



North Central
Weed Science Society

2021

76th Annual Meeting

North Central Weed Science Society

www.ncwss.org

December 13 - 16, 2021

**Amway Grand Plaza,
Grand Rapids, MI**

President's Welcome

2021 North Central Weed Science Society Meeting

Welcome to the 76th annual meeting of the North Central Weed Science Society (NCWSS) at the Amway Grand Plaza in Grand Rapids, MI. I want to thank the membership for the opportunity to serve as President in 2021. Thinking back to when I became involved in weed science brings back fond memories of my time at the University of Nebraska – Lincoln. I decided to go into horticulture instead of Plant Pathology because I wanted to grow plants instead of trying to figure out what was killing them. However, by my second semester, I realized my true passion was killing plants, and more specifically the weeds that were invading annual statice (*Limonium sinuatum*). Perhaps there was also a slight influence from a young man (Steve Valenti) working on his MS in weed science, just down the hallway. By the time I got to Iowa State University, I knew this was the career path I wanted, and with the guidance from excellent advisors like Mike Owen and Nick Christians, along with that first NCWSS weed contest and NCWSS annual meeting, I've been hooked for life with no regrets! I hope that this annual meeting will provide a similar spark for those attending for the first time. For others, I hope it is that perfect opportunity to network with new acquaintances as well as old friends. However, for everyone this meeting remains a vital and vibrant opportunity to share weed science information while learning from others. So please take advantage of every opportunity to engage with others, continue to be a life-long learner, and feel the contentment of an in-person NCWSS annual meeting.

Christy Sprague and the Local Arrangements Committee have done an amazing job with the help of the hotel staff to prepare for our meeting. The Amway Grand Plaza will provide a spacious, high-quality site with outstanding services. There are also diverse restaurants and local attractions nearby.

David Simpson, this year's Program Chair, has organized an exceptional program. In addition to the many volunteer paper and poster presentations, the program has a very timely symposium, "Implications for weed management due to climate change" and graduate student workshop "Career development and interviewing" on Wednesday afternoon. Then on Thursday morning after the Industry Breakfast, the ever-popular "What's New in Industry" session, organized this year by Industry Committee Chair Lowell Sandell. Additionally, the 9th annual "Women in Weed Science Networking Breakfast" is scheduled Wednesday morning with Wendy Pline Sronic, Vice President of Seeds R&D at Corteva, as the speaker.

The Distinguish Achievement and Fellow awards will be announced at the Awards Luncheon on Wednesday. Later that evening, the Graduate Student Paper and the Graduate and Undergraduate Poster Contest winners will be announced at the NCWSS Society Social. Please help us congratulate our NCWSS students.

It is never too late to be more involved in the NCWSS committees and activities. The NCWSS is a volunteer organization, so you need be involved for its continued success. Your attendance, giving presentations, and serving on at least one committee are excellent ways to be involved. If you are unsure of what is involved with a particular committee, find the name of the Chair, Vice Chair, or even the Past Chair towards the back of the program and then find that person to talk with. Every society committee will meet during the conference and the meeting information is listed towards the front of the program. Please feel free to attend any of the committee meetings that interest you, and please volunteer to serve.

It has been a great privilege and opportunity to serve as President of the NCWSS. I will always cherish this experience. If you have any suggestions on how NCWSS can serve you better, please let me know. I look forward to seeing you at the Amway Grand Plaza Hotel and thank you for your continued support and service of the NCWSS.

Harlene Hatterman-Valenti
President

Conference Headquarters

All sessions of the conference and the meeting events will be held at the Amway Grand Plaza, 187 Monroe Avenue NW, Grand Rapids, MI 49503.

Registration Hours

The registration desk is at the **Center Concourse**, and will be open Monday 4 to 6:30 pm, Tuesday 7:30 am to 4 pm, Wednesday 8 to 11 am and 2 to 4 pm, Thursday 8 to 10:15 am.

Meeting Rooms

All sessions and meetings will be in the Amway Grand Plaza. Additional meetings may be arranged any time during the conference by contacting Christy Sprague, Local Arrangements Chair.

Proceedings

2021 NCWSS Proceedings will be available following the meeting online at the NCWSS website.

Sustaining Members

Sustaining members that have made prior arrangements with the Industry Chair may put up a display in the Center Concourse. No other displays are allowed.

Health and Safety

Smoking is allowed in designated areas only.

Please contribute to conference environment in which diverse attendees may learn, network, and enjoy the company of colleagues in a professional and harassment-free atmosphere.

The NCWSS believes in and supports the laws designated to keep our Society safe and designed to protect the environment. If you believe that an unsafe condition exists in our Society, bring it immediately to the attention of the President, a member of the Board, or Executive Secretary. If an incident takes place, report it pursuant to policy and immediately take action to address the problem. Any incident or situation that violates the law or this policy should be immediately reported to the Executive Secretary; in person or via this contact information: info@ncwss.org or 720-445-4789.

Please keep your personal belongings with you at all times.

No photographs or videos

Do not take pictures or videos of any presentations without prior permission from the presenter. Many presentations will be available online after the conference, by those that agreed to upload pdf versions of their presentations.

NCWSS Mobile Meeting App – Crowd Compass

The 76th Annual Meeting Program has its own mobile app. Get started by downloading the **Attendee Hub** App in your mobile app store.

1. Open the invitation in your inbox. Tap **Verify Account**.
2. Tap **Open App**. to complete the verification via your brand new mobile app.

If you're signing up for an account:

1. From the event home screen, tap the hamburger icon at the top left of the screen.
2. Tap **Log in for more features!**
3. Enter your first and last name and tap **Next**.
4. Enter your email.
5. We'll send you an email to verify your account. We just want to make sure it's you.
6. Open your email to find your verification code.
7. Return to the app and enter the four-digit code to finish logging in.

Follow NCWSS on Twitter

Keep up to date with the latest NCWSS news by following @NCWeedScience and the annual meeting tag #NCWSS2021.

Program Symbols

- * Presenting Author
- † Paper or poster in the graduate student contest
- ‡ Poster in the undergraduate student contest

Meal Functions of the Society 2021

Meal Functions

Breaks

Tuesday, 9:50 – 10:45 am	Crown Foyer
Tuesday, 3:15 – 3:30 pm	Crown Foyer & North Concourse
Wednesday, 10:00 – 10:30 am	North Concourse
Wednesday, 3:15 pm – 3:30 pm	Pantlind
Wednesday, 3:20 pm – 3:50 pm	Imperial

Presidential Reception

*– Open to 2020 and 2021 Distinguished Award Winners,
New and Current Fellows, Current Board Members*

Monday, 6:00 – 7:00 pm	Presidential
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Student Mixer

Sponsored by BASF Corporation – Open to all attendees

Monday, 6:30 – 9:30 pm	Imperial
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Paper and Poster Judges Breakfast

Tuesday, 7:00 am	Pearl
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Student Luncheon/Business Meeting

Sponsored by Corteva Agriscience – Open to all students

Tuesday, 12:00 – 1:15 pm	Pantlind
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Women in Weed Science Networking Breakfast

Open to all women

Wednesday, 6:30 – 8:00 am	Pantlind
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Society Awards Luncheon

Wednesday, 11:30 – 1:15 pm	Ambassador
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Society Social and Contest Awards

Sponsored by Sustaining Members – Open to all

Wednesday, 5:30 – 7:00 pm	Ambassador
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Industry Breakfast (Cost \$45)

Thursday, 7:00 – 8:15 am	Ambassador West
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Meetings of the Society 2021

Meetings will take place for conducting the business of each respective committee. Most meetings are open to members. Please contact the committee chair or attend the committee meeting if you are interested in serving the society by being a committee member. * denotes committees that will elect a new Vice Chair to serve as Chair in 2023.

NCWSS Committee Meetings

Local Arrangement Committee

Monday, 10:00 am

Governor's

Board of Directors

Monday, 1:00 pm

Pearl

Resident Education, Summer Contest and Contest Rules Joint meeting

Monday, 5:00 pm

Governor's

NCWSS Fellows

Monday, 5:00 pm

Lyon

Resolutions & Necrology*

Monday, 5:30 pm

Lyon

Program Committee and Section Chairs

Monday, 7:30 pm (*section moderators*)

Governor's

Nominating

Tuesday, 5:15 pm

Lyon

Finance, Steering & Policy

Tuesday, 5:45 pm

Lyon

Strategic Planning

Tuesday, 5:30 pm

Pearl

Paper Judges

Tuesday, 7:00 am with breakfast

Pearl

Wednesday, 1:30 pm

Vandenberg B

Poster Judges

Tuesday, 7:00 am with breakfast

Pearl

Wednesday, 1:30 pm

Vandenberg A

Industry

Thursday, 10:00 am

Ambassador East

Board of Directors

Thursday, 10:15 am

Pearl

Meetings of the Society 2021

Program Section Business Meetings

Weed Biology, Ecology & Management

Tuesday, 4:30 pm

Ambassador West

Horticulture and Specialty Crops

Tuesday, 4:15 pm

Vandenberg

Agronomic Crops II (Soybeans)

Tuesday, 5:00 pm

Ambassador East

Agronomic Crops I (Corn)

Wednesday, 9:30 am

Vandenberg B

Invasive Weeds, Rangeland and Vegetation Management

Wednesday, 11:00 am

Vandenberg B

Equipment and Application Methods

Wednesday, 11:15 am

Governor's

Extension

Wednesday, 11:10 am

Imperial

Herbicide Physiology

Wednesday, 11:15 am

Vandenberg A

Symposia

Implications for Weed Management Due to Climate Change

Wednesday, 1:30 – 5:30 pm

Imperial

NCWSS Graduate Student Workshop on Career

Development and Interviewing:

Wednesday, 1:30 – 5:00 pm

Pantlind

Condensed Program – NCWSS 2021

Monday, December 13

10:00 – 12:00 Local Arrangements

Governor's

1:00 - 5:00 Board of Directors

Pearl

4:00 - 8:00 Poster Setup

Center

Concourse

5:00 - 5:30 NCWSS Fellows

Lyon

5:00 - 6:00 Resident Education and subcommittees

Governor's

5:30 - 6:00 Resolutions and Necrology Committee

Lyon

6:00 - 7:00 Presidents Reception

Presidential

6:30 - 9:30 Graduate Student Mixer

Imperial

7:30 - 8:30 Program Committee and Section Program Chairs

Governor's

Tuesday, December 14

7:00 - 8:00	Paper and Poster Judges Breakfast	Pearl
8:00 - 10:00	General Session	Ambassador
10:00 - 11:50	Poster Session I	Center Concourse
12:00 - 1:15	Graduate Student Committee	Pantlind
1:15 - 5:15	Agronomic Crops II - Soybeans	Ambassador East
1:15 - 4:30	Horticulture and Specialty Crops	Vandenberg
1:15 - 4:45	Weed Biology, Ecology, Management	Ambassador West
5:15 - 5:45	Nominating Committee	Lyon
5:45- 6:30	Finance Steering and Policy Committee	Lyon
5:30 - 6:30	Strategic Planning	Pearl
5:30 - 6:30	Poster Session II	Center Concourse

Wednesday, December 15

6:30 - 8:00	Women in Weed Science Networking Breakfast	Pantlind
7:00 - 5:30	Poster Viewing	Center Concourse
8:00 - 11:30	Extension	Imperial
8:00 - 11:30	Equipment and Application Methods	Governor's
8:15 - 11:30	Herbicide Physiology & Molecular Biology	Vandenberg A
8:15 - 9:45	Agronomic Crops I - Corn	Vandenberg B
10:15 - 11:15	Invasive Weeds, Rangeland, Pasture, and Vegetation Management	Vandenberg B
11:30 - 1:15	Society Awards Luncheon	Ambassador
1:15 - 2:00	Poster Final Grades Submission	Vandenberg A
1:15 - 2:00	Paper Judges Final Grades Submission	Vandenberg B
1:30 - 5:30	Implications for Weed Management Due to Climate Change	Imperial
1:30 - 5:00	NCWSS Graduate Student Workshop on Career Development and Interviewing:	Pantlind
5:30 - 7:00	Society Social and Contest Awards	Ambassador

Thursday, December 16

7:00 - 8:15	Industry Breakfast (cost \$45)	Ambassador West
8:30 - 10:00	What's New in Industry	Ambassador East
10:00 - 10:15	Industry Business Meeting	Ambassador East
10:15 - 11:15	Board of Directors	Pearl

General Session

LOCATION: Ambassador Ballroom
TIME: 8:00 AM - 10:00 AM
MODERATOR: David M. Simpson

- 8:00 AM Welcome to the 76th Annual Meeting of the North Central Weed Science Society.** David M. Simpson*; Corteva, Indianapolis, IN **(1)**
- 8:05 AM NCWSS Members' Vision for Continued Success.** Sarah Lancaster^{*1}, Erin Haramoto², Alyssa Essman³, Cody Evans⁴, Justin Pollard⁵, Debalin Sarangi⁶, Daniel H. Smith⁷, Nader Soltani⁸; ¹Kansas State University, Manhattan, KS, ²University of Kentucky, Lexington, KY, ³The Ohio State University, Columbus, OH, ⁴Bayer Crop Science, Franklin, IL, ⁵Bayer Crop Science, Lathrop, MO, ⁶University of Wyoming, Laramie, WY, ⁷University of Wisconsin-Madison, Madison, WI, ⁸University of Guelph, Ridgetown, ON, Canada **(2)**
- 8:20 AM Michigan Agriculture: Challenges and Opportunities Today and in the Future.** Chuck Lippstreu*; President, Michigan Agri-Business Association, Lansing, MI **(3)**
- 8:50 AM Weed Science Policy Update from DC.** Lee Van Wychen*; Weed Science Society of America, Alexandria, VA **(4)**
- 9:15 AM Presidential Address.** Harlene M. Hatterman-Valenti*; North Dakota State University, Fargo, ND **(5)**
- 9:45 AM Remembering NCWSS Members and Friends.** Derek Potratz*; Tilth Agronomy Group, Omro, WI **(6)**
- 9:50 AM Program Announcements.** David Simpson*; Dow AgroSciences, Zionsville, IN **(7)**

Poster Sessions

Room: Center Concourse

Chairperson and Moderator: Scott Payne

Poster Setup

Posters can be set up between 4:00 and 8:00 pm on Monday, December 13. All NCWSS posters will be on display on Tuesday, December 14 from 7:00 am until 6:30 pm and on Wednesday, December 15 from 7:00 am until 5:00 pm. Posters must be removed by 7:00 pm on Wednesday, December 15.

Students in the Poster Contest must be with their posters during both Poster Sessions on Tuesday for judging. Students in the poster contest are required to bring letter-sized copies of your posters to hand out.

Tuesday, December 14

10:00 – 11:50 am Poster Session I

5:30 – 6:30 pm Poster Session II

Poster Removal

All posters must be removed by 7:00 pm on Wednesday, December 15.

NCWSS Sustaining Member Exhibitors

Tuesday & Wednesday

Center Concourse

Set up Monday afternoon.

Program Symbols

- * Presenting Author
- † Paper or poster in the graduate student contest
- ‡ Poster in the undergraduate student contest

Posters:

Agronomic Crops I - Corn

†Weed Control in Corn with Residual Herbicides Applied Preemergence. Tatiane S. Silva*¹, Nicholas J. Arneson¹, Daniel H. Smith¹, Ryan P. DeWerff¹, Daniel V. Silva², Rodrigo Werle¹; ¹University of Wisconsin-Madison, Madison, WI, ²Federal Rural University of the Semi-Arid Region, Mossoro, Brazil **(8)**

Precipitation and Temperature Effects on Group 15 Herbicides. Tyler P. Meyeres*, Lily A. Woitaszewski, Chad J. Lammers, Malynda M. Smith, Sarah Lancaster; Kansas State University, Manhattan, KS **(9)**

†Spray Volume Effects on Residual Herbicide Efficacy in Corn. Tyler P. Meyeres*¹, Lily A. Woitaszewski¹, Malynda M. Smith¹, Christopher Mayo², Sarah Lancaster¹; ¹Kansas State University, Manhattan, KS, ²Bayer CropScience, Salina, KS **(10)**

†Comparative Effects of Herbicide, Nitrogen Inhibitors, and Nitrogen Source on Nitrification and Corn Yield. William H. Neels*, Amit J. Jhala, Bijesh Maharjan, Richard Little, Javed Iqbal; University of Nebraska-Lincoln, Lincoln, NE **(11)**

†Control of Glyphosate/glufosinate/dicamba-resistant Soybean Volunteers in Corn with Pre-emergence Herbicides. Mandeep Singh*, Amit J. Jhala; University of Nebraska-Lincoln, Lincoln, NE **(12)**

Maverick: A New Herbicide Premix for PRE and POST Weed Control in Corn. Garrison J. Gundy*¹, John Pawlak², Lowell Sandell³, Jonathon Kohrt⁴, Eric Ott⁵, Trevor Israel⁶, Ron Estes⁷; ¹Valent USA LLC, Seymour, IL, ²Valent USA LLC, Lansing, MI, ³Valent USA LLC, Ashland, NE, ⁴Valent USA LLC, West Des Moines, IA, ⁵Valent USA LLC, Greenfield, IN, ⁶Valent USA LLC, Harrisburg, SD, ⁷Valent USA LLC, Tolono, IL **(13)**

†Control of Multiple Herbicide-Resistant Palmer Amaranth (*Amaranthus palmeri*) in Corn Resistant to 2,4-D Choline/Glufosinate/Glyphosate. Ramandeep Kaur*¹, Vipin Kumar², Stevan Knezevic³, Nevin Lawrence⁴, Rachana Jhala¹, Amit J. Jhala¹; ¹University of Nebraska-Lincoln, Lincoln, NE, ²Kansas State University, Manhattan, KS, ³University of Nebraska Lincoln, Concord, NE, ⁴University of Nebraska Lincoln, Scottsbluff, NE **(14)**

†Evaluating Greenhouse Corn Preemergence Herbicide Carry Over Potential to Interseeded Cover Crops. Victor de Sousa Ferreira*¹, Christopher Proctor¹, Breno Nyssen¹, Thiago H. Vitti¹, Rodrigo Werle², Tatiane S. Silva², Bruno Canella Vieira²; ¹University of Nebraska Lincoln, Lincoln, NE, ²University of Wisconsin-Madison, Madison, WI **(15)**

Agronomic Crops II - Soybeans

†Effect of Spray Volume and Weed Height on Palmer Amaranth (*Amaranthus palmeri*) and Large Crabgrass (*Digitaria sanguinalis*) Control by Tank Mixes Used in 2,4-D Resistant Soybeans. Chad J. Lammers*, Malynda M. Smith, Tyler P. Meyeres, Kraig Roozeboom, Sarah Lancaster; Kansas State University, Manhattan, KS **(16)**

Planting Soybean "Green" -- Supplemental Nitrogen, Yield Response and Weed Management Implications. Mark L. Bernards*, Brent S. Heaton, Kinsey E. Tiemann; Western Illinois University, Macomb, IL **(17)**

†Hyperspectral Imaging for Early Detection of Herbicide-Resistant *Amaranthus tuberculatus* in Soybean Production Fields. Austin H. Schleich*¹, Prashant Jha¹, Joseph Shaw², Bryan Scherrer², John Sheppard², Ramawatar Yadav¹, Alexis L. Meadows¹, Avery J. Bennett¹, Ryan Hamberg¹, Edward S. Dearden¹; ¹Iowa State University, Ames, IA, ²Montana State University, Bozeman, MT **(18)**

Kyber Clean: an Effective Solution for Managing Resistant Weeds in Enlist Soybean. Kelly A. Backscheider*, Joe Armstrong, David M. Simpson, Kevin Johnson, Kristin Rosenbaum, Dave Johnson, Frances Meeks; Corteva Agriscience, Indianapolis, IN **(19)**

†Cover Crop Termination Timing by Herbicide Interaction for Managing Glyphosate-Resistant Horseweed and Waterhemp in Soybean. Edward S. Dearden*, Prashant Jha, Ramawatar Yadav, Avery J. Bennett, Alexis L. Meadows, Austin Schleich, Ryan Hamberg; Iowa State University, Ames, IA **(20)**

†Effective Respray Herbicide Options for Weeds Surviving Auxin Herbicides. Tomas F. Delucchi*, William G. Johnson, Bryan G. Young; Purdue University, West Lafayette, IN **(21)**

Tuesday Posters 2021

Effect of POST Applied Dicamba and Glufosinate Alone or in Sequential Combination on Glyphosate-Resistant Palmer Amaranth in XtendFlex Soybean. Rui Liu*¹, Vipin Kumar¹, Monica Marrs², Taylor Lambert¹; ¹Kansas State University, Hays, KS, ²Kansas State University, Manhattan, KS (22)

†Weed Management in Soybean Using a Combination of Metobromuron and S-metolachlor. Eric Y. Yu*, Debalin Sarangi; University of Minnesota, St. Paul, MN (23)

Using an Agar-Based Bioassay to Characterize the Interaction Between Mesotrione and Metribuzin on Giant Ragweed. Benjamin C. Westrich*, Bryan G. Young; ¹Purdue University, West Lafayette, IN (24)

†Competitiveness of an Oat Companion Crop on *Amaranthus spp.* and Soybean. Jeffery K. Stith*, Joseph T. Ikley; North Dakota State University, Fargo, ND (25)

Accentuated Injury in Soybean When Thifensulfuron is Co-applied with Glyphosate. Nader Soltani*, Christy Shropshire, Peter H. Sikkema; University of Guelph, Ridgetown, ON, Canada (26)

Sensitivity of Various Market Classes of Dry Beans to Tiafenacil Applied Preemergence. Nader Soltani*, Christy Shropshire, Peter Sikkema; University of Guelph, Ridgetown, ON, Canada (27)

‡A Multi-state Survey of Waterhemp Populations for Responses to Dicamba and Glufosinate. Taylor Nix*, Travis Winans, Jacob E. Vaughn, Mandy Bish, Kevin W. Bradley; University of Missouri, Columbia, MO (28)

‡Evaluation of Weed Control in Early Planted Soybeans in Kentucky. Catlin M. Young*, Travis Legleiter; University of Kentucky, Princeton, KY (29)

Influence of Different 2,4-D Formulations and Tank Mix Partners on 2,4-D Volatility. Matthew Osterholt*¹, Daniel B. Reynolds², Jason K. Norsworthy³, Mandy Bish⁴, Kevin W. Bradley⁴, Bryan G. Young¹; ¹Purdue University, West Lafayette, IN, ²Mississippi State University, Mississippi State, MS, ³University of Arkansas, Fayetteville, AR, ⁴University of Missouri, Columbia, MO (30)

Tuesday Posters 2021

†Examining the Influences of Delayed Activation and Cover Crop Residue on the Efficacy of Acetochlor. Bradley J. Decker*, Eric J. Miller, Karla L. Gage; Southern Illinois University, Carbondale, IL **(31)**

Comparison of Banded vs Blanket Preemergent Herbicide Applications in a Cereal Rye Cover Crop. Alexander R. Mueth*, Eric J. Miller, Karla L. Gage; Southern Illinois University, Carbondale, IL **(32)**

†Effect of Postemergence Herbicide Application Timing and Sequence on Weed Control in Enlist E3 Soybean. Navjot Singh*¹, Ryan P. Miller¹, Thomas J. Peters², Seth L. Naeve¹, Debalin Sarangi¹; ¹University of Minnesota, St. Paul, MN, ²North Dakota State University, Fargo, ND **(33)**

Residual Control of Giant Ragweed with Preemergence Soybean Herbicides. Ryan P. DeWerff*, Nicholas J. Arneson, Maxwell Coura Oliveira, Rodrigo Werle; University of Wisconsin-Madison, Madison, WI **(34)**

†Planting Green in Soybean: Evaluation of Cereal Rye Termination, Weed Control, and Soybean Yield. Trey P. Stephens*¹, Jenny Rees¹, Stevan Knezevic², Humberto Blanco¹, Katja Koehler-Cole¹, Amit J. Jhala¹; ¹University of Nebraska-Lincoln, Lincoln, NE, ²University of Nebraska Lincoln, Concord, NE **(35)**

Equipment and Application Methods

†The Use of UAVs for Crop Protection. Emma L. Gaither*, Reid Smeda; University of Missouri, Columbia, MO **(36)**

Impact of Spray Carrier Volume and Nozzle Selection on Control of Volunteer Corn with Clethodim and Velvetleaf and Waterhemp with Glufosinate. Nikola Arsenijevic*, Felipe de Andrade Faleco, Nicholas J. Arneson, Rodrigo Werle; University of Wisconsin-Madison, Madison, WI **(37)**

Application Method and Environmental Impacts on Palmer Amaranth Control with Glufosinate and Paraquat. Jeff Golus*¹, Bruno Canella Vieira², Greg Kruger¹, Kasey Schroeder¹, Vinicius Velho¹, Barbara Vukoja¹, Trenton W. Houston¹; ¹University of Nebraska-Lincoln, North Platte, NE, ²University of Wisconsin-Madison, Madison, WI **(38)**

Tuesday Posters 2021

‡Effectiveness of Glufosinate on Troublesome Warm-Season Weeds as Influenced by Carrier Volume and Ammonium Sulfate. Nina Pejovic*, Milos Zaric, Jesaelen Gizotti de Moraes; University of Nebraska Lincoln, North Platte, NE **(39)**

The Use of Canopeo App for Data Collection in Weed Science. Nikola Arsenijevic*, Rodrigo Werle; University of Wisconsin-Madison, Madison, WI **(40)**

Extension

†A Survey of Kansas Herbicide Applicators to Guide Research and Extension. Lily A. Woitaszewski*, Tyler P. Meyeres, Chad J. Lammers, Sarah Lancaster; Kansas State University, Manhattan, KS **(41)**

Grass Weed Control in Herbicide-Resistant Grain Sorghum. Vipran Kumar*, Rui Liu, Taylor Lambert, Sachin Dhanda, Monica Marrs; Kansas State University, Hays, KS **(42)**

Managing Waterhemp in Soybean on Low Organic Matter and Elevated pH Soils with Residual Herbicides. Daniel H. Smith*¹, Jamie Patton², Scott Reuss³, Maxwell Coura Oliveira¹, Ryan P. DeWerff¹, Nicholas J. Arneson¹, Rodrigo Werle¹, Kolby Grint¹; ¹University of Wisconsin-Madison, Madison, WI, ²University of Wisconsin-Madison, Shawano, WI, ³University of Wisconsin-Madison, Marinette, WI **(43)**

Weed Control in Herbicide Resistant Grain Sorghum in Kansas. Malynda M. Smith*¹, Patrick Geier², Randall S. Currie², Sarah Lancaster¹; ¹Kansas State University, Manhattan, KS, ²Kansas State University, Garden City, KS **(44)**

There and Back Again: A Look at North Dakota Weed Control Research Over 50 Years. Stephanie DeSimini*, Joseph T. Ikley, Kirk A. Howatt; North Dakota State University, Fargo, ND **(45)**

Farmer Survey Reveals New Trends in Weed Management. Elizabeth Stahl*¹, Jared J. Goplen², Anthony A. Hanson², Ryan P. Miller³, David Nicolai⁴, Angie J. Peltier⁵; ¹University of Minnesota Extension, Worthington, MN, ²University of Minnesota Extension, Morris, MN, ³University of Minnesota, Rochester, MN, ⁴University of Minnesota Extension, Farmington, MN, ⁵University of Minnesota Extension, Crookston, MN **(46)**

Tuesday Posters 2021

Cereal Rye Tolerance to Weedy Grass Herbicides. Dwight Lingenfelter*, John M. Wallace; Penn State University, University Park, PA (47)

History of Weed Management in Minnesota and North Dakota. David Nicolai*¹, Thomas Peters², Roger Becker¹, Calvin Messersmith²; ¹University of Minnesota, St. Paul, MN, ²North Dakota State University, Fargo, ND (48)

Herbicide Physiology & Molecular Biology

†Investigating Clopyralid Resistance in *Ambrosia artemisiifolia* (Common Ragweed) Using RNA Sequence Transcriptome Analysis. Nash D. Hart*, Erin E. Burns, Eric L. Patterson; Michigan State University, East Lansing, MI (49)

†The Genomic Response of *Kochia scoparia* to Sub-lethal Doses of Glyphosate. Carly A. Claucherty*¹, Nathan Hall¹, Todd Gaines², and Eric L. Patterson¹; ¹Michigan State University, East Lansing, MI; ²Colorado State University, Fort Collins, CO (50)

Reduced Translocation of 2,4-D Observed in Resistant *Plantago lanceolata*. Quincy D. Law*¹, Ronald R. Rogers², Travis Gannon², Aaron Patton³; ¹North Dakota State University, Fargo, ND, ²North Carolina State University, Raleigh, NC, ³Purdue University, West Lafayette, IN (51)

†Role of Glyphosate Retention and Absorption on Tolerance of Two Horseweed Growth Types. Justine L. Fisher*, John A. Schramski, Eric L. Patterson, Christy Sprague; Michigan State University, East Lansing, MI (52)

Inheritance of Resistance to ALS-Inhibitors in Giant Ragweed is Controlled by Multiple Genetic Factors. Benjamin C. Westrich*, Bryan G. Young; Purdue University, West Lafayette, IN (53)

†A KASP Assay for Sex-Determination in Palmer Amaranth (*Amaranthus palmeri*) and Application in Weed Ecology. Ednaldo A. Borgato*, Sathishraj Rajendran, Anita Dille, Mithila Jugulam; Kansas State University, Manhattan, KS (54)

†Soil Applied PPO Inhibitors Select for Fewer Resistant Individuals Than Foliar Applications. Jesse A. Haarmann*, Bryan G. Young, William G. Johnson; Purdue University, West Lafayette, IN (55)

Isolation of Protoplasts from Waterhemp Cell Suspension Cultures. Robert P. Sabba, Michael J. Christoffers*; North Dakota State University, Fargo, ND (56)

†Population Structure and Adaptation of Weedy *Lolium* spp. Revealed by a Continental Transcriptomic Study. Lucas K. Bobadilla*¹, Brent P. Murphy², Anita Küpper³, Roland S. Beffa⁴, Patrick Tranel²; ¹University of Illinois, Champaign, IL, ²University of Illinois, Urbana, IL, ³Bayer Crop Science, Frankfurt, Germany, ⁴Bayer Crop Science, Frankfurt / Main, Germany (57)

The Functional Annotation of Weedy Genomes for the International Weed Genomics Consortium. Nathan D. Hall*, Eric L. Patterson; Michigan State University, East Lansing, MI (58)

Horticulture and Specialty Crops

†The Importance of Weed Control in Vineyards. Michelle M. Maile*; University of Missouri, Columbia, MO (59)

The Performance of Halauxifen-methyl + Fluroxypyr + 2,4-D Choline (GameOn™) in Golf Native Area Weed Management Programs. David E. Hillger*, Amy L. Agi, Paul T. Marquardt; Corteva Agriscience, Indianapolis, IN (60)

†Peppermint (*Mentha × piperita*) Response to Mesotrione and S-Metolachlor Applied Post-Harvest. Jeanine Arana*, Stephen L. Meyers; Purdue University, West Lafayette, IN (61)

Tolerance of 'Tina Gold' Mum to Reduced Rates of Glyphosate, 2,4-D, and Dicamba. Laura Rodriguez*, Stephen L. Meyers, Jeanine Arana, Nathaly Vargas; Purdue University, West Lafayette, IN (62)

Cantaloupe Response to Simulated Flumioxazin Tank Contamination. Nathaly Vargas*, Stephen L. Meyers, Jeanine Arana, Laura Rodriguez; Purdue University, West Lafayette, IN (63)

Suppression of Horseweed in Sugarbeet with Cereal Rye. Brian J. Stiles II*, Christy L. Sprague; Michigan State University, East Lansing, MI (64)

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‡Tolerance of Volunteer Hemp to Spring Burndown Herbicides in Soybean. Alina Gava*, Milos Zaric; University of Nebraska Lincoln, North Platte, NE (65)

‡The Response of Jack-o'-lantern Pumpkins to Fomesafen Herbicide. Luz Aide Cardona Giraldo*, Stephen L. Meyers, Jeanine Arana; Purdue University, West Lafayette, IN (66)

Determining an Effective Yet Economical Pendimethalin Application for Early-season Weed Control in Onion. Harlene M. Hatterman-Valenti*, Avery Shikanai, Collin Auwarter; North Dakota State University, Fargo, ND (67)

Invasive Weeds, Rangeland, Pasture, and Vegetation Management

†Roadside and Right-of-way Control of Glyphosate-resistant Johnsongrass (*Sorghum Halepense*). Sarah E. Dixon*; University of Missouri, Columbia, MO (68)

†Weed Suppression by Winter Annual Cover Crops. Alex J. Hewitt*; Kansas State University, Manhattan, KS (69)

Control Options for Japanese Knotweed Along Roadsides - Initial Results. Joseph Omielan*; University of Kentucky, Lexington, KY (70)

†Evaluation of Some New Herbicide Products for Use in Missouri Pastures. Haylee E. Schreier*, Travis Winans, Jacob E. Vaughn, Delbert Knerr, Mandy Bish, Kevin W. Bradley; University of Missouri, Columbia, MO (71)

NCWSS Strategic Planning

Growing from Strong Roots: NCWSS Members' Vision for the Future. Sarah Lancaster*¹, Erin Haramoto², Alyssa Essman³, Cody Evans⁴, Justin Pollard⁵, Debalin Sarangi⁶, Daniel H. Smith⁷, Nader Soltani⁸; ¹Kansas State University, Manhattan, KS, ²University of Kentucky, Lexington, KY, ³The Ohio State University, Columbus, OH, ⁴Bayer Crop Science, Franklin, IL, ⁵Bayer Crop Science, Lathrop, MO, ⁶University of Wyoming, Laramie, WY, ⁷University of Wisconsin-Madison, Madison, WI, ⁸University of Guelph, Ridgetown, ON, Canada (72)

Weed Biology, Ecology, Management

†Waterhemp Suppression and Control as a Function of Cereal Rye Biomass. Jose J. Nunes*, Nicholas J. Arneson, Rodrigo Werle; University of Wisconsin-Madison, Madison, WI (73)

†Investigation of Group 4 Herbicide Resistance in Indiana *Amaranthus tuberculatus*. Claudia R. Bland*, Bryan G. Young, William G. Johnson; Purdue University, West Lafayette, IN (74)

Emergence Pattern of Horseweed (*Erigeron canadensis*) Populations Across Nebraska. Ahmadreza Mobli*¹, Maxwell O. Oliveira¹, Liberty Butts², Chris Proctor², Nevin Lawrance³, Rodrigo O. Werle¹; ¹University of Wisconsin-Madison, Madison, WI, ²University of Nebraska-Lincoln, Lincoln, NE, ³University of Nebraska-Lincoln, Scottsbluff, NE (75)

†Influence of Cover Crops and Higher Loading of Soil Residual Herbicides on Weed Suppression in Soybean. Lucas Oliveira Ribeiro Maia*, William G. Johnson, Bryan G. Young, Eileen J. Kladvko, Shalamar Armstrong, Joshua R. Widhalm; Purdue University, West Lafayette, IN (76)

†Seed Destructor: A Harvest Weed Seed Control Method for Managing Herbicide-Resistant Waterhemp in Midwest Soybean Production. Alexis L. Meadows*, Prashant Jha, Avery J. Bennett, Ramawatar Yadav, Edward S. Dearden, Ryan Hamberg, Austin H. Schleich; Iowa State University, Ames, IA (77)

Weed Suppression Potential Varies Between Cereal Rye Cultivars. Erin Haramoto*, Hanna J. Poffenbarger, Matthew Allen; University of Kentucky, Lexington, KY (78)

‡Cowpea as a Summer Cover Crop: Effect of Germplasm and Seeding Rate on Weed Biomass. Bautista Garcia Calvo*¹, Erin Haramoto², Matthew Allen², Sara K. Carter², Parmeshwor Aryal³, Carlene A. Chase³; ¹University of Buenos Aires, Buenos Aires, Argentina, ²University of Kentucky, Lexington, KY, ³University of Florida, Gainesville, FL (79)

‡Advancing Dormancy Breaking Techniques in Common Ragweed (*Ambrosia artemisiifolia*). Erin C. Hill*; Michigan State University, East Lansing, MI (80)

Tuesday Posters 2021

Evaluation of Italian Ryegrass (*Lolium perenne* L. ssp. *multiflorum*) Control Utilizing Soil Residual Herbicides in Kentucky Winter Wheat. Jesse Gray*, Shawn Wood, Travis Legleiter; University of Kentucky, Princeton, KY (81)

‡Investigation of Weed Seed Contamination and Frequency of Herbicide Resistance in Contaminated Sunflower Screenings. Emma A. Mitchell*, Nathan H. Haugrud, Stephanie A. DeSimini, Joseph T. Ikley; North Dakota State University, Fargo, ND (82)

Long-Term Management of Herbicide-Resistant Waterhemp Seedbank in Corn-Soybean Rotations. Ramawatar Yadav*, Prashant Jha, Avery J. Bennett, Alexis L. Meadows, Austin H. Schleich; Iowa State University, Ames, IA (83)

†Comparative Analysis of Weedy and Grain *Amaranthus* Species Reveals Mobilome Contributing to Genome Diversity. Damilola A. Raiyemo*¹, Jacob S. Montgomery², Nathan D. Hall³, Eric L. Patterson⁴, Patrick Tranel¹; ¹University of Illinois, Urbana, IL, ²Colorado State University, Fort Collins, CO, ³Auburn University, Auburn, AL, ⁴Michigan State University, East Lansing, MI (84)

†Multiple Herbicide Resistance in Wisconsin Waterhemp (*Amaranthus tuberculatus*) Accessions. Felipe de Andrade Faleco*, David E. Stoltenberg, Mark J. Renz, Rodrigo Werle; University of Wisconsin-Madison, Madison, WI (85)

Relationship of Soil Properties and the Spatial Distribution of Weed Seedbanks. Rose V. Vagedes*, Bryan G. Young, William G. Johnson; Purdue University, West Lafayette, IN (86)

†Optimizing Timings of Dicamba and Glufosinate for Control of Glyphosate-resistant Palmer Amaranth in XtendFlex Soybeans. Monica R. Marrs*¹, Vipin Kumar², Anita Dille¹, Augustine Obour²; ¹Kansas State University, Manhattan, KS, ²Kansas State University, Hays, KS (87)

†Cover Crops, Weeds, and Residual Herbicides: Winners and Losers. Ethan Ley*; University of Minnesota, St. Paul, MN (88)

Evaluation of Italian Ryegrass (*Lolium perenne* L. ssp. *multiflorum*) Control Utilizing Soil Residual Herbicides in Kentucky Winter Wheat. Jesse Gray*, Shawn Wood, Travis Legleiter; University of Kentucky, Princeton, KY (89)

Tuesday Posters 2021

†Effect of Plant Growth Regulator Herbicides on Native Plant Species. Samuel N. Ramirez*, Karla L. Gage; Southern Illinois University, Carbondale, IL **(90)**

†Effects of Cropping Practices on the Weed Seedbank. Mackenzie R. Trader*, Karla L. Gage; Southern Illinois University, Carbondale, IL **(91)**

†Targeted Weed Management: Challenges and Opportunities. Thiago H. Vitti*¹, Rodrigo Werle², Bruno Canella Vieira², Christopher Proctor¹, Isaac Harrison Barnhart³, Anita Dille³, Greg Kruger⁴; ¹University of Nebraska Lincoln, Lincoln, NE, ²University of Wisconsin-Madison, Madison, WI, ³Kansas State University, Manhattan, KS, ⁴University of Nebraska Lincoln, North Platte, NE **(92)**

‡Impact of Elevated CO₂ Levels on C3 (*Chenopodium album*) and C4 (*Amaranthus palmeri*) Weed Growth. Megan L. Williams*¹, Anita Dille²; ¹University of Virginia, Washington, DC, ²Kansas State University, Manhattan, KS **(93)**

Emergent Cohort Dynamics of Palmer Amaranth on Growth and Flowering. Ethan C. Denson*, Anita Dille; Kansas State University, Manhattan, KS **(94)**

Barriers to Adoption: Farmer Collaborators Use Inter-seeded Winter Wheat Practices as a Sustainable Approach for Suppressing Common Waterhemp in Soybean. Madison R. Decker*, Karla L. Gage, Ronald F. Krause; Southern Illinois University, Carbondale, IL **(95)**

Student Luncheon – Business Meeting

Sponsored by Corteva Agriscience – Open to all students

12:00 – 1:15 pm

Pantlind

Papers

*SPEAKER

† GRADUATE CONTEST

Agronomic Crops II - Soybeans

LOCATION: Ambassador East
TIME: 01:15 PM - 05:15 PM
MODERATOR: Drake Copeland

- 1:15 PM** **Evaluation of Fall-Applied Burndown and Residual Herbicides for Winter Annual Weed Control.** Daniel Beran^{*1}, Bob Bruss²; ¹Nufarm Americas, Eldora Us, IA, ²Nufarm Americas, Morrisville, NC **(96)**
- 1:30 PM** **†Impact of Soil and Cover Crop Management Strategies on the Deposition and Fate of Preemergence Herbicides in Soybean Cropping Systems.** Jose J. Nunes*, Nicholas J. Arneson, Ryan P. DeWerff, Rodrigo O. Werle; University of Wisconsin-Madison, Madison, WI **(97)**
- 1:45 PM** **†Fall-Seeded Cereal Rye and Narrow Soybean Row Widths Improve Horseweed Management.** Justine L. Fisher*, Christy Sprague; Michigan State University, East Lansing, MI **(98)**
- 2:00 PM** **Field Survey of Herbicide-Resistant Common Waterhemp from Kansas Soybean Fields.** Rui Liu*, Vipin Kumar, Taylor Lambert; Kansas State University, Hays, KS **(99)**
- 2:15 PM** **†Impact of Herbicide Use and Cropping Patterns on the Development of Herbicide-Resistant Waterhemp (*Amaranthus tuberculatus*) in Iowa.** Ryan Hamberg*, Prashant Jha, Micheal D. Owen, Ramawatar Yadav, Avery J. Bennett, Alexis L. Meadows, Austin Schleich, Edward S. Dearden; Iowa State University, Ames, IA **(100)**
- 2:30 PM** **TENDOVO - Setting the Standard for Soybean Herbicides.** Brett R. Miller^{*1}, Peter Eure², Tom H. Beckett³, Scott E. Cully⁴, James C. Holloway Jr⁵;

Tuesday Papers 2021

¹Syngenta Crop Protection, Fargo, ND, ²Syngenta Crop Protections, Greensboro, NC, ³Syngenta Crop Protection, Greensboro, NC, ⁴Syngenta Crop Protection, Marion, IL, ⁵Syngenta Crop Protection, Jackson, TN **(101)**

2:45 PM **†Efficacy of Pre-Emergence Herbicides on Palmer Amaranth Control as Affected by Cover Crop Termination Timings.** Ednaldo A. Borgato*, Sarah Lancaster, Mithila Jugulam, Anita Dille; Kansas State University, Manhattan, KS **(102)**

3:00 PM **†The Powerful Palmer: Confirming Auxin Resistance in Tennessee.** Delaney C. Foster*, Larry Steckel; University of Tennessee, Jackson, TN **(103)**

3:15 PM **Coffee Break**

3:30 PM **Development of a New Multi-Functional Tankmix Partner for Use with Dicamba.** Kevin Crosby*¹, Ryan Rector², Mickey Brigrance¹, Amy Carter¹; ¹Adjuvants Unlimited, Memphis, TN, ²Adjuvants Unlimited, St Charles, MO **(107)**

3:45 PM **†Multi-state Evaluation of Electrocutation as a Rescue Treatment on Escaped Weeds in Soybean.** Jacob Vaughn*¹, Mandy Bish¹, Karla L. Gage², Prashant Jha³, Amit J. Jhala⁴, William G. Johnson⁵, Sarah Lancaster⁶, Bryan G. Young⁵, Kevin W. Bradley¹; ¹University of Missouri, Columbia, MO, ²Southern Illinois University, Carbondale, IL, ³Iowa State University, Ames, IA, ⁴University of Nebraska Lincoln, Lincoln, NE, ⁵Purdue University, West Lafayette, IN, ⁶Kansas State University, Manhattan, KS **(105)**

4:00 PM **†Evaluation of the Seed Terminator™ Implement in Missouri Soybean Production Systems.** Travis R. Winans*, Kevin W. Bradley, Mandy Bish, Brian Dintelmann, Haylee E. Schreier, Jake Vaughn, Delbert R. Knerr; University of Missouri, Columbia, MO **(106)**

4:15 PM **Evaluation of a New Multi-Functional Tankmix Partner for Use with Dicamba.** Ryan Rector*¹, Kevin Crosby², Mickey Brigrance², Amy Carter²;

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¹Adjuvants Unlimited, Saint Charles, MO,

²Adjuvants Unlimited, Memphis, TN (104)

- 4:30 PM †Using Artificial Intelligence and Computer Vision to Detect Weeds in Soybean Cropping Systems.** Isaac Harrison Barnhart*¹, Sarah Lancaster¹, Douglas Goodin¹, Jess Spotanski², Anita Dille¹; ¹Kansas State University, Manhattan, KS, ²Midwest Research Inc., York, NE (108)
- 4:45 PM †Antagonism of Group 4 and 15 Herbicides on Volunteer Corn Control with Clethodim.** Marcelo Zimmer*, Bryan G. Young, William G. Johnson; Purdue University, West Lafayette, IN (109)
- 5:00 PM Business Meeting**

Horticulture and Specialty Crops

LOCATION: Vandenberg
TIME: 01:15 PM - 04:30 PM
MODERATOR: Kristin K. Rosenbaum

- 1:15 PM Weed Control in Specialty Crops Using Bicyclopyrone.** Cristin Weber*¹, Peter Eure², Tom H. Beckett³, Dan Wilkinson⁴; ¹Syngenta Crop Protection, Normal, IL, ²Syngenta Crop Protections, Greensboro, NC, ³Syngenta Crop Protection, Greensboro, NC, ⁴Syngenta Crop Protection, St. Johns, MI (110)
- 1:30 PM †Evaluation of Two Preemergence Herbicides on Weed Control Efficacy for Container Nursery Crop Production.** Manjot Kaur Sidhu*¹, Debalina Saha²; ¹Michigan State University, Lansing, MI, ²University of Florida, Apopka, FL (111)
- 1:45 PM †Tolerance of Four Dry Bean Market Classes (*Phaseolus vulgaris* L. and *Vigna angularis* (Willd.) Ohwi & H. Ohashi) to Flufenacet, Acetochlor and S-Metolachlor Applied Preplant Incorporated.** Hannah E. Symington*¹, Allan Kaastra², David C. Hooker³, Darren E. Robinson³, Peter Sikkema³; ¹University of Guelph, Rr#3 Watford, ON, Canada, ²Bayer Crop Science,

Tuesday Papers 2021

Guelph, ON, Canada, ³University of Guelph, Ridgetown, ON, Canada **(112)**

- 2:00 PM** **Comparing Newer Versus Older Preemergence Herbicides on Large Crabgrass and Common Ragweed Control in Container Production.** Debalina Saha*, Manjot Kaur Sidhu; Michigan State University, East Lansing, MI **(113)**
- 2:15 PM** **†Sensitivity of Potato, Tomato and Watermelon to Off-target Movement of Dicamba.** Timothy C. Rice*, Reid Smeda; University of Missouri, Columbia, MO **(114)**
- 2:30 PM** **†Morningglory (*Ipomoea* Spp.) Interference in Triploid Watermelon.** Jeanine Arana*, Stephen L. Meyers; Purdue University, West Lafayette, IN **(115)**
- 2:45 PM** **Evaluating Ways to Reduce Flumioxazin Herbicide Injury to Potato.** Harlene M. Hatterman-Valenti*, Collin Auwarter; North Dakota State University, Fargo, ND **(116)**
- 3:00 PM** **†Organic Fiber Hemp Effect on Weed Seedbanks.** Andres Fonnegra*; Purdue University, Bogota, Colombia **(117)**
- 3:15 PM** **Coffee Break**
- 3:30 PM** **Dicamba Injury on Sunflower, Dry Bean, and Soybean Influenced by Preplant Interval and Rainfall.** Nathan H. Haugrud*¹, Joseph T. Ikley¹, Brian Jenks², Greg Endres³; ¹North Dakota State University, Fargo, ND, ²North Dakota State University, Minot, ND, ³North Dakota State University, Carrington, ND **(118)**
- 3:45 PM** **Efficacy of Preplant Incorporated, Preemergence, and Postemergence Herbicides for Control of Waterhemp (*Amaranthus tuberculatus*) in Dry Bean.** Joseph T. Ikley*, Nathan H. Haugrud; North Dakota State University, Fargo, ND **(119)**
- 4:00 PM** **Morningglory (*Ipomoea* Spp.) Interference in Processing Tomato.** Stephen L. Meyers*, Jeanine

Tuesday Papers 2021

Arana, Laura Rodriguez, Nathaly Vargas; Purdue University, West Lafayette, IN (120)

4:15 PM Business Meeting

Weed Biology, Ecology, Management

LOCATION: Ambassador West
TIME: 01:15 PM - 04:45 PM
MODERATOR: Seth A. Strom

- 1:15 PM Evapotranspiration of Palmer Amaranth (*Amaranthus palmeri* S. Watson) in Corn, Soybean, and Fallow Under Subsurface Drip and Center-Pivot Irrigation Systems.** Jasmine M. Mausbach^{*1}, Suat Irmak², Meetpal S. Kukal², Kelsey Karnik¹, Debalin Sarangi³, Amit J. Jhala¹; ¹University of Nebraska-Lincoln, Lincoln, NE, ²Penn State University, University Park, PA, ³University of Minnesota, St. Paul, MN (121)
- 1:30 PM †Evaluating Potential Fitness Costs Associated with Clopyralid Resistance in Common Ragweed (*Ambrosia artemisiifolia*).** Nash D. Hart^{*}, Eric L. Patterson, Erin E. Burns; Michigan State University, East Lansing, MI (122)
- 1:45 PM †Effect of Emergence Timing on *Amaranthus tuberculatus* Growth and Seed Production.** Claudia R. Bland^{*}, William G. Johnson, Bryan G. Young; Purdue University, West Lafayette, IN (123)
- 2:00 PM Comparative Genomics of Dioecious *Amaranthus* Species.** Damilola A. Raiyemo^{*1}, Lucas Kopecky Bobadilla², Patrick Tranel¹; ¹University of Illinois, Urbana, IL, ²University of Illinois, Champaign, IL (124)
- 2:15 PM †Evaluation of Italian Ryegrass Seed Dispersal Prior to and at Wheat Harvest.** Amber L. Herman^{*}, Travis Legleiter, Catlin Young; University of Kentucky, Princeton, KY (125)
- 2:30 PM †Soil Microbial Activity and Degradation of Sulfentrazone, S-Metolachlor, and Cloransulam-**

Tuesday Papers 2021

methyI After Two Years of Cover Crop Use. Lucas Oliveira Ribeiro Maia*, William G. Johnson, Bryan G. Young, Eileen J. Kladvko, Shalamar Armstrong, Joshua R. Widhalm; Purdue University, West Lafayette, IN **(126)**

2:45 PM Early Applications of XtendiMax® Herbicide with VaporGrip® Technology in the Roundup Ready® Xtend Crop System. Devin Hammer*; Bayer CropScience, St. Louis, MO **(127)**

3:00 PM †Confirmation of PPO Resistance in a Wisconsin Giant Ragweed (*Ambrosia trifida*) Accession. Felipe de Andrade Faleco*, Nicholas J. Arneson, David E. Stoltenberg, Rodrigo Werle; University of Wisconsin-Madison, Madison, WI **(128)**

3:15 PM Coffee Break

3:30 PM †Using Chaff-Lining to Manage Herbicide-Resistant Waterhemp (*Amaranthus tuberculatus*) in a Soybean-Corn Rotation. Avery J. Bennett*, Prashant Jha, Ramawatar Yadav; Iowa State University, Ames, IA **(129)**

3:45 PM Waterhemp and Palmer Amaranth Survival and Impact on Forage Productivity in Established Alfalfa Fields Across the Northern United States. Mark J. Renz*¹, Erin E. Burns², Roger Becker³, Dwight Lingenfelter⁴, John M. Wallace⁴; ¹University of Wisconsin-Madison, Madison, WI, ²Michigan State University, East Lansing, MI, ³University of Minnesota, St Paul, MN, ⁴Penn State University, University Park, PA **(130)**

4:00 PM †Influence of Soil Texture and Moisture on the Competitiveness of Waterhemp (*Amaranthus tuberculatus*) and Palmer Amaranth (*Amaranthus palmeri*). Jeffery K. Stith*, Joseph T. Ikley; North Dakota State University, Fargo, ND **(131)**

4:15 PM †Distribution of Herbicide-Resistant Waterhemp (*Amaranthus tuberculatus*) in Minnesota. Navjot Singh*¹, Thomas J. Peters², Seth L. Naeve¹, Ryan P. Miller³, Debalin Sarangi¹; ¹University of Minnesota, St. Paul, MN, ²North Dakota State

Tuesday Papers 2021
University, Fargo, ND, ³University of Minnesota,
Rochester, MN **(132)**

4:30 PM Business Meeting

Poster Session II

5:30 – 6:30 PM Second Poster Session

Students in the Poster Contest must be with their posters during both the morning and evening poster sessions.

Women in Weed Science Networking Breakfast

Open to all women

6:30 - 8:00 am

Pantlind

Guest Speaker: Wendy Sronic, Leader of Corteva Seed R&D Business Platform

Extension

LOCATION: Imperial

TIME: 8:00 AM – 11:30 AM

MODERATOR: Nicholas J. Arneson

Oral presentations are 15 minutes

Video Presentations are 5 minutes

8:00 AM †Considerations for Postemergence Weed Control Under Drought Conditions. Navjot Singh*, Debalin Sarangi; University of Minnesota, St. Paul, MN **(133)**

8:05 AM †Investigating Glufosinate Resistance in a Wisconsin Waterhemp (*Amaranthus tuberculatus*) Accession. Rodrigo Werle, Bruna Loureiro Fontana Bolsoni*, Felipe de Andrade Faleco; University of Wisconsin-Madison, Madison, WI **(134)**

8:10 AM †Opportunities and Challenges for Integrating Cover Crops in Corn-Soybean Rotations in the Upper Midwest. Eric Y. Yu*, Debalin Sarangi; University of Minnesota, St. Paul, MN **(135)**

8:15 AM †Palmer Amaranth (*Amaranthus palmeri*) Eradication in Minnesota: Timeline, Actions, and Beyond. Eric Y. Yu*¹, Shane Blair², Monika Chandler², Denise Thiede², Anthony Cortilet², Jeffrey Gunsolus¹, Roger Becker¹, Debalin Sarangi¹; ¹University of Minnesota, St. Paul, MN, ²Minnesota Department of Agriculture, St. Paul, MN **(136)**

Wednesday Papers 2021

- 8:30 AM** **Enlist Weed Control System in Enlist E3 Soybean.** David M. Simpson*, Joe Armstrong; Corteva Agriscience, Indianapolis, IN **(137)**
- 8:45 AM** **†What is the Better Tankmix Partner, Saflufenacil or Metribuzin, with Dicamba, 2,4-D Ester, Halauxifen-methyl or Pyraflufen-ethyl/2,4-D, Applied Preplant, for Glyphosate-Resistant Horseweed Control in Soybean?** Meghan E. Dillio*, David C. Hooker, Darren E. Robinson, Peter Sikkema; University of Guelph, Ridgetown, ON, Canada **(138)**
- 9:00 AM** **†STOP THE SPREAD: Revisiting the Status of Herbicide-Resistant Waterhemp in Iowa Corn and Soybean Fields.** Ryan Hamberg*; Iowa State University, Ames, IA **(139)**
- 9:05 AM** **†The Tolerance of Cucurbit Crops to Reflex Herbicide.** Jeanine Arana*, Stephen L. Meyers; Purdue University, West Lafayette, IN **(140)**
- 9:10 AM** **†Weed Electrocutation: a Viable Option in Soybean Production?** Haylee E. Schreier*, Jacob E. Vaughn, Travis Winans, Delbert Knerr, Mandy Bish, Kevin W. Bradley; University of Missouri, Columbia, MO **(141)**
- 9:15 AM** **†Effect of Water Conditioners on Glyphosate, Glufosinate and 2,4-D Efficacy.** Barbara Vukoja*¹, Vinicius Velho¹, Greg R. Kruger², Christopher Proctor³; ¹University of Nebraska-Lincoln, North Platte, NE, ²BASF, Durham, NC, ³University of Nebraska Lincoln, Lincoln, NE **(142)**
- 9:30 AM** **Confirmation and Control of Imazamox-Resistant Shattercane.** Vipin Kumar*, Rui Liu, Taylor Lambert, Ramsamy Perumal; Kansas State University, Hays, KS **(143)**
- 9:45 AM** **†Interactions of 4-hydroxyphenylpyruvate Dioxygenase (HPPD)-inhibiting and Reactive Oxygen Species (ROS)-Generating Herbicides for the Control of Annual Weed Species in Corn.** John C. Flutterm*, Mariano Galla², David C. Hooker¹, Darren E. Robinson¹, Peter Sikkema¹;

Wednesday Papers 2021

¹University of Guelph, Ridgetown, ON, Canada,

²ISK Biosciences, Concord, OH (144)

10:00 AM Coffee Break

10:15 AM †Integrated Management of Multiple Herbicide-resistant Palmer Amaranth in Corn. Ramandeep Kaur*; University of Nebraska-Lincoln, Lincoln, NE (145)

10:20 AM †Assessing Factors Influencing Dicamba Volatility in a Controlled Environment. Matthew Osterholt*, Julie M. Young, William G. Johnson, Joshua R. Widhalm, Bryan G. Young; Purdue University, West Lafayette, IN (146)

10:25 AM †Control of Glyphosate/Glufosinate/Dicamba-resistant Soybean Volunteers in Corn with Postemergence Herbicides. Mandeep Singh*, Amit J. Jhala; University of Nebraska-Lincoln, Lincoln, NE (147)

10:30 AM *Amaranthus* Spp. Has Redefined Weed Management in Sugarbeet in Minnesota and North Dakota. Alexa L. Lystad*, Thomas J. Peters; North Dakota State University, Fargo, ND (148)

10:45 AM Acifluorfen to Control *Amaranthus* spp. Escapes in Sugarbeet. Thomas J. Peters*¹, Emma L. Burt², Alexa L. Lystad¹; ¹North Dakota State University, Fargo, ND, ²Minn-Dak Farmers Cooperative, Wahpeton, ND (149)

11:00 AM †Evaluation of the Seed Terminator™ as a Harvest Weed Seed Control Tool in Missouri Soybean Production. Travis R. Winans*, Mandy Bish, Kevin W. Bradley; University of Missouri, Columbia, MO (150)

11:05 AM †Testing Redekop Seed Destructor to Combat Herbicide-Resistant Weeds in Iowa Soybean Fields. Alexis L. Meadows*, Prashant Jha, Ramawatar Yadav, Avery J. Bennett, Edward S. Dearden, Ryan Hamberg, Austin H. Schleich; Iowa State University, Ames, IA (151)

11:10 AM Business Meeting

Wednesday Papers 2021
Equipment and Application Methods

LOCATION: Governor's
TIME: 8:00 AM - 11:30 AM
MODERATOR: Ryan J. Edwards

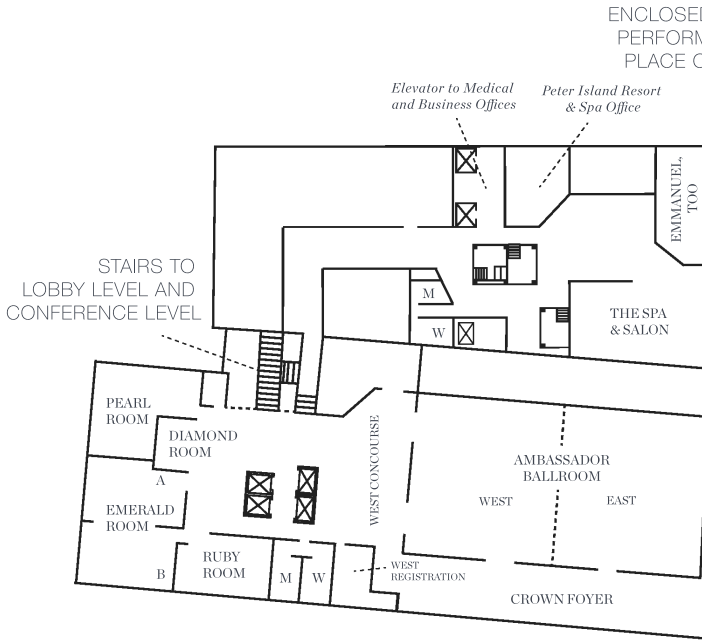
- 8:00 AM Characteristics and Performance of a Novel Deposition and Drift Reducing Adjuvant.** Gregory K. Dahl^{*1}, Ryan J. Edwards², Ryan Wolf³, Joshua Mayfield⁴, Joshua J. Skelton⁵, Steven A. Fredericks², Christine Colby², Eric P. Spandl², Kevin Krueger⁶; ¹Winfield United, Eagan, MN, ²WinField United, River Falls, WI, ³Winfield United, Sheldon, IA, ⁴Winfield United, Four Oaks, NC, ⁵WinField United, Saint Paul, MN, ⁶Winfield United, Arden Hills, MN **(152)**
- 8:15 AM †Integrated Weed Management in 2,4-D and Isoxaflutole-Resistant Soybeans in Kansas.** Chad J. Lammers*, Malynda M. Smith, Tyler P. Meyeres, Kraig L. Roozeboom, Sarah Lancaster; Kansas State University, Manhattan, KS **(153)**
- 8:30 AM Utilizing Preemergence Herbicides to Maximize the Value of Machine-Vision Application Technology.** Dane L. Bowers¹, R Joseph Wuerffel², Jason W. Adams³, Pete Berry^{*4}; ¹Syngenta Crop Protection, Greensboro, NC, ²Syngenta Crop Protection, Gerald, MO, ³Syngenta Crop Protection, Fargo, ND, ⁴Syngenta Crop Protection, Monticello, IL **(154)**
- 8:45 AM †Spatial Variability of Soil Properties Influencing Soil Residual Herbicide Rates Within Indiana Commercial Fields.** Rose V. Vagedes*, Bryan G. Young, William G. Johnson; Purdue University/, West Lafayette, IN **(155)**
- 9:00 AM Reduced Herbicide Antagonism Using a Dual Tank Delivery System for Volunteer Corn Control.** William L. Patzoldt*; Blue River Technology, Sunnyvale, CA **(156)**
- 9:15 AM †Impact of Weed Density on Foliar Herbicide Efficacy.** Tomas F. Delucchi*, Bryan G. Young, William G. Johnson; Purdue University, West Lafayette, IN **(157)**

Wednesday Papers 2021

- 9:30 AM** **Evaluation of a Low Speed Wind Tunnel for Simulating Boom-Scale Pesticide Spray Drift in Field Application Conditions.** Elizabeth R. Alonzi, Aszhia K. Albrecht, Steven A. Fredericks*; Winfield United, River Falls, WI **(158)**
- 9:45 AM** **†Impact of Electrocutation on Weed Control and Weed Seed Viability in Soybean.** Haylee E. Schreier*, Travis Winans, Jake Vaughn, Delbert Knerr, Mandy Bish, Kevin W. Bradley; University of Missouri, Columbia, MO **(159)**
- 10:00 AM** **Coffee Break**
- 10:15 AM** **Influence of Adjuvants on Canopy Deposition and Drift with UAV Application.** Lee Boles A. Boles*, Ryan J. Edwards, Steven A. Fredericks, Laura Hennemann; WinField United, River Falls, WI **(160)**
- 10:30 AM** **†Adoption of UAVs for Pest Management.** Emma L. Gaither*, Reid Smeda; University of Missouri, Columbia, MO **(161)**
- 10:45 AM** **How Accurate Are Available Weather Resources for Pesticide Applicators? Comparisons Across Geographies.** Mandy Bish*¹, Taylor Nix¹, Kevin W. Bradley¹, Nicholas J. Arneson², Nikola Arsenijevic², Maggie Ginn³, Zachary S. Howard⁴, Joseph Ikley⁵, William G. Johnson⁶, Jaime Knight⁷, Sarah Lancaster⁷, Lauren M. Lazaro⁸, Travis Legleiter⁹, Mark Loux¹⁰, Scott A. Nolte¹¹, Bryan G. Young⁶, Rodrigo Werle², Marcelo Zimmer⁶;
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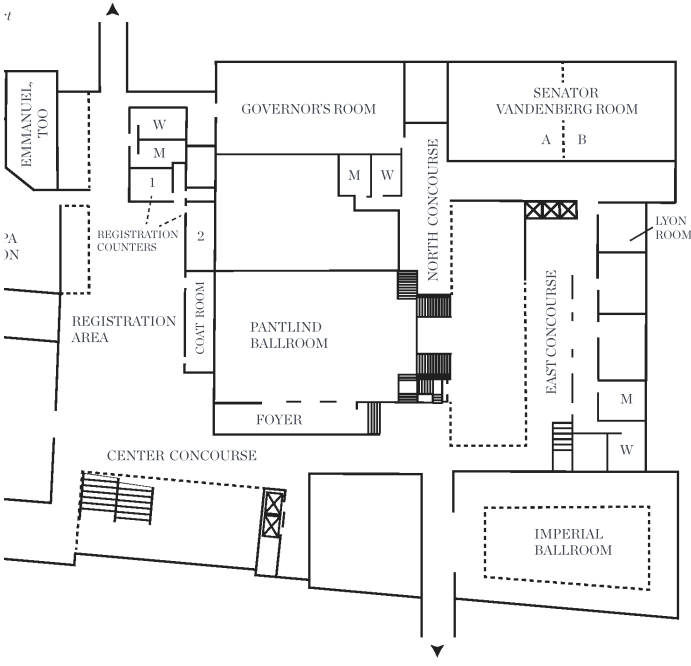


CONCOURSE LE



LEVEL – 2ND FLOOR

ENCLOSED WALKWAY TO DEVOS
PERFORMANCE HALL & DEVOS
PLACE CONVENTION CENTER



ENCLOSED SKYWALK TO PEARL STREET PARKING
RAMP, PLAZA TOWERS, AND VAN ANDEL ARENA

Wednesday Papers 2021

11:00 AM Hooded Broadcast Sprayer for Particle Drift Reduction. Rodrigo Werle*¹, Bruno Canella Vieira¹, Maxwell Coura Oliveira¹, Guilherme Sousa Alves², Jeffrey A. Golus², Kasey Schroeder², Reid Smeda³, Ryan Rector⁴, Greg Kruger²; ¹University of Wisconsin-Madison, Madison, WI, ²University of Nebraska-Lincoln, North Platte, NE, ³University of Missouri, Columbia, MO, ⁴Bayer Crop Science, St Louis, MO **(163)**

11:15 AM Business Meeting

Herbicide Physiology & Molecular Biology

LOCATION: Vandenberg A
TIME: 8:15 AM - 11:30 AM
MODERATOR: Nick T. Harre

8:15 AM †Diagnostics for ALS and Glyphosate Resistance in Michigan Soybean. Juliano R M Sulzback*, Erin C. Hill, Jinyi Chen, Eric L. Patterson; Michigan State University, East Lansing, MI **(164)**

8:30 AM The International Weed Genomics Consortium: a Resource for Weed Genomics. Sarah Morran*¹, Dana R. MacGregor², Eric L. Patterson³, Joseph S. McElroy⁴, Roland S. Beffa⁵, Todd A. Gaines¹; ¹Colorado State University, Fort Collins, CO, ²Rothamsted Research, Harpenden, United Kingdom, ³Michigan State University, East Lansing, MI, ⁴Auburn University, Auburn, AL, ⁵Bayer Crop Science, Frankfort / Main, Germany **(165)**

8:45 AM †Glyphosate-resistant Johnsongrass (Sorghum halepense) in Missouri: Potential Mechanisms of Resistance. Sarah E. Dixon*; University of Missouri, Columbia, MO **(166)**

9:00 AM Better Together: Bicyclopyrone and Mesotrione Enhance Weed Control in Acuron GT. Ryan D. Lins*¹, Mark Kitt², David Stafford³, Mark Johnston³, Brian Pickett³, Sunil Kumar⁴; ¹Syngenta Crop Protection, Rochester, MN, ²Syngenta Crop Protection, Greensboro, NC, ³Syngenta Crop Protection, Jealott's Hill, United Kingdom,

Wednesday Papers 2021

⁴Syngenta Crop Protection, Basel, Switzerland
(167)

- 9:15 AM** †**Understanding a New Mechanism of Dicamba-resistance in *Bassia scoparia*.** Jacob S. Montgomery*¹, Neeta Soni¹, Sarah Morran¹, Eric L. Patterson², Philip Westra¹, Franck E. Dayan¹, Todd A. Gaines¹; ¹Colorado State University, Fort Collins, CO, ²Michigan State University, East Lansing, MI (168)
- 9:30 AM** †**Heterologous Expression of CYPs from HPPD-resistant Palmer Amaranth (*Amaranthus palmeri*) in Yeast.** Carlos Alberto Gonsiorkiewicz Rigon*¹, Crystal D. Sparks¹, Lennart Charton², Anita Küpper³, Roland S. Beffa⁴, Franck E. Dayan¹, Todd A. Gaines¹; ¹Colorado State University, Fort Collins, CO, ²Bayer Crop Science, Frankfurt Am Main, Germany, ³Bayer Crop Science, Frankfurt, Germany, ⁴Bayer Crop Science, Frankfurt / Main, Germany (169)
- 9:45 AM** **Evidence of Multiple Gene Inheritance of 2,4-D Resistance in Palmer Amaranth.** Chandrima Shyam*, Dallas E. Peterson, Mithila Jugulam; Kansas State University, Manhattan, KS (170)
- 10:00 AM** **Coffee Break**
- 10:15 AM** †**"The Effect of ?G210 and R128G Mutations in Waterhemp on the Resistance Phenotype for Soil Applied PPO Inhibitors."** Jesse A. Haarmann*, Bryan G. Young, William G. Johnson; Purdue University, West Lafayette, IN (171)
- 10:30 AM** **Fields to Genes After 36 Years of a Weed Science Career in Colorado.** Philip Westra*; Colorado State University, Fort Collins, CO (172)
- 10:45 AM** †**The First Dicamba-Resistance Case in Waterhemp (*Amaranthus tuberculatus*): Inheritance Characterization and Identification of Candidate Resistance Genes from RNA-Seq.** Lucas K. Bobadilla*¹, Darci Giacomini², Patrick Tranel³, Aaron Hager³; ¹University of Illinois, Champaign, IL, ²Invitae, Golden, CO, ³University of Illinois, Urbana, IL (173)

Wednesday Papers 2021

11:00 AM Inheritance of Resistance to ALS-Inhibitors in Giant Ragweed is Controlled by Multiple Genetic Factors. Benjamin C. Westrich*, Bryan G. Young; Purdue University, West Lafayette, IN (53)

11:15 AM Business Meeting

Agronomic Crops I - Corn

LOCATION: Vandenberg B

TIME: 8:15 AM – 9:45 AM

MODERATOR: Parminder Chahal

8:15 AM TriVolt Herbicide: A New Residual Herbicide Combination for Weed Management in Corn. Eric Riley*; Bayer Crop Science, St. Louis, MO (174)

8:30 AM Preemergence Weed Control in Corn with Resicore® XL. Kevin D. Johnson*, Joe Armstrong, Kristin Rosenbaum, Jeffrey T. Krumm, David M. Simpson; Corteva Agriscience, Indianapolis, IN (175)

8:45 AM Resicore XL® for Postemergence Weed Control and Two-Pass Programs in Corn. Joe Armstrong*, Kevin D. Johnson, Kevin Hahn, Dave Johnson, David M. Simpson; Corteva Agriscience, Indianapolis, IN (176)

9:00 AM Bromoxynil + Fluroxypyr + Pyrasulfotole + Mefenpyr-diethyl Combination Herbicide – Overview of Performance in Northern Plains Cereals. Kevin B. Thorsness*¹, Dean W. Maruska², Michael C. Smith³, Brad Nemmers⁴, Sarah V. Striegel⁵, Ryan E. Rapp⁶, Devin J. Hammer⁷, Rory Cranston⁸; ¹Bayer Crop Science, Fargo, ND, ²Bayer Crop Science, Warren, MN, ³Bayer Crop Science, West Fargo, ND, ⁴Bayer Crop Science, Dell Rapids, SD, ⁵Bayer Crop Science, Madison, MN, ⁶Bayer Crop Science, Mitchell, SD, ⁷Bayer Crop Science, St. Louis, MO, ⁸Bayer Crop Science, Calgary, AB, Canada (177)

Wednesday Papers 2021

9:15 AM Reviton and Other New Herbicides from Helm. Brock S. Waggoner*¹, James Whitehead², Scott Akin³; ¹Helm Agro, Salem, IL, ²Helm Agro, Oxford, MS, ³Helm Agro, Murray, KY **(178)**

9:30 AM Business Meeting

Invasive Weeds, Rangeland, Pasture, and Vegetation Management

LOCATION: Vandenberg B
TIME: 10:15 AM - 11:15 AM
MODERATOR: David E. Hillger

10:15 AM Imazamox for Saltcedar Control. Walter H. Fick*; Kansas State University, Manhattan, KS **(179)**

10:30 AM †Influence of Grazing on Red and White Clover Biomass in Rotationally Grazed Grass-Legume Pastures Treated with 2,4-D + Florpyrauxifen. Garrett N. Imhoff*¹, Mark J. Renz¹, Scott Flynn²; ¹University of Wisconsin-Madison,, Madison, WI, ²Corteva Agriscience, Indianapolis, IN **(180)**

10:45 AM 2021 Survey Results for the Most Common and Troublesome Weeds in Aquatic and Non-Crop Areas. Lee Van Wychen*¹, Devon Carroll², Rebecca Champagne³; ¹WSSA, Alexandria, VA, ²University of Tennessee, Knoxville, TN, ³University of Maine, Orono, ME **(181)**

11:00 AM Business Meeting

NCWSS Awards Luncheon

Distinguished Achievement and Fellow Awards
11:30 – 1:15 Ambassador

Implications for Weed Management Due to Climate Change

LOCATION: Imperial
TIME: 01:30 PM – 05:30 PM
MODERATOR: Martin Williams

- 1:30 PM Observed and Potential Future Impacts of Climate Change on the Midwest.** Jim Angel*; Illinois water survey/University of Illinois, Champaign, IL **(182)**
- 1:55 PM Crops and a Changing Climate: Lessons Learned from FACE Experiments.** Chris Montes*; USDA-ARS, Urbana, IL **(183)**
- 2:20 PM Carbon Dioxide, Climate and Competition: A New Paradigm.** Lewis Ziska*; Columbia University, New York, NY **(184)**
- 2:40 PM A Medley of Mechanisms: How Weeds Readily Adapt to a Changing Climate.** David R. Clements*; Trinity Western University, Langley, BC, Canada **(185)**
- 3:00 PM Precipitation Extremes Influence Weed-Crop Interactions.** Erin E. Burns*; Michigan State University, East Lansing, MI **(186)**
- 3:20 PM Coffee Break**
- 3:35 PM Climate Change Exacerbates the Damage of Weeds Through Reduced Herbicide Efficacy.** Maor Matzrafi*; Agricultural Research Organization- Volcani Institute, Ramat-yishay, IN **(187)**
- 3:55 PM Insights into How Warming Temperatures Can Reduce Herbicide Efficacy and Pose a Challenge for Weed Control.** Mithila Jugulam*; Kansas State University, Manhattan, KS **(188)**
- 4:15 PM The Effects of a Changing Climate on Weed Populations and Herbicide Resistance Evolution.** Eric L. Patterson*; Michigan State University, East Lansing, MI **(189)**

Wednesday Papers 2021

- 4:35 PM** **Climate Change Influences on Pest Treatment Costs and Strategies.** Bruce McCarl*; Texas A&M University, College Station, TX **(190)**
- 4:55 PM** **Climate and Herbicide Interaction Project: Using Past Data to Predict Future Consequences.** Christopher A. Landau*; University of Illinois, Urbana, IL **(191)**
- 5:15 PM** **Panel Discussion**

NCWSS Graduate Student Workshop on Career Development and Interviewing:

LOCATION: Pantlind
TIME: 01:30 PM - 05:00 PM
MODERATOR: Dawn Refsell

- 1:30 PM** **Introduction to Graduate Student Workshop on Career Development and Interviewing**
- 1:45 PM** **Yoga and Perspectives on a Successful Career in Industry.** Mark Peterson*; Affiliation Not Specified, West Lafayette, IN **(192)**
- 2:00 PM** **I Didn't Want to Go to College, Now I Don't Want to Leave.** Patrick Tranel*; University of Illinois, Urbana, IL **(193)**
- 2:15 PM** **What's Behind Door Number 3: What My Major Prof Didn't Tell Me.** Eric P. Spandl*; Winfield United, River Falls, WI **(194)**
- 2:30 PM** **Panel Discussion: Career Paths. (195)**
- 2:45 PM** **Industry Resumes: Finding Way to Top of the Stack.** Stott Howard*¹, Dawn Refsell²; ¹Syngenta Crop Protection, Des Moines, IA, ²Corteva Agriscience, Johnston, IA **(196)**
- 3:15 PM** **Coffee Break**
- 3:30 PM** **Preparation and Execution: The Difference in Nailing or Failing That Industry Interview.**

Wednesday Papers 2021

David M. Simpson*; Corteva Agriscience,
Indianapolis, IN **(197)**

3:45 PM Interview Preparation for an Academic Career.
Harlene M. Hatterman-Valenti*; North Dakota
State University, Fargo, ND **(198)**

4:00 PM About That Job Interview. Stott Howard*;
Syngenta Crop Protection, Des Moines, IA **(199)**

4:45 PM Panel Discussion

NCWSS Society Social

Sponsored by the Sustaining Members – Open to all attendees.
Graduate and Undergraduate Paper and Poster Awards

5:30 - 7:00 pm

Ambassador

Industry Breakfast (Tickets Required)

LOCATION: Ambassador West

TIME: 07:00 AM – 8:15 AM

MODERATOR: Lowell Sandell

07:30 AM The International Weed Genomics Consortium: A Public & Private Collaboration. Eric Patterson, Assistant Professor, Michigan State University.

What's New in Industry

LOCATION: Ambassador East

TIME: 08:30 AM – 10:15 AM

MODERATOR: Lowell Sandell

8:30 AM What's New in Industry Talks

10:00 AM Business Meeting

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Michael Weber	Past Chair	515-201-9995

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Honorary Members

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1949	A.H. Larson *	1984	Edward W. Stroube *
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1951	R.W. Fuelleman *		Gail A. Wicks *
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1952	Henry E. Wood *	1986	Elroy J. Peters *
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1954	A.L. Bakke *	1987	Ralph Althaus *
1955	Charles J. Willard *		William M. Phillips
1956	R.S. Dunham *		Gerald R. Miller
1957	P.J. Olson *	1988	Robert Benson
1958	L.W. Melander *		Calvin Messersmith
	T.K. Pavlychenko *		Edward Stoller
1959	E.A. Helgeson *	1989	Loyd M. Wax
1960	Oliver C. Lee *		Alan R. Putman
1962	Sig Bjerken *	1990	Alan G. Dexter
1964	K.P. Buchholtz *		Russell L. Nash *
	E.P. Sylwester *	1991	George Kapusta *
1966	Robert C. Beatty *		Marshall McGlamery *
	Clare Buskirk *		Russell Moomaw *
1967	J.K. Freeman *		Don Penner
1968	E.K. Alban *	1992	R. Gordon Harvey, Jr. *
	H.A. Friesen *		Larry K. Binning
1969	Lawrence Southwick *		Alex R. Martin
	David W. Staniforth *		Don Taylor
1970	Delbert D. Hemphill *	1993	Merrill A. Ross, Jr. *
	George Frederick Warren *		Robert G. Wilson
1971	Fred W. Slife *		Jerry D. Doll
1972	Thomas Victor Beck *	1994	Ted R. Warfield
	O. Hale Fletchall *		William W. Witt
1973	Richard Behrens*	Fellows¹	
	Lawrence H. Hannah *	1995	Charles R. Fenster
1974	William Lobay *		Leon J. Wrage
1975	John D. Furrer *	1996	Thomas T. Bauman *
1976	Lyle A. Derscheid *		Earl W. Chamberlain
	LeRoy G. Holm *		Richard S. Fawcett
1977	James W. Divall		William E. Lueschen
	James L. Williams, Jr. *	1997	Stephen D. Miller
1978	Melwin K. McCarty *		M.D.K. Owen
	Robert E. Nylund*		Fred W. Roeth
1979	Ellery L. Knake *	1998	Paul J. Ogg *
	Kenneth W. Bradfield *		James P. Worthington
1980	John D. Nalewaja *	1999	Michael Barrett
	O.C. Burnside *		Norman J. Probst
1981	Rodney J. Fink	2000	Douglas D. Buhler
	Juett C. Hogancamp *		Bill Miller
	Larry W. Mitich *		Philip L. Orwick
1982	W.D. Carpenter		Stephen C. Weller
	James W. Herron *	2001	LeRoy R. Cobia
	William F. Meggitt	2002	James J. Kells
1983	Robert N. Andersen*	2003	Karen Ann Renner
	Dale E. Bush*		Charles Slack
			Phillip Stahlman

North Central Weed Science Society Information

Honorary Members/Fellows (continued)

2004	Duane Rathman	2013	Bryan Young
	David Regehr	2014	Adrian Moses
2005	Dallas E. Peterson		David Stoltenberg
2006	James R. Martin	2015	Dave Johnson
	Bernard H. Zandstra		Mark Wrucke
2007	Chris M. Boerboom	2016	David Simpson
	Michael J. Horak		Curtis Thompson
2008	Thomas J. Peters	2017	John Hinz
	Jeffrey Gunsolus		Patrick J. Tranel
	Kassim Al-Khatib	2018	Anita Dille
2009	J.D. Green		Mark Peterson
	Thomas B. Threewitt	2019	Greg Dahl
	Robert N. Klein		Mark Loux
2010	No nominations		Rich Zollinger
2011	Bill Johnson	2020	Kevin Bradley
	Harlene Hatterman-Valenti		Dawn Refsell
	Gordon K. Roskamp		Christy Sprague
2012	Peter H. Sikkema		
	Bob Hartzler		
	Roger Becker		

* Deceased

¹Society members being honored were originally referred to as Honorary Members. Beginning in 1995, the award was changed to Fellow.

North Central Weed Science Society Information

North Central Weed Science Society Presidents

1944	No President	2000	Kells, James J.
1945	Yost, Ted F. *	2001	Rathmann, Duane P.
1946	Yost, Ted F. *	2002	Peterson, Dallas E.
1947	Hanson, Noel S. *	2003	Horak, Michael J.
1948	Willard, Charles J. *	2004	Doll, Jerry D.
1949	Dunham, R. S. *	2005	Peters, Tom
1950	Worzella, W. W. *	2006	Miller, Stephen D.
1951	Sylwester, Erhardt P. *	2007	Moses, Adrian
1952	Buchholtz, Kenneth P. *	2008	Johnson, William G.
1953	Gilbert, C. J. *	2009	Holm, Mick
1954	Lee, Oliver C. *	2010	Boerboom, Chris
1955	Grigsby, Buford H. *	2011	Wrucke, Mark
1956	Helgeson, Earl A. *	2012	Young, Bryan
1957	Slife, Fred W. *	2013	Johnson, Dave
1958	Derscheid, Lyle A. *	2014	Green, J.D.
1959	Foster, J. Roe *	2015	Hinz, John
1960	Holm, Leroy G. *	2016	Dille, Anita
1961	Alban, E. K. *	2017	Dahl, Gregory
1962	Bjerken Sig. *	2018	Sprague, Christy L.
1963	Hemphill, Delbert D. *	2019	Hager, Aaron
1964	Hemphill, Delbert D. *	2020	Stott Howard
1965	Furrer, John D. *	2021	Harlene Hatterman-Valenti
1966	Furrer, John D. *		
1967	Warden, Robert L. *		
1968	Fletchall, O. Hale *	* Deceased	
1969	Beck, Thomas V. *		
1970	Hannah, Lawrence H. *		
1971	Knake, Ellery *		
1972	Williams, Jr., James L. *		
1973	Meggitt, William		
1974	Bradfield, Kenneth W. *		
1975	Burnside, Orvin C. *		
1976	Fink, Rodney J.		
1977	Carpenter, Will D.		
1978	Doersch, Ronald E.		
1979	Nalewaja, John D. *		
1980	Stroube, Edward W. *		
1981	Herron, James W. *		
1982	Benson, Robert L.		
1983	DiVall, James W.		
1984	Miller, Gerald R.		
1985	Messersmith, Calvin G.		
1986	Wax, Loyd M.		
1987	Chamberlain, Earl *		
1988	Harvey, R. Gordon *		
1989	Worthington, James P.		
1990	Martin, Alex R.		
1991	Taylor, T. Don		
1992	Stoller, Edward W.		
1993	Warfield, Ted R.		
1994	Bauman, Thomas T. *		
1995	Cobia, LeRoy R.		
1996	Dexter, Alan G.		
1997	Miller, Bill		
1998	Buhler, Douglas D.		
1999	Orwick, Philip L.		

Distinguished Achievement Awards

1990	Gerald W. Gogan – Education Gail A. Wicks - Service Robert G. Wilson - Research Jeffrey L. Gunsolus - Young Scientist
1991	F. Strizke - Education Paul G. Mayland - Industry Patrick J. Shea - Research
1992	William W. Witt - Education James P. Worthington - Education Rex A. Liebl - Research Jerry D. Doll - Service
1993	Robert G. Hartzler - Education Douglas D. Buhler - Research Karen A. Renner - Young Scientist
1994	David L. Regehr - Education Deane W. Finnerty - Industry Robert N. Andersen - Service David A. Mortensen - Young Scientist
1995	Will D. Carpenter - Industry Phillip W. Stahlman - Research M.D.K. Owen - Service
1996	Beverly R. Durgan - Education Charles L. Kern - Industry E. James Retzinger - Industry Michael J. Horak - Young Scientist
1997	Roger Becker - Education Joseph G. Vollmer - Industry Charles H. Slack - Research Richard Zollinger - Service David E. Stoltenberg - Young Scientist
1998	Randy W. Lloyd - Industry Ronald F. Krausz - Research James R. Martin - Service
1999	Thomas R. Hoverstad - Professional Staff Robert J. Kremer - Research J. D. Green - Service Chris M. Boerboom - Young Scientist Reid J. Smeda - Young Scientist
2000	Harlan P. Palm - Industry James F. Lux - Professional Staff Gary E. Powell - Professional Staff David A. Vox - Professional Staff William G. Johnson - Young Scientist
2001	John B. Masiunas - Education Bernard H. Zandstra - Education Patrick W. Geier - Professional Staff Douglas J. Maxwell - Professional Staff Kassim Al-Khatib - Research
2002	Paul L. Sprankle - Industry Thomas B. Threewitt - Industry Monica Elmes - Professional Staff John L. Luecke -Professional Staff Bryan Young - Young Scientist
2003	Mark Loux - Education Kenneth Carlson - Industry Daniel E. Schroeder - Industry Andrew Chomas - Professional Staff

2004	Jeffrey Stachler - Professional Staff
	Gordon Roskamp - Education
	Robert N. Klein - Education
	David Stoltenberg - Research
	Robert E. Wolf - Service
2005	Patrick J. Tranel - Young Scientist
	Chris Boerboom - Education
	Dennis Belcher - Industry
	Anthony F. Dobbels - Professional Staff
	Curtis R. Thompson - Service
2006	Christy Sprague - Young Scientist
	Richard K. Zollinger - Education
	John R. Hinz - Industry
	Christy Shropshire - Professional Staff
	Glenn Nice - Service
2007	Dean E. Riechers - Young Scientist
	Douglas Doohan - Education
	Kevin Gibson - Young Scientist
	Martin M. Williams II - Young Scientist
	Frank Forcella - Research
2008	Anita Dille - Young Scientist
	Damian Franzenburg - Professional Staff
	Joseph Matthews - Professional Staff
	Kevin W. Bradley – Young Scientist
	Adam S. Davis – Young Scientist
2009	Reid J. Smeda – Education
	Adrian J. Moses – Industry
	James L. Moody – Professional Staff
	Darren Robinson – Young Scientist
	Aaron Hager – Education
2010	Jon Scott – Professional Staff
	Peter Sikkema - Research
	Anita Dille - Education
	Walter Fick - Education
	Terry Wright - Industry
2011	Greg Dahl - Industry
	Nader Soltani - Professional Staff
	Chad Brabham - Graduate Student
	Dain Bruns - Industry
	Fritz Breitenbach - Professional Staff
2012	Timothy Trower - Professional Staff
	Erin Taylor-Hill - Professional Staff
	Paul Marquardt-Graduate Student
	Kirk Howatt – Education
	Mark Renz – Education
2013	Patrick Tranel – Research
	Stevan Knezevic – Research
	Christy Sprague - Service
	Rodrigo Werle – Graduate Student
	Greg Kruger – Young Scientist
2014	Ryan Lins – Young Scientist
	Dawn Refsell – Industry
	Jeff Golus – Professional Staff
	Collin Auwarter – Professional Staff
	Jessica Bugg – Graduate Student
2015	Brian Jenks – Service
	Doug Nord – Service
	Marvin Schultz – Industry

2015 Bruce Ackley – Professional Staff
 Darren Robinson – Research
 Cody F. Creech – Graduate Student

Distinguished Achievement Awards (continued)

2016 Richard Cole- Industry
 Mark Peterson- Industry
 Larry Hageman- Industry
 Stott Howard- Service
 Amit Jhala- Young Scientist

2017 Scott Cully – Industry
 Helen Flanigan – Industry
 Lowell Sandell – Industry
 Steven Knezevic – Education
 Julie Young – Professional Staff
 Parminder Chahal – Graduate

2018 Carla Yerkes – Industry
 Kevin Bradley – Education
 Peter Sikkema – Education
 Richard Proost – Professional Staff
 Phil Westra – Research
 Marshall Hay – Graduate Student

2019 Mark Bernards – Education
 David Thomas – Industry
 Nader Soltani – Research
 Mithila Jugulam – Research
 Mayank Malik – Young Scientist

2020 Mark Bernards – Education
 Eric Spandl – Industry
 Mandy Bish – Research
 Joe Wuerffel – Young Scientist
 Vipin Kumar – Young Scientist
 Lisa Behnken – Professional Staff
 Ram Yadav – Graduate Student

North Central Weed Science Contest Locations

YEAR	Company	Location
1981	Agri-Growth	Hollandale, MN
1982	Agri-Growth	Hollandale, MN
1983	Lilly Research Lab	Leshara, NE
1984	Dow Chemical Research	Geneseo, IL
1985	Bayer (Mobay)	Stilwell, KS
1986	Union Carbide	Newton, IA
1987	Monsanto	Monmouth, IL
1988	Agri-Growth	Hollandale, MN
1989	FMC	Champaign, IL
1990	DowElanco	Greenfield, IN
1991	CibaGeigy	Champaign, IL
1992	Cenex Land o Lakes	Iowa
1993	Zeneca	Champaign, IL
1994	Bayer (Miles)	Stilwell, KS
1995	Amcy	Seymour, IL
1996	Monsanto	Monmouth, IL
1997	Land o Lakes	Webster City, IA
1998	Valent	Champaign, IL
1999	Agri-Growth	Hollandale, MN
2000	Bayer	West Lafayette, IN
2001	Monsanto	Monmouth, IL
2002	Dow AgroSciences	Fowler, IN
2003	Syngenta	Champaign, IL
2004	University of Minnesota- Southern Research & Outreach Ctr.	Waseca, MN
2005	Kansas State University	Manhattan, KS
2006	Midwest Research Inc.	York, NE
2007	Bennett Ag. Research Corp	Richland, IA
2008	SGS Alvey Ag Research	Carlyle, IL
2009	joint NC/NE – ABG Ag Services	Indianapolis, IN
2010	no contest	
2011	Weed Olympics, University of Tennessee	Knoxville, TN
2012	Diamond Ag Research Inc.	Larned, KS
2013	joint NC/NE - Monsanto	Monmouth, IL
2014	DuPont Pioneer	Johnston, IA
2015	Weed Olympics, The Ohio State University	Columbus, OH
2016	Purdue University	West Lafayette, IN
2017	Iowa State University FEEL	Ames, IA
2018	Monsanto Water Utilization Learning Center	Gothenburg, NE
2019	Weed Olympics BASF, Bayer, Corteva, Valent Klein Family Farm	Seymour, IL
2020	Canceled due to Covid	
2021	North Dakota State University	Fargo, ND
2022	Corteva Agriscience	Johnston, IA

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NCWSS Sustaining Members

We are grateful for the support of the following
Sustaining Members:

Gold

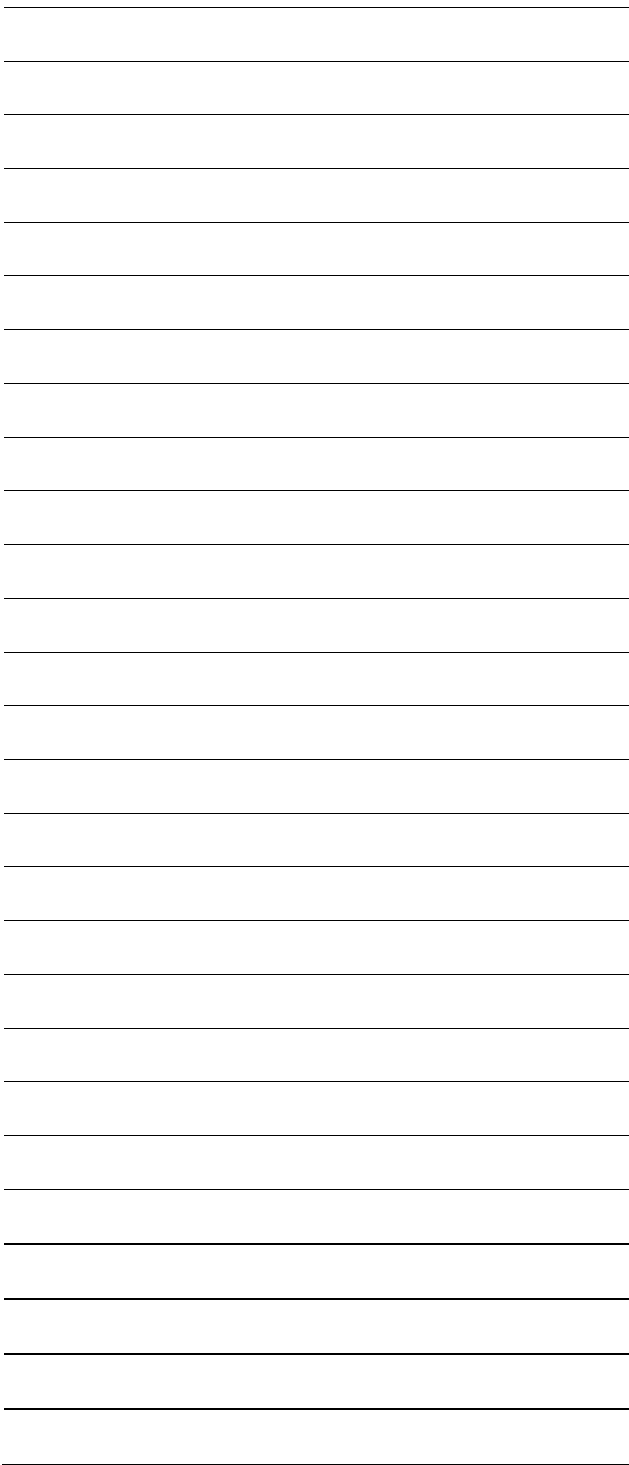
BASF Corporation
Bayer CropScience
Belchim
Corteva Agriscience
Syngenta Crop Protection
Winfield United

Silver

FMC Corporation
Gowan
Helena
Valent
Wilbur-Ellis

Bronze

ABG Ag Services
ADAMA
AMVAC
BellSpray Inc.
Clariant Chemical Corporation
Greenleaf Technologies
Growmark
GDM Solutions Inc.
KayJay Ag Services Inc.
Lamberti
Midwest Research Inc.
PRS LLC
Stepan
TeeJet Technologies
UPL



[illegible]

Time Schedule

Mark papers and meetings in the appropriate space.

Time	Tuesday	Wednesday	Thursday
8:00	General Session		What's New In Industry
8:15			
8:30			
8:45			
9:00			
9:15			
9:30			
9:45			
10:00	Poster Session I		
10:15			
10:30			
10:45			
11:00			
11:15			
11:30			
11:45			
12:00	Student Luncheon	NCWSS Awards Luncheon	
12:15			
12:30			
12:45			
1:00			
1:15			
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4:00			
4:15			
4:30			
4:45			
5:00			
5:15			
5:30	Poster Session II	Society Social	
6:00			
6:30			
7:00			

Future NCWSS Annual Meeting Sites

2022 – December 5 - 8 St. Louis, MO

2023 – December 11 - 14 Minneapolis, MN
