



Fusarium Focus

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Fall 2009

2009 National FHB Forum Set for Dec. 7-9 in Orlando



The Wyndham Orlando Resort in Orlando, Fla., provides the venue for the 2009 National Fusarium Head Blight Forum on December 7-9. This year's Forum — the 12th — is again geared toward wheat and barley growers, grower group representatives, public and private scientists, millers, maltsters and brewers, additional food processors, consumers and others with an interest in Fusarium Head Blight (scab) and its impact.

Sponsored by the U.S. Wheat & Barley Scab Initiative (USWBSI), the '09 Forum will feature stakeholder and scientific speaker presentations, along with poster sessions, focused group discussions and

evening breakout sessions.

The Forum begins at 1:00 p.m. on Monday, the 7th, and concludes at noon on Wednesday, the 9th. Invited talks on Monday afternoon will be presented by Carl Schwinke of Siemer Milling Co., Teutopolis, Ill., and Gretchen Stewart, CII Laboratory Services, Kansas City, Mo. They're followed by Session 1: Food Safety, Toxicology and Utilization of Mycotoxin-Contaminated Grain. Chidozie Amuzie of Michigan State University will speak on "Risk Assessment and Biomarkers for DON," and a panel of DON lab personnel will discuss sample selection and preparation techniques.

Rounding out the afternoon is Session 2: FHB Management, with four invited speakers. The annual reception and dinner precede evening breakout sessions.

Tuesday morning features Session 3: Variety Development and Host Plant Resistance, with five invited speakers. Focused group discussions will take place in the afternoon, with evening breakout meetings scheduled for that evening.

Session 4: Pathogen Biology and Genetics opens the morning program on Wednesday, followed by Session 5: Gene Discovery and Engineering Resistance.

The USWBSI Steering Committee meets in the afternoon following the Forum's adjournment.

Key dates for the 2009 National Fusarium Head Blight Forum include:

- Oct. 27 — Deadline for registration of posters, papers, abstracts.
- Oct. 30 — Deadline for submission of abstract and manuscript content for the Forum proceedings.
- Nov. 9 — Deadline for early registration (fee: \$150) and last day to receive a full refund.
- Nov. 10 — Late registration begins (fee: \$185).
- Nov. 13 — Last day to reserve hotel with guaranteed availability and rate.
- Nov. 20 — Last day to receive a partial refund.
- Nov. 27 — Registration closes.

Advance registration is required and can be accomplished online at USWBSI's website: www.scabusa.org.

Participants are responsible for making their own hotel reservations. To do so, use the link on the USWBSI website.

Questions regarding the 2009 National FHB Forum can be directed to scabusa@scabusa.org. ♦



'Scab Smart' Now Operational



Grain producers and others looking for the latest information on the management of Fusarium Head Blight (scab) now have a valuable new tool:

"Scab Smart" is the name of a just-activated website designed to serve as a quick guide to the integrated strategies that result in optimum reduction of

Fusarium Head Blight and its primary associated mycotoxin, deoxynivalenol (DON). Scab Smart provides users with two ways of accessing information, according to Marcia McMullen, North Dakota State University extension plant pathologist and coordinator of the site's development. "You can go directly to the

management strategy you're interested in," McMullen explains, "or you can go to the grain class and then to the strategy for that class."

Management strategy categories include variety resistance (by grain class and by state), scab forecasting, fungicides, crop rotation and other strategies (such as residue management, planting date and harvest practices). The covered grain classes include hard red spring wheat, durum wheat, spring barley, hard red winter wheat, soft red winter wheat (broken down by northern and southern regions), soft white wheat and hard white wheat.

Scab Smart's content will be updated on an ongoing basis as new management information becomes available.

The website can be accessed at www.scabsmart.org or by logging on to the U.S. Wheat & Barley Scab Initiative's site — www.scabusa.org — and clicking on the Scab Smart link. ♦

Steering Committee Spring Mtg.

The USWBSI Steering Committee (SC) held its most recent semi-annual meeting in Minneapolis on May 28.

Several important areas were addressed at the meeting. Mike Davis (American Malting Barley Association) provided an update on the FY 2010 federal budget, and Kay Simmons (USDA-ARS) updated the group on ARS issues, including FY09 funding allocation. Executive Committee members reported on



the EC's recommendation on a two-year funding process, the redesigned USWBSI website, the new "Scab Smart" management site, and standardized research proposal review criteria.

Coordinated Project (CP) leaders for the six CPs (three VDHRs, hard winter wheat, barley and durum) each presented recommendations for their FY 2010 working cap level.

The Steering Committee next reviewed the pre-proposal process for research funding and discussed the procedure for setting FY 2010 working caps. The committee then broke up into five small-group discussions to brainstorm on identifying potential topics for targeted research, *i.e.*, focusing on "what aren't we doing that we should be doing." Each group's conclusions were then shared with the overall committee.

The USWBSI Steering Committee exists to ensure comprehensive input from all stakeholders in the scab issue. It seeks to forge consensus strategies for the the scientific, organizational and budgetary aspects of the war on scab. Together, SC members represent all areas of the scab-affected community — including wheat and barley growers, wheat millers, the pasta sector, the malting and brewing industry, crop protection, the seed industry, and public researchers and extension personnel.

For a complete listing of current Steering Committee members, go online to www.scabusa.org. Click on "Committees" and then "Steering."

The SC's next meeting will take place on December 9 in Orlando, Fla., following the 2009 National FHB Forum. ♦



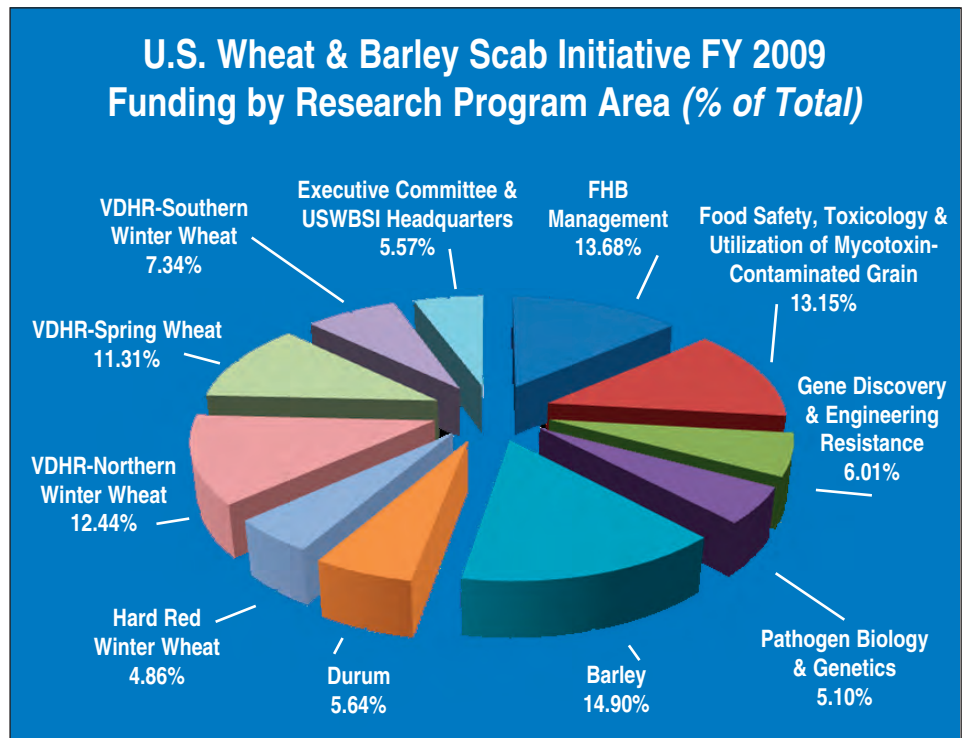
USWBSI Research Funding: FY '09

The U.S. Wheat & Barley Scab Initiative (USWBSI) recommended the funding (to USDA's Agricultural Research Service) of more than \$4.9 million in research project spending for fiscal year 2009. That total encompasses 144 projects located in 25 states, plus Mexico and Syria. Funded entities include 25 land grant universities, USDA-ARS and two international agriculture centers (CIMMYT in Mexico and ICARDA in Syria). A total of 83 principal investigators (PIs) are heading up the projects.

The pie chart at right shows the percentage of total funding being invested in the various research areas. In terms of the dollars actually allocated by ARS (\$4,927,433) per research area, the breakdown is as follows:

- Barley Coordinated Project — \$734,205 on 22 projects
- Durum Coordinated Project — \$277,787 on six projects
- Executive Committee & USWBSI Headquarters — \$274,591
- FHB Management — \$674,047 on 42 projects.
- Food Safety, Toxicology & Utilization of Mycotoxin-Contaminated Grain — \$647,849 on six projects
- Gene Discovery & Engineering Resistance — \$296,200 on eight projects
- Hard Winter Wheat Coordinated Project — \$239,245 on seven projects
- Pathogen Biology & Genomics — \$251,486 on 11 projects
- Variety Development & Host Resistance (VDHR)-Northern Winter Wheat Region — \$613,068 on 17 projects
- VDHR-Spring Wheat Region — \$557,227 on 15 projects
- VDHR-Southern Winter Wheat Region — \$361,728 on seven projects.

Each year, the USWBSI is charged with developing a comprehensive research plan and budget recommendation geared toward achieving its primary mission: to develop, as quickly as possible, effective control measures that minimize the threat of Fusarium Head Blight (scab) — including the reduction of mycotoxins — to the



producers, processors and consumers of wheat and barley. The entire process followed to develop this research plan and budget is a product of extensive deliberations that are overseen and approved by the USWBSI Steering Committee (SC).

This year's review process was completed in December 2008. It was orchestrated by the USWBSI Networking & Facilitation Office in close consultation with the Executive Committee (EC) and chairs of each individual Research Area (RA). A split process was utilized, consisting of: (1) a call for and review of individ-

ual RA-based pre-proposals, and (2) the submission and review of Year 2 documentation for the Coordinated Projects.

A total of 73 pre-proposals were received from 54 Principal Investigators (PIs) at 25 institutions (24 land grant universities plus USDA-ARS). Year 2 documentation for commodity Coordinated Projects included 61 research projects by 44 PIs at 22 institutions (universities plus USDA-ARS, CIMMYT and ICARDA).

The EC recommended plan and budget was presented to the USWBSI Steering Committee in early December. Following a briefing and study of the plan, the SC passed it by a unanimous vote. It thus became the official USWBSI comprehensive research plan and budget recommendation for fiscal year 2009. It was later translated into individual ARS grant applications, which in turn were submitted, en masse, as the USWBSI's recommendation for how ARS could allocate the resources awarded it by the U.S. Congress.

Anyone wishing to learn more about the process should visit the Initiative's website: www.scabusa.org. ♦

Individual Project Information

To view complete listings of FY 2009 research project titles, names of principal investigators, institutions and the amount of USWBSI funding, visit www.scabusa.org. Click on "Committees," followed by "RACs," and then go to the appropriate RAC's homepage.



Scab's '09 Impact

Benign in Some Areas, Troublesome in Others

What kind of a year was 2009 in terms of Fusarium Head Blight (scab) incidence and severity? Not surprisingly, the answer depends upon your location. In some growing areas the problem was scattered and light; in others, it was widespread and serious.

“This was **North Carolina**’s worst year in many for wheat and barley head scab — possibly as bad as the scab epidemic of 2003,” report Paul Murphy (North Carolina State University) and Christina Cowger (USDA-ARS-NCSU). “The Piedmont was the hardest-hit region in the state, with both wheat and barley affected. In eastern North Carolina, there was more localized damage in the area north and south of the Albermarle Sound.”

Murphy and Cowger say Piedmont growers who planted susceptible varieties had from 50 to 90% scab incidence “and were fortunate if they could sell normally high-yielding varieties for feed at 48 lbs/bu test weight and lower.” Meanwhile, they note, “nearby fields of moderately resistant varieties fared much better, with scab incidence of 5-15%.”

In **Virginia**, scab was very prevalent in wheat fields viewed by Virginia Tech extension plant pathologist Erik Stromberg during an early June evaluation trip through the state’s northern and western growing areas. The situation was fueled by conditions very conducive to FHB — *i.e.*, significant rainfall during the wheat flowering period and much of the wheat being planted no-tillage into corn residues. At the time, Stromberg expected damage in Virginia to be the worst in some 15 years — a prediction that, unfortunately, came to fruition.

Much of **Kentucky** experienced a damaging epidemic of FHB this past spring, reports University of Kentucky extension plant pathologist Don Hershman. Scab significantly reduced yields and test weights in many fields, with the worst damage occurring in the western third of the state. Grain harvested from affected fields commonly contained unacceptably high levels of DON (from 2.0 all the way up to 20 ppm), according to Hershman.

In **Arkansas**, widespread, prolonged May rains came on the heels of a warm, dry and windy spring, so there was not much concern about Fusarium Head Blight. “Wheat in southern Arkansas was close to maturity when the rains started, and matured before many [scab] symptoms developed,” according to University of Arkansas plant pathologist Gene Milus.

Scab levels were low to moderate across the rest of the state. Yet FHB was only one problem faced by Arkansas wheat growers in 2009. The frequent rains also promoted glume blotch and leaf blotch, and some wheat died prematurely

because of prolonged flooded soils. All of these issues contributed to low test weights — a common reason for dockage across Arkansas. Dockage for high DON levels was not common, however.

To the northwest of Arkansas, most of **Kansas** escaped serious scab problems in 2009. Only trace levels were found in June university evaluations in the northeastern and north central districts of the state, for instance. The exception to a generally benign season occurred in the southeastern district. Scab proved to be a significant problem there for the third straight year, says Kansas State University plant pathologist Bill Bockus. Early August yield loss estimates placed the figure for southeastern Kansas at 19.4%.

All wheat-growing areas of **Nebraska** had some level of scab in 2009. “South central and eastern Nebraska — the areas that suffered the greatest damage from scab in 2007 and 2008 — escaped damaging levels of the disease in 2009 due to dry weather in May,” according to Stephen Wegulo, University of Nebraska extension plant pathologist. “The disease later developed in June due to prolonged heavy rains; but only late-maturing cultivars were affected.”

Wegulo says damage from scab in those late-maturing varieties was not economically significant in south central and eastern Nebraska. However, in the southwestern part of the state, the rains coincided with flowering. “As a result, some fields planted with susceptible cultivars had economically significant levels of scab,” he reports. While scab typically is very rare in the Nebraska Panhandle, this year it showed up as far north and west as Hemingford because of above-normal June rainfall. Damage in the area, though, was not at economically significant levels.

DON levels in 2009 Nebraska wheat were much lower than those in the 2007 and 2008 crops, Wegulo adds.

To the north, parts of south central **South Dakota** suffered scab levels that were as serious — or worse — than in any previous year. Statewide, winter wheat production was down about 13 bu/ac from last year’s 55-bushel level — mainly because of Fusarium diseases (scab and crown rot). “Crown rot was especially heavy this year due to stressful growing conditions,” says South Dakota State University plant pathologist Lawrence Osborne. “Scab also was a major problem on susceptible varieties like ‘Wesley,’ accounting for a good portion of the yield reduction [compared to] last year.”

The SDSU Seed Testing Laboratory has reported germination rates on some seed lots of as low as 45%, “with a rough average on winter wheat of 70-80%,” Osborne relates. (Germination rates normally run in the mid- to upper 90s.) The low germ rates are largely due to scab infection.

The northeastern district of South Dakota — typically the area most prone to FHB issues — came through fairly unscathed in 2009 compared to other districts in the state.

In **North Dakota**, an early August survey of 310 post-flowering wheat fields and 60 post-heading barley fields revealed generally low levels of scab. North Dakota State University extension plant pathologist Marcia McMullen says FHB symptoms



were observed in 42 (13.5%) of the 310 surveyed wheat fields, with average severity in those 42 fields being a low 2.2%. The highest field severity was 12%, but only a few fields were above 5%. Of the 60 surveyed barley fields, only three showed any symptoms of FHB, with severity in those three fields averaging less than 1%. (Surveyed fields were picked at random, with the variety planted and fungicide-use pattern unknown.)

Very cool nighttime temperatures (averaging in the 40s and low 50s) in July “may have hindered development of the disease,” McMullen suggests. Also, parts of the state received very little rainfall during July. As of August 12, some North Dakota counties bordering Canada still had wheat in FHB-susceptible stages, with forecast models indicating some high risk of infection. However, very high temperatures during the next few days likely obstructed Fusarium Head Blight development in those fields, according to McMullen.

Disease was not a yield- or quality-limiting factor this year for small grains in **Minnesota**, says Charla Hollingsworth, Crookston-based plant pathologist with the University of Minnesota. FHB symptoms were “scattered and widespread in the Red River Valley, but severity was usually low,” she indicates. “The only exception to that was where a susceptible variety was grown and an early flower application of fungicide was not made.”

A late spring followed by a cool summer in the Red River Valley did translate into an extended FHB susceptibility period; but scab levels still remained low.

Levels of FHB in **Wisconsin** were generally low, reports Paul Esker, University of Wisconsin extension field crops plant pathologist. But some samples tested high (above 2.0 ppm) for DON, and dockage or rejection did occur.

Winterkill at some winter wheat trial locations (Arlington and Chilton) reduced the ability to assess varieties for FHB resistance. However, at Janesville (southern Wisconsin), “the incidence of FHB was less than 5% and severity was less than 1%,” Esker reports. At the Lancaster trial site (southwestern Wisconsin), incidence of FHB ranged from 3% up to 23%, with several in the < 1% to 2% range. “Assessments of damaged kernels postharvest showed that there were differences across locations,” Esker adds, “with the lowest levels observed at the Chilton site (< 3% FDK) and levels at the other three locations of as high as 50-60% FDK.”

In southern **Illinois**, where most of that state's wheat acreage is located, an early June survey of nine counties showed scab in every examined wheat field. Percent infected heads ranged from 17 up to 100%. At harvest, dockage for low test weight and high DON was “pretty typical for farmers in southern Illinois,” reports Carl Bradley, University of Illinois extension plant pathologist. “Some loads had DON levels so high that they were rejected at the elevator.” Infection levels in central and northern Illinois were not as serious.

The 2009 Fusarium Head Blight situation in **Indiana** was not favorable. As of mid-June, FHB was very severe and widespread south of Indianapolis — and especially in southwestern and southeastern Indiana, notes Purdue University agronomist Herb Ohm. Yield losses on fields planted to susceptible varieties were expected by Ohm to be at least 15% and perhaps closer to 30%.

Apparent disease levels were lower at Lafayette and northward in Indiana until mid grain fill (mid-June), largely because of cool weather conditions. However, by the time fields approached maturity in late June, FHB disease symptoms were moderately severe in susceptible varieties. In Purdue performance trials at Lafayette, Wabash and Atlanta, Fusarium-damaged kernel levels were running 20 to 30% on susceptible cultivars. “As in other states, university trials are reflecting a much lower disease index (incidence x severity in infected spikes) in certain lines,” Ohm observes. For instance the disease index in Ohm's nursery at Evansville for one line being prepared for likely release was just 4%. That compared with indexes of as high as 50% for certain susceptible varieties.

A late June survey of 97 wheat fields across 21 **Ohio** counties showed an average scab incidence of about 3.6%, according to Ohio State

University cereal grains pathologist Pierce Paul. Of the 97 inspected fields, 22 had incidence levels below 1%, with another 50 rating between 1% and 5%. Only four fields — all in the southwestern part of the state — registered higher than 10% scab incidence.

The Ohio survey also gathered information on the variety planted in each field and its level of resistance to wheat scab. “Of the 37 fields for which variety resistance data were provided, 18 were planted with moderately resistant varieties, eight with moderately susceptible varieties, and 11 with susceptible varieties,” Paul reports. Average scab incidence was lowest in fields planted to moderately resistant varieties (2%).

To the north, Fusarium Head Blight incidence in **Michigan** was quite low this year, remarks Michigan State University agronomist Janet Lewis.

In **New York**, Cornell University plant pathologist Gary Bergstrom surveyed a number of winter wheat fields across the central and western parts of the state during the third week in June. That survey, coupled with observations from extension educators and crop consultants, indicated no significant incidences of Fusarium Head Blight.

“Overall, DON levels were low, and relatively few loads were rejected by flour mills for DON levels exceeding 2.0 ppm,” Bergstrom says. “There were a few apparent hot spots with individual trailer loads of wheat exceeding 6.0 ppm; but other loads from the same geographic areas had low-DON grain.

“We avoided the ‘big hit’ by FHB in 2009 that severely affected some other winter wheat producing states,” Bergstrom concludes. ◆



Arkansas Reports Moderately Resistant Wheat Varieties

Based on results from inoculated and misted nurseries at Fayetteville in 2008 and 2009, and from natural infection across four or five locations in Arkansas in 2009, a few wheat varieties appeared to have moderate resistance to Fusarium Head Blight.

Progeny 166 ranked better than Bess (the moderately resistant check) for a combination of FHB severity, percentage of scabby kernels and DON level in both 2008 and 2009 inoculated and misted nurseries.

Across four locations with natural infection, Progeny 166 ranked 17th for percentage of scabby kernels out of 90 entries in the 2009 Arkansas Wheat Variety Test. However, Progeny 166 may be the same genotype as Dixie 900 that ranked second for the same comparisons. Dixie Bell DB1002 and Delta Grow 4500 ranked first and third, respectively, across the four locations.

In addition to Progeny 166, Armor 5110 and AGS 2050 also ranked better

than Bess in the 2008 inoculated and misted nursery.

Interpreting these results is complicated since all varieties were not in all tests and since pedigrees and previous head blight reactions are not available for most licensed varieties. However, these results are the first comprehensive summary of head blight resistance among varieties marketed in Arkansas.

Data summaries can be found at <http://plantpathology.uark.edu/2229.htm>.

Editor's Note: This report was submitted by UA plant pathologist Gene Milus. Robert Bacon, Scott Monfort and Rick Cartwright contributed to the work. ◆

Canadian FHB Workshop Set for Nov. 2-4 in Ottawa

The sixth Canadian Workshop on Fusarium Head Blight will be held November 2-4 at the Marriott in Ottawa, Ont.

Along with a plenary session, there will be sessions on breeding and markers, biology of the disease, toxicology and safety, and disease management.

Workshop details are available at www.cwfhb.org or by emailing CWFHB-2009@agr.gc.ca.

Scab Resistance in New Kansas Wheat Cultivar

By Allan K. Fritz & William W. Bockus

The Kansas Wheat Alliance is releasing the cultivar 'Everest' this fall for seed production.

Everest, which was developed by Dr. Allan Fritz in the Kansas State University Agronomy Department, is a hard red winter wheat with excellent resistance characteristics. It is resistant to leaf rust, stripe rust, barley yellow dwarf, and the Hessian Fly. It also has moderate resistance to Fusarium Head Blight.

Everest is best suited for the east and central areas of Kansas. Provided below are comparisons of the reaction of Everest with the most popular cultivar in Kansas (Overley) to Fusarium Head Blight and DON. The reactions are from the past few years and are on a 1 to 9 scale where 1 = highly resistant and 9 = highly susceptible.

Everest FHB: 3.30, 3.42, 4.57, 3.72
Overley FHB: 9.00, 8.99, 9.01, 9.49

Everest DON: 4.66, 3.41, 3.20, 2.46
Overley DON: 8.99, 8.99, 9.49, 5.67

For more details on Everest, visit the Kansas Wheat Alliance website: www.kswheatalliance.org. ◆

Durum Quality Program Secures \$3 Million

The FY 2010 Agriculture, Rural Development, Food and Drug Administration and Related Agencies Appropriations conference report has provided \$3 million for the Durum Wheat Quality Program — a temporary cost-share program between growers and USDA to help mitigate the impacts of Fusarium Head Blight (scab) on the domestic durum industry.

About one million acres of durum currently are grown in scab risk areas. Supporters say funding for the Durum Wheat Quality Program will go a long way in helping to address the decline in

durum production and in protecting the jobs associated with the production, processing and packaging of durum, both in North Dakota and throughout the United States.

Funding for the Durum Wheat Quality Program was supported by United States Durum Growers Association, National Pasta Association, North American Millers Association, Montana Grain Producers, North Dakota Wheat Commission, Miller Milling, Dakota Pasta Growers Association and numerous other independent pasta manufacturers. ◆



Fusarium Focus

Fusarium Focus is an online newsletter published periodically by the U.S. Wheat & Barley Scab Initiative. The USWBSI is a national, multi-disciplinary and multi-institutional research system whose goal is to develop as quickly as possible effective control measures that minimize the threat of Fusarium head blight (scab), including the production of mycotoxins, for the producers, processors and consumers of wheat and barley. Contact information is as follows:

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