State-Based Impact Statements Follow**

**Arkansas**

Terry Spurlock, Assistant Professor and Extension Plant Pathologist

University of Arkansas System Division of Agriculture

**Personnel involved in wheat disease extension and research:** Terry Spurlock, Mandy Tolbert, Larry Earnest, Linda Martin, Jason Kelly

**2015 wheat production and major diseases**

Approximately 240,000 acres of wheat were harvested with an average yield statewide of 56 Bu/acre. Rainfall was above average for the spring and due to severe flooding in spring in most of the Arkansas Delta, some of the wheat crop was lost. These losses combined with a poorer yielding crop than expected, with the exception of wheat grown on well-drained soil, and an unusually dry fall contributed to much less acreage planted for 2016 harvest. Foliar disease levels for the state (Septoria tritici blotch and others) were generally low in 2015.

For at least the fourth consecutive year, stripe rust and leaf rust were found in late January and early February on tillering wheat. Leaf rust levels were not reported to be severe later in the season but many fields with early signs of rust were sprayed with 4 oz/acre of propiconazole. Some reports of severe stripe rust occurred in both the north and south areas of the delta with multiple fungicide applications needed to control the disease. Reliable variety reports of affected fields were not made available. In April, conditions became favorable for infection and disease development of Fusarium head blight on early maturing varieties. A few loads of grain were rejected at one elevator but this appeared to be atypical for the crop overall.

**Impact statements:**

1.Responded to numerous field calls to determine diseases present and provide management options.

2. Completed multiple foliar fungicide trials to provide farmers with current product efficacy data.

**Delaware**

Nathan Kleczewski, Extension Plant Pathologist

University of Delaware

**Personnel involved in wheat disease extension and research:** Nathan Kleczewski, Andy Kness, Christopher Ramage, Nathan Smith

**2015 wheat production and major diseases**

In Delaware a total of 70,000 acres of winter wheat and 32,000 of winter barley were planted, down 5,000 and 9,000 acres for wheat and barley, respectively. Statewide averages were 65 and 80 bu / A for wheat and barley, respectively, which was approximately 7 bu/A less than 2014.

2015 was characterized by a very dry period from FGS 6-10. Prolonged drought was not favorable for disease development in most areas throughout the state. In areas where overhead irrigation was implemented, diseases such as tan spot, Stagonospora leaf blotch, and speckled leaf blotch were common, but observed at low levels in the upper canopy. Glume blotch was somewhat prevalent in irrigated fields. Head blight was largely absent in the region due to dry conditions preceding and at flowering. Viruses such as Barley Yellow Dwarf were detected at insignificant levels. Many areas suffered significant pest-related yield losses due to cereal leaf beetle, which occurred earlier and at a higher level in 2015 than what is characteristic for the state. The combination of drought and CLB likely were the most important contributors to reduced yields in 2015.

**Impact statements**

1. Conducted a survey and small plot research on Fusarium head blight in Delaware. Data were shared with producers and growers at local and regional meetings as well as local publications and websites
2. Developed a factsheet on powdery mildew of small grains for printing and viewing
3. Conducted online training course for Pioneer Agronomists throughout the United States. Surveys of those in attendance put the overall production value of this course at 4.9 million $US.
4. Held a wheat quality meeting, which was attended by 150 producers, consultants, and specialists from PA, VA, MD, and DE. Surveys of those in attendance put the value of the information presented at 1.9 million $US
5. Integrated DEOS weather monitoring systems into the Fusarium head blight prediction center interface ([www.wheatscab.psu.edu](http://www.wheatscab.psu.edu)) improving precision of this model in the state and parts of Maryland.

**Illinois**

Santiago Mideros, and Fred Kolb,

University of Illinois at Urbana-Champaign

**2015 wheat production and major diseases**

In Illinois 540,000 acres of winter wheat and 40,000 acres of oats were planted, down 200,000 and up 5,000 acres respectively. Yield averages were 65 and 77 bu / A for wheat and oats, respectively, which was approximately 2 bu/A less than 2014. Significant levels of leaf and stripe rust were observed in 2015. Grain quality was significantly affected by a mixture of scab and pre-harvest sprouting.

**Impact statements**

1. The University of Illinois’ soft red winter wheat program conducts yearly evaluations of Fusarium head blight resistance on hundreds of materials, and has implemented genomic selection for FHB and yield.
2. Experiments have been initiated to map resistance genes to glume blotch and implement genomic selection.
3. Experiments have been initiated to identify pathogenesis genes and characterize the populations of *Fusarium graminearum* in Illinois.

**Indiana**

Kiersten Wise, Field Crops Extension Specialist

Purdue University

**Personnel involved in wheat disease extension and research:** Kiersten Wise, Gail Ruhl. Our new wheat breeder (Mohsen Mohammadi) began in summer 2015.

**2015 wheat production and major diseases**

According to the USDA National Agricultural Statistics Service, approximately 260,000 acres of wheat were harvested in Indiana in 2015, with an average production of 68 bushels/acre, which was a reduction in both acreage and yield from 2014. Fall of 2014 was very wet, which delayed wheat planting, and the spring was also exceptionally wet, which prevented harvest and increased disease levels in wheat. Foliar diseases observed included Stagonospora leaf blotch/Septoria leaf blight. Fusarium head blight (FHB) was observed throughout the state and some fields had high levels of deoxynivalenol present. Farmers were concerned that the FHB model was underpredicting the risk for FHB development, particularly in southern IN, and farmers also struggled to understand why low FHB risk areas had high levels of DON. Leaf rust and stripe rust were observed across Indiana, however all rust diseases arrived too late in the growing season to cause significant yield loss. Several viral diseases of wheat, including wheat streak mosaic virus (WSMV), wheat spindle streak mosaic virus (WSSMV), soil-borne wheat mosaic virus (SBWMV), and barley yellow dwarf virus (BYDV) were confirmed in Indiana.

**Impact statements**

1. Research activities in 2015 focused on evaluating integrated management strategies for control of FHB. The results of these research projects indicate that a well-timed fungicide application can significantly reduce the impact of FHB and DON in wheat varieties, and increase yields in most varieties. This information is of primary importance to growers and is presented in extension programs and summarized in extension articles to aid growers in managing wheat diseases, especially FHB.
2. Research was also conducted on post-anthesis applications of fungicides in conjunction with timing of inoculum availability. Results indicate that due to prolonged tiller development in soft red winter wheat, applications of fungicide post-anthesis may be equally as effective at reducing FHB and DON as when applied at FGS 10.5.1. Indiana also contributed periodic commentary to the USWBSI FHB forecasting tool and disseminated information about risk of FHB and other wheat diseases via Extension newsletter articles.
3. Research is underway to determine the sensitivity of *Fusarium graminearum* to the triazole fungicides metconazole and tebuconazole. We are currently screening isolates from across the United States. This research will help us determine if shifts in sensitivity are occurring to the fungicides recommended for FHB management.

**Kansas**

Erick De Wolf, William Bockus, and Mark A. Davis

**Impact statements**

1. Discussions among participants of the NCERA-184 meetings have helped in the efficiency and accuracy of applied disease research efforts on winter wheat in Kansas. The following projects were aided by these meetings:1. determining the reactions of breeding lines and commercial winter wheat cultivars to various diseases (publications 1, 2, 3, 4, 6, 7, 9, 11, 12, 13); 2. dissemination of disease-reaction data of cultivars to wheat producers (publications 12,13); and 3. the effect of seed-treatment and foliar fungicides on wheat diseases (publications 5, 7, 8). Progress toward identifying resistance to wheat pathogens has helped in the development of new, resistant wheat cultivars.
2. Determining the impact of fungicides on wheat diseases is necessary to develop accurate chemical control recommendations. Extension publications were developed and refined to help producers make more efficient use of fungicides. We are currently developing web-based tools to deliver this information.
3. A multi-state effort to predict epidemics of Fusarium head blight (FHB) continued during the 2009-2015-growing seasons. This prediction effort includes web-based tools, which display daily estimates of disease risk for 30 states. Commentary developed by a disease specialist in each state is displayed along with the risk maps. Commentary is also distributed via an FHB Alert System that sends email and text messages to mobile devices. The prediction tools received over 7,889 sessions (14,355 page views) by 4,394 users during the 2014-growing season in the U.S. (April – August). Nearly all of the wheat disease specialists in the 30 states covered by the disease prediction system contributed commentary to the disease prediction effort. A total of 126 commentaries were submitted in 2014. The FHB Alert System sent commentary to nearly 900 subscribers in 2014. Users of the FHB prediction models and the FHB Alert System were surveyed annually in 2009-2014. The survey results included input from 2,400 respondents and indicated that 72% of these users were either farmers or farm advisors. Nearly 70% of the users applied the information directly on their farm, or used it to make recommendations about disease management to others. In 2009-2014, 95% of the users considered the information to be of high or moderate value for their farm operations and businesses. A subset of questions targeting the influence of the information suggests that 90% of the users experienced moderate or great improvement in their awareness of the disease risk in their area. The results also showed that the information influenced disease management decisions directly for 33% of the respondents, and motivated another 29% to seek advice from others. The 2014 survey asked growers to estimate the monetary value of the information provided to their farm or business. This survey indicates that the median monetary value of the information provided by the prediction system was $15,000 per user. Combining this figure with use statistics suggests that annual impact of the FHB prediction model exceeds $65 million.

**Louisiana**

Trey Price, Extension/Research Plant Pathologist

LSU AgCenter

**Personnel involved in wheat disease extension and research:** Trey Price, Myra Purvis, Hunter Pruitt, Clayton Hollier, Boyd Padgett, Steve Harrison, Rick Mascagni, Brenda Tubana, Kelly Arceneaux

**2015 wheat production and major diseases**

It was a disastrous year for wheat producers in Louisiana mainly due to wheat scab, lodging, and terrible harvest conditions. Estimated losses due to scab alone were near 25%. Nevertheless, we were able to rate the wheat OVTs and Dr. Steve Harrison’s nurseries at MRRS for stripe rust, leaf rust, and scab. Cooperative efforts with Dr. Brenda Tubana examining the effects of soil amendments on wheat diseases also were successful. Our field experiments indicate that most fungicides remain effective and economical on stripe rust and leaf rust. In trials with later applications closer to flowering, it appears that we have management options for wheat scab, albeit with limited efficacy (maximum 50%). Other trials indicated that seed treatments may improve stand, but do not have an effect on yield.

Other issues of note during 2015 included: stripe rust in seedling wheat, bacterial streak, herbicide drift, stem rust, barley yellow dwarf, loose smut, and Septoria leaf blotch.

**Michigan**

Martin Nagelkirk, MSU Extension

Michigan State University

**Personnel involved in wheat disease extension and research:**

Martin Chilvers, Assistant Professor, Department of Plant, Soil and Microbial Sciences

Martin Nagelkirk, Extension Educator

**2015 wheat production and major diseases**

Michigan’s small cereal grain crops consist almost exclusively of soft winter wheat. However, there are some oats being grown and there is a growing interest in the development of a malting barley industry. Relative to winter wheat, the state’s acreage slipped to 475,000 harvested acres in the 2015 season. During the vegetative stages, wheat exhibited relatively low amounts of both powdery mildew and Septoria leafspot. Following heading, however, foliar diseases were more pronounced particularly leaf rust and leaf spots (Septoria leaf spot and Stagonospora leaf blotch). Fusarium head blight (FHB) symptoms were again evident in nearly all Michigan fields. Although disease incidence may have averaged only 1 to 2 heads per 10 feet of row (less than 1 percent of heads) and most DON levels were well below 2 ppm in the major wheat growing regions of the state , there were pockets throughout the state reporting relatively high DON levels. The worst hit areas were in the southern tier of counties. Here, excessive rainfall repeatedly injured the crop and encouraged fusarium development throughout the grain-fill period resulting in some DON levels in excess of 5ppm.

**Minnesota**

Ruth Dill-Macky, Madeleine Smith and Jochum Wiersma

**Personnel involved in wheat disease extension and research::** James Anderson, Ruth Dill-Macky, Yanhong Dong, Melania Figueroa, Carol Ishimaru, Yue Jin, Shahryar Kianian, James Kolmer, Pablo Olivera, Matthew Rouse, Kevin Smith, Madeleine Smith\*, Brian Steffenson, Les Szabo, and Jochum Wiersma\*.

**2015 wheat production and major diseases**

In 2015, 1.53 million acres were planted to wheat (spring and winter) in Minnesota, which is a 270,000 acre increase over 2014. Of the wheat acres harvested in Minnesota, 1.43 million were spring wheat, which represents an increase over the 1.18 million acres harvested in 2014. The winter wheat acreage harvested has continued to increase over the past few years and in 2015 was up again by 11,000 acres from the 32,000 acres harvested in 2014. The average wheat (all wheat) yield for the state was 59.9 bushels per acre, being 5.1 bu/A and 3.2 bu/A above the yields for 2014 and 2013, respectively. Spring wheat yields, at 60 bu/A in 2015, were 9 and 15 bu/A above the yields for 2014 and 2013, respectively. Winter wheat yields for the state averaged 58 bu/A, which was significantly higher than any of the previous three years. There are no official (USDA) statistics available for durum wheat planted in Minnesota. The area of barley harvested in 2015 was 120,000 acres. This is twice the area of the 2014 barley crop and also significantly more than the 2013 crop where 75,000 acres were harvested. The recent increase in barley production is in part due to the increase in acres contracted by malting companies sourcing locally grown malt for microbreweries in Minnesota. The average yield of barley in Minnesota for 2015 was 77 bu/A, which was 25 bu/A above the average yield in 2014. The oat acreage in Minnesota in 2015 was 280,000, which is 40,000 acres more than was planted in either 2013 or 2014. The average yield for oats in Minnesota was 78 bu/A, up from 63 bu/A in 2014.

The 2015 season in Minnesota was ideally suited for cereals and oats, barley, and spring wheat all achieved new state record yield averages of 78, 77 and 60 bu/A, respectively. While yields were excellent the reduced prices and futures for all commodities likely impacted the profitability of small grains in the state.

The winter of 2014-2015 was relatively mild, for Minnesota, and there was little snow cover. This led to 90% of spring wheat, barley and oats being seeded by the end of April. The relatively dry and early spring limited, at least temporarily, the ongoing expansion of corn production north toward the Canadian border. The first diseases to appear in the state were tan spot and stripe rust. The first reports of stripe rust in spring wheat came in mid-June followed quickly by reports of crown rust in oats. The use of fungicides at the five-leaf stage and at anthesis is a common practice for much of the spring wheat acres and this practice appears to have been recently adopted by oat growers in the state, especially after they experienced significant losses in 2014 due to oat crown rust. Bacterial leaf streak (BLS) was observed but appeared much later in the season than in 2014. A large number of acres in Minnesota are still planted to BLS susceptible varieties and so this disease remains a concern, although the impact of BLS on yields appears to have been minimal in 2015. The Impact due to Fusarium head blight (FHB) was generally light across the state in 2015 and only in the southeastern part of the state was routine testing of DON common. Although conditions were drier than 2014 a number of days with 100% relative humidity allowed FHB to gain a foothold in some parts of the state. Where FHB did occur, growers were able to either remove infected grain at harvest by turning up the air on their combines and/or to dilute the DON by mixing seed lots. In the northern third of the state there were some wheat crops that did not meet yield expectations. In many of these cases lower yields were attributed to the abortion of developing kernels following a sudden increase of daytime temperatures during grain filling.

**Impact statements**

1. Screening of advanced breeding material for Fusarium Head Blight (wheat, barley and oat), leaf rust (wheat), stem rust (wheat), net form net blotch (barley), spot form net blotch (barley), bacterial leaf streak (wheat and barley), loose smut (oat), Septoria speckled leaf blotch (barley), spot blotch (barley), powdery mildew (wheat and barley), scald (barley) was conducted in 2015 in uniform, inoculated field nurseries and/or greenhouse tests. Phenotypic data are used to develop and validate marker assisted selection, genomic selection and in the association mapping of disease resistance. Ultimately this work aids in the development of wheat, barley and oat germplasm with improved resistance to multiple diseases.
2. Testing of fungicides on wheat and barley for efficacy to Fusarium head blight was conducted as part of a national cooperative effort and recommendations of the best management practices are made available to growers through the US Wheat and Barley Scab Initiative (USWBSI) and MAES websites.
3. The reactions of hard red spring wheat, barley and oat varieties to various diseases prevalent in Minnesota were disseminated to small grains producers on the Minnesota Variety Trials Results. This information provides growers with options and aids them in selecting cultivars that are appropriate for their area and risk level for the diseases prevalent in Minnesota.

**Missouri**

Laura Sweets, Extension Plant Pathologist

University of Missouri

**2015 wheat production and major diseases**

Fall seedings for the 2015 winter wheat crop in Missouri totaled 760,000 acres although only 610,000 acres were actually harvested. Harvested acres were down 18 percent from the previous year. The wheat yield was estimated at 53 bushels per acre, down five bushels from 2014. The final production for the 2015 crop of Missouri winter wheat is estimated at 32.3 million bushels, twenty five percent below the previous year. Wet conditions through much of the wheat production season led to the widespread development of Fusarium head blight and delayed harvest in many areas leading to an increase in “black” wheat and sprouting in the wheat heads. The July 6, 2015, *Missouri Crop Progress and Condition Report* listed wheat harvest as 68 percent complete, 20 percentage points behind the 5-year average and winter wheat condition was rated 7 percent very poor, 19 percent poor, 45 percent fair, 26 percent good and 3 percent excellent. An estimated 640,000 acres of wheat were planted in the fall of 2015. This represents a decrease of 120 thousand acres from the previous fall and a decrease of 240 thousand acres from the fall of 2013.

The fall of 2014 was dry through much of the state so there were concerns about planting into dry seed beds. Planting was somewhat delayed for this reason. However, stands did emerge fairly well and winter injury was minimal. Early in the season the crop was rated by the Missouri Agricultural Statistics Service as being primarily fair to good with a small percent in excellent condition. But by the middle of June wheat conditions began to slip due to extended periods of cool, wet weather. Harvest was 96 percent complete by July 27- well past average harvest dates. There were scattered reports of foliage diseases but by far the most widespread and serious biotic disease problem throughout Missouri for the 2015 season was Fusarium head blight or scab. A significant acreage was sprayed in an attempt to manage scab but environmental conditions were so favorable for disease development that fungicide sprays did not give the desired benefit. The delay in harvest due to wet conditions also led to an increase in “black” wheat and to sprouting in the head. During harvest there were numerous reports of loads being heavily docked at the elevators or being rejected. This lead to many, many questions on what to do with poor quality wheat. As well as to many rumors about vomitoxin or DON. There were also questions related to the use of 2015 wheat for planting. The Missouri Crop Improvement Association had wheat germination test results ranging from 97% germination to 37% germination. The low germination lots had high levels of dead seed. Much of the low quality seed was eventually planted as cover crop.

**Nebraska**

Stephen Wegulo, Extension Plant Pathologist

University of Nebraska-Lincoln

**Personnel involved in wheat disease extension and research:** Stephen Wegulo, Janelle Millhouse, Julie Stevens, Ryan Haverkamp

**2015 wheat production and major diseases**

In Nebraska in 2015, winter wheat harvested was approximately 46 million bushels, down 35% from 2014. Area harvested for grain totaled 1.21 million acres, down 17% from 2014. Planted acreage totaled 1.49 million, down 4% from 2014. The yield was 38 bushels per acre, down 11 bushels from 2014.

2015 was characterized by excessive rainfall and temperatures that favored stripe rust infections early in the growing season and Fusarium head blight (FHB) later in the growing season. These were the two major diseases and they occurred in epidemic proportions, causing significant yield losses especially in fields that were not sprayed with fungicides. Stripe rust occurred statewide whereas FHB occurred mostly in the southeastern, south central, and southwestern parts of the state. Although there were other foliar diseases, their development was minimal because most of the wheat foliage was destroyed by stripe rust whose onset was early in the growing season.

**Impact statements**

1. Participated in and presented at the 2015 Crop Production Clinics. Estimated impact: $78 million to Nebraska Agriculture.

2. Participated in and presented at 7 wheat field days and 2 Certified Seed Producers meetings. Estimated impact: $9 million.

3. Did 1 Market Journal (MJ) TV interview. Estimated total MJ impact: over $40 million annually to Nebraska's production agriculture.

4. Did 1 Nebraska Ag Almanac radio interview. Estimated impact: $2 million.

5. Did two KRVN radio interviews. KRVN broadcasts agricultural news to Nebraska, Kansas, and parts of four other states. Estimated impact: $4 million.

6. Conducted 6 wheat disease surveys. Estimated impact: $8 million.

7. Co-delivered a nationwide webinar on wheat diseases and seed treatments offered by Seed World. Founded in 1915, Seed World covers news, issues and events as they relate to seed of agricultural crops. Estimated impact: $6 million.

**North Dakota**

Andrew Friskop, Cereal Crop Extension Plant Pathologist

North Dakota State University

P**ersonne**l **involved in wheat disease extension and research:** Andrew Friskop,Scott Meyer,Jim Jordahl, Jessica Halvorson, Elizabeth Crane

**2015 wheat production and major diseases**

**Hard Red Spring Wheat**

North Dakota producers seeded 6.2 million acres in 2015 and had another record year in production. Tan spot was the most prevalent disease across spring wheat acreage and stripe rust was the most yield-limiting foliar disease. Stripe rust was detected on June 1 and the eastern 1/3 of the state had several fields of high stripe rust incidence and severity. Ergot was problematic in the southwest corner of the state resulting in some grain loads being rejected at the elevator. Fusarium head blight (FHB) was problematic in a few areas in northcentral and northwest ND, but most of the spring wheat had low deoxynivalenol (DON) levels.

**Hard Red Winter Wheat**

Winter wheat acreage decreased by approximately 70% when compared to 2014. Although acreage was down, mean yields were higher than the 2014 growing season. The biggest yield-limiting disease in winter wheat was FHB. Higher levels of FHB and DON were reported in southwestern North Dakota. Scab risk (as depicted by the FHB Prediction Model) was high in this area when the winter wheat crop was flowering.

**Durum**

A total of 1.1 million acres of durum were seeded in 2015, which was up from 2014 (820,000 acres). Dry weather during the latter half of the growing season contributed to a high quality durum crop. FHB and DON were lower compared to the problematic 2014 growing season. Most producers impacted by the 2014 season applied fungicides at early-flowering to offset FHB and DON.

**Barley**

Barley was seeded on 1.1 million acres in 2015 and desirable malting contracts prompted more production in non-traditional areas of North Dakota. The most problematic foliar disease was net blotch (both forms) and in some cases resulted in yield losses in excess of 50%. FHB and DON was not problematic for most barley growers as they tend to spray for FHB.

**Impact statements**

1. The updated NCERA-184 Fungicide Efficacy table was distributed to county agents, growers, and other agricultural professionals in 2015. Similar efforts will be done in 2016
2. Commentary was provided for the FHB forecasting website. Most of the reports were given when the small grain crops were approaching anthesis.
3. Based on information delivered at 2015 winter Extension meetings in the northwest, several producers incorporated multiple FHB management tools in 2015.

**Ohio**

Pierce A. Paul

Associate Professor and Small Grain Specialist

Department of Plant Pathology

The Ohio State University, Ohio Agricultural Research and Development Center

**2015 wheat production and major diseases**

Approximately 520,000 acres of SRWW were planted in Ohio in the fall of 2014, down 100,000 acres from fall 2013. Planting intentions were high, but late soybean harvest and poor planting conditions again prevented several fields from being planted.

Spring and early-summer conditions were wet, with fairly frequent rainfall during the months of April and May. However, temperatures were relatively cool, which likely reduced the risk of the scab and other disease during heading and early grain fill. During most of the flowering window, conditions were generally not favorable for scab – either too dry or too cold. Conditions remained relatively cool and dry during grain-fill, but then it rained consistently during the last week of June and the 14-20 days of July, preventing most fields from being harvested in a timely manner. Producers who were able to get the crop out of the field before it began to rain had yields in the 80-Upper 90 bu/A range, but most of the late-harvested field were badly affected – sprouting, low test weight, and vomitoxin contamination. The late-season rainfall also led to high levels of Stagonospora leaf blotch, which also contributed to reducing grain quality.

**The 2015-2016 Crop:** About 600,000 acres of SRWW were planted this past fall (2015). Early corn and soybean harvest was likely the biggest incentive for planting wheat in spite of a relatively poor 2015 wheat season. Most of the crop was planted at the recommended time (within the first two weeks after the fly-safe date). The winter was very mild, so winter-kill was low and the crop looked very good going into and coming out of dormancy. Most of the wheat tilled well after spring top dressing and continues to look good across the state. We are currently about 7 to 10 days early in terms of crop growth and development.

**South Dakota**

Emmanuel Byamukama – Extension Plant Pathologist

South Dakota State University

**Personne**l **involved in wheat disease extension and research:** Emmanuel Byamukam, Shaukat Ali, Marie Langham, Connie Strunk

**2015 wheat production and major diseases**

Wheat acreage in South Dakota was 2.2 m acres for 2015. This was a 16% decrease in acres compared to the previous year. Wheat yields averaged 44 bu/acre for winter wheat and 48 bu/acre for spring wheat. The main challenge with winter wheat in 2015 was winter kill.

The 2015 wheat season in South Dakota was characterized by cool and dry spring that translated later to rainy weather towards wheat heading. This led to heavy scab development in both classes of wheat, with over 56% FHB index and over 7 ppm of DON in the susceptible non treated plots. Also due cooler and wet weather as well as high inolum level from the southern states, we saw severe stripe rust develop in 2015. Stripe rust developed starting at heading and therefore fungicide application was advised. In winter wheat, *wheat streak mosaic virus* continues to be a problem. This is mainly in the west-central South Dakota. Winter wheat in this area is usually planted into wheat fallow with high levels of WSMV in volunteer wheat. Bacterial leaf streak has continued to be a problem in both spring wheat and winter wheat. Leaf spots (Tan spot, Stagonospora blotch) also developed owing to the wet weather.

**Impact statements**

1. Disease alerts and progress and advice for disease management information was disseminated to producers and crop consultants.
2. Efficacy of foliar fungicides on Fusarium head blight and leaf diseases was published to producers and crop consultants.
3. Presented wheat disease management information at various producer meetings, research field days, and plot tours.

**Tennessee**

Heather M. Kelly, Extension/Research Plant Pathologist

University of Tennessee

**University of Tennessee personnel involved in wheat disease extension and research:** Heather Kelly, Tyson Raper, Jamie Jordan, Wesley Crowder

**2015 wheat production and major diseases**

In Tennessee a total of 455,000 acres of soft, red winter wheat was planted with 395,000 harvested. A total of 26.86 million bushels produced with an average of 68 bu/A. Harvested acreage and total production was down 80,000 acres and 4.49 million bushels from 2014, respectively. Although, average yield was up from 66 bu/a in 2014.

In 2015 disease development was minimal, on average, across the state. Moderate, wet weather that turned warm and drier as the season progressed was not conducive for any rust epidemics although there were a few reports of stripe rust that were managed and some late season reports of leaf rust. Septoria/Stagonospora blotch complex was common but mainly just in the lower canopies. No reports of powdery mildew were recorded. Fusarium head blight was minimal, especially compared to the previous years. Viruses such as Barley Yellow Dwarf were detected at insignificant levels.

**Impact Statements**

1. Research activities focused on fungicide timing and efficacy trials on common wheat diseases in Tennessee. In addition, fungicide applications at bloom were implemented to evaluate the performance of the Fusarium head blight prediction tool. Data were shared with producers and growers at local and regional meetings as well as local publications and websites.
2. Updated wheat quick facts sheet for printing and viewing
3. Updated wheat fungicide efficacy table for printing and viewing

**Virginia**

Hillary Mehl, Extension Plant Pathologist

Virginia Tech

**Personnel involved in small grain disease extension and research:** Hillary Mehl, Linda-Byrd Masters, Steve Byrum, Ed Hobbs

**2015 wheat production and major diseases**

In Virginia, wheat yields averaged 66 bu/A on 210,000 acres. This was 5 bu/A lower than the yield record of 71 bu/A in 2008. *Stagonopsora* leaf and glume blotch was the most common foliar disease of wheat in southeastern Virginia, and powdery mildew occurred on susceptible varieties. Rust was minimal in 2015. Overall, conditions were dry from flag leaf emergence through flowering so disease severity was generally low on the upper leaves. Scab (Fusarium head blight) incidence was low overall in the state, but it was present in some fields throughout the state and contributed to yield losses and deoxynivalenol contamination of grain. Viruses including Barley Yellow Dwarf were present in some fields but at low levels.

**Impact statements**

1. Conducted small plot research on foliar diseases in southeastern Virginia.
2. Disseminated wheat disease management data to growers through local meetings and through Extension publications and websites.
3. Posted wheat disease updates to the Virginia Ag Pest and Crop Advisory throughout the growing season and contributed local commentary to the Fusarium Head Blight Prediction Center.

**Wisconsin**

Damon Smith, Extension Plant Pathologist

University of Wisconsin-Madison

**Personnel involved in wheat disease extension and research:** Damon Smith, Shawn Conley, Carol Groves, Scott Chapman, Brian Mueller, John Gaska, Adam Roth, Brian Hudelson

**2015 wheat production and major diseases**

Wisconsin saw a 17% decrease in winter wheat acres planted (245,000) in the 2014-2015 growing season compared to the previous year with 230,000 acres harvested, compared to 250,000 in 2014. Wheat germinated late and had poor tiller development prior to winter dormancy. Despite poor establishment and poor snow cover coupled with cold temperatures, winterkill was relatively isolated. Average yield for the 2015 crop was around 72 bu/A, up 7 bu/A from last year. Wheat establishment in the fall of 2014 was a challenge due to late plantings.

Statewide Fusarium head blight was the most widespread disease in 2015. In southern Wisconsin, fields had high (>20%) incidence of FHB with average severity ratings on heads near 50% on susceptible cultivars. This resulted in significant dockage at the grain elevators in areas of the state. Near the shore of Lake Michigan, growers and consultants report that the Scab Advisor does not perform well, often under-predicting the need to spray in this area.

Other diseases of importance include leaf rust which was present on some varieties in southern Wisconsin but mostly 10% or less severity on flag leaves. Stagnospora/Septoria leaf blotch was also present and variable depending on variety. In central and east-central Wisconsin FHB incidence was lower and more variable than in southern Wisconsin although some FHB could be found in fields. Stripe rust was the predominant disease in this part of the state. Stripe rust at the Arlington research station location nearly defoliated all plants in some plots. More reports of Cephalosporium stripe in a small number of fields around the state were reported in 2015. This is likely related to short rotations in the problematic fields. Powdery mildew was nearly non-existent throughout the state for the third year in a row.

Planting in the fall of 2015 was very favorable. Stands were well-established going into the winter of 2015, which was mild. Wheat in the spring of 2016 looked very healthy and was progressing about 2-3 weeks ahead of schedule.

**Impact statements**

1. M.S.-level graduate student (Brian Mueller) joined the UW field crops program to conduct research on stripe rust and FHB of winter wheat in Wisconsin.
2. Research trials were implemented to understand the epidemiology of stripe rust in the upper Midwest
3. Research on FHB continued and focused on developing improved fungicide application recommendations for Wisconsin winter wheat growers – research suggests that waiting 5 days after anthesis provides excellent control of FHB and significantly reduces deoxynivalenol (DON) levels in harvested grain compared to applications at anthesis.