U.S. WHEAT & BARLEY SCAB INITIATIVE

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2008 National FHB Forum Set For Dec. 2-4 in Indianapolis

Photo: Indianapolis Convention & Visitors Association/www.indy.org

Indianapolis, Ind., is the setting for the 2008 National Fusarium Head Blight Forum. This year's event takes place on December 2-4 at the Crowne Plaza Hotel at Historic Union Station in downtown Indianapolis.

This will be the 11th FHB Forum, which attracts wheat and barley growers, grower group representatives, public and private scientists, millers, maltsters and brewers, other food processors, consumers and additional individuals with an interest in Fusarium Head Blight (scab) and its impact.

The 2008 Forum will feature stakeholder and scientific speaker presentations, along with poster sessions. There also will be focused group discussions and evening breakout sessions.

The Forum begins on Tuesday afternoon, December 2, with a welcome by USWBSI co-chair Dave Van Sanford and a stakeholder talk by the Initiative's other co-chair, Art Brandli. That's followed by the FHB Management speaker session and the Pathogen Biology and Genetics speaker session. Three evening breakout meetings follow dinner: Fungicides and Biocontrol Uniform Trials, Genotyping Centers, and Techs and Grad Students.

Wednesday morning speaker sessions begin with Food Safety, Toxicology and Utilization of Mycotoxin-Contaminated Grain. That's followed by a session on Gene Discovery and Engineering Resistance. The afternoon schedule features focused group discussions (RA-based and VDHR coordinated projects), with commodity-based discussions planned for the evening. Forecasting models will be the subject of an evening breakout meeting.

Thursday morning's speaker session will be on Variety Development and Host Plant Resistance. The Forum adjourns at noon on the 4th.

Here are several key dates for those planning on participating in the 2008 National Fusarium Head Blight Forum:

- Oct. 27 — Deadline for registration of posters, papers, abstracts.
- Oct. 31 — Deadline for submission of abstract and manuscript content for Forum proceedings.
- Nov. 3 — Deadline for early registration (fee: $125) and last day to receive full refund.
- Nov. 4 — Late registration begins (fee: $160)
- Nov. 12 — Last day to reserve hotel with guaranteed rate and availability; last day to receive partial refund.
- Nov. 21 — Registration closes.

Advance registration is required and can be accomplished online at USWBSI's web site: www.scabusa.org. (Registrants will receive one complimentary copy of the Forum proceedings.)

Participants likewise are responsible for making their own hotel reservations. To do so, use the link appearing on the Initiative web site.

Questions regarding this year's FHB Forum may be directed to the USWBSI at scabusa@scabusa.org. ◆

— Déja Vu —

'08 Scab Situation Similar to '07

Nebraska & Kansas Once Again Hardest Hit; Other States Largely Avoid FHB This Year

"Incidence & Severity of Scab Quite Low in 2007," read the headline of a report in the Fall 2007 issue of *Fusarium Focus*. "Nebraska & Kansas Were the Exception," was the subhead for that summary article.

Except for changing the year from 2007 to 2008, the same headlines could be used in assessing this year's scab situation. As in 2007, levels of Fusarium Head Blight (FHB) were quite low this growing season across most areas — with the most notable exceptions again being Nebraska and Kansas.

"Fusarium Head Blight afflicted Nebraska for the second straight year in 2008," confirm Stephen Wegulo and P. Stephen Baenziger, extension plant pathologist and small grains breeder, respectively, with the **University of Nebraska**. "The south central and eastern parts of the state were affected the most; but the disease was observed as far west as Imperial in southwestern Nebraska and in irrigated wheat fields where moisture favored infection during flowering."

Losses of up to 20% were estimated for the most severely affected areas, with the overall statewide loss in grain yield estimated at 2.3% (1.64 million bushels). Based on a late-August wheat price of $8.11 per bushel, that totals out at $13.3 million.

"However, the real losses may be in reduced prices for the infected grain with high levels of deoxynivalenol (DON)," the UN specialists observe. "In the most severely affected areas, DON concentrations of more than 18 ppm were recorded in the most susceptible cultivars. Discounts of up to $5.00 per bushel occurred due to high DON levels."

Some Nebraska growers were reluctant to apply fungicides at flowering since they had already sprayed earlier to control foliar diseases. "However, the fungicides most commonly used to control foliar diseases (Headline, Quilt, Stratego) do not reduce scab," Wegulo and Baenziger point out. "Hence, the damage in [foliar] fungicide-treated fields was also severe." Also, some growers who wanted to spray for scab with ground equipment were unable to do so due to heavy rainfall coinciding with flowering.

"The severe epidemics of 2007 and 2008 are testimony to the fact that although Fusarium Head Blight is sporadic in Nebraska due to a variable climate, it can be devastating when it occurs," conclude Wegulo and Baenziger.

Just to the south, Kansas sustained its second largest loss from FHB since loss estimates were initiated in 1976, report **Kansas State University** specialists William Bockus, Jon Appel, Erick DeWolf and Robert Bowden. (Only the 1982 epidemic caused more loss.)

The 2008 statewide loss in Kansas is estimated at 1.9%. That's equivalent to about 7.1 million bushels — or, put another way, $57 million, based on late-August cash grain prices. Scab was particularly serious in the eastern third of Kansas this year, according to KSU, with losses placed at 17.6% for the northeast crop reporting district, 15.8% for the east central district and 8.7% in the southeast reporting district.

'The severe epidemics of 2007 and 2008 are testimony to the fact that although Fusarium Head Blight is sporadic in Nebraska due to a variable climate, it can be devastating when it occurs.'

In addition to the above-noted production losses, a number of Kansas growers incurred market discounts due to DON levels being above the allowed tolerance.

Because the vast majority of Kansas small grain production is in the *western* two-thirds of the state, "statewide loss was much lower than it could have been," note the KSU group. "However, one main reason for low production in the eastern third of Kansas is farmer aversion to the risk of FHB epidemics. This year illustrates the potential for significant FHB losses in the eastern third of Kansas."

To the southeast, neither Arkansas nor Louisiana reported significant scab issues this year. "We had a pretty dry spring and only a moderate incidence of scab," notes Stephen Harrison, wheat and oat breeder with **Louisiana State University**. The disease was more prevalent in the southwestern (rice growing) area of the state, as is commonly the case. Acreage of both wheat and corn was up significantly in Louisiana in 2008, Harrison adds, "and the possibility certainly exists for increased scab in 2008/09 as a result of more wheat following corn."

In Arkansas, rainy weather during April and May promoted a low level of FHB in wheat fields during the soft dough stage. However, final yields were not affected, according to **University of Arkansas** plant pathologist Gene Milus.

To assess levels of scab and DON in 2008, extension agents in 15 counties collected 120 random wheat samples from commercial fields for analysis. Only three of the Arkansas samples had more than a trace of scabby grain; 19% showed a trace; and 78% had no detectable level. Results of toxin analysis indicated no detectable DON in 31% of the samples, with 54% having levels below 0.3 ppm. Just one sample was

greater than 2.0 ppm, while the remaining 14% had DON levels between 0.3 and 1.0 ppm.

The 2008 scab situation was quite benign in the Dakotas. **South Dakota State University** plant pathologist Larry Osborne says FHB was not a serious problem in his state this year, "though many winter wheat producers did treat for the disease." The SDSU scab advisory web site received more than 1,000 hits during the period when winter and spring wheat were heading, he adds.

South Dakota was significantly drier around the time most of the state's winter wheat was heading, Osborne indicates, and stayed that way until after the spring wheat crop was near maturity. "Some reports of higher-than-normal DON in winter wheat made their way to me; but in general, it was a low scab year for South Dakota," he advises. The value of scab forecast models (both SDSU's and that of Penn State) was affirmed for a number of producers who held off spraying their spring wheat due to the models' low-risk predictions.

In North Dakota, the annual field survey of major diseases and insects in wheat and barley revealed "very low FHB incidence and severity" across the state this year, according to **North Dakota State University** extension plant pathologist Marcia McMullen. The 2008 survey covered 974 wheat and 222 barley fields across all of the state's nine crop reporting districts — including 279 post-flowering wheat fields and 93 post-heading barley fields. "Of the post-flowering wheat fields, 23.3% showed some symptoms of FHB; but the average FHB index was only 1.7%," according to McMullen. "Of the post-heading barley fields surveyed, 10.8% showed some symptoms of FHB, but the average FHB index in these fields was only 2.2%."

The most frequent occurrence and highest severity of scab was observed in the northeast district of North Dakota, where repeated small showers, coupled with late maturation of the crop during the first half of August, favored FHB development and some late DON production. "The average FHB index in the northeast district was 3.4% in wheat and

3.0% in barley — values higher than elsewhere in the state, but still at relatively low levels," McMullen reports. No incidences of scab were observed in most of North Dakota's western districts, where very dry conditions existed throughout much of the 2008 growing season.

Across the Red River to the east, Minnesota had generally good wheat yields with low FHB severity and incidence, says Charla Hollingsworth, extension plant pathologist with the **University of Minnesota** Northwest Research & Outreach Center, Crookston. Disease pressure was considerably higher in certain locales, however. "Some of these areas had excessive rain during the early growing season and continued to have frequent rain through grain fill," Hollingsworth reports.

"Yields were up because soils weren't saturated and rain was timely; but quality was disappointing."

"Scab was easy enough to find in Illinois during 2008, but generally not severe," says Carl Bradley, **University of Illinois** plant pathologist. Incidence of scab in non-irrigated fungicide trials around the state ranged from zero to 10%. "This closely matched what was observed in growers' fields," Bradley relates.

Herb Ohm, professor of agronomy at **Purdue University**, reports that the spring and early summer of 2008 were very wet and cool in Indiana, with no noticeable FHB around the state. "However, the disease did develop late in grain filling, apparently with the onset of seasonable warm and humid conditions beginning about early June and through harvest," Ohm adds. "We noted the disease when harvesting our nursery plots, and the Indiana Crop Improvement Association distributed a notice after harvest that some seed samples sent in for lab tests were lower than normal for percent germination."

Don Hershman, **University of Kentucky** extension plant pathologist, says that while significant head scab (20-25% incidence and severity) occurred in a small number of isolated, early heading fields, "FHB and DON levels were extremely low in 99% of the Kentucky wheat crop." Hershman did not receive any reports of excess DON, "although it would not surprise me if there was an isolated case here and there."

The UK plant pathologist says the very low incidence of scab in 2008 was mainly due to "a general lack of multiple days of rainy weather. When we had rain (and we actually did have quite a bit of rain this spring), the next day was always dry, sunny and windy. Plus, it was very dry during grain fill, which favors high yields but not FHB/DON."

University of Maryland extension plant pathologist Arvydas Grybauskas says FHB and DON were "non-issues" in his state during 2008. "Although we had periods of significant rainfall between heading and soft dough, our temperatures remained cool. Those conditions helped extend the grain fill period, but were unfavorable for significant Fusarium Head Blight development," he explains. "The only symptoms of FHB were noted in a small percentage of the crop at the very end of the grain fill period, just as the crop was beginning to turn," Grybauskas adds. "I was thinking that might lead to some unexpected surprises for growers at the elevator due to elevated DON levels; but I have not had any reports of rejections due to DON."

Carl Griffey, small grains breeder with **Virginia Tech**, reports "notable FHB in Virginia this year." The disease was visible and scabby kernels could be found in grain samples harvested in state variety trials at Blacksburg (southwest part of the

state), Holland (southeast) and Warsaw (northern coastal plain). Evaluation of 91 released wheat cultivars and experimental lines at the Holland site showed an average Fusarium Head Blight rating of 2.0 (on a 0-9 scale, with 0 = highly resistant and 9 = highly susceptible). Ratings ranged from 0.5 up to 5.5.

Most North Carolina wheat fields escaped significant FHB damage in 2008, and average yield and test weight were high. "However, rain coincided with flowering in the northeastern part of the state, and FHB incidences of 10-20% were observed in numerous production fields — particularly in the area surrounding the Albemarle Sound," says Christina Cowger, **USDA-ARS** plant pathologist at **North Carolina State University**. "Scab joined 'take-all' (a disease resulting in white, sterile heads and stunting) and a late-spring freeze to have a moderate effect on otherwise strong yields in this area."

Significant levels of FHB also appeared in non-inoculated test plots at Kinston (southeast North Carolina) and Pinetown (east). At Pinetown, FHB was heavier in later-planted, later-heading tests. "Luckily, elevated FHB levels in commercial Tidewater fields do not seem to have resulted in substantial DON problems," Cowger indicates, "as extension agents reported no known instances of dockage or rejection for DON at grain intake points."

Fusarium Head Blight and DON contamination were not major problems for winter wheat production in 2008 in most regions of New York, reports **Cornell University** plant pathologist Gary Bergstrom. "The exception was the Lake Champlain Valley of New York and Vermont, where rainfall in early June coincided with wheat flowering, according to Bergstrom. "Significant DON contamination of has been reported from that region. Conditions were dry from head emergence through early grain formation in the larger wheat production areas of central and western New York, resulting in a low incidence of FHB by soft dough."

DON levels appear to average below 0.5 ppm across the region, Bergstrom indicates. "Yet some individual fields (often planted into corn stubble and in humid microclimates) produced grain with as much as 5 ppm DON." ◆

U.S. Contingent Attends Internat'l FHB Symposium Held in Hungary

Several U.S. scientists and stakeholders in the U.S. Wheat & Barley Scab Initiative participated in the Third International Symposium on Fusarium Head Blight take took place in early September in Szeged, Hungary. The event, which was held in conjunction with the 10th European Fusarium Seminar, attracted about 150 scientists and others from a number of countries. Two Americans — Dave Van Sanford and Bikram Gill — were members of the organizing committee. Van Sanford is a University of Kentucky wheat breeder and co-chair of the U.S. Wheat & Barley Scab Initiative. Gill is professor of plant pathology at Kansas State University and director of the KSU Wheat Genetics Resource Center.

Several Americans presented invited talks at the symposium, including:

- Jim Anderson, University of Minnesota — "QTL Mapping and Marker-Assisted Selection for Fusarium Head Blight Resistance in Wheat"
- Dave Van Sanford, University of Kentucky — "Breeding FHB-Resistant Soft Winter Wheat: Progress and Prospects"
- Prem Jauhar, USDA-ARS, Fargo, N.D. — "Synthesis of a FHB-Resistant Durum Disomic Alien Addition Line with a Pair of Diploid Wheatgrass Chromosomes"
- Steve Scofield, USDA-ARS, West Lafayette, Ind. — "Evaluating the Ability of the Barley Strip Mosaic Virus-Induced Gene Silencing System to Simultaneously Silence Two Wheat Genes"
- Marcia McMullen, North Dakota State University — "Integrated Strategies for Fusarium Head Blight Management in the United States"
- Ruth Dill-Macky, University of Minnesota — "Cultural Control Practices for Fusarium Head Blight: Problems and Solutions"

Minnesota producer and USWBSI co-chair Art Brandli says he came away from the symposium with an enhanced understanding of the global scope of Fusarium Head Blight, as well as an appreciation for the volume and quality of research being conducted on the issue. As in the United States, other affected countries tend to view FHB management as a multi-faceted effort — with strong emphasis on improved cultivar resistance. "We'll probably never find that 'home run'" in terms of controlling FHB, Brandli says, referring to the long history of the disease in other areas of the world. "We're looking for those 'singles' that can help keep us in the ballgame."

NDSU's Marcia McMullen says the international symposium provided her with "an opportunity to learn what others around the world are doing to understand FHB and how they are combating this disease in other countries. It truly is a worldwide disease, found wherever cereals are grown in conjunction with a favorable environment for the disease cycle to occur." ◆

Below: Participants in the 3rd International Symposium on Fusarium Head Blight.

Photo: Lazlo Faraday / Hungary

NIRS Method for Precise Identification Of Fusarium-Damaged Wheat Kernels

By K.H.S. Peiris and F.E. Dowell

Engineering Research Unit, USDA-ARS Grain Marketing and Production Research Center, Manhattan, Kan.

Development of scab-resistant wheat varieties may be enhanced by non-destructive evaluation of kernels for *Fusarium*-damaged kernels (FDKs) and deoxynivalenol (DON) levels. *Fusarium* infection generally affects kernel appearance, but insect damage and other fungi can cause similar symptoms. Also, some kernels may have high DON levels but appear asymptomatic.

We are developing technology to correctly identify FDKs using an automated single-kernel NIR (SKNIR) system. A calibration developed to select sound kernels from scabby kernels had an accuracy of more than 99%, but the fraction sorted as FDKs contain kernels which are not totally scabby or sound ("grey kernels"). Comparison of NIR spectra of sound and FDKs (both tombstones and grey kernels) showed distinguishable NIR absorption patterns at 960-985, 1110-1180, 1210-1230 and 1310-1350 nm wavebands. These differences may be due to changes in food (carbohydrates and proteins) reserves and/or DON levels. Additional research is ongoing to determine DON levels of grey kernels and to assess the accuracy of sorting FDKs.

We are also developing a calibration to estimate DON levels of single wheat kernels. Kernels from artificially inoculated and control wheat spikes were used for the collection of spectra in order to get a concentration gradient of DON for calibration and validation samples. Analysis of single kernel DON by wet chemical methods will also yield additional information regarding the changes in DON levels in kernels above and below the point of infection.

The findings of these studies will be helpful to develop a rapid and automated single kernel evaluation technology to correctly identify sound and FDKs in wheat samples and/or to sort wheat kernels based on DON level. This will facilitate quick evaluation of a large number of breeding lines for scab resistance to identify better scab resistant varieties or parent materials for crossing. Further, this technique may be extended as a cost-effective and environmentally friendly technique for analysis of DON in wheat samples for grading commercial grain lots by replacing the time consuming and expensive methods that use various other chemicals for extraction of DON. This technique may also be extended to other grains such as barley. ◆

Va. Tech Supports New DON Testing Services for Eastern U.S. Stakeholders

*By David G. Schmale, III**

Concerns about deoxynivalenol (DON) continue to mount, and there is a growing need to develop and expand U.S. Wheat & Barley Scab Initiative diagnostic laboratories for mycotoxins throughout the United States. Mycotoxin testing services are vital to the development of varieties of wheat and barley with reduced mycotoxin potential and are required to develop and/or exclude strategies for managing Fusarium Head Blight.

With recent support from the USWBSI and the Virginia Small Grains Board, the Schmale Laboratory at Virginia Tech launched a new regional diagnostic laboratory for mycotoxins in the eastern United States. In FY08, the Schmale Laboratory will be testing approximately 6,000 wheat and barley samples for DON from stakeholders in four states (Maryland, North Carolina, New York and Virginia). Testing services are managed by two talented scientists (Patricia Gundrum and Diane Reaver) and four dedicated undergraduates (D'Lourdes Cuadra, Shannon Grosse, Tamara Fetters and Will Russell).

The ultimate goals of this work are to provide analytical services necessary to develop new cultivars of wheat and barley with reduced potential for DON contamination and to facilitate DON testing that will improve chemical and cultural practices necessary to reduce DON contamination in wheat and barley. The availability of these new testing services will expedite the acquisition and delivery of data from DON analyses and ensure increased uniformity, quality and sample capacity for stakeholders in the eastern United States. ◆

Below: Members of the Schmale Laboratory peer over wheat and barley samples to be tested for DON in FY08.

**David Schmale is assistant professor of mycotoxicology and fungal plant pathology at Virginia Polytechnic Institute and State University, Blacksburg.*

A Six-Rowed *vrs1* Mutant in FHB-Resistant Line CIho4196

By Christine Boyd[1], Richard Horsley[2] and Andris Kleinhofs[1]

One of the goals of the U.S. Wheat & Barley Scab Initiative is to develop six-rowed Fusarium Head Blight (FHB)-resistant cultivars. This has proven difficult due to the close linkage of the two-rowed (*vrs1*) trait to a major FHB resistance QTL on chromosome 2H bin10 (Horsley et al. 2006; Mesfin et al. 2003). To eliminate this obstacle, we have developed a six-rowed (*vrs1*) mutant in the FHB-resistant line CIho4196 (Fig. 1) (Boyd et al. 2008).

The mutant, designated G07-014, was isolated in a gamma irradiated CIho4196 M2 population (proposed gene and allele designation *vrs1.u*). The mutant phenotype was confirmed in Pullman, Wash., during the summer of 2008 and genotype confirmed by sequencing. Sequence analysis revealed that the mutant *vrs1* gene has a 9 nucleotide (nt) deletion compared with the wild-type CIho4196 *vrs1* gene (Fig. 2). FHB resistance of the mutant was comparable to CIho4196 in China during winter 2007/08 (Table 1).

[1] *Dept. of Crop & Soil Sciences, Washington State University, Pullman, WA 99164-6420*

[2] *Dept. of Plant Sciences, North Dakota State University, Fargo, ND 58105-5051*

Figure 1. *Left to right:* CIho4196, Mutant G07-014 and cv. Morex Spikes.

Since the 9 nt deletion does not result in a frameshift, we wondered why the protein is inactivated. It turned out that the deletion is at the beginning of the homeodomain of exon II, a critical region of the gene (Fig. 3).

Commercial six-rowed cultivars carry a mutant *vrs1* gene and also an *int-c* gene which facilitates filling of the side florets. Therefore we have also isolated several intermedium mutants (Fig. 4). These are being crossed to the *vrs1* mutant to enhance the six-rowed trait development.

Limited seed is available by contacting Andris Kleinhofs. ◆

Article references listed on next page.

Table 1. Fusarium Head Blight Score & Plant Height of CIho4196 & G07-014 — 2007/08 FHB Nursery, Zhejiang University, Hangzhou, China.

Entry	FHB Score				Plant Height
	May 7, 2008	May 9, 2008	Average	Standard Deviation	
	----------1-5 score*----------				*(cm)*
CIho4196	2.0	2.0	2.0	0.00	140
G07-014	1.0	2.0	1.5	0.71	141

** Score of 1 = no disease and 5 = severe disease.*

Figure 2. Comparison of the CIho4196 *Vrs1* Gene Sequence With the Mutant G07-014 Gene Sequence.

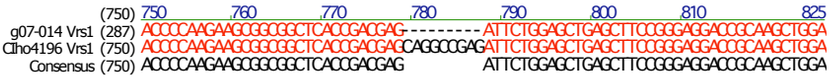
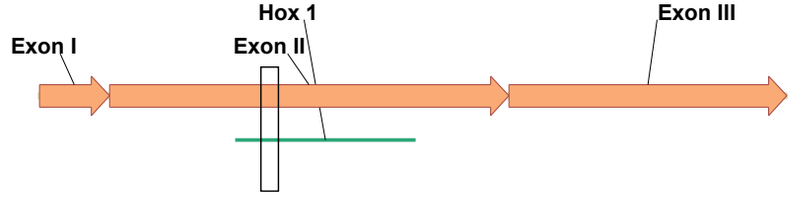


Figure 3. CIho4196 *Vrs1* cDNA Structure.

Approximate location of the 9nt deletion Is boxed. Homeodomain region Is underlined.



Splicing Product of Vrs1 Cl 1-4 7 669 bp

Figure 4. *Left to Right:* CIho4196, Intermedium Mutant G07-012 and G07-013, and cv. Morex Spikes.

Nozzle Angle Improves Spray Coverage on Barley Heads

By Scott Halley[1], Gary Van Ee[2], Richard Horsley[3], Stephen Neate[4] and Vern Hofman[5]

Most sprayers are configured to apply herbicides to field crops with a vertical nozzle orientation. The primary target for controlling Fusarium Head Blight with fungicide is the sides of the grain head. Past studies have shown that spray coverage on grain heads can be improved considerably by angling the spray nozzles forward so the spray pattern hits the grain head at a more perpendicular angle as compared to directing the spray pattern vertically.

A study was conducted in 2008 on barley at the North Dakota State University Langdon Research Extension Center. The study compared a vertical spray nozzle configuration to nozzles that were oriented forward 30 degrees down from horizontal.

The study was conducted with a tractor-mounted sprayer on two barley cultivars with different levels of resistance (Tradition and ND20448). Fungicide efficacy will be reported later this winter. A dye was included in the spray solution. After spraying, heads were removed and the dye was washed from the head with alcohol. Absorbance from this solution was recorded with a photospectrometer which provides a comparison of spray coverage. (While this study was completed on barley, the same principle also applies to wheat.)

Figure 1 shows the averages of both barley cultivars. Column 1 shows the difference in head coverage when spray nozzles direct the spray straight down, as compared to column 2 which applies spray forward 30 degrees down from horizontal. Grain heads present a very small target when spray is directed straight down, while angling nozzles directed forward allows more spray to be deposited on the side of heads.

Many spray booms are difficult to rotate the nozzles forward 60 degrees from vertical, but nozzle adapters are commercially available that can be added between the nozzle body and the nozzle. Some adapters are designed to angle the nozzles 45 degrees forward, while single-swivel nozzle adapters can be set at any angle. The idea is to apply spray so it is deposited on the side of the grain head. Scab control is best when the head is covered with fungicide, and a nozzle that applies spray 30 degrees down from horizontal is preferred over the 45-degree angle nozzle.

Some growers have used the forward and backward nozzle design, which was the early recommendation. This works well at low travel speeds, *i.e.*, 3.0 to 4.0 miles per hour applying 20 gallons per acre (GPA). A single angled forward-facing nozzle is as effective at speeds of 8.0 to 10 miles per hour as are two nozzles. The backward-facing nozzle does little good at this speed, as the spray drops fall almost vertical to the crop.

The studies also found that applying fungicide with one forward-facing nozzle at 10 GPA controls scab equal or better than 20 GPA with the forward- and backward-facing nozzle. This means much less water is needed in the field.

More information on this nozzle arrangement can be found in NDSU Extension Publication AE-1314. This is available from North Dakota county extension offices or on the web. Go to www.ag.ndsu.edu and then search for the publication number. ◆

[1]*Crop Protection Scientist, North Dakota State University Research Extension Center, Langdon;* [2]*Retired Ag Engineer, Michigan State University;* [3]*Barley Breeder, NDSU;* [4]*Plant Pathologist, NDSU;* [5]*Professor Emeritus, Ag Engineering, NDSU.*

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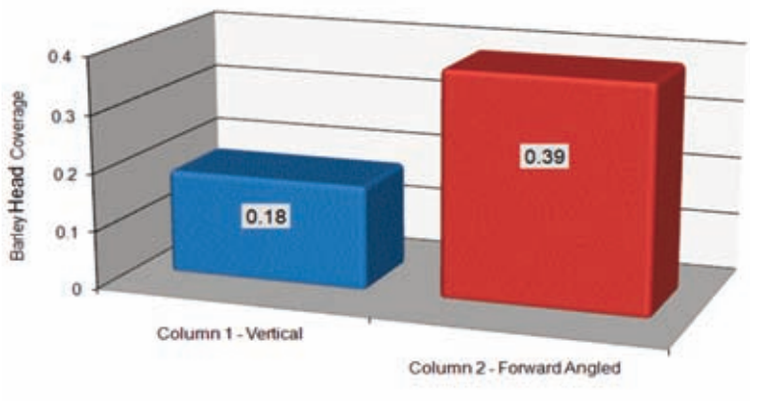

Figure 1. Relation of Dye Coverage on Barley Heads with Forward-Angled (30° down from horizontal) and Vertical Nozzles.

— Scab-Related Peer-Reviewed Publications —

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National Wheat Genomics Conference Dec. 4-6 in Indy

The second National Wheat Genomics Conference will be held on December 4-6 at the Crowne Plaza Hotel in Indianapolis, Ind. The conference follows the 2008 National Fusarium Head Blight Forum at the same venue.

All U.S. wheat workers are invited and encouraged to attend the December conference, regardless of area of research expertise. Details on the conference agenda, speakers, poster sessions, registration, travel and hotel reservations can be found on the NWGC's web site: http://wheat.pw.usda.gov/nwgc08.html.

This year's National Wheat Genomics Conference session topics will include Wheat Structural Genomics and Bioinformatics, Genomics of Abiotic Stress, Genomics and Wheat Quality, and Genomics of Wheat Development. There also is a poster session.

Questions regarding the December conference can be directed to organizing committee co-chair Justin Faris (justin.faris@ars.usda.gov) or co-chair Scot Hulbert (scot_hulbert@wsu.edu).◆

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:

U.S. Wheat & Barley Scab Initiative
Networking & Facilitation Office
380 Plant & Soil Sciences Bldg.
East Lansing, MI 48824-1325

Phone — (517) 355-0271, Ext. 1183
Fax — (517) 353-3955
E-mail — scabusa@scabusa.org
Web — www.scabusa.org

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