



Fusarium Focus

Volume 18 Issue 1

Winter 2018

2017 FHB Forum Draws 195+

Nearly 200 scientists, graduate students, growers and industry representatives from the U.S. and foreign countries attended the 2017 National Fusarium Head Blight Forum in early December. The 20th FHB Forum took place at the Hyatt Regency in downtown Milwaukee, Wis.

The event featured stakeholder and scientific invited speaker presentations, plus focused group discussions and social events for attendee interaction. Numerous research posters were on display as well, with primary authors present to discuss the research. For the fourth year, postdoctoral scientists and graduate students participated in “Flash & Dash” sessions in which they provided mini-oral presentations on posters they had at the Forum.

Organized/hosted by the U.S. Wheat & Barley Scab Initiative (USWBSI), the annual FHB Forum provides a central venue for reports on the latest research findings on Fusarium Head Blight (scab) and deoxynivalenol (DON), the mycotoxin produced by scab infection in grains.

The 2018 National Fusarium Head Blight Forum will return to the Hyatt Regency at the Arch in St. Louis, Mo. Dates are December 2-4.

The following pages contain photos and talk summaries from some of the



invited speaker presentations at the 2017 Forum. PDF copies of the following presentations are posted on the USWBSI’s website — www.scabusa.org — as are the full Forum Proceedings:

- *Five Ongoing Challenges for the USWBSI* / Dave Van Sanford, University of Kentucky and outgoing USWBSI co-chair.
- *Metabolism, Toxicity and Occurrence of Deoxynivalenol-3-glucoside* / Senay Simsek, North Dakota State University, Fargo.
- *FHB Impacts on Southeastern*

Millers, Farmers, Seedsmen and Breeders / Jimmy Clements, AGSouth Genetics, Albany, Ga.

- *Data Management for Efficient Phenotypic and Genomic Selection in Applied Breeding Programs* / Rich Horsley, North Dakota State University, Fargo.

- *Unraveling FHB Epidemics in the Brazilian Subtropics: Lessons Learned and Control Strategies* / Emerson Del Ponte, University Federal de Vicosa, Vicosa - MG, Brazil.

- *Enhanced Resistance to Trichotheceae and FHB by *Exproressioni* of Arabidopsis and Wheat Non-specific Lipid Transfer Proteins (*nsLTPs*) in Wheat* / John McLaughlin, Rutgers University, New Brunswick, N.J.

- *A Regional Approach to Genomic Selection for Scab Resistance* / Martin Sarinelli, North Carolina State University, Raleigh, N.C. ❖

USWBSI Researcher Co-Chair Transition

Ruth Dill-Macky Replaces
Dave Van Sanford

— See Articles on Pages 2 & 3 —



Dill-Macky Is New Initiative Co-Chair

Ruth Dill-Macky, research plant pathologist with the University of Minnesota, is the new researcher co-chair of the U.S. Wheat & Barley Scab Initiative. Dill-Macky officially assumed the co-chair position as of January 1. She succeeds University of Kentucky wheat breeder David Van Sanford, who had served the USWBSI as its researcher co-chair since 2006.

Her approval as co-chair was first endorsed by USDA-ARS national program director Jose Costa and then voted upon by the USWBSI Executive Committee and Steering Committee, respectively.

“I think there is cause for great optimism,” Van Sanford said during the 2017 National FHB Forum in recognition of Dill-Macky’s talents, experience and dedication to the USWBSI and its work.

A native of Australia, Dill-Macky completed her BSc and BSc Honours degrees at the University of Queensland in 1983 and 1984, respectively. She then took a position as research plant pathologist with the Queensland Department of Primary Industries at the Queensland Wheat Research Institute (now the Leslie Research Facility) in Toowoomba. There, she recounts, “I gained research experience in the diseases of barley and wheat and a sound knowledge of plant breeding, cereal chemistry and the production systems used for cereals in Australia.”

During that time, Dill-Macky enrolled in a Ph.D. program through the University of Queensland. Her thesis research focused on stem rust. “As I neared the end of my Ph.D. program, I looked to gain additional experience with the cereal rusts,” she explains. That led to her moving to the United States for a post-doctoral position work-



Ruth Dill-Macky

ing with stem rust of barley at the USDA-ARS Cereal Rust Laboratory (now the Cereal Disease Laboratory) in St. Paul, Minn.

During her two years at the USDA-ARS St. Paul laboratory, Dill-Macky expanded her understanding of rust biology and disease control practices in North America. “My early research experience,” she relates, “provided me a solid foundation that has enabled me to collaborate with relative ease with numerous colleagues whose expertise differs from my own, but with whom I share goals to developing effective disease control measures for the economic pathogens of cereal crops.”

Dill-Macky joined the faculty of the University of Minnesota’s Department of Plant Pathology as an assistant professor in 1994. She is now a professor in the department, where her independent cereal crop research program has focused on Fusarium Head Blight (FHB), as well as net blotch of barley, loose smut of oat, tan spot of wheat, root rots of cereals — all the while maintaining her interest in cereal

rusts. More recently, she has expanded the program to include bacterial leaf streak of wheat and barley.

Dill-Macky’s internationally recognized work on Fusarium Head Blight encompasses the examination of host, pathogen and environmental factors in the development of FHB and deoxynivalenol (DON) accumulation. Her research has been instrumental in selecting sources of resistance, developing effective techniques to screen breeding progeny for resistance, conducting studies to understand the nature and genetics of host resistance, and in examining factors affecting resistance expression. Her collaborations with wheat, barley and oat breeding programs have been key components in the development of cultivars with improved resistance to multiple diseases, including nine wheat, two barley and five oat cultivars released by the University of Minnesota. She also has published nearly three dozen peer-reviewed journal articles as well as authoring or co-authoring numerous abstracts relating to posters or oral presentations at national and international meetings.

Dill-Macky’s connections with the U.S. Wheat & Barley Scab Initiative date back to the early 1990s, actually prior to the USWBSI’s formal establishment. “Soon after the 1993 FHB epidemic, a collaborative research effort was established including researchers from Minnesota, North Dakota, South Dakota and Manitoba, Canada,” she says in recalling her role in formulating the region’s initial research plan.

Dill-Macky organized the first National FHB Forum (held in St. Paul in 1997) and, since then, has been continually involved in the USWBSI’s efforts, both as a researcher and as an Initiative leader. Shortly after the USWBSI was established, she was elected to its Steering Committee; and, in 2010, to the USWBSI Executive Committee. As an EC member, she reviews research proposals (around 130 annually) submitted for funding. She also has helped develop the scientific program for the annual FHB Forum and has fostered collaboration across discipline and geographic boundaries. ❖



Van Sanford Reflects On Leadership Years

Served As USWBSI Researcher Co-Chair From 2006 Through 2017

Dave Van Sanford took the reins as researcher co-chair of the U.S. Wheat & Barley Scab Initiative at the beginning of 2006. He was just the second person to hold that post, having succeeded Rick Ward of Michigan State University. Ward, one of the “founding fathers” of the Initiative in 1997, was leaving his MSU faculty position for CIMMYT in Mexico, where he would work with Dr. Norman Borlaug on the Global Rust Initiative.

Van Sanford was already a busy man as of late 2005. In addition to his position as wheat breeder with the University of Kentucky, he was wrapping up a term as chairman of the National Wheat Improvement Committee. That’s when Ward asked if he would be interested in taking over as USWBSI co-chair.

Sue Canty had joined the Initiative as administrator in 2000, based at the USWBSI Networking & Facilitation Office in East Lansing. “Sue and I had already established a good working relationship when she helped me out as NWIC chair, scheduling all of our D.C. visits when we went to the Hill in the spring,” Van Sanford remembers. “It was a huge job, and having that shared work experience told both of us that we could work together well.” The rest, as the saying goes, is history.

Several people paid tribute to Van Sanford and his commitment to USWBSI during a recognition dinner at the 2017 National FHB Forum in Milwaukee. Jose Costa, national program leader for grain crops with USDA-ARS, thanked Van Sanford “for his exceptional contributions to the USWBSI and American agriculture,” affirming “he has done a phenomenal



Dave Van Sanford

job.” Mike Davis, president of the American Malting Barley Association and USWBSI Executive Committee member, characterized Van Sanford as a “driving force: tough when it was needed, but always working to form a consensus. Dave has done more than anyone could have expected.” And Sue Canty, with whom Van Sanford worked very closely for more than a decade, saluted him as “a great boss: open, honest, forthright.”

For his part, Van Sanford paid tribute to the many partners who comprise the U.S. Wheat & Barley Scab Initiative. He recognized stakeholders as a group and several by name; the PIs (principal investigators), “who continue to be willing to do battle every year” in

‘I just put stakeholders first, and I made listening a priority.’

the effort to reduce the impact of FHB and DON; the Initiative’s Steering Committee, “the people who really guide the USWBSI;” and finally, the Executive Committee and Sue Canty.

Asked whether he had any sort of “guesstimate” as to the amount of time and energy invested as USWBSI co-chair across the past decade-plus, Van Sanford says that’s very difficult to quantify. “It fluctuated a great deal during the year,” he notes. “Fortunately, it did not impinge much on the field part of my [UK breeding] program, so during planting and harvest I could focus on getting those jobs done. When I was pulled away, it was always for something time-sensitive that had to be ‘front and center’ in my mind.

“The main drawback was not being able to devote myself as completely to areas of interest like genomic selection and responsibilities liking taking care of grad students.”

While he’s hardly one to seek kudos for his USWBSI contributions, Van Sanford does allow that “the one accomplishment that I feel best about is that over time, communication and collaboration has really increased.” Shortly after becoming Initiative co-chair, he was attending a CIMMYT meeting in Mexico. During one poster session, Van Sanford recalls, it became apparent that multiple groups supported by the USWBSI were mapping the same gene — but there was little or no communication among them. “It was clear to me that we couldn’t let getting a ‘scoop’ be more important than delivering solutions to stakeholders,” he recounts. “So I began thinking about what became the Coordinated Projects (CP). I think the CPs have been great for the Initiative, and I’ve observed great strides in collaboration — even in those research areas that don’t currently have CPs.”

As to his USWBSI leadership role, “I just put stakeholders first, and I made listening a priority,” Van Sanford observes. “The EC (Executive Committee), for example, is populated by very smart, deeply committed people. My job was to make sure their ideas and opinions were heard and val-



'Five Ongoing Challenges'

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ued; and from that, we could fashion policy. A big part of leadership was also listening to Sue (Canty), running ideas by her to make sure that I wasn't out in 'left field.'

Van Sanford also treasures the personal relationships that were developed and deepened during his tenure as Initiative co-chair. "The USWBSI is an amazing community, and it has been so cool to see how conversations have evolved over the years; how stakeholders in particular have learned the nuances, impediments, struggles and accomplishments of different scientists and different research areas," he says. "I have gone to [Capitol] Hill any number of times and been in groups that included a miller and a farmer who I knew well from our USWBSI shared experience. It was very clear to the [congressional] staffers that we were very much on the same page."

How will Dave Van Sanford be investing his "freed-up time" now that he's no longer researcher co-chair of the U.S. Wheat & Barley Scab Initiative? "Right now, I'm drilling down into the breeding program and just taking time to plan the next few years in a pretty detailed way," he relates. "This is something I've been wanting to do for a long time, so it is fun!" ❖

Mark Your Calendar!

2018 National FHB Forum

December 2-4

Hyatt Regency
At the Arch

St. Louis, Mo.

— 2017 FHB Forum —

Robust Management Programs to Minimize Losses

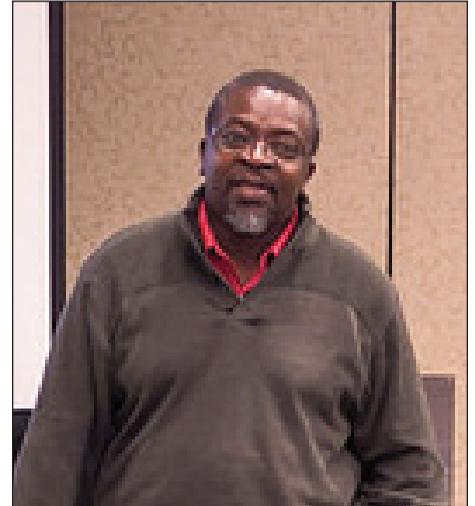
Robust Management Programs to Minimize Losses Due to Fusarium Head Blight and Deoxynivalenol in Wheat was the title of the presentation delivered by **Pierce Paul** to the 2017 FHB Forum in Milwaukee. Paul is Wooster-based plant pathologist and extension specialist with Ohio State University.

Paul presented an overview of scab management guidelines and barriers, incorporating uniform fungicide trial results encompassing 17 states throughout the U.S. spring wheat and winter wheat regions. General management guidelines for wheat producers in these states include the application of Prosaro® or Caramba® fungicide at anthesis; the use of wheat varieties with resistance to scab; tillage; crop rotation; and, the employment of the FHB Prediction Tool. A common barrier to broader adoption of these strategies is unsatisfactory application timing due to either (1) adverse weather conditions, (2) lack of field-level flowering uniformity, and/or (3) an inability to adequately identify anthesis.

Primary questions among researchers and stakeholders (*e.g.*, wheat growers) are:

- How effective are early or late fungicide treatments when it comes to influencing disease index, DON levels, grain yield and test weight?
- Is efficacy influenced by the fungicide used (*i.e.*, Prosaro vs. Caramba)?
- Is efficacy influenced by wheat type/region (*i.e.*, spring wheat vs. winter wheat)?
- Is fungicide efficacy influenced by level of cultivar resistance to scab?

Paul presented cumulative data from the multi-state uniform fungicide and integrated management trials. The conclusions drawn from these extensive data across states and years were as follows:



Pierce Paul

- Both pre- and post-anthesis fungicide treatments were effective in terms of reducing FHB incidence, disease index, DON and FDK (*Fusarium*-damaged kernels).

- There is a comparable level of efficacy between anthesis and post-anthesis treatments when it comes to reducing FHB index and DON. Both of these treatment timings were more effective than the pre-anthesis timing of application.

- The efficacy of Caramba and Prosaro was comparable against FHB index.

- Post-anthesis treatments had a higher efficacy in spring wheat than in winter wheat production regions.

The combination of the best resistant variety and a Prosaro or Caramba application, whether at or a few days after anthesis, was more effective than a fungicide treatment or resistance alone, Paul reported. The integrated approach resulted in the greatest reductions in FHB index, DON and FDK, and the highest increases in grain yield and test weight. ❖



— 2017 FHB Forum —

Do QoI Fungicides Potentially Contribute to Increased DON Levels?

Does the use of Quinone outside inhibitor (QoI) fungicides potentially contribute to increased DON levels in wheat?

Carl Bradley, University of Kentucky plant pathologist, addressed that question during his presentation at the 2017 National FHB Forum.

QoI — also known as strobilurin — fungicides are commonly used to manage foliar diseases of wheat. However, they have not been recommended for management of Fusarium Head Blight. “Reports of low efficacy in managing FHB and reports of increased deoxynivalenol (DON) associated with late applications (at heading or later) of QoI fungicides” are the main reasons why they have not been recommended for FHB, Bradley explained.

Nonetheless, QoI fungicides sometimes are applied at later growth stages, such as Feekes 10.5 (heading complete), to help control foliar diseases. “Many fungicide products registered for wheat contain a mixture of a QoI active ingredient and a demethylation inhibitor (DMI, also known as triazole) active ingredient,” Bradley noted. “Currently, certain DMI fungicides are the only products available that are recommended for FHB control.”

A multi-state research project sought to determine (1) the effects of QoI and QoI + DMI fungicides applied at different growth stages on FHB and DON, and (2) whether sequential applications of a QoI at flag leaf emergence followed by DMI at anthesis counteracted any potential DON increase associated with the application of a QoI alone. Data from trials conducted across 17 soft and hard wheat-producing states were utilized for this research.

The compiled data showed that while some QoI fungicide applications did significantly reduce FHB index values compared to the non-treated con-



Carl Bradley

trol, they were not as effective as DMI fungicides in reducing FHB index values. “When applied alone, QoI fungicides significantly increased DON values, relative to the non-treated control, when applied at Feekes 10.0 or 10.5,” Bradley reported. “Only one of the three

QoI + DMI products applied at Feekes 10.5 significantly increased DON values relative to the non-treated control, while the other two products had no effect on DON.” Sequential applications of a QoI fungicide at Feekes 9 (flag leaf emergence), followed by a DMI product at Feekes 10.5.1 (anthesis), generally reduced DON relative to the non-treated control. “However, the reduction in DON observed with these sequential applications was generally not as great as observed with a solo DMI application at Feekes 10.5.1,” he added.

In general, Bradley summarized, this multi-state research project confirmed that QoI (strobilurin) fungicides have the potential to increase DON levels in wheat when applied at Feekes 10.0 or 10.5. Also, following a QoI fungicide with a DMI fungicide applied at Feekes 10.5.1 “did not entirely counteract the potential of a QoI fungicide to increase DON levels.” ❖



The poster sessions once again were a popular feature at the National FHB Forum, with most authors present for questions and discussion. Postdoctoral scientists and graduate students piqued interest in their posters by presenting mini-talks about their research at ‘Flash & Dash’ sessions leading up to the poster breaks.



— 2017 FHB Forum —

Breeding for Resistance in Durum: Challenges & Successes

Southern Stakeholder View



Elias Elias

Elias Elias, longtime North Dakota State University durum wheat breeder, provided the 2017 Forum audience with an overview of challenges confronted and progress achieved during recent decades' efforts to develop scab-resistant durum wheat. North Dakota accounts for about 60% of the durum produced annually in the United States.

Fusarium Head Blight has certainly influenced — in a negative way — the levels of harvested durum acreage and

overall production in North Dakota, Elias emphasized. That in turn has impacted the national pasta industry and international export market.

Sources of FHB resistance in durum wheat are very limited, Elias noted. To date, the NDSU program has screened 8,000 durum accessions from the world collection — three of which have shown moderate resistance to Fusarium Head Blight. Another 6,000 accessions from ICARDA (the International Center for Agricultural Research in the Dry Areas) also have been screened, with three of those displaying moderate resistance to FHB.

“The use of wild relatives and/or Sumai 3 in durum wheat is hindered by a linkage drag,” further slowing the rate of success, the NDSU breeder explained to his Forum listeners. Efforts to lower DON levels are moving forward, but the toxin “remains a major risk and high cost to the durum industry,” Elias said. As with barley and the other wheat classes, fungicides combined with moderately resistant cultivars are central to minimizing the risk from scab and DON for durum producers and processors. ❖



Jimmy Clements

Jimmy Clements offered a southern stakeholder's view in his Forum presentation *FHB Impacts on Southeastern Millers, Farmers, Seedsmen and Breeders*. Clements is managing partner of AGSouth Genetics, Albany, Ga., purveyors of wheat and soybean seed.

Clements, a 35-year veteran of the seed business, focused on the need to meet the demands and requirements of customers. For seedsmen, “customers” obviously means farmers, *i.e.*, delivering high-yield, disease-resistant planting seed and educating dealers on how to support their grower base. For farmers, it means the millers and feedlots who purchase their commodities. For millers, “customers” translates to flour makers and bakeries. And for public and private wheat breeders, “customers” encompasses the above three groups: farmers, seedsmen and millers.

Clements described FHB as a “villain” causing substantial economic problems for “the crop protection group (no crop to apply their services), bankers (lack of July cash flow from their customers), seedsmen (no wheat to condition) and farmers (no rotation and no cash flow for bankers).” While acknowledging key strides that have been made in FHB management, he simultaneously stressed the need for increasingly resistant varieties to meet the needs of these groups of stakeholders. “Breeders, we need your help!” Clements concluded. ❖

Below: Ruth Dill-Macky, University of Minnesota, and Christina Cowger, USDA-ARS, North Carolina State University, facilitate discussion during a joint session of breeders and pathologists.



— 2017 FHB Forum —

A Seed Industry Perspective on Developing FHB Solutions

Development of FHB Solutions: A Seed Industry Perspective was the title of **John Pitkin's** presentation at the 2017 National FHB Forum. Pitkin is global disease management platform lead for Monsanto. The company's wheat breeding program, based in south central Idaho, is working extensively with advanced breeding techniques, including marker systems and doubled haploids, in the development of new and improved wheat cultivars.

Pitkin pointed out that the use of biotechnology in today's breeding world carries a very high financial stake. It can cost \$140-150 million to "get in the door" when commercializing a gene, he noted. That investment level translates into the need to develop traits applicable to a very broad acreage base. Other challenges include a long development period (a dozen years or more) and societal acceptance issues for biotech traits. The "broad acreage" necessity with biotech is one reason why wheat acreage has been declining while corn and soybean acreage has expanded, he stated.

The Monsanto scientist covered a lot



John Pitkin

of ground in his FHB presentation, discussing everything from foliar chemistry (also very expensive to develop and commercialize) to digital ag solutions (e.g., the FHB prediction model) to gene editing (for multiple uses, including disease resistance, herbicide tolerance, virus resistance and quality traits).

"The approaches considered for a

multinational agricultural company [in developing FHB solutions] will differ from those of a university wheat breeding effort focused on a smaller region," Pitkin noted. "These decisions include the value of FHB tolerance relative to other regionally important wheat traits such as quality, agronomic traits and, ultimately, yield." The considerations also obviously factor in the cost/value of developing solutions for FHB in wheat versus the value of developing agronomic solutions in more-profitable crops (i.e., corn and soybeans). "The benefit of working in wheat in a large company includes availability of technologies developed for crops such as corn and soy," Pitkin observed. Marker platforms, genomic resources and biotechnology are all key components in that toolbox. ❖

**2017 National FHB Forum
Photo Credits:**

**Dave Hane
USWBSI, Albany, Calif.**

Below: University of Minnesota plant pathologist Brian Steffenson (left) facilitates the Barley Coordinated Project breakout session during the 2017 FHB Forum. Other breakouts were held simultaneously for CPs in Durum, Hard Winter Wheat, and for Variety Development & Host Resistance projects for Spring Wheat, Northern Soft Winter Wheat and Southern Soft Red Winter Wheat.



Above: Carl Bradley and Mark Sorrells (far left, facing camera) lead the VDHR-Mgmt. joint session for Northern Soft Winter Wheat during the 2017 Forum. Additional VDHR-Mgmt. joint sessions were conducted for Hard Winter Wheat, Spring Wheat/Barley/Durum and Southern Soft Winter Wheat. There also was a joint session for GDER and PBG (Gene Discovery & Engineering Resistance and Pathogen Biology & Genetics).



— 2017 FHB Forum —

Five Ongoing Challenges for the USWBSI

Dave Van Sanford has stepped up to the podium at every National Fusarium Head Blight Forum since 2006, the year he became researcher co-chair of the U.S. Wheat & Barley Scab Initiative. At the 2017 FHB Forum, his final one as co-chair, the University of Kentucky wheat breeder took the opportunity to reflect upon the USWBSI's accomplishments over the past several years — and to outline five primary challenges he believes the Initiative faces going forward.

USWBSI achievements that Van Sanford singled out include:

- The creation of commodity-based Coordinated Projects.
- Development of a comprehensive database for use by USWBSI breeders.
- Development of the FHB Alert System, giving growers, advisors and

grain industry personnel better advanced notice of potential outbreaks and the risk of scab in their area.

- Update of USWBSI's mission statement (which currently reads: 'To enhance food safety and supply by reducing the impact of Fusarium Head Blight (scab) on wheat and barley:').

- Converting to electronic submission/review of research pre-proposals.

- During the 2014 farm bill process, working in concert with the National Barley Improvement Committee and National Wheat Improvement Committee to secure language authorizing \$10 million for scab research.

- Contracting with USDA's National Agricultural Statistics Service to conduct a survey of growers in 17 states regarding the impact of scab on their farming operations and their use of scab management tools.

- Producing an Impact Statement outlining the role USWBSI has played in reducing the effect of scab and DON through development of resistant varieties, disease forecasting, management, food safety and economic return.

- Commissioning a study (conducted by North Dakota State University ag economists) to estimate the economic impact of the USWBSI's work to reduce FHB on cereal grain producers, traders, handlers and processors. That study concluded there was a 'net savings' for the period 1997-2014, attributable to the USWBSI, of nearly \$5.4 billion, representing a return of \$71 for every dollar invested.

The bottom line, Van Sanford emphasized, is that "the Initiative's PIs (principal investigators) have accomplished a tremendous amount with limited resources."

Still, despite all these accomplishments, USWBSI's outgoing co-chair stressed that much work remains. "How do we maintain the delicate balance between demonstrating we are still needed — *i.e.*, that scab is still a problem — and showing that we have

made progress?" he asked his Forum audience.

Van Sanford then listed what he termed "five difficult pieces" for the Initiative to focus on as it moves ahead: (1) serving the stakeholder; (2) giving the USWBSI a "creative lift;" (3) "leaving our comfort zone;" (4) managing the narrative; and (5) building a stronger community.

"We are scientists, and we want to be engaged with 'gnarly' problems; that's what animates us," Van Sanford acknowledged in reference to his first point. But, the laser must remain focused on the stakeholder's interests, he stated. They are the reason the Initiative exists, and they must remain the primary beneficiaries of its work.

As to that "creative lift," it must emerge from the PIs who perform the nuts and bolts work of the USWBSI — not from the Initiative's Executive Committee, Van Sanford observed. New ideas must continuously evolve and be discussed, including ideas regarding the content and format of the annual Forum.

"Staying within our 'comfort zone' is very natural; but it limits our creative impulses and limits what the USWBSI can achieve," Van Sanford continued. Living in a "state of relative anxiety" wherein one's stress levels are slightly higher than normal can actually feed creativity, productivity — and positive results.

In speaking to his "managing the narrative" point, Van Sanford emphasized that "perception is everything" — both inside and outside the Initiative. He cautioned the PIs against being content with the status quo and to focus instead on stretching the envelope and being supportive of and collaborative with their fellow researchers throughout the Initiative. There are "no big fish, no little fish; just strong swimmers who can solve this problem" together, he affirmed.

Finally, it's essential for the USWBSI to continue building an ever-stronger community, Van Sanford emphasized. That includes transcending a particular market class or geographic area. And, it includes a heightened focus on cross-disciplinary research and management approaches. ❖



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 producers, processors and consumers of wheat and barley. Contact information is as follows:

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