U.S. WHEAT & BARLEY SCAB INITIATIVE

Fusarium Focus

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Brandli Now USWBSI Co-Chair

Northwestern Minnesota Producer Chosen to Succeed Late Tom Anderson in Leadership Role

This past December, the U.S. Wheat & Barley Scab Initiative (USWBSI) named Art Brandli as its new co-chairman. Brandli succeeded Barnesville, Minn., farmer Tom Anderson, who died in July. Anderson had served as USWBSI co-chair since the Initiative's inception in 1997.

Brandli, a third-generation farmer from the northern Minnesota community of Warroad, served four years in the U.S. Navy. Following his discharge, he enrolled at the University of Minnesota, where he earned a bachelor's degree in electrical engineering and a master's in business administration.

In 1973 Brandli and his wife, Nancy, returned to the Warroad area and began farming. Wheat has been their primary crop, but they've also grown barley, sunflower, canola, soybeans and grass seed on their 2,200-acre farm. At one time, the Brandlis also operated a 130-head cow/calf herd.

Art Brandli

The Brandlis recently sold their Roseau County farming operation. Since then, Art has directed a transition of the farm from production agriculture to forest and wildlife production for its new owner.

Brandli has served on several local and statewide boards during the past 35 years, including the Warroad school board, a state rural education board, a university advisory board and a statewide farm marketing cooperative board. His involvement on wheat boards dates back to his election 13 years ago to the Minnesota Wheat Research and Promotion Council, of which he is a past chairman and current member. That work led to his serving on the boards of U.S. Wheat Associates and national Wheat Foods Council, which he also chaired.

Brandli was selected as co-chair by the USWBSI Steering Committee following the 2007 National Fusarium Head Blight Forum in Kansas City. His fellow co-chair is University of Kentucky wheat breeder Dave Van Sanford.

"I'm extremely impressed with the Scab Initiative program and all its research projects," the new USWBSI co-chair observed following his selection. "My goal is to be a communications conduit not only to and from growers, but also between researchers and industry."

Brandli emphasizes the critical importance of an integrated approach to resolving the scab-related problems impacting the nation's wheat and barley industries. "We need to hit scab with every piece of ammunition we have — from fungicides, to improved varieties, to biotechnology," he states.

"I like to see results, and I'm anxious that we come to conclusions on some of these projects, generating results that can go back and benefit the producers." ◆

Inside: '07 FHB Forum Highlights

The 2007 National Fusarium Head Blight Forum, held in Kansas City on December 2-4, attracted more than 200 crop scientists, growers and industry representatives. The 10th FHB Forum featured a mix of stakeholder and scientific speaker presentations, poster sessions and focused discussion groups. See pages 2 and 3 for photos and narrative on the '07 forum.

— Recap: The 2007 FHB Forum —

Forum Photos: Don Lilleboe

Above: Ruth Dill-Macky of the University of Minnesota was one of several speakers who paid tribute to the late Tom Anderson, Minnesota wheat grower and co-chair of the U.S. Wheat & Barley Scab Initiative from 1997 to 2007. Listening to Dill-Macky are, left to right: Dave Van Sanford, USWBSI co-chair; Kirsten Anderson; Tom and Kirsten's daughter, Melissa; and their son, Paul.

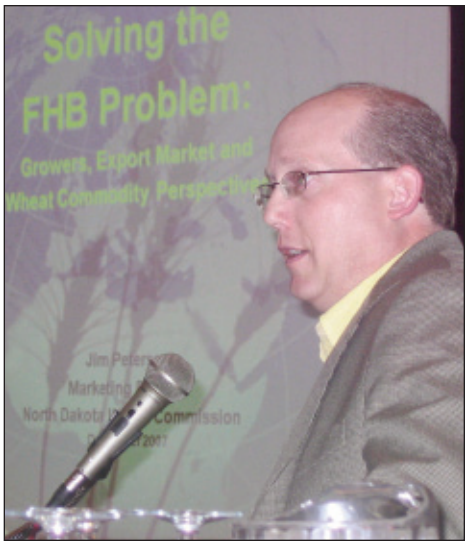
Above: Poster sessions once again were an important Forum component. More than 100 posters were presented, encompassing all five of the USWBSI's focus areas: Food Safety, Toxicology & Utilization of Mycotoxin-Contaminated Grain; Pathogen Biology and Genetics; Gene Discovery & Engineering Resistance; FHB Management; and Variety Development & Host Resistance.

Below: Greg McMaster, USDA-ARS, Fort Collins, Colo., was one of the 2007 Forum's invited speakers. McMaster spoke on "Time of Flowering in Wheat for Managing Fusarium Head Blight," discussing wheat development and how an increased understanding of flowering time and its influence can help improve the management of Fusarium head blight.

Below: North Dakota State University plant pathologist Marcia McMullen outlined spring wheat, winter wheat, durum and barley studies in her state. Several 2005 research trials in eastern North Dakota "provided quantitive evidence that a combination of crop rotation, variety choice and fungicide treatment reduced FHB severity and DON levels in an additive manner," she noted.

Right: One afternoon of the 2007 Forum was dedicated to focused group discussions by research area. Here, Stephen Neate (at easel) of North Dakota State University and Christina Cowger, USDA-ARS, Raleigh, N.C., moderate the FHB Management session. Along with discussion of the current state of research in each area, the breakout sessions also addressed the stated goals of the USWBSI action plan that was finalized earlier in 2007. One of the FHB Management objectives is enhanced communication and end user education/outreach. Toward that end, the FHB Management group endorsed the development of a generic management brochure — supplemented by individual state-oriented inserts — for distribution to growers and other stakeholders.

Above: Linnea Skoglund of Busch Agricultural Resources updated the audience on efforts to meet the FHB challenges to malting barley and brewing through breeding. All malting barley cultivars grown in the 1990s were susceptible to FHB, she noted, and breeding programs had little or no resistance in their "up and coming" lines. Since then, "progress has been painfully slow," Skoglund stated, "due to lack of major genes with large effects in a background close to that needed for brewing." However, there have been "incremental improvements in DON accumulation in advanced lines using a variety of genetic resources." These lines, she added, "are slowly progressing through the testing and acceptance procedures on their way to farmers' fields and the brew house."



Above: Jim Peterson, marketing director for the North Dakota Wheat Commission, outlined the economic impact of FHB from the perspective of growers, the export market and the wheat industry in general. He pointed out that scab has provoked shifts in growers' cropping systems and varieties planted. Within North Dakota, acreage of spring wheat, durum and barley has, since the mid-1990s, migrated westward and declined overall. "Finding solutions to FHB is critical to our future," Peterson emphasized — especially as small grains compete more intensely with other crops for acreage.

2008 National Fusarium Head Blight Forum

December 2-4

Crowne Plaza Hotel • Indianapolis, Ind.

Economic Perspectives of Wheat Growers Confronting FHB & DON

Summary of Plenary Talk from the 2007 National Fusarium Head Blight Forum

No one is more of a stakeholder in the ongoing effort to control Fusarium Head Blight (scab) and deoxynivalenol (DON) than the producers of wheat and barley. So how can their economic perspectives help guide the decisions of where to focus research on scab and DON?

That was the question posed by Felicia Wu in her presentation to the 2007 National Fusarium Head Blight Forum in Kansas City. Wu, an assistant professor in the Department of Environmental & Occupational Health at the University of Pittsburgh, delivered a plenary talk during the first day of the '07 Forum.

Wu pointed out that small grain growers suffer loss from scab in three ways: lower yield, lower test weight and dockage at the elevator from the presence of Fusarium-damaged kernels in their delivered loads.

DON negatively impacts growers as well through marketing discounts and animal health issues. Depending upon the levels of scab and DON, a grower's economic losses obviously can be substantial.

For growers affected by scab and/or DON, the result is a lot of uncertainty — both in terms of whether and how to grow the crop, and in the marketplace: Will it be a favorable or unfavorable year for scab? How reliable are the prediction models available to me? Which varieties should I grow? Should I apply a fungicide — and, if so, when? What levels of discounts can I expect this year if my crop is impacted by scab and DON?

While moderately resistant varieties have been entering the market within recent years, there remain impediments to growers' adoption of these resistant cultivars, according to Wu. For example, there's the issue of geographic suitability (climate, soil, plant height) for a given variety. Then there is the individual grower's preference for certain agronomic characteristics that may not be present at a satisfactory level in a specific variety. Finally, in those years when scab does not become a serious problem, some growers may question their decision to plant FHB-resistant varieties.

Felicia Wu

Despite such hurdles, "high-yield resistant cultivars are an absolute economic benefit to growers," Wu stressed, adding that "continual grower outreach is vital" to ensure the adoption and optimum management of such varieties.

What about the cost-effectiveness of fungicide treatments to reduce damage from scab?

Wu reminded the audience that the timing of application is critical. She reported that the highest efficacy levels to date have been 50-60% against FHB and a 30-40% reduction in DON.

When might fungicides provide an inadequate return to growers, she asked?

- When they're not needed but still applied.
- When they're applied too early or too late (thus allowing the disease to still develop, DON to accumulate, and the resulting harvested grain being discounted and possibly rejected).
- When they're applied correctly — but their efficacy is "insufficient to substantially reduce economic loss under high disease pressure" (*e.g.*, wet, humid conditions during flowering or exceptionally early grain fill).
- When the fungicide cannot be applied at all due to rain or persistent excessive winds.

Wu asked — and then answered — the question of whether fungicides applied for scab/DON control are cost-effective. Her general example — admittedly using price levels significantly lower than those found in today's marketplace — looked at the expense of scab to a grower, in a "scab year," when a fungicide is not used. The analysis factored in projected yield without scab, market price, yield loss through scab's presence, test weight, scab-damaged kernel discounts and DON discounts. The bottom line was a total expected cost — due to scab — of $41.60 per acre.

If, under that scenario, the grower did apply a fungicide, Wu calculated a net benefit of between $0.20 to $9.20 per acre, depending on the percentage of control and the cost of the fungicide application. "It is cost-effective," she observed. "But growers must aim for the lowest (feasible) fungicide costs." Emphasizing that her models utilized "average" crop reduction and control costs, Wu added that "in years predicted to have very high risk [of scab, growers] should definitely use fungicide."

The University of Pittsburgh professor also addressed the topic of crop choice — *i.e.*, wheat producers replacing at least some of those acres with an alternative crop such as corn. While attractive prices (spurred by ethanol demand) helped hike 2007 U.S. corn plantings by 12.1 million acres over 2006, wheat and barley prices likewise have increased dramatically, she pointed out.

In the end, Wu stated, while some elements of small grain production are out of the control of producers, several other elements can be affected by them. The challenge for FHB/DON researchers, she emphasized, is to "increase the efficacy of [those] elements over which growers have control." That effort should take the form of (1) steady improvement in the quality of FHB-resistant cultivars; (2) improved fungicidal efficacy and cost-effectiveness; (3) heightened predictive power of disease models; and (4) continual outreach to growers regarding the best tools available to them. ♦

Upcoming USWBSI Research-Based Planning Meetings

Spring Wheat Parents Coordinated Project (VDHR-SPR) Planning Meeting

Date: March 31, 2008
Location: Fargo, N.D.
Purpose: Discuss and if necessary modify plans for second year of VDHR-SPR Coordinated Project.
Coordinator: Dave Garvin - garvi007@umn.edu

Hard Winter Wheat Coordinated Project (HWW-CP) Planning Meeting

Date: April 28, 2008
Location: Manhattan, Kan.
Purpose: Discuss and if necessary modify plans for second year of HWW-CP Coordinated Project.
Coordinator: Stephen Baenziger - pbaenziger1@unl.edu

Barley Coordinated Project (BAR-CP) Planning Meeting

Date: June 2008 (date not yet finalized, but likely sometime in the first half of the month).
Location: Fort Collins, Colo.
Purpose: Discuss and refine research plans for Year 2 of the Barley CP, and to discuss any other research issues that can still be addressed in Year 1.
Coordinator: Kevin Smith - smith376@umn.edu

GDER - Tour of FHB Nursery for Transgenic Materials

Date: July 2008 (date not yet finalized)
Location: St. Paul/Rosemount, Minn.
Purpose: Provide stakeholders (and cooperating scientists) an opportunity to see GMO wheat and barley in the field, and demonstrate that this approach offers some potential to mitigate FHB and/or DON.
Coordinator: Ruth Dill-Macky - ruthdm@umn.edu

FHB Management (MGMT) and Pathogen Biology and Genetics (PBG)

MGMT and PBG groups will first meet separately, and then together.

Date: July 27, 2008
Location: Minneapolis, Minn. (These meetings will be held during the 2008 APS Centennial Meeting, July 26-30)
Purpose for MGMT Meeting: At this meeting, those who are considering submitting FY09 pre-proposals in the areas of chemical and biological control, integrated management, and epidemiology will discuss priorities and common research objectives. Research protocols will be agreed upon. Mechanisms for creating coordinated pre-proposals will be clarified.
MGMT Coordinators: Christina Cowger (christina_cowger@ncsu.edu) and Stephen Neate (stephen.neate@ndsu.edu)
Purpose for PBG Meeting: Planning meeting for pre-proposals for the Pathogen Biology Committee. Those considering submitting pre-proposals to this RAC should attend to discuss priorities and the coordination of projects.
PBG Coordinator: Frances Trail - trail@msu.edu
Purpose for Joint Meeting between MGMT and PBG: The purpose of this meeting is to determine how researchers in these two research areas can coordinate research to enhance the discovery of practical solutions to the disease problem.

Persons interested in participating in any of the above meetings are encouraged to contact the meeting coordinator.

Soft Winter Wheat Coordinated Scab Research Projects Meeting

Eastern soft wheat breeders held a meeting in Wooster, Ohio, on March 11 to further the coordination of FHB breeding efforts in the VDHR research area. The meeting was attended by 41 people. In attendance from public institutions were 14 breeders and one pathologist, eight staff and post-docs, and four graduate students. Also in attendance were six breeders from private companies, five representatives from the milling industry, and three wheat growers. All participants provided input into 10 agenda items.

For More Information: Clay Sneller - sneller.5@osu.edu

2007 FHB Forum Proceedings

The complete proceedings of the 2007 National Fusarium Head Blight Forum are available online. To view and/or download the proceedings, go to www.scabusa.org and look under "What's New?"

FHB-Related Magazine Cover Graphic

The above-depicted magazine cover — from the January 18 issue of the *Journal of Biological Chemistry* —provides an stunning visualization pertaining to the value of molecular approaches to understanding and combating Fusarium head blight.

The photo refers to an article in that issue titled, "Structural and Functional Characterization of the TRI101 Trichothecene 3-*O*-Acetyltransferase from *Fusarium sporotrichioides* and *Fusarium graminearum*: Kinetic Insights to Combating Fusarium Head Blight."

Authorized by Graeme Garvey*, Susan McCormick# and Ivan Rayment,*the article showed that there are significant differences in the kinetic ability of TRI10-1 orthologs to inactivate trichothecene mycotoxins. The authors suggest those differences "might be reflected in the ability of these enzymes to combat Fusarium head blight when inserted as transgenes and hence the choice of enzyme may be critical." The article is is available online at http://www.jbc.org. ◆

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Recent Scab-Related Peer-Reviewed Publications

- E.M. Del Ponte, J.M.C. Fernandes, G.C. Bergstrom. 2007. Influence of growth stage on Fusarium head blight and deoxynivalenol production in wheat. *Journal of Phytopathology* 155 (10), 577-581.

(This manuscript documents that Fusarium infection can occur as late as the hard dough stage (counter to the prevailing view of this disease) and result in DON contamination of otherwise plump and nonsymptomatic kernels. These findings have important implications for predictive models of DON risk; for the window of wheat vulnerability and corresponding control measures; and for current grading systems that employ the presence of visibly damaged kernels as a means of estimating DON content.)

Fusarium Focus welcomes your submissions for listing. Please send to:

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Minnesota Releases 'Tom' Wheat

By James Anderson
Wheat Breeder & Professor
University of Minnesota

This January, the University of Minnesota Agricultural Experiment Station released a new spring wheat variety to be known as "Tom." The variety was named after the late Tom Anderson, former chair of the U.S. Wheat & Barley Scab Initiative, in recognition of his many contributions to the wheat industry.

Tom — MN01311-A-1, pedigree 97T-1003 (Verde/Sonja)/Verde — possesses medium maturity, height and straw strength. This variety has shown consistently high grain yields (especially in northern locations), moderate leaf rust resistance and a level of Fusarium head blight resistance comparable to Alsen. It also is resistant to the Ug99 race of rust.

Tom has large kernels, above-average test weight and grain content, as well as very good resistance to preharvest sprouting.


Tom Anderson

Anderson, who farmed near Barnesville, Minn., passed away in the summer of 2007. He is remembered as a visionary leader for agriculture at the local, regional and national levels.

Anderson was instrumental in conceiving and founding the U.S. Wheat & Barley Scab Initiative and then was its co-chair from 1997 to 2007. He also served as a grower representative on numerous other ag research and position search committees. ◆

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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