FUSARIUM FOCUS

BACK IN PERSON

2022 National FHB Forum Offered Engaging Science and Valuable Connections

After two years of virtual Forums, it seemed fitting that in 2022 the National Fusarium Head Blight Forum was back in person to recognize 25 years of the U.S. Wheat and Barley Scab Initiative (USWBSI).

More than 200 researchers, industry/organization representatives, growers, post-doctoral researchers, and graduate students from five countries attended the Forum December 4-6, 2022, held at the Grand Hyatt Tampa Bay, in Tampa, Florida. Attendees had the opportunity to participate in six General Sessions, 18 Breakout Sessions, two Poster Sessions, an Early Career Networking Social, and a Women in USWBSI Social, as well as other pop-up meetings.

Ruth Dill-Macky, University of Minnesota plant pathologist and USWBSI researcher co-chair, welcomed attendees to this year's event. Introducing the speaker line-up, Dill-Macky thanked the Forum Organizing Committee (FOC) for their efforts in planning this year's great program. In addition, she thanked all the sponsors who helped make the event possible.

Dill-Macky introduced the 2022 Opening Session Speakers with the keynote presentation provided by **Ed Souza** (Feeding the 10 Billion: Thinking through the Journey), followed by the plenary presentation by **Mike Davis** (The Story Behind the U.S. Wheat and Barley Scab Initiative Establishment in FY1998 and its Evolution to What it is Today). These topics provided a retrospective on the need behind the USWBSI and the necessity to continue research for increased food production.

Ruth Dill-Macky

Ed Souza

Mike Davis

Souza presented on the goal of feeding the expected 10 billion people in the world by 2050. There are three things, he noted, to keep in mind when working on this goal: 1. Take people that you like on this journey, 2. Be clear about where you are going, and 3. Know some of what you want to do on the journey. "We have the vocation to feed the 10 billion people in the world," said Souza. To accomplish this goal, barley and wheat production needs to increase by 20% in 2025 to meet the world demand. Since the 1980's, breeding has come a long way, he indicated. With the application of genomic methods and the reduced cost of genotyping, breeders introduced *Fhb1* from 'Sumai 3' into 50% of the U.S. spring wheats and most of the soft winter wheat backgrounds. Now due to genomic advances, breeders

General session audience

FUSARIUM FOCUS

Fusarium Focus is an online newsletter published periodically by the U.S. Wheat & Barley Scab Initiative (USWBSI) and distributed to the USWBSI community.

Content Creation: Amber Hoffstetter
Design: Dawn Mathers

The USWBSI is a national multi-disciplinary and multi-institutional research consortium whose goal is to develop 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. The USWBSI's annual budget comes from Federal funds appropriated through the USDA-ARS and is distributed to 150 research projects in more than 30 states.

U.S. Wheat & Barley Scab Initiative (USWBSI)
Networking & Facilitation Office (NFO) Michelle Bjerkness, Director of Operations
495 Borlaug Hall / 1991 Upper Buford Circle / St. Paul, MN 55108
nfo@scabusa.org / 517.290.5023
https://scabusa.org
Twitter @USWBSI / Linkedin #uswbsi

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"It was wonderful to catch up with researchers across the broad realm of FHB... So many innovative ideas were shared and presented from across the world."

—2022 NFHB FORUM ATTENDEE

can introduce smaller effect QTLs into adapted backgrounds much quicker. Many people were involved in making this happen.

He encouraged the audience that whatever the journey is take people with you. "People do science. Science doesn't do science," said Souza. He suggested when planning a research project, find people that share your vision, take people that you like along on the journey, and help them succeed. It's important to think about all the people that came before and will come after your work. And remember, "liking people in science is different than liking people on Facebook."

Following Souza, Davis's presentation on the evolution of the USWBSI provided those in the audience new to the Initiative a history of how it all began. "It is my pleasure and honor today to be a historian," said Davis. The formation of the USWBSI all began with a U.S. epidemic of FHB in 1983 that frustrated growers and puzzled researchers shared Davis. Thus, **Tom Anderson**, **Marv Zutz**, and **Dave Torgerson** started the Small Grains Initiative. Grower, industry, and researcher stakeholder meetings continued and by 1998 the first Research Co-Chair, **Rick Ward** from Michigan State University, started. Tom Anderson, the first grower co-chair, among others started lobbying for FY1998 support. That year, Congress appropriated $500,000 to establish the Initiative.

Thanks to lobbying efforts of the National Wheat Improvement Committee, National Association of Wheat Growers, North American Milling Association, the National Barley Improvement Committee, the American Malting Barley Association, and the National Barley Growers, together they effectively increased the appropriation of the USWBSI. Today, the USWBSI is currently authorized at $15 million.

"Where do we go from here?" asked Davis. Keep sending the "troops" to Congress to lobby, he recommended, because the USWBSI researchers' work is critical.

Following the Opening Session, Sunday, Monday, and Tuesday General Sessions featured fourteen relevant invited presentations covering topics ranging from a grower's perspective, integrated management, genomic approaches to FHB resistance, *Fusarium graminearum* effectors and their role in controlling FHB, *Fusarium* fungicide sensitivity, fungal elicitor-triggered

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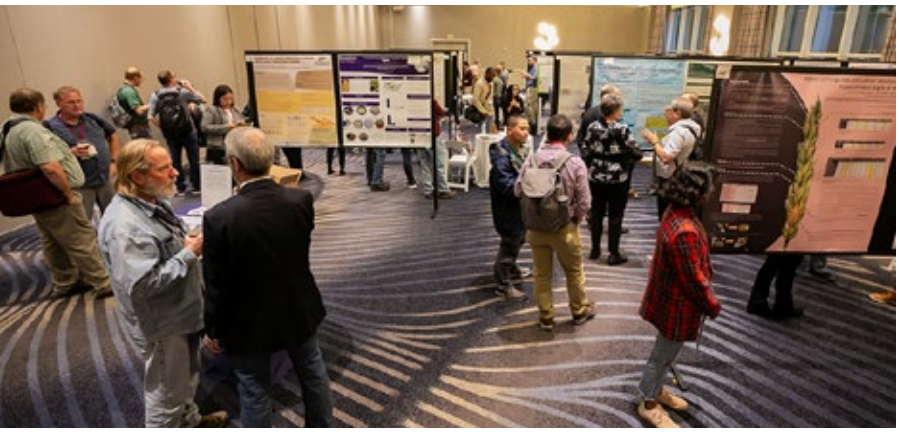

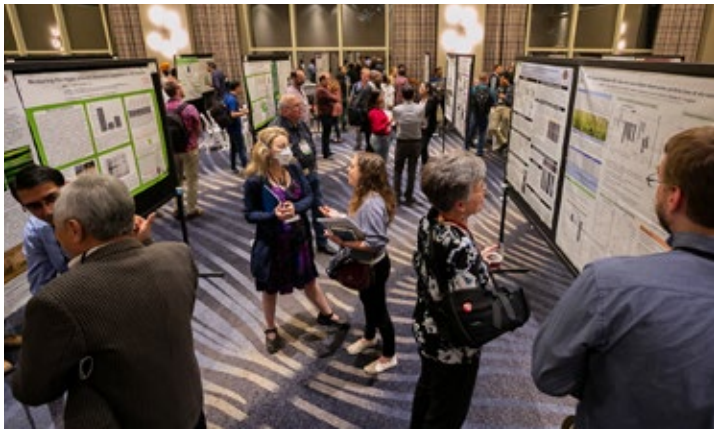

Thomas Miedaner

Ludovic Bonhomme

immune responses, and methods for reducing DON production in infected grain during the malting process. General Sessions were moderated by the FOC members with live question and answer sessions following each presentation. A full list of the presenters and their presentation abstracts are available online. Included in this year's presentations were two international speakers; **Thomas Miedaner**, from the University of Hohenheim, Germany presented on the correlation between plant height, anther retention, and FHB (Complex Interactions Between FHB Resistance, Plant Height, and Anther Retention in Wheat Analyzed by Genomic-estimated Breeding Values) while **Ludovic Bonhomme**, Université Clermont Auvergne, France, showed how *F. graminearum* effectors interplay with wheat responses during the early stages of infection (Searching for *F. graminearum* Effectors Controlling Fusarium Head Blight: a Core Arsenal Targeting Conserved Susceptibility Drivers in Bread Wheat?).

Two invited speakers were unable to attend the Forum in person; however, accommodations were made to allow them to virtually present. **Rex Bernardo**, University of Minnesota, provided an interesting presentation on recurrent selection. Instead of using a traditional PowerPoint presentation, Bernardo performed live math equations to demonstrate the efficiency of recurrent selection in maize (Should Breeders Routinely Do Recurrent Selection During Cultivar Development?). The audience followed up with live questions to Bernardo, in Minnesota, regarding implementation in wheat. **Alyssa Koehler**, University of Delaware, gave the audience a virtual update on the Coordinated Fungicide Sensitivity Project. This project established preliminary baseline sensitivities to monitor sensitivity levels as new fungicides are made available.

The 2022 NFHB Forum featured two live Poster Sessions on Sunday and Monday evenings. Over the course of the two evenings, poster authors presented

Thank You USWBSI 2022 Forum Organizing Committee (FOC)

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their research to other attendees during the reception. In addition to the live Poster Sessions, the Virtual Poster Room was made available to attendees prior to the Forum for viewing the posters and poster author's pre-recorded videos. Seventy-five poster abstracts, the most in the last five years, were featured in this year's Virtual Poster Room/Sessions. In addition, 15 of the student and post-doc poster authors were selected for Flash and Dash presentations during the General Sessions.

Monday morning featured the return of traditional Breakout Sessions since 2019. During the Breakout Sessions, Research Area groups were able to discuss issues and projects for possible consideration in the next funding cycle. While the T3 Breeders Database Workshop allowed **David Waring** to update breeders on the new features of the database and answer questions, the Regional Genotyping Lab Breakout Sessions allowed lab leaders to coordinate with their researchers on implementing markers and platforms which may eventually be uploaded to T3. Finally, the Nuts-and-Bolts Breakout Session allowed graduate students, post-doctoral researchers, and technicians to interact and ask questions related to growing *Fusarium graminearum* cultures, inoculating and rating scab nurseries, greenhouse experiments, lab assays, etc.

Graduate students and post-doctoral researchers have had limited face-to-face interactions in the last two years.

To increase their ability to interact with one another two events were offered this year. Sunday evening featured the Early Career Social for attendees to network amongst themselves (see ScabNet article on pg. 9 for additional information). On Monday evening, an informal opportunity for women in the USWBSI community to network was offered.

Wrapping up the 2022 NFHB Forum, **Richard Magnusson**, Roseau, MN grower and USWBSI stakeholder co-chair, provided the Closing Session remarks. Magnusson presented the poster awards and offered special recognition to BASF for their generous sponsorship of the cash prizes for the poster competition. He also thanked the USWBSI community for attending the in-person event and for making this year's event a special tribute to the 25 years of the USWBSI. He concluded by reminding everyone to mark their calendars and attend the 2023 National Fusarium Head Blight Forum in Cincinnati, Ohio, December 3-5, 2023.

Richard Magnusson

As a reminder, abstracts of all the presentations and posters continue to be available in the online 2022 NFHB Forum Abstract Viewer. If you need to reference material presented during the Forum, the full 2022 NFHB Forum Proceedings are also now published.

Thank you sponsors

2022 NFHB FORUM FUNDING AGENCY

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NFHB Forum Poster Competition Provides Opportunities for Early Career Professionals

The Poster Competition returned for the third year at the 2022 NFHB Forum. This year's competition featured 33 posters across five research categories presented by 23 graduate students and 7 post-doctoral researchers. 27 judges evaluated the posters in two rounds of judging to determine the top three graduate student and post-doctoral researcher winners.

New this year, judges utilized an online rating system to provide scores and comments. Round one consisted of judges watching the pre-recorded videos and reviewing the scientific merit of the research over a weeklong period. Poster judges evaluated the posters and videos for research concept, experimental quality, design, and overall quality and presentation. The second round of judging occurred on site in Tampa, Florida, where five judges evaluated the poster authors ability to convey their research problem, methods, conclusions, and implications with confidence and professionalism.

The results were entered live, and the winners were announced at the Closing Session on Tuesday, December 6, 2022. Cash prizes, sponsored by BASF, were awarded to the top 3 finalists in each category: 1st Place - $500, 2nd Place - $300, and 3rd Place - $200. A huge thank you to BASF, this year's Poster Competition Sponsor, for generously providing these cash prizes for all the awardees.

The winners were all appreciative of their awards and were grateful for the opportunity to present their research. From feedback received, the graduate students and post-docs appreciated the opportunity to showcase their research in person as for many of them, this was their first conference experience. The USWBSI looks forward to organizing the competition again in 2023, details will be available in the coming months.

Poster competition awardees. L to R: Bhanu Dangi, Bhavit Chhabra, Yishan Zhang, Megha Gupta, Wanderson Bucker Moraes, and Xiaoxi Qi.

Congratulations to the 2022 NFHB Forum Poster Competition Winners

POST-DOCTORAL RESEARCHER AWARDEES

1st Place: **Megha Gupta**, University of Maryland, Gene Discovery and Engineering Resistance # 129, "*Wheat Pore-forming Toxin-line Protein Confers a Broad Spectrum Resistance Against Multiple Fungal Pathogens in Arabidopsis*"

2nd Place: **Wanderson Bucker Moraes**, The Ohio State University, FHB Management Poster # 105, "*Rainfastness of Fungicides for Fusarium Head Blight and Deoxynivalenol Reduction in Soft Red Winter Wheat*"

3rd Place: **Xiaoxi Qi**, North Dakota State University, Food Safety and Toxicology Poster # 121, "*Mechanisms of Antifungal and Mycotoxin Inhibitory Properties of Thyme Essential Oil and its Major Chemical Constituents in Emulsion-based Delivery System*"

GRADUATE STUDENTS AWARDEES

1st Place: **Bhanu Dangi**, North Dakota State University, Variety Development and Host Resistance # 155, *"Diversification of FHB Resistance QTL in Winter Wheat Germplasm"*

2nd Place: **Bhavit Chhabra**, University of Maryland, Gene Discovery and Engineering Resistance Poster # 126, *"Discovery of a Susceptibility Factor for Fusarium Head Blight on Chromosome 7A of Wheat"*

3rd Place: **Yishan Zhang**, University of British Columbia, Pathogen Biology and Genetics Poster # 148, "*Decoding Adaptive Traits in Fusarium graminearum Using Integrated Omics*"

To learn more about this year's poster winner's check out the January Featured Researcher posting.

Special Thanks to All the 2022 Poster Judges

Anthony Adeuya, Food and Drug Administration
Gazala Ameen, South Dakota State University
Heather Darby, University of Vermont
Yanhong Dong, University of Minnesota
Cory Hirsch, University of Minnesota
Amir Ibrahim, Texas A&M AgriLife Research
Katherine Jordan, USDA-ARS
Claire Keene, North Dakota State University
David Kendra, Cibus
Hye-Seon Kim, USDA-ARS
Ramamurthy Mahalingam, USDA-ARS
G. Francois Marais, North Dakota State University
Juliet Marshall, University of Idaho
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John McLaughlin, Rutgers, the State University of New Jersey
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Eric Olson, Michigan State University
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Jorge David Salgado, FMC Corporation
Ehsan Shakiba, University of Arkansas
Kevin Smith, University of Minnesota
Shyam Solanski, South Dakota State University
Vijay Tiwari, University of Maryland
Christopher Toomajian, Kansas State University
Briana Whitaker, USDA-ARS

If you are interested in serving as a poster judge for future competitions, please contact Amber Hoffstetter.

2022 FHB Disease Impact Update Published

The U.S. Wheat and Barley Scab Initiative (USWBSI) announced the publishing of its *2022 Fusarium Head Blight Disease Impact Update* November 18, 2022. **Amber Hoffstetter**, PhD, USWBSI research technical specialist, once again authored this year's article. Commentary from experts in 31 states indicated growers dealt with hot and dry conditions which were unfavorable for the development of Fusarium head blight (FHB, scab). A few isolated occurrences of FHB were reported in areas where rainfall and high humidity levels coincided with heading and flowering. In most cases, growers that were proactive with fungicide applications were able to mitigate their risk.

"The USWBSI Fusarium Head Blight Disease Impact Update is a valuable annual overview of the impact of FHB on small grains crops and also serves to monitor the production conditions that U.S. wheat and barley growers experienced throughout the year," noted **Ruth Dill-Macky**, PhD, USWBSI researcher co-chair. "Growers and researchers alike rely on this information to plan research in the years to come, identify production issues that might need attention, and to help validate tools used to mitigate FHB including the Fusarium Risk Tool, fungicides, and crop varieties with improved levels of resistance."

The Fusarium Head Blight Disease Impact Update provides an annual report of the crop growing conditions as well as the impact of FHB on wheat and barley in different regions of the United States. Additionally, photographs of these cereal crops were included to highlight specific crop conditions. The USWBSI has been releasing this update article annually since 2010 to provide insights into the experiences that small grains growers had with FHB during the most recent growing season.

For more information on resources and publications about Fusarium Head Blight of wheat and barley visit ScabUSA.


FHB Disease IMPACT Update 2022

2022 Conditions and Proactive Growers Reduce Fusarium Head Blight Impact Across U.S.

Producers can also view the FHB Risk Tool developed by USWBSI researchers to monitor the FHB risk in their area during the growing season as well as review prior years data for planning. Additionally, subscribe to FHB Alerts for the most up-to-date information on issues regarding FHB by state experts. ●

MARK YOUR CALENDARS

2023 National Fusarium Head Blight Forum—Cincinnati, Ohio

The 2023 National Fusarium Head Blight Forum will be held December 3-5, 2023, in Cincinnati, Ohio at the Hilton Cincinnati Netherland Plaza. The Netherland Plaza has been a downtown Cincinnati icon since 1931 and its authentic French Art Deco is recognized as a National Historic Landmark. Located in downtown, explore restaurants and sites either on foot or by ride-share. Never been to Kentucky, take a short ride across the Ohio River to visit Covington, Newport, or Mansion Hill. The Cincinnati/Northern Kentucky International Airport is 20 minutes from the property. We are excited to see you all in person at the 2023 NFHB Forum! Mark your calendars, check the USWBSI ScabUSA website, and watch your email for more information as it becomes available. ●

USWBSI Featured Researchers 2022 Highlights

Check out new postings on the What's Hot feed of ScabUSA and all of the previous featured researchers on the USWBSI Featured Researcher archives page. Have an idea for a featured researcher? Send your suggestions to amber.hoffstetter@scabusa.org.

Here is a listing of all the individuals that were featured in 2022.

2022

- **JAN** — **2021 NFHB Forum Poster Competition Winners**
- **FEB** — Dr. **José Costa**, USDA-ARS, Beltsville, MD (Retired)
- **MAR** — Dr. **Corby Kistler**, USDA-ARS, St. Paul, MN (Retired)
- **APR** — **Sue Canty**, USWBSI, NFO, East Lansing, MI (Retired)
- **MAY** — **Richard Magnusson**, USWBSI Grower Co-Chair, Roseau, MN
- **JUN** — Dr. **Nidhi Rawat**, University of Maryland, College Park, MD
- **JUL/AUG** — Dr. **Gazala Ameen**, South Dakota State University, Brookings, SD
- **SEP** — Dr. **Milton Drott**, USDA-ARS, St. Paul, MN
- **OCT** — Dr. **Thomas Miedaner**, University of Hohenheim, Stuttgart, Germany
- **NOV** — Dr. **Harmonie Bettenhausen**, Hartwick College, Center for Craft Food and Beverage, Oneonta, NY
- **DEC** — Dr. **Ludovic Bonhomme**, Université of Clermont Auvergne, Clermont-Ferrand, France

2023

- **JAN** — **2022 NFHB Forum Poster Winners**
- **FEB** — Dr. **Zhao Jin**, North Dakota State University, Fargo, ND

Dave Van Sanford and Rich Horsley honored Sue Canty and Mike Davis for the years of service to the USWBSI. L to R: Mike Davis, Dave Van Sanford, Sue Canty, Ruth Dill-Macky, and Rich Horsley.

USWBSI Recognizes Mike Davis and Sue Canty for Impressive Contributions to the Initiative

In a special dinner program, **Rich Horsley**, **Brian Steffenson**, and **Dave Van Sanford** recognized **Mike Davis** and **Sue Canty** for their dedicated service to the USWBSI. Davis, former president of the American Malting Barley Association, served as a USWBSI Executive Committee member for over two decades. During his tenure as the executive secretary for the National Barley Improvement Committee, Davis traveled to Washington D.C. to lobby for funding of barley research 34 times and was instrumental in the successive funding growth for the USWBSI. Sue Canty is the former director of operations of the USWBSI Networking and Facilitation Office and served the Initiative for 22 years. During her time as the director of operations, Canty aided the USWBSI in organizing administrative and governance meetings, planning and staffing the NFHB Forum, handling all of the funding management, as well as dozens of other NFO responsibilities. During the program honoring Davis and Canty, **Ruth Dill-Macky**, researcher co-chair, presented the honorees with special plaques of recognition.

We thank Mike Davis and Sue Canty for all their years of service to the USWBSI and wish both all the best in retirement.

2022 USWBSI Publications

Take some time to review this impressive listing of publications associated with USWBSI funding this past year.

Ackerman, A. J., Holmes, R., Gaskins, E., Jordan, K. E., Hicks, D. S., Fitzgerald, J., Griffey, C. A., Mason, R. E., Harrison, S. A., Murphy, J. P., Cowger, C., Boyles, R E. (2022). Evaluation of Methods for Measuring *Fusarium*-Damaged Kernels of Wheat. *Agronomy* 12(2): 532.

Alam, S. T., Sarowar, S., Mondal, H. A., Makandar, R., Chowdhury, Z., Louis, J., Shah, J. (2022). Opposing effects of *MYZUS PERSICAE-INDUCED LIPASE 1* and jasmonic acid influence the outcome of *Arabidopsis thaliana–Fusarium graminearum* interaction. *Molecular Plant Pathology*, 23:1141–1153.

Baenziger, P. S., Frels, K. A., Boehm, J., Belamkar, V., Rose, D. J., Xu, L., Wegulo, S. N., Regassa, T., Easterly, A. C., Creech, C. F., Santra, D. K., Klein, R. N., Jin, Y., Kolmer, J., Chen, M.-S., Guttieri, M. J., Bai, G., El-Basyoni Salah, I., Masterson, S. D., Poland, J. (2022). Registration of 'Epoch' hard red winter wheat. *Journal of Plant Registrations*, 16: 613– 621.

Baenziger, P. S., Masterson, S. D., Boehm, J. D., Belamkar, V., Barnett, M. D., Rose, D. J., Xu, L., Wegulo, S. N., Regassa, T., Easterly, A. C., Creech, C. F., Santra, D. K., Kruger, G. R., Hergert, G. W., Klein, R. N., Jin, Y., Kolmer, J., Chen, M.-S., Hein, G. L., Bowden, R.L., Guttieri, M.J., Bai, G., Salah, E., Poland, J. (2022). Registration of LCS 'Valiant' hard red winter wheat. *Journal of Plant Registrations*, 00:1– 11.

Bucker Moraes, W., Madden, L. V., Gillespie, J., Paul, P. A. (2022). Environment, Grain Development, and Harvesting Strategy Effects on Zearalenone. Phytopathology 0 0:ja.

Bucker Moraes, W., Madden, L. V., Paul, P. A. (2022). Characterizing Heterogeneity and Determining Sample Sizes for Accurately Estimating Wheat Fusarium Head Blight Index in Research Plots. *Phytopathology*, 112(2):315-334.

Bucker Moraes, W., Madden, L. V., Paul, P. A. (2022). Efficacy of Genetic Resistance and Fungicide Application Against Fusarium Head Blight and Mycotoxins in Wheat Under Persistent Pre- and Postanthesis Moisture. *Plant Disease*, 106(11):2839-2855.

Chen, H., Su, Z., Tian, B., Liu, Y., Pang, Y., Kavetskyi, V., Trick, H. N. and Bai, G. (2022). Development and optimization of a *Barley stripe mosaic virus*-mediated gene editing system to improve Fusarium head blight resistance in wheat. *Plant Biotechnol. J.*

Duffeck, M. R., Bandara A. Y., Weerasooriya, D. K., Collins, A. A., Jensen, P. J., Kuldau, G. A., Del Ponte, E. M., and Esker, P. D. (2022). Fusarium Head Blight of Small Grains in Pennsylvania: Unravelling Species Diversity, Toxin Types, Growth, and Triazole Sensitivity. *Phytopathology*, 112(4):794-802.

Gaire, R., Sneller, C., Brown-Guedira, G., Van Sanford, D., Mohammadi, M., Kolb, F. L., Olson, E., Sorrells, M., Rutkoski, J. (2022). Genetic Trends in Fusarium Head Blight Resistance from 20 Years of Winter Wheat Breeding and Cooperative Testing in the Northern U.S.A. *Plant Disease*, 106(2):364-372.

Gaire, R., de Arruda, M. P., Mohammadi, M., Brown-Guedira, G., Kolb, F. L., Rutkoski, J. (2022). Multi-trait genomic selection can increase selection accuracy for deoxynivalenol accumulation because of fusarium head blight in wheat. *Plant Genome*, 15:e20188.

Green, A. J., Mergoum, M., Frohberg, R., Underdahl, J., Horsley, R., Walz, A., Simsek, S., Otteson, B., Heilman-Morales, A. M., Friskop, A., Ransom, J., Rickertsen, J., Ostlie, M., Schatz, B., Hanson, B., Eriksmoen, E., Pradhan, G., Martin, G., Rasmussen, J., Zhong, S., Friesen, T., Rouse, M., Jin, Y., Chai, S., Acevedo, M. (2022). Registration of 'ND VitPro' hard red spring wheat. *Journal of Plant Registrations*, 16:606– 612.

Friskop, A., Halvorson, J., Hansen, B., Meyer, S., Jordahl, J., Arens, A., Chapara, V., Gautam, P., Kalil, A., Tjelde, T., Fonseka, D., Schatz, B., Brueggeman, R., Baldwin, T., Gross, P., Deplazes, C., Ransom, J. K. (2022). Effect of Fungicides and Cultivar Resistance on Fusarium Head Blight and Deoxynivalenol in Spring Barley from 2014 to 2019. Plant Health Progress 0:ja.

Hao, G., Tiley, H., McCormick S. (2022). Chitin Triggers Tissue-Specific Immunity in Wheat Associated with Fusarium Head Blight. *Frontiers in Plant Science*, 13.

Low, Y. C., Lawton, M., Di, R. (2022). *Ethylene insensitive 2 (EIN2)* as a potential target gene to enhance *Fusarium* head blight disease resistance. *Plant Science*, 322.

Lu, P., Chen, D., Qi, Z., Wang, H., Chen, Y., Wang, Q., Jiang, C., Xu, J.-R., Liu, H. (2022). Landscape and regulation of alternative splicing and alternative polyadenylation in a plant pathogenic fungus. New Phytol, 235: 674-689.

Poudel, B., Mullins, J., Puri, K. D., Leng, Y., Karmacharya, A., Liu, Y., Hegstad, J., Li, X., Zhong, S. (2022). Molecular Mapping of Quantitative Trait Loci for Fusarium Head Blight Resistance in the Brazilian Spring Wheat Cultivar "Surpresa". *Frontiers in Plant Science*, *12*.

Ren, J., Zhang, Y., Wang, Y., Li, C., Bian, Z., Zhang, X., Liu, H., Xi, J.R., Jiang, C. (2022). Deletion of all three MAP kinase genes results in severe defects in stress responses and pathogenesis in *Fusarium graminearum*. *Stress Biology*, 2(6).

Winn, Z. J., Lyerly, J., Ward, B., Brown-Guedira, G., Boyles, R. E., Mergoum, M., Johnson, J., Harrison, S., Babar, A., Mason, R. E., Sutton, R., Murphy, J. P. (2022). Profiling of *Fusarium* head blight resistance QTL haplotypes through molecular markers, genotyping-by-sequencing, and machine learning. *Theoretical Applied Genetics*, 135:3177–3194.

Xu, H., Ye, M., Xia, A., Jiang, H., Huang, P., Liu, H., Hou, R., Wang, Q., Li, D., Xu, J.-R., Jiang, C. (2022). The Fng3 ING protein regulates H3 acetylation and H4 deacetylation by interacting with two distinct histone-modifying complexes. New Phytol, 235: 2350-2364.

Zhang, J., Gill, H. S., Brar, N. K., Halder, J., Ali, S., Liu, X., Bernardo, A., St. Amand, P., Bai, G., Gill, U. S., Turnipseed, B., Sehgal, S. K. (2022). Genomic prediction of Fusarium head blight resistance in early stages using advanced breeding lines in hard winter wheat. *The Crop Journal*, 10(6):1695-1704.

Zhang, J., Gill, H. S., Halder, J., Brar, N. K., Ali, S., Bernardo, A., Amand, P. S., Bai, G., Turnipseed, B., Sehgal, S. K. (2022). Multi-Locus Genome-Wide Association Studies to Characterize Fusarium Head Blight (FHB) Resistance in Hard Winter Wheat. *Frontiers in Plant Science*, *13*.

Zhang, J., Min, A., Steffenson, B., Su, W., Hirsch, C., Anderson, J., Wei, J., Ma, Q., Yang, C. (2022). Wheat-Net: An Automatic Dense Wheat Spike Segmentation Method Based on an Optimized Hybrid Task Cascade Model. *Frontiers in Plant Science*, 13.

Zhao, L., Su, P., Hou, B., Wu, H., Fan, Y., Li, W., Zhao, J., Ge, W., Xu, S., Wu, S., Ma, X., Li, A., Bai, G., Wang, H., Kong, L. (2022). The Black Necrotic Lesion Enhanced *Fusarium graminearum* Resistance in Wheat. *Frontiers in Plant Science*, *13*.

Zhao, L., Ge, W., Lyu, Z., Xu, S., Xu, Y., Bernardo, A., Zhang, Q., Xu, S., Wang, H., Kong, L., Bai, G. (2022). Development and validation of diagnostic markers for the wheat Fusarium head blight resistance gene *Fhb7*. *Crop Science*, *62*:1903–1911.

Zhu, X., Boehm, J. D., Zhong, S., Cai, X. C. (2022). Genomic compatibility and inheritance of hexaploid-derived Fusarium head blight resistance genes in durum wheat. *Plant Genome*, 15: e20183.

New ScabNet Early Career Offerings Provided LinkedIn Tips and Tricks and In-Person Networking

Leigh Neys is a career coach and owner of Leigh Neys Career Coaching.

On the evening of September 29, 2022, 21 participants tuned into the ScabNet webinar to listen to Dr. **Leigh Neys** present the ins and outs of utilizing LinkedIn for career transitioning purposes. The event, geared towards graduate students and post-doctoral researchers, provided a hands-on experience to attendees for creating a profile that would help them find their dream career. ScabNet is a new USWBSI effort to help connect early career professionals in the FHB community.

Neys graciously offered a free 45-minute career coaching session to one individual who attended the webinar. The lucky winner was Anusha Dahal, a graduate student at Kansas State University, with Dr. Jessica Rupp.

Neys encourages people to visit her profile as an example. She also has a website for those interested in personalized career coaching. www.leighneys.com

In-Person Networking in Tampa

Finally, after two years, 30 graduate students, post-doctoral researchers, and young professionals were able to gather for the ScabNet Early Career Social at the 2022 NFHB Forum. For many, this was their first in-person Forum or conference. Several attendees knew each other from prior virtual ScabNet events and were now able to finally meet one another face-to-face. Attendees from a range of institutions as well as countries shared their experiences as a graduate student or post-doctoral researcher and discussed their exciting research projects. Mike Davis, former President of the American Malting Barley Association, made a surprise appearance at the Social to pass down his wisdom to the next generation of researchers.

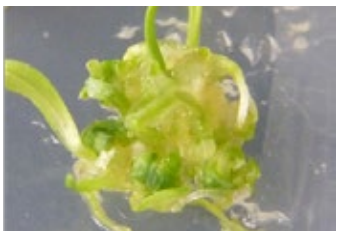
Graduate students and post-doctoral researchers gather at the 2022 NFHB Forum Early Career Social to share their experiences and research.

The ScabNet Co-Organizers hope to host more events in 2023. Stay tuned for details on the ScabNet webpage. ●

Key LinkedIn Tips

As Neys shared, LinkedIn is the largest professional network website. More than 50% of the users are recent college graduates. When creating a LinkedIn profile "it's important that you have a profile that represents you as a candidate for the job and shows your skillset," said Neys. She offered the following tips:

- **Build your brand.** First start with changing your URL to a unique identifier that makes it easy to locate you.
- **Create a headline statement.** Your headline statement is the first thing a visitor sees when viewing your profile.
- **Take a professional photo and create a banner that sells who you are.** You can use Canva to create a LinkedIn banner using one of their thousands of templates. Add your name and intended job for a personal touch.
- **Write something that says what you want to project to the world** in the About Section. Remember, "when talking about yourself, use the I pronoun, not third person pronouns," reminds Neys. When choosing skills to showcase, choose those which are important to the job you are seeking. You can showcase up to 50 of your top skills and ask others to endorse your skill set. The ones which are endorsed the most will show up at the top of your profile.
- **Make connections.** Look at suggestions and provide a personalized message with each connection. Also, actively posting helps to build one's leadership and shows recruiters that you are an expert in your field with knowledge you want to share with others.



Transformation Labs Ready to Help

Do you have any genes you would like to be expressed or modified in wheat or barley? Have you identified a target for gene editing? The USWBSI transformation/gene editing facilities are here to serve the FHB community and ready to help. For wheat transformation please contact **Harold Trick** (hnt@ksu.edu) and for barley transformation please contact **Rong Di** (rongdi@sebs.rutgers.edu) to discuss your project. ●

SunShow—Linking Breeders with Variety Licensees

By J. Paul Muphy, North Carolina State University

SunGrains (Southern University Grains) is a collaborative breeding program comprising public small grain breeding programs in seven southern states (NC, SC, FL, GA, LA, TX and AR). The goal is to efficiently serve clientele in the region through coordinated variety/germplasm development, enhanced graduate student research/training, open ended discussion of research developments and mentoring of new colleagues. Breeding lines are evaluated in successive generational uniform nurseries across the region and varieties are jointly released with royalties shared by all institutions. Expensive doubled haploids are shared across programs, a robust, centralized genomic selection program is employed and UAV sensors are starting to improve performance predictions. As a result, SUNGRAINS is likely the most coordinated multi-state public breeding project in the U.S.

We are enthusiastic about the variety development model implemented, however, the release process culminating from our breeding efforts has been somewhat haphazard, with each program going its own way. In retrospect, this was predictable because university faculty are well schooled in the science of variety development, but less educated in entrepreneurial skills.

SunShow is an initiative designed to rectify this end-of-pipeline weakness and centralize information for over 30 potential licensees of our varieties. It involves a two-pronged process: 1) an annual poll of all potential licensees concerning current or potential gaps in their variety portfolios, and 2) growing drill strips of all the SunGrains varieties available for licensing. The drill strips are grown in each state adjacent to the state official variety trial. SunShow enhances the appraisal experience for potential licensees through uniformity in demonstrations and provides clarity concerning adaptation across the region. Large signs are placed in front of each plot with important information and QR codes provide links to the Sunshow website, providing in depth information on each available line

Example of signage used by the SunShow initiative to advertise the gene packages available in the lines marketed within the nursery.

We are also promoting some new ideas in wheat variety marketing. While corn breeders boast about their 'smart stack' gene packages, we in the wheat community behave with restraint and old-fashioned good manners concerning our accomplishments! Nevertheless, wheat breeders are doing outstanding jobs in putting together comprehensive pyramids of effective genes and we believe that the wheat community might value more information concerning the non-GMO technology they are purchasing in a variety.

Advanced generation lines undergo DNA analysis at the USDA's Eastern Small Grains Genotyping Center in Raleigh. Information is provided on the presence of over 60 genes / QTL controlling disease and insect resistances, end use quality and growth habit. In North Carolina, for example, we need genetic resistance to scab, powdery mildew, leaf rust, Hessian fly, and, perhaps, stripe rust and Barley Yellow Dwarf Virus in our varieties. Other SunGrains programs face similar challenges. Should the DNA analysis identify an experimental line containing *Fhb1*, *Pm54*, *Lr18*, *H13*, *Yr4BL* and *Bdv2*, it would have an ideal resistance gene pyramid for NC. The variety could perhaps be marketed as protected by the 'NC Pest Resistance Umbrella', or some such approach. Growers have become familiar with this approach with corn varieties, so I believe they would appreciate knowing the genes available to them in wheat varieties. It would surely enhance management decisions if certain disease or insect pests are reported in the state during the growing season. ●

DID YOU KNOW...

RESISTANT VARIETIES

USWBSI funded breeding efforts for FHB resistant wheat and barley cultivars in FY21 resulted in:

37 VARIETIES/GERMPLASM RELEASED

FgV1-SD4 Reduces *Fusarium graminearum*'s Infection of Wheat

Researchers at the USDA-ARS Application and Technology Research Unit, in Wooster, Ohio and South Dakota State University worked together to identify a strain of a fungal virus that disables the fungus's ability to make its mycotoxin, deoxynivalenol (DON). **Shin-Yi Lee Marzano**, PhD, is a research molecular biologist, with the Application and Technology Research Unit and based in Toledo, Ohio. She started working on this project with Dr. **Yang Yen**'s lab at SDSU. Together, the group discovered through characterization of the hypovirulence gene of the virus that the novel strain of the *Fusarium graminearum* virus 1 (FgV1), FgV1-SD4, significantly reduced the fungus' virulence against wheat. FgV1-SD4 has a few amino acid residue differences compared to the Chinese strain which is not hypovirulent. In greenhouse and lab assays, *F. graminearum* cultures infected with FgV1-SD4 grew much slower than the non-infected cultures. Additionally, cultures containing FgV1-SD4 produced no DON in the grain of greenhouse grown susceptible wheat plants. Whereas the virus free cultures produced 18 ppm DON in susceptible wheat plants.

Marzano hopes to continue working on the project to determine if mutations result in different FgV1 strains with further reduced fungal virulence in wheat. She hopes to make an infection clone of the virus to mutate specific amino acid residues and determine which ones correlate with FHB reductions in wheat. Furthermore, the hypovirulent fungal strain will be tested as a biostimulant to protect wheat for disease resistance or a biocontrol agent against fusarium head blight.

You can read more about the results of this project in the article published in *Microorganisms*. ●

A healthy wheat head (left) in contrast to one infected with Fusarium graminearum and showing symptoms (right). Image by USDA-ARS via Office of Communications.

COMMUNITY UPDATES

Congratulations to the Following USWBSI Funded Students Who Graduated

Abdullah Alhashel, PhD, North Dakota State University, Advisors: **Shengming Yang** and **Thomas Baldwin**. His research focused on spot form net blotch resistance and Fusarium head blight resistance through Host Induced Gene Silencing (HIGS). Alhashel will be returning to his home country, Saudi Arabia, to continue his research and teaching career.

Kudos to those Starting New Positions

Zhao Jin, PhD, is a new assistant professor at North Dakota State University and the PI for the wheat and barley DON lab in Fargo, ND. Jin was previously a post-doctoral research associate with **Paul Schwarz**, PhD, the former NDSU barley DON lab PI. In her new role, she is interested in identifying strategies to increase diversity and characteristics of grain malt and incorporating malt into brewing and other beverage types. In addition, Jin is interested in expanding her research to include food fermentation and improving the quality and safety of our food. ●

CALENDAR

USWBSI EVENTS

2023

December 3-5
2023 National Fusarium Head Blight Forum, Cincinnati, OH

OTHER EVENTS

FEBRUARY

13-17 North American Plant Phenotyping Network Annual Conference, St. Louis, MO

15 University of Illinois Crop Management Conference, Sycamore, IL

22 Michigan Wheat Program Annual Winter Grower Meeting, Frankenmuth, MI

APRIL

17-21 127th Annual IAOM Conference & Expo, Minneapolis, MN

AUGUST

12-16 APS Plant Health 2023, Denver CO

OCTOBER

29-1 2023 ASA, CSSA, SSA International Annual Meeting, St. Louis, MO