FUSARIUM FOCUS

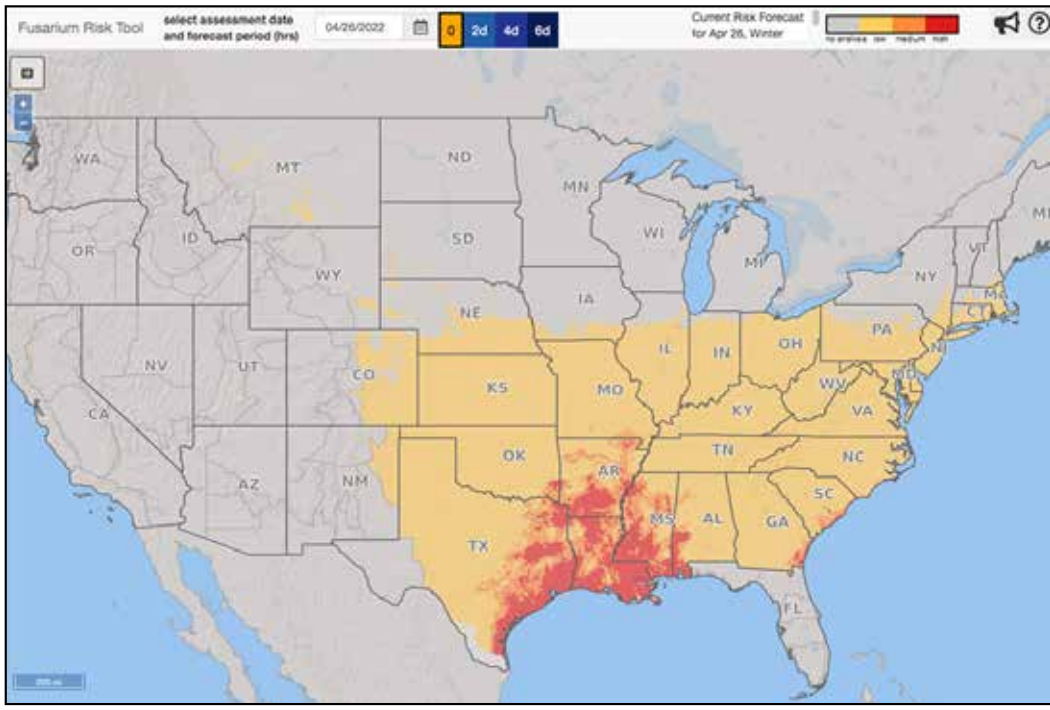
FHB PREDICTION CENTER

New Features in the Risk Tool Allow Growers to View Risk in their Region

Updates to the USWBSI FHB Prediction Center's Risk Tool are made annually depending on user needs and weather data. This year, USWBSI PI's working on the FHB Risk Tool have made improvements upon the latest version. The map shows the risk of severe disease throughout the central and eastern U.S. A lower probability of severe risk is indicated by yellow areas while high probabilities are indicated by orange and red gradients. States with gray areas are either not at a critical growth stage for infection yet or are not included in the predicted risk analysis. Excluded regions can be due to areas where crop growth is limited or where disease models have yet to be verified. To view more localized risk predictions, users can Zoom into their location by using the + or – buttons or simply holding the shift key and dragging the mouse.

Depending on when users may want to spray this season's crop, assessment dates can be selected in the upper toolbar using the calendar. This feature allows users to select dates in the future depending on when their crop may be at the appropriate growth stage for initial infection and fungicide application. Since the default risk is based on 14 days of observed weather, users can customize the map to include 2, 4, or 6-day weather forecasts by selecting the appropriate time frame in the toolbar.

Users can now customize the map based on the overall scenario for the growing season. This means, one can select whether to view the risk for winter or spring wheat varieties and different levels of genetic resistance (very susceptible, susceptible, moderately susceptible, and moderately resistant) to Fusarium head blight of the planted variety. By default, the map displays the risk for susceptible winter wheat. These settings are easily changed using the menu button in the top left corner of the map which also allows the user to display geographical features such as counties, streets, and places.



Updates to the FHB Risk Tool provide a new color gradient to show the probability of severe risk. Low probability of disease risk is indicated by yellow while higher probabilities are indicated by orange and red.

Finally, users can view expert commentary by selecting the megaphone button located at the right corner of the toolbar. This displays commentary by experts located in different geographical regions. To receive alerts when new commentary is added, make sure to subscribe at https://scabusa.org/fhb_alerts. For more information on the predictive models or updates to the FHB Risk Tool, please contact the NFO (nfo@scabusa.org).

DISCLAIMER: The estimates of disease risk are offered without cost within the USA. The model developers, their institutions, and funding agencies cannot guarantee prediction accuracy. Users should always consult with local advisors when making disease management decisions. ●

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.

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ScabNET Early Career Industry Meetup Provided Valuable Career Tips



(left to right) Pravin Gautam, Andrea Lugo-Torres, and Kestrel McCorkle met with post-doctoral researchers and graduate students to provide insights into industry careers.

During the evening of March 29, 25 graduate students, post-doctoral researchers and early career industry professionals gathered on Zoom for the ScabNET Early Career Industry Meetup to learn more about careers in industry. Co-organizer **Peter Oppenheimer** (North Carolina State University) opened the meetup by describing ScabNet and introducing the evenings panelists of professionals which included Dr. **Pravin Gautam** (BASF), **Andrea Lugo-Torres** (PivotBio), and Dr. **Kestrel McCorkle** (GreenLight BioSciences). Following the introductions, co-organizer **Lovepreet Singh** (University of Maryland) led the question-and-answer session by asking the industry professionals questions submitted by the attendees during registration. Attendees were also encouraged to ask questions verbally or through Zoom's chat feature. When asked about networking and using networking sites, Gautam noted "It's all about networking and getting people to notice you." One such question asked was about the relevance of your skill set being exactly what was in the job description. In McCorkle's experience your skill set might not seem like the right fit for a job but being able to sell your skill set and package it is an important task. "You can use the same set of skills and apply them to new positions. It's just selling those skills to the new position."

Some other great questions included "What is the work life balance in industry?", "When is a good time to apply for a job?", and "What's a typical workday like?". One of the last questions which was informative, was "What is one skill a graduate student should work on before applying to an industry position?" Lugo-Torres said for her, "Project management skills are something you should learn how to articulate in your resume/CV." And the second one she would recommend is critical thinking, looking at the bigger picture and talking with people. She mentioned having friends review your resume to make sure you are conveying yourself the way you want to. We would like to thank all the panelists for their time and for helping provide this event for the ScabNet community.

Look for future ScabNet events by joining our Slack workspace and the ScabNet email listserve and following us on twitter @USWBSI.

ScabNet is a newly formed USWBSI network of graduate students and post-docs formed from the outcome of the Early Career Meetup at the 2021 NFHB Forum whose goal is to provide educational, career, and social opportunities for those in FHB research and beyond. The focus of ScabNet is to bring together the current generation of graduate students and post-docs with other members of this community to provide information on relevant topics.

Tim Widmer Overseeing USWBSI for USDA-ARS

Tim Widmer, USDA-ARS National Program Leader for Plant Health, is currently serving as the representative overseeing the U.S. Wheat & Barley Scab Initiative. He is the point of contact for all USDA-ARS projects related to plant health and is also involved with antimicrobial resistance, soil health, and issues related to food security. He brings experience as a Program Leader for the National Predictive Modeling Tool Initiative and has quickly offered his guidance to the USWBSI. With the retirement of José Costa, Widmer has stepped into this role until a permanent hire is put in place.

USWBSI Held First Ever 'Scabinar' for Practitioner Stakeholders to Gain Insights on FHB

On March 15, 2022, 177 individuals tuned into the first 'Scabinar', a new webinar hosted by the U.S. Wheat and Barley Scab Initiative and co-organized by extension plant pathologists **Carl Bradley**, University of Kentucky; **Juliet Marshall**, University of Idaho; and **Andrew Friskop**, North Dakota State University on Fusarium Head Blight (FHB; scab) of wheat and barley. Each of the two parts of the webinar featured a presentation followed by specific questions to panelists from the audience.

In part one, attendees learned about the "*Biology of Fusarium Head Blight*" in **Tom Baldwin**'s, North Dakota State University, presentation. In his presentation, Baldwin touched on the life cycle of the filamentous fungus *Fusarium graminearum*, one of the primary causal agents of FHB. Baldwin noted that there are three types of spores created by the fungus (macroconida, ascospores, and chlamydospores). Of those, ascospores are the ones present on crop residue which cause the initial infection of the wheat or barley heads. Secondary infections occur through macroconida, which are dispersed by rain events to other areas of the plant canopy throughout the infection period. Interestingly, macroconida can travel long distances, up to 60m. The final spore type, chlamydospores, allow the fungus to survive unfavorable conditions.

While *Fusarium graminearum* is the most well-known causal agent of FHB, the disease is in fact caused by six different *Fusarium* species. In North America, three distinct groups of *Fusarium* can be found amongst the isolates; however, within a region the more aggressive species and isolates are the ones that tend to be the causal agents. "The FHB species complex is very diverse and dynamic, it's always changing," noted Baldwin. Switching gears, Baldwin touched on the five different types of resistance found in wheat and/or barley and why it's important to have multiple types of resistance within the same variety. After the presentation, **Stephen Wegulo**, University of Nebraska; Carl Bradley, and Juliet Marshall joined Baldwin as panelists for a discussion and Q&A session.

The second part of Scabinar focused on management of the disease, and **Kelsey Andersen Onofre**, Kansas State University, hit all the major points in her presentation "*Practical management of FHB (scab).*" There are three steps farmers can take to manage FHB: pre-planting decisions, within-season decisions, and harvest decisions. Pre-planting decisions include variety selection; Andersen Onofre noted that planting of varieties with moderate resistance to FHB is recommended. Additionally, crop rotation and tillage can be important management strategies to help reduce the pathogen's load during the season. Within-season decisions are mainly the application of fungicides at the recommended timing.

Presenters and panelists answer attendees' questions during the question-and-answer portions of the first Scabinar event.

Andersen Onofre noted that application timing is critical to provide the best prevention of FHB. Management practices at harvest vary, but it is recommended to harvest at the proper moisture to reduce DON accumulation.

Andersen Onofre also presented some recent data from the Integrated Management Trials, conducted by USWBSI PI's. It is known that the "the DMI fungicides (triazole group) are the most effective against FHB and DON, although there are differences between the individual products," reminds Andersen Onofre. Recently, some new products containing SDHI's have been labeled for FHB and DON management and the group has been testing these products. Overall, the results show that a new product, Miravis® Ace, containing both a DMI and SDHI can be used for management of FHB. This is important as it brings a new FRAC code to the fungicides recommended for FHB. After Andersen Onofre's presentation, Juliet Marshall; **Alyssa Koehler**, University of Delaware; and **Heather Kelly**, University of Tennessee, joined the panel for questions.

Recordings of each part of the Scabinar are now available for ongoing access at https://scabusa.org/scabinar. Although attendees of the Scabinar received 2.0 CEU's for attending the live webinar, CEUs are not available for the recording. Input from the attendees is being reviewed, and plans are being considered for ongoing Scabinar offerings in the future, stay tuned! ●

Have Any Exciting New Genes You Want Expressed or Modified in Wheat or Barley?

Dr. **Harold Trick** (hnt@ksu.edu) and Dr. **Rong Di** (rongdi@sebs.rutgers.edu) both provide transformation services to the FHB community through USWBSI funded transformation labs. If you are looking for wheat transformation, contact Harold Trick or for barley, contact Rong Di to discuss your project and its needs today.

SCABSOURCE

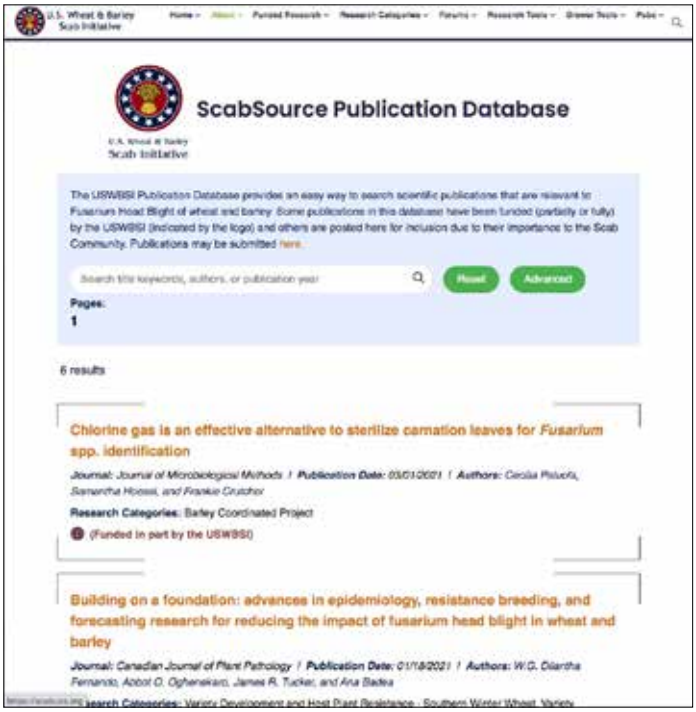
Introducing a Publications Database for Scientific FHB Articles

The ScabUSA website has a new database for users.

ScabSource is a recently developed database for research publications related to FHB of wheat and barley. Publications within the database are categorized by research area (i.e. Barley-CP, Gene Discovery and Engineering Resistance, etc.). Viewers can use the search bar to search on title, author, publication year and even grain class. Additionally, the advanced search feature allows users to incorporate multiple criteria at once. All submissions within the database include links to the original publication allowing for easy navigation to the article of choice. Provided your Institution has full access to the journal, users can view the full publication. Also, simple downloads to citation databases allow the creation of references within one's own work. Publications which acknowledge funding from the USWBSI are indicated with the USWBSI logo. Currently, the database includes publications starting in 2019 with plans to continue to build the citations going forward.

We encourage the community to submit your peer-reviewed articles for inclusion in the database by using the ScabSource Submission form (login in required, use your USWBSI credentials for access). Please note that submissions will not show automatically in the database as they will be vetted for accuracy before being posted.

We hope this database will serve as a valuable archive of peer-reviewed journal articles relevant to the FHB community. If you have any questions, please contact the NFO (nfo@scabusa.org). ●



USWBSI Executive Committee Holds Annual Strategy Session in Minnesota

The USWBSI Executive Committee met again in-person April 21-22, 2022 at the University of Minnesota for its annual strategy session. After having managed all business virtually for the past two years, bringing everyone together for a series of in-depth discussions and strategy planning was a welcomed event. A careful assessment of the current USWBSI Action Plan was the first order of business followed by additional focused discussions on the funding process and approaches for enhancing efforts. The group took some time to also visit the new USWBSI Networking & Facilitation Office (NFO) now located within the UMN Department of Plant Pathology as well as the USWBSI-funded DON laboratory. ●

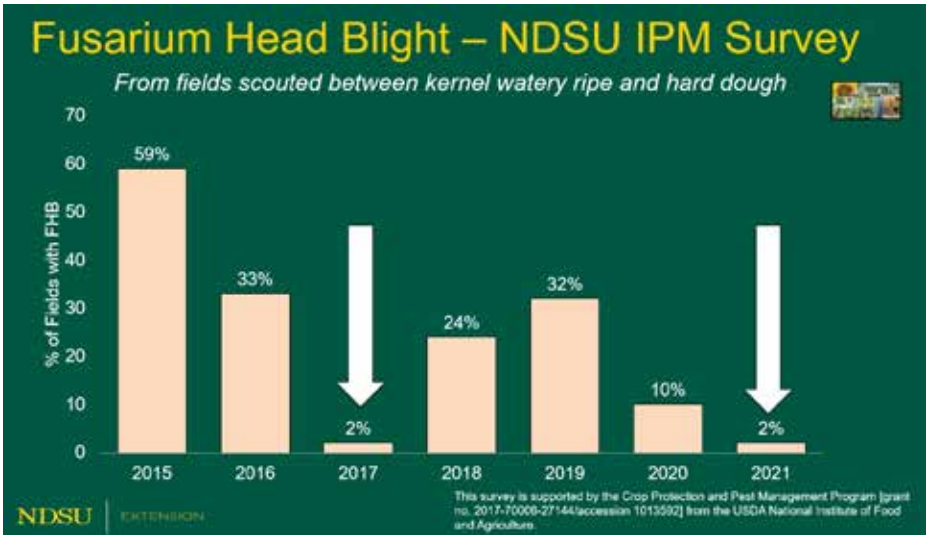
(above) The Executive Committee appreciated connecting again in-person to discuss overall strategies and upcoming plans for the USWBSI.

(left) While at the University of Minnesota, the Executive Committee had the opportunity to meet with Yanhong Dong and learn more about the USWBSI's-funded DON lab.

What Will FHB Risk Be After a Dry Year?

ANDREW FRISKOP / *North Dakota State University, Associate Professor and Cereal Crop Extension Plant Pathologist*

The very dry 2021 growing season in the Northern Great Plains resulted in very little scab concerns for the small grain crop. As we have moved into 2022, a common conversation at winter meetings revolved around developing a scab management plan for 2022. First, a dry growing season of 2021, does not automatically translate to reduced *Fusarium* inoculum for 2022. *Fusarium graminearum* is an ultimate survivalist and survives well on corn and small grain residue. This means that weather events post-harvest can influence the amount of inoculum on residue, and in some cases, fall moisture events can increase the amount of *Fusarium* in fields. To help illustrate this point, scab survey data (supported by USDA-NIFA Crop Protection and Pest Management Program) from 2017 and 2021 will be used. Both growing seasons were very dry and had a very low field prevalence with scab (2% of the fields scouted had scab). However, the growing season of 2018 documented scab in 24% of the surveyed fields. This suggests that the environmental conditions during the current growing season were more important than the environmental conditions of the previous growing season. A similar mindset should be used for 2022, and growers have been reminded to prepare for scab using an integrated management strategy. Understand the level of scab resistance in the variety, the environmental factors that increase scab risk, and use an effective fungicide at the right time (if needed). ●



NBIC and NWIC Advocate for Barley and Wheat Research on Capitol Hill

NBIC Seeking Increases in Barley Research Support

ASHLEY MCFARLAND / *NBIC Vice President & Technical Director*

The National Barley Improvement Committee (NBIC) wrapped up their annual legislative fly-in after attending 50+ virtual and in-person meetings with legislators from across the country. Between March 7-8, the NBIC made 37 virtual visits followed by 14 in-person visits made by a small group of NBIC members who traveled to D.C.

This year the NBIC's key priority was to seek an increase in the appropriated funding for the Barley Pest Initiative (BPI), which focuses on research related to addressing insects and diseases of barley and the development of new resistant varieties and management strategies. NBIC advocated for an additional $1 million in appropriated funds for the BPI. Beginning in 2021, the BPI funded research in 15 states with an initial appropriation of $1 million. NBIC seeks to increase funding in 2023 to reach the $5.3 million needed annually to address these research challenges.

Members of the National Barley Improvement Committee recently traveled to Washington D.C. to advocate on behalf of increased federal funding for barley research.

NWIC Priority on USWBSI and New Wheat Resiliency Initiative

JAKE WESTLIN / *NAWG Vice President of Policy & Communications*

In late March, the National Wheat Improvement Committee (NWIC) held a hybrid fly-in with 30 Congressional offices in Washington, D.C., and over Zoom. During the fly-in, over twenty members of the public and private sector research community, wheat growers, and staff from the National Association of Wheat Growers (NAWG) and North American Millers' Association (NAMA) met with legislators and their staff to advocate for critical research funding for wheat as part of the fiscal year (FY) 2023 appropriations process. In particular, the fly-in focused on two specific funding requests: maintaining the $15 million for the U.S. Wheat and Barley Scab Initiative (USWBSI) and advocating for a new Wheat Resiliency Initiative (WRI).

For FY 2023, NWIC's number one request to appropriators is maintaining full funding for the USWBSI that facilitates key research into Fusarium Head Blight. The 2018 Farm Bill authorizes up to $15 million annually for the USWBSI, which requires continued engagement with Capitol Hill to ensure full funding is realized as part of the annual appropriations process. Since FY 2020, Congress has funded the USWBSI at its authorized level.

NWIC's second appropriations request is pursuing new funding to create a Wheat Resiliency Initiative (WRI), which would provide up to $5.66 million to address future threats to wheat production outside of scab. In particular, U.S. wheat growers and researchers have identified wheat rusts (leaf rust, stripe rust, and stem rust), Wheat Stem Sawfly, Hessian Fly, and Bacterial Leaf Streak as the greatest future threats to wheat production. Changes in U.S. wheat growing conditions have led these pests and pathogens to spread into new areas and increase in severity, affecting every growing region and wheat market class across the United States. While this funding request has yet to be appropriated, the fly-in served a key purpose in educating offices about these new and emerging challenges and helped identify potential champions on Capitol Hill. ●

Public and private sectors researchers, growers and National Association of Wheat Growers and North American Millers' Association staff made their annual Capitol Hill visit in March.

DID YOU KNOW...

FHB PUBLISHED RESEARCH

research articles, associated with USWBSI funding, were published in FY20-21 furthering the progress of FHB research in wheat and barley

COMMUNITY UPDATES

Kudos to those Starting New Positions

Dr. **Imane Laraba**, is now a post-doctoral researcher in the USDA-ARS Mycotoxin Prevention and Applied Microbiology Research Unit, Peoria, IL. Her research is focused on the *Influence of Fusarium diversity and ecological interactions on Fusarium head blight and mycotoxin contamination of wheat and barley*, and she is working with Dr. Martha Vaughan.

Welcoming the following New USWBSI Funded Students

Mahnoor Asif, Ph.D. student, University of Nebraska-Lincoln, Project: *Effects of Fungicides and Cultivars on Fusarium Head Blight and Foliar Fungal Diseases of Wheat*, Advisor: Stephen Wegulo

Brooke Benz, M.S. student, North Dakota State University, Project: *Microbiome Interaction of FHB on Barley*, Advisors: Barney Geddes and Thomas Baldwin

Julian Cooper, Ph.D. student, University of Minnesota, Project: *Efficacy of Mineral Rover for High Fidelity/Temporal Resolution of Field FHB Severity*, Advisor: Cory Hirsch

Bhanu Dangi, M.S. student, North Dakota State University, Project: *Evaluation of Winter Wheat for FHB Genetic Background Resistance using a Test Cross Analysis*, Advisor: G. Francois Marais

Anmol Kajla, Ph.D. student, University of Maryland, Project: *High Resolution Mapping of Native Resistance against FHB in the Soft Red Winter Wheat Cultivar 'Jamestown'*, Advisor: Vijay Tiwari

Abbeah Navasca, Ph.D. student, North Dakota State University, Project: *Fusarium Genomics and Host Switching during Rotations for FHB causing Fusarium*, Advisors: Thomas Baldwin and Gary Secor

Bipin Neupane, M.S. student, North Dakota State University, Project: *A Diallel Study to Detect Variation in Genetic Background FHB Resistance in Winter Wheat*, Advisor: G. Francois Marais

Alireza Poursafar, Ph.D. student, North Dakota State University, Project: *Molecular Mapping and Genetic Characterization of FHB Resistance in Durum Wheat*, Advisor: Shaobin Zhong

Amna Riasat, Ph.D. student, North Dakota State University, Project: *Molecular Characterization of Fusarium graminearum Effectors Involved in FHB Development in Wheat*, Advisor: Shaobin Zhong

Joyce Robinson, Ph.D. student, University of Kentucky, Project: *Combining Flavor, Dough Functionality and Scab Resistance in a Diverse Wheat Population*, Advisor: Dave Van Sanford

Shahed Safar, Ph.D. student, North Dakota State University, Project: *Molecular Mapping and Introgression of FHB Resistance in Spring Wheat*, Advisor: Shaobin Zhong.

CALENDAR

USWBSI EVENTS

2022

December 4-6
2022 National Fusarium Head Blight Forum, Tampa, FL

2023

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

RELATED EVENTS

JUNE

1	International Wheat Stem Sawfly Forum: Farmers Voice, Virtual
2	2022 Cornell Small Grains Management Field Day, Seneca Falls, NY
9	UNL Jefferson County Winter Wheat Variety Trials 2022 Field Tour
14	OARDC and Ohio Corn and Wheat Association Field Day, Wooster, OH: Tentative
19-24	Fusarium Laboratory Workshop, Manhattan, KS
20	UNL Gosper and Red Willow Counties Winter Wheat Variety Trials 2022 Field Tours
21-23	2022 APS North Central Division Meeting, Lincoln, NE
21	UNL Perkins and Deuel Counties Winter Wheat Variety Trials 2022 Field Tours
22	UNL Cheyenne and Box Butte Counties Winter Wheat Variety Trials 2022 Field Tours
23	UNL Banner County Winter Wheat Variety Trials 2022 Field Tour
29	Cornell Seed Growers' Field Day, Ithaca, NY

JULY

3-7	13th International Barley Genetics Symposium, Riga, Latvia
5-7	20th International Conference for Cereal Science and Technology, Vienna, Austria

AUGUST

6-10	APS Plant Health 2022, Pittsburg, PA

SEPTEMBER

22-24	23rd North American Barley Researchers Workshop and 43rd Barley Improvement Conference, Davis, CA

NOVEMBER

6-9	2022 ASA, CSSA, SSSA International Annual Meeting, Baltimore, MD