



2023

78th Annual Meeting

North Central Weed Science Society

www.ncwss.org

December 11-14, 2023

Hyatt Regency, Minneapolis, MN

NCWSS General Program Information

President's Welcome

2023 North Central Weed Science Society Meeting

Welcome to the 78th annual meeting of the North Central Weed Science Society (NCWSS) at the Hyatt Regency in downtown Minneapolis, MN. We have something for everyone at the meeting this year. You can't thank me for putting together an excellent program, but you can thank Dawn Refsell, President Elect and Program Chair for the 2023 annual meeting. You can also thank Eric Spandl and his dedicated members of the Local Arrangement Committee for setting up an engaging and effectively organized program. As is true for most organizations, the behind-the-scenes efforts of these individuals laid the foundation for a successful meeting. Please take a moment when you see Dawn, Eric or LAC members to thank them for their service.

Two symposia are planned for the meeting. On Wednesday, the first symposium is entitled "Field to Film: Beginners Guide to Video Editing and Production". Claudia Bland and the Graduate Student Association have organized this. If you have ever wondered how to create short videos and use them for instructional purposes, this symposium is for you. A second symposium that day is entitled "UAV Pesticide Applications", which was organized by David Simpson. The title alone indicates the topic of this timely symposium. New this year will be a workshop entitled "Mentoring and Networking-Up for Graduate Students". This will be offered on Wednesday afternoon.

In addition to the science, there are a number of other engaging activities. This starts with the WinField United Tour for students which takes place on Monday afternoon. Monday evening is the traditional Student Mixer sponsored by BASF, although all society members are invited to take part. The Women in Weed Science group will be meeting Tuesday morning (see program for details). At noon on Tuesday is the Graduate Student Luncheon sponsored by Corteva. This is a great time to meet other students who someday may be academia, industry, or government colleagues. On Wednesday is the Society Awards Luncheon where we recognize the Distinguished Achievement Award and Fellow Award winners. On Wednesday evening is the Society Social and Contest Awards where we recognize all graduate student contest award winners (although ALL participants are winners). Thursday morning is the inaugural "Society Breakfast", which replaces the "Industry Breakfast". All students are invited to participate at no cost to you, thanks to Syngenta. There will be a guest speaker and the "What's New in Industry" section.

The first NCWSS meeting I attended was as a fledgling graduate student from MSU in 1984. The meeting was in Indianapolis at the Hyatt Regency. I can remember thinking how crazy it was to wear a suit and tie for 2.5 days and stand shoulder to shoulder in a room packed to hear Marshall McGlamery speak. This year we celebrate 78 years as a society, which was built on the volunteer efforts of many that came before me. Our society still depends on volunteers. There are many opportunities to join a committee. Please strongly consider this, as you have an opportunity to impact our society for years to come. If you want to serve on a committee, speak to me or Dawn Refsell and we can accommodate you. Alternatively, you can participate by attending a committee meeting, and the program book or app can provide details.

To Sustaining Members of the NCWSS I say a sincere "thanks" for your generous support. This helps to cover the costs of this meeting. To the paper and poster judges, I salute your sacrifices and efforts to evaluate student papers, posters, and videos.

It has been a pleasure serving as your NCWSS President. I walk in the footsteps of many past presidents who laid the foundation of this society. I leave you with the saying on a poster that hangs in my office, and previously hung in my bedroom as a kid starting at 10 years of age:

The future belongs to those who are willing to work for it.

Your efforts on behalf of the NCWSS at this meeting and going forward can shape our society and impact weed science.

Reid Smeda, President

NCWSS General Program Information

Conference Headquarters

All sessions of the conference and the meeting events will be held at the Hyatt Regency Minneapolis, 1300 Nicollet Mall, Minneapolis, MN 55403

Registration Hours

The registration desk is at **Alcove D in the Nicollet Promenade**, 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.

Meeting Rooms

All sessions and meetings will be in the Hyatt Regency Minneapolis. Additional meetings may be arranged any time during the conference by contacting Eric Spandl, Local Arrangements Chair.

Proceedings

2023 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 Exhibit Hall. No other displays are allowed.

Endowment Support Opportunity

Silent auction items will be available for viewing and bidding at the registration desk until Wednesday at 3 pm. Auction items winners will be announced at the Wednesday evening awards ceremony. Proceeds from the silent auction will be placed into the NCWSS Endowment Fund.

Health and Safety

Attendees need to always wear NCWSS name badges. Smoking is allowed in designated areas only. If the situation is an emergency --- dial 55 from any hotel phone and immediately report it. If the matter is NOT an emergency, dial 0 or 44 from any hotel phone, ask to speak to the Security Manager on Duty, and report the matter accordingly.

Please contribute to the 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.

NCWSS Mobile Meeting App – Crowd Compass

The 78th 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 #NCWSS2023.

No photographs or videos

Do not take pictures or videos of any presentations without prior permission from the presenter. The posters will be available online after the conference.

Program Symbols

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

Meal Functions of the Society 2023

Meal Functions

If you requested specific dietary needs during the meeting, please identify yourself and needs to the wait staff as they begin serving.

Breaks

Tuesday, 9:45 – 10:00 am	Exhibit Hall
Tuesday, 3:00 – 3:15 pm	Exhibit Hall
Wednesday, 10:00 – 10:15 am	Nicollet Promenade
Wednesday, 3:00 pm – 3:30 pm	Nicollet Promenade

Presidential Reception

– *Open to 2023 Distinguished Award Winners, New and Current Fellows, Current Board Members*

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

Sponsored by BASF Corporation – Open to all attendees

Monday, 6:30 – 10:00 pm	NorthStar A
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Student Luncheon/Business Meeting

Sponsored by Corteva Agriscience – Open to all students

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

Open to all (preregistration)

Tuesday, 6:30 – 7:45 am	Greenway G-I
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Society Awards Luncheon

Wednesday, 12:00 – 1:15 pm	NorthStar A
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Society Social and Contest Awards

Sponsored by Sustaining Members – Open to all attendees

Wednesday, 5:30 – 7:00 pm	Nicollet B-C
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Society Breakfast

Students sponsored by Syngenta – Open to all attendees (preregistration)

Thursday, 7:30 – 9:00 am	NorthStar A
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Tours of the Society 2023

Graduate Student WinField Tour

Hosted by WinField United - attendees meet in the hotel lobby at 12:40 and lead the group to the buses at 12:50. Busses leave no later than 1:00 pm

Monday, 1:00 pm – 4:30 pm	Meet in Lobby
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NCWSS General Program Information

Meetings of the Society 2023

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 2025.

NCWSS Committee Meetings

Board of Directors

Monday, 10:00 am

Greenway J

Resident Education, Summer Contest and Contest Rules Joint meeting

Monday, 4:30 pm

Lakeshore B

NCWSS Fellows*

Tuesday, 5:45 pm

Greenway A

Resolutions & Necrology

Monday, 5:00 pm

Lakeshore A

Program Committee and Section Chairs

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

Lakeshore A

Distinguished Achievement Awards

Tuesday, 5:30 pm

Nicollet D3

Nominating*

Tuesday, 6:15 pm

Greenway B-D

Strategic Planning

Tuesday, 5:15 pm

Lakeshore C

Finance, Steering & Policy

Monday, 5:30 pm

Lakeshore C

Paper Judges

Monday, 5:30 pm

Lakeshore B

Wednesday, 4:00 pm

Greenway A

Poster Judges

Monday, 5:30 pm

Lakeshore B

Wednesday, 11:30 am

Greenway A

Industry

Thursday, 10:00 am

Northstar A

Board of Directors

Thursday, 10:30 am

Greenway J

NCWSS General Program Information

Meetings of the Society 2023

Program Section Business Meetings

Weed Biology, Ecology & Management

Tuesday, 5:15 pm

Lakeshore B-C

Agronomic Crops II (Soybeans)

Tuesday, 5:15 pm

Nicollet D1/D2

Equipment and Application Methods

Tuesday, 5:15 pm

Nicollet A

Horticulture and Specialty Crops

Wednesday, 10:00 am

Nicollet D1/D2

Extension

Wednesday, 8:45 am

Lakeshore B-C

Invasive Weeds, Rangeland, Pasture, and Vegetation
Management

Wednesday, 11:15 am

Nicollet A

Herbicide Physiology & Molecular Biology

Wednesday, 8:15 am

Nicollet A

Agronomic Crops I (Corn)

Wednesday, 5:00 pm

Nicollet D1/D2

Symposia

Field to Film: Beginners Guide to Video Editing and
Production

Wednesday, 9:45 – 11:45 pm

Lakeshore B-C

UAV Pesticide Application Symposia

Wednesday, 1:25 – 5:00 pm

Nicollet A

What's New in Industry

Thursday, 9:00 – 10:30 am

NorthStar A

Graduate Student Workshop

Networking & Mentoring from Graduate Student to
Retirement

Wednesday, 1:30 – 5:00 pm

Lakeshore B-C

NCWSS General Program Information

Condensed Program

Tuesday

Women in Weed Science Breakfast	6:30 AM - 8:00 AM	Greenway G-I
POSTER SESSION I	8:00 AM - 9:45 AM	Exhibit Hall
General Session	10:00 AM - 11:45 AM	Nicollet A
Student Luncheon	12:00 PM - 1:15 PM	NorthStar A
ORAL - Agronomic Crops II - Soybeans	1:30 PM - 5:30 PM	Nicollet D1/D2
ORAL - Weed Biology, Ecology, Management	1:30 PM - 5:30 PM	Lakeshore B-C
ORAL - Equipment and Application Methods	1:30 PM - 5:30 PM	Nicollet A
POSTER SESSION II	5:00 PM - 6:30 PM	Exhibit Hall

Wednesday

POSTER SESSION III	8:00 AM - 9:45 AM	Exhibit Hall
ORAL - Herbicide Physiology & Molecular Biology	8:15 AM - 10:00 AM	Nicollet A
ORAL - Invasive Weeds, Rangeland, Pasture, and Vegetation Management	10:15 AM - 11:30 AM	Nicollet A
Video Student Contest	9:00 AM - 9:45 AM	Lakeshore B-C
SYMPOSIUM - Field to Film: Beginners Guide to Video Editing and Production	9:45 AM - 11:45 AM	Lakeshore B-C

NCWSS General Program Information

ORAL - Horticulture and Specialty Crops 8:00 AM - 10:15 AM Nicollet D1/D2

ORAL - Agronomic Crops I - Corn 10:15 AM - 11:45 AM Nicollet D1/D2

Society Awards Luncheon 12:00 PM - 1:15 PM NorthStar A

ORAL - Agronomic Crops I - Corn 1:30 PM - 5:15 PM Nicollet D1/D2

SYMPOSIUM - UAV Pesticide Application Symposia 1:25 PM - 5:00 PM Nicollet A

GRAD STUDENT WORKSHOP - Networking & Mentoring from Graduate Student to Retirement 1:30 PM - 5:00 PM Lakeshore B-C

Society Social 5:30 PM - 7:00 PM Nicollet B-C

Thursday

Society Breakfast 7:30 AM - 9:00 AM Northstar A

What's New in Industry 9:00 AM - 10:30 AM Northstar A

NCWSS General Program Information

Poster Sessions

Room: Exhibit Hall

Moderator: Adam Striegel

Poster Setup

Posters can be set up between 1:00 and 9:00 pm on Monday, December 11. All NCWSS posters will be on display on Tuesday, December 12 from 8:00 am until 6:30 pm and on Wednesday, December 13 from 7:00 am until 1:00 pm. Posters must be removed by 4:30 pm on Wednesday, December 13.

Students in the Poster Contest must be with their posters during the Poster Sessions on Tuesday morning for judging. They are highly encouraged to be present also on Wednesday morning. Students in the poster contest are required to bring at least 25 letter-sized copies of your posters to hand out.

Tuesday, December 12

8:00 – 9:45 am Poster Session I

5:00 – 6:30 pm Poster Session II

Wednesday, December 13

7:30 – 9:00 am Poster Session III

Poster Removal

All posters must be removed by 4:30 pm on Wednesday, December 13.

NCWSS Sustaining Member Exhibitors

Tuesday & Wednesday

Exhibit Hall

Set up Monday afternoon.

Program Symbols

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

PROGRAM

MONDAY MORNING DECEMBER 11

Board of Directors

LOCATION: Greenway J
TIME: 10:00 AM - 3:00 PM Central Time

TUESDAY MORNING DECEMBER 12

Women in Weed Science Breakfast (Preregistration)

LOCATION: Greenway G-I
TIME: 6:30 AM - 8:00 AM Central Time

*SPEAKER

6:30 AM Meal Served

7:00 AM Lets Talk About Allyship. Rebecca Dunning*; NC State University, Raleigh, NC (1)

TUESDAY MORNING DECEMBER 12

POSTER - Equipment and Application Methods

LOCATION: Exhibit Hall
TIME: 8:00 AM - 9:45 AM Central Time

*PRESENTER † GRADUATE CONTEST ‡
UNDERGRADUATE CONTEST

‡Evaluating the Interaction of Herbicide and Adjuvant Treatment by Water Hardness Level Over Time. Ryan J. Edwards¹, Brandt Berghuis², Jace Heiman*²; ¹WinField United,

NCWSS Program

River Falls, WI, ²University of Wisconsin - River Falls, River Falls, WI (2)

‡**Evaluating the Impact of Tank-mix Antagonism and Spray Nozzle Incompatibility with a Two-boom Two-tank Application System on Weed Control Efficacy.** Danilo J. Krabbenborg*, Thiago H. Vitti, Christopher Proctor; University of Nebraska - Lincoln, Lincoln, NE (3)

†**Harvest Seed Destruction in Wheat: Evaluation of Combine Performance.** Alec C. Adam*¹, Sarah Lancaster¹, Brian Ganske², Wade T. Burris¹, Salina Raila¹; ¹Kansas State University, Manhattan, KS, ²John Deere, Hays, KS (4)

Adjuvants Influence the Amount of 2,4-D Remaining on the Leaf Surface After 24 Hours. Joshua J. Skelton*¹, Anderson Weber², Dustyn Sawall²; ¹WinField United, River Falls, MN, ²WinField United, River Falls, WI (5)

†**Exploring Spray Deposition Within Weedy Soybean Canopy.** Nikola Arsenijevic*¹, Rodrigo Werle¹, Zaim Ugljic¹, Guilherme Chudzik¹, Jacob H. Felsman¹, Ryan P. DeWerff², Ahmadreza Mobli¹; ¹University of Wisconsin - Madison, Madison, WI, ²University of Wisconsin, Madison, WI (6)

‡**Wind-Speed Effects on Pattern Displacement: Insights from Wind-Tunnel Trials.** Gabriel de Souza Lemes*, Milos Zaric, Aleksandra Pantic, Jeffrey Golus; University of Nebraska - Lincoln, North Platte, NE (7)

†**More is Less or Less is More? Evaluating the Influence of Nozzle Number and Type for Novel Spot Spray Technologies.** Zaim Ugljic*¹, Ryan P. DeWerff², Bruno Canella Vieira¹, Rodrigo Werle¹; ¹University of Wisconsin - Madison, Madison, WI, ²University of Wisconsin, Madison, WI (8)

Postemergence Herbicide Injury in Non-GMO Soybean Using Site-Specific Herbicide Application Technologies. Marcelo Zimmer*¹, Wyatt J. Stutzman², Michael L. Flessner², Lauren M. Lazaro³, William G. Johnson¹, Bryan G. Young⁴; ¹Purdue University, West Lafayette, IN, ²Virginia Tech, Blacksburg, VA, ³Blue River Technology, Sunnyvale, CA, ⁴Purdue University, Brookston, IN (9)

†**Comparing Droplet Deposition in Corn from an UAV Versus Ground-based Sprayer.** Emma L. Gaither*, Reid J. Smeda; University of Missouri, Columbia, MO (10)

NCWSS Program

‡Analysis of Droplet Size and Spray Dynamics Across Nozzles with Different Fan Angles for Precision Application.

Aleksandra Pantic*, Milos Zaric, Jeffrey Golus, Gabriel de Souza Lemes; University of Nebraska - Lincoln, North Platte, NE (11)

Insights into the Blue River Technology Agronomy Test Machine Research Program. Lauren M. Lazaro*¹, Michael M. Houston², William L. Patzoldt¹; ¹Blue River Technology, Sunnyvale, CA, ²Blue River Technology, Greenville, MS (12)

†Utilizing Directed Energy as a Non-chemical Weed Control Method. Ryan Hamberg*¹, Muthukumar Bagavathiannan¹, Jon Jackson², Neil Sater²; ¹Texas A&M University, College Station, TX, ²Global Neighbor, Inc, Xenia, OH (13)

†Impacts of Weed Electrocutation on Other Non-target Organisms in the Agroecosystem. Grant D. Coe*; University of Missouri, Columbia, MO (14)

POSTER - Extension

LOCATION: Exhibit Hall

TIME: 8:00 AM - 9:45 AM Central Time

***PRESENTER**

Mature Alfalfa Tolerance to Flaming. Stevan Knezevic*¹, Luka Milosevic², Jon Scott², Chris Bruening², George Gogos²; ¹University of Nebraska - Lincoln, Concord, NE, ²University of Nebraska - Lincoln, Lincoln, NE (15)

Soybean Tolerance to Late Season Flaming. Stevan Knezevic*¹, Luka Milosevic², Jon Scott², Chris Bruening², George Gogos²; ¹University of Nebraska - Lincoln, Concord, NE, ²University of Nebraska - Lincoln, Lincoln, NE (16)

New Corn Herbicide Programs in Nebraska. Jon Scott*¹, Luka Milosevic¹, Stevan Knezevic²; ¹University of Nebraska - Lincoln, Lincoln, NE, ²University of Nebraska - Lincoln, Concord, NE (17)

Burcucumber Management in Corn and Soybean. Dwight Lingenfelter*; Penn State University, University Park, PA (18)

Giant Ragweed Management in Corn: A Review of Herbicide Systems Over Six Years of Research. Ryan P. DeWerff*¹,

NCWSS Program

Rodrigo Werle²; ¹University of Wisconsin, Madison, WI,

²University of Wisconsin - Madison, Madison, WI (19)

Strategies for Managing Herbicide Tolerant Volunteer Corn in 2,4-D Tolerant Soybeans.

Ryan P. Miller*¹, Lisa M.

Behnken¹, Debalin Sarangi²; ¹University of Minnesota,

Rochester, MN, ²University of Minnesota, St. Paul, MN (20)

Cover Crop Biomass Production in Wisconsin: 2020-2022

Wisconsin Cover Crop Survey. Daniel H. Smith*¹, Mrill

Ingram², Gregg Sanford¹, Ricardo Costa³, Dan Marzu⁴, Jamie

Patton⁵, Jose J. Nunes¹, Ahmadreza Mobli¹, Rodrigo Werle¹;

¹University of Wisconsin - Madison, Madison, WI, ²Michael

Fields Agricultural Institute, Madison, WI, ³The Nature

Conservancy, Waukasha, WI, ⁴University of Wisconsin -

Madison, Wausau, WI, ⁵Wisconsin Natural Resources

Conservation Service, Shawano, WI (21)

Advancing Weed Science Research, Extension, and

Education: NIFA Grants and Panel Reviewer Opportunities.

Annu Kumari*¹, Cynthia Sias², James Kells³, Vijay Nandula⁴,

Lee Van Wychen⁵; ¹Auburn University, Auburn, AL, ²Virginia

Tech, Blacksburg, VA, ³Michigan State University, East

Lansing, MI, ⁴USDA, Stoneville, MS, ⁵Weed Science Society of

America, Alexandria, VA (22)

POSTER - Herbicide Physiology & Molecular Biology

LOCATION: Exhibit Hall

TIME: 8:00 AM - 9:45 AM Central Time

***PRESENTER † GRADUATE CONTEST**

†Evaluation of Adjuvants for Maximizing Herbicide

Performance of Saflufenacil or Glyphosate. Joana Schroeder

de Souza*¹, Anita Dille¹, Isaac Barnhart¹, Ryan J. Edwards²,

Aaron Hunsinger³; ¹Kansas State University, Manhattan, KS,

²WinField United, River Falls, WI, ³One Smart Spray, Carmi, IL

(23)

Knock-down of Endogenous Transcripts Using RNAi

Approaches for Weed Management. Yaiphabi Kumam*,

Veerendra Kumar Sharma, Harold N. Trick, P.v. Vara Prasad,

Mithila Jugulam; Kansas State University, Manhattan, KS (24)

NCWSS Program

†**Subtelomeric 5-enolpyruvylshikimate-3-phosphate Synthase Copy Number Variation Confers Glyphosate Resistance in *Eleusine indica***. Nick A. Johnson*¹, Nathan D. Hall², Qin Yu³, Chun Zhang⁴, Eric L. Patterson¹; ¹Michigan State University, East Lansing, MI, ²Michigan State, East Lansing, MI, ³University of Western Australia, Perth, Australia, ⁴Guangdong Academy of Agricultural Sciences, Guangzhou, China (25)

†**Gene Co-expression Network Analysis in Indaziflam Resistant and Susceptible *Poa Annua***. Mohit Mahey*¹, Eric L. Patterson¹, Peter Knut Lundquist¹, Jinyi Chen²; ¹Michigan State University, East Lansing, MI, ²Nianjing Agricultural University, Nianjing, China (26)

Validation of the International Weed Genomics Consortium Genome Annotation Pipeline Using Model Species. Luan Cutti*¹, Jessica Matheson², Nathan D. Hall³, Eric L. Patterson¹; ¹Michigan State University, East Lansing, MI, ²The University of Massachusetts Amherst, Amherst, MA, ³Michigan State, East Lansing, MI (27)

†**Segregation of Non-Target-Site Resistance to S-Metolachlor in *Amaranthus tuberculatus***. Isabel S. Werle*, Lucas K. Bobadilla, Filipi M. Machado, Aaron G. Hager, Patrick J. Tranel; University of Illinois, Urbana, IL (28)

†**Characterization of MCPA Resistance in Palmer Amaranth (*Amaranthus palmeri*)**. Rishabh Singh*¹, Mithila Jugulam¹, Francois Tardif²; ¹Kansas State University, Manhattan, KS, ²University of Guelph, Guelph, ON, Canada (29)

†**Genomic Resources for *Amaranthus* Species**. Damilola A. Raiyemo*, Patrick J. Tranel; University of Illinois, Urbana, IL (30)

Cytogenetic Characterization of EPSPS Gene Amplification in Glyphosate-resistant Windmill (*Chloris truncata*) and Northern Barley (*Hordeum glaucum*) Grasses from Australia. Md Mazharul Islam*¹, Bikram S. Gill¹, Christopher Preston², Mithila Jugulam¹; ¹Kansas State University, Manhattan, KS, ²University of Adelaide, Glen Osmond, Australia (31)

†**Using RNA Sequence Transcriptome Analysis to Characterize Genes Associated with Conferring Clopyralid Resistance in Common Ragweed (*Ambrosia artemisiifolia*)**. Nash D. Hart*, Erin E. Burns, Eric L. Patterson; Michigan State University, East Lansing, MI (32)

NCWSS Program

†**Overexpression of *TaHPPD* Gene in Wheat (*Triticum aestivum*) Reduces Sensitivity to Mesotrione.** Susee Sudhakar*, Yaiphabi Kumam, Hyeonju Lee, Veerendra Kumar Sharma, Harold N. Trick, Mithila Jugulam; Kansas State University, Manhattan, KS (33)

POSTER - Invasive Weeds, Rangeland, Pasture, and Vegetation Management

LOCATION: Exhibit Hall

TIME: 8:00 AM - 9:45 AM Central Time

***PRESENTER** † **GRADUATE CONTEST** ‡
UNDERGRADUATE CONTEST

‡**Evaluating the Effect of Adjuvants to Improve Sprayability of a Bio-based Sprayable Mulch.** Thales Rodrigues da Silva*, Ana Clara Gomes, Camila Chiaranda Rodrigues, Christopher Proctor, Muhammad Akram; University of Nebraska - Lincoln, Lincoln, NE (34)

†**Do Increased Stocking Periods Affect Weed Populations in Pastures in Southern Wisconsin?** Arthur Franco Teodoro Duarte*¹, Mark J. Renz¹, Marta Moura Kohmann¹, David Jaramillo²; ¹University of Wisconsin - Madison, Madison, WI, ²USDA -ARS, Marshfield, WI (35)

Control Options for Japanese Knotweed Along Roadsides. Joe Omielan*; University of Kentucky, Lexington, KY (36)

†**Rate of Florypyrauxifen That Prevents Wild Parsnip (*Pastinaca sativa* L.) Seed Production.** Charlton I. Rodriguez*, Mark J. Renz, Travis Wilson; University of Wisconsin - Madison, Madison, WI (37)

†**Efficacy of Cereal Rye Cover Crop Termination Options in the Spring.** Sithin Mathew*¹, Eric Y. Yu², Lizabeth Stahl³, Debalin Sarangi²; ¹University of Minnesota, Minneapolis, MN, ²University of Minnesota, St. Paul, MN, ³University of Minnesota, Worthington, MN (38)

2023 Survey Results for the Most Common and Troublesome Weeds in Grass Crops, Pasture and Turf. Lee Van Wychen*¹, Cynthia Sias², Annu Kumari³; ¹Weed Science Society of America, Alexandria, VA, ²Virginia Tech, Blacksburg, VA, ³Auburn University, Auburn, AL (39)

NCWSS Program

†Palmer Amaranth, Manure, and Black Soldier Fly □ Oh My!

Isidor Ceperkovic*¹, Melissa Wilson¹, Chelsea Miranda², Jeffery K. Tomberlin³, Navjot Singh¹, Eric Y. Yu⁴, Roger Becker⁴, Debalin Sarangi⁴; ¹University of Minnesota, Saint Paul, MN, ²Howard Payne University, Brownwood, TX, ³Texas A&M University, College Station, TX, ⁴University of Minnesota, St. Paul, MN **(40)**

‡Evaluating Sensors as a Tool for Non-destructive Weed and Cover Crop Biomass Estimation.

Bruno Henrique Corrêa*, Victor de Sousa Ferreira, Christopher Proctor; University of Nebraska - Lincoln, Lincoln, NE **(41)**

POSTER - Weed Biology, Ecology, Management

LOCATION: Exhibit Hall

TIME: 8:00 AM - 9:45 AM Central Time

*PRESENTER † GRADUATE CONTEST ‡
UNDERGRADUATE CONTEST

†From Stress to Success: Hormesis Explained.

Luka Milosevic*¹, Stevan Knezevic²; ¹University of Nebraska - Lincoln, Lincoln, NE, ²University of Nebraska - Lincoln, Concord, NE **(42)**

Volunteer Hemp Tolerance to Early-Season Herbicides in

Soybean. Milos Zaric*¹, Kasey P. Schroeder¹, Thiago H. Vitti², Jeffrey Golus¹, Christopher Proctor², Sam Wortman²;

¹University of Nebraska - Lincoln, North Platte, NE, ²University of Nebraska - Lincoln, Lincoln, NE **(43)**

†Emergence Periodicity of Six Weed Species as Impacted by Cereal Rye Cover Crop.

Eric Y. Yu*, Debalin Sarangi; University of Minnesota, St. Paul, MN **(44)**

†Quantifying Success: Cereal Rye Cover Crop Versus Giant Ragweed.

Guilherme Chudzik*, Nicholas J. Arneson, Jose J. Nunes, Rodrigo Werle; University of Wisconsin - Madison, Madison, WI **(45)**

Characterization of Multiple Resistant Waterhemp

(*Amaranthus tuberculatus*) Response to Soil-Applied

Herbicides. Claudia R. Bland*¹, Bryan G. Young², William G. Johnson¹; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN **(46)**

NCWSS Program

†**Palmer Amaranth Suppression in Cotton with Harvest Aid Herbicides.** Wade T. Burris*, Sarah Lancaster, Salina Raila, Alec C. Adam; Kansas State University, Manhattan, KS (47)

Influence of Cereal Rye Cover Crop and Tillage on the Emergence Pattern of Waterhemp Across a Latitudinal Gradient in the United States. Purushottam Gyawali¹, Pavle Pavlovic², Ahmadreza Mobli*³, Prashant Jha⁴, Rodrigo Werle³, Jason K. Norsworthy⁵, Martin M. Williams II⁶, Muthukumar Bagavathiannan¹; ¹Texas A&M University, College Station, TX, ²University of Illinois, Urbana, IL, ³University of Wisconsin - Madison, Madison, WI, ⁴Louisiana State University, Baton Rouge, LA, ⁵University of Arkansas, Fayetteville, AR, ⁶USDA-ARS, Urbana, IL (48)

†**Evolutionary Stability of Dioecy in the Genus *Amaranthus*.** Alexander J. Lopez*, Lucas Kopecky Bobadilla, Patrick J. Tranel; University of Illinois, Urbana, IL (49)

Potential Growth and Fecundity of Early Versus Late-season Waterhemp (*Amaranthus Tuberculatus*) Cohorts. Ahmadreza Mobli*, Rodrigo Werle; University of Wisconsin - Madison, Madison, WI (50)

‡**Herbicide and Cereal Rye for *Palmer amaranth* Management in Corn and Soybeans.** Igor G R Lima*, Alec C. Adam, Wade T. Burris, Salina Raila, Sarah Lancaster; Kansas State University, Manhattan, KS (51)

Modeling the Emergence of Palmer Amaranth Seedlings in Five Central US States in Response to Tillage. Zhe Ren*¹, David J. Gibson², William G. Johnson¹, Lauren M. Schwartz-Lazaro³, Kevin W. Bradley⁴, Lucas X. Franca⁵, Joseph L. Matthews², Larry Steckel⁶, Bryan G. Young⁷; ¹Purdue University, West Lafayette, IN, ²Southern Illinois University, Carbondale, IL, ³Blue River Technology, Sunnyvale, CA, ⁴University of Missouri, Columbia, MO, ⁵Syngenta AG, Basel, IL, ⁶University of Tennessee, Jackson, TN, ⁷Purdue University, Brookston, IN (52)

†**The Influence of Row Spacing, Density, and Herbicide Program on Weed Communities in Hemp (*Cannabis sativa* L.).** Kaitlin E. Creager*¹, Eric J. Miller¹, Kevin W. Bamber², Matthew P. Spoth², Michael L. Flessner², Karla L. Gage¹; ¹Southern Illinois University, Carbondale, IL, ²Virginia Tech, Blacksburg, VA (53)

NCWSS Program

Measuring Drought Response Variability in Maretail. Ahmet Tansel Serim*, Eric L. Patterson; Michigan State University, East Lansing, MI (54)

†Determining the Digital Mapping Sample Area for an Accurate Measure of Weed Infestations. Emma Lagerhausen*¹, Alexander R. Mueth², Siddhartho S. Paul², Bryan G. Young³; ¹Purdue University, Shumway, IL, ²Purdue University, West Lafayette, IN, ³Purdue University, Brookston, IN (55)

†Impact of Rainfall on Atrazine Fate in Cover Cropping Systems. Lucas Oliveira Ribeiro Maia*¹, Bryan G. Young², Eileen J. Kladvik¹, Shalamar Armstrong¹, William G. Johnson¹; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN (56)

POSTER - Agronomic Crops I - Corn & Sorghum

LOCATION: Exhibit Hall
TIME: 8:00 AM - 9:45 AM Central Time

***PRESENTER † GRADUATE CONTEST**

†Control of Glufosinate/glyphosate-resistant Corn Volunteers in iGrowth^{&Reg;} and Double Team™ Sorghum. Mandeep Singh*, Amit J. Jhala; University of Nebraska - Lincoln, Lincoln, NE (57)

Control of Weeds with Tolpyralate and Atrazine Plus Grass Herbicides in Corn. Nader Soltani*, Peter H. Sikkema; University of Guelph, Ridgetown, ON, Canada (58)

Control of Volunteer Corn in Soybean with Clethodim and Adjuvants. Nader Soltani*, Christy H. Shropshire, Peter H. Sikkema; University of Guelph, Ridgetown, ON, Canada (59)

†Evaluating Efficacy and Crop Safety of AMV5233D (Glufosinate + Quizalofop) for Control of Glufosinate/glyphosate-resistant Corn Volunteers in Enlist™ Corn. Mandeep Singh*¹, Richard K. Zollinger², Amit J. Jhala¹; ¹University of Nebraska - Lincoln, Lincoln, NE, ²Amvac Chemical Company, Spokane Valley, WA (60)

Plant-back Exposure of Tiafenacil to Sorghum. Alex Chmielewski*; University of Nebraska - Lincoln, Lincoln, NE (61)

NCWSS Program

†**Response of Grain Sorghum (*Sorghum bicolor*) to Post Herbicides Exposed to High- Temperature Stress.** Manogna Devi Adari*, Mithila Jugulam, Pv Vara Prasad; Kansas State University, Manhattan, KS (62)

Maverick(R) Corn Herbicide: Broad-Spectrum Residual Control in Corn. Eric J. Ott*¹, Garrison J. Gundy², Randall L. Landry³, Chad L. Smith⁴, Ronald E. Estes⁵, Nathan Drewitz⁶, Jonathon Kohrt⁷; ¹Valent USA LLC, Greenfield, IN, ²Valent USA LLC, Mcpherson, KS, ³Valent USA LLC, Seymour, IL, ⁴Valent USA LLC, Hallsville, MO, ⁵Valent USA LLC, Tolono, IL, ⁶Valent USA LLC, Fountain, MN, ⁷Valent USA LLC, Zionsville, IN (63)

†**Weed Management in Conventional Corn in Minnesota.** Venkatanaga Shiva Datta Kumar Sharma Chiruvelli*, Debalin Sarangi; University of Minnesota, St Paul, MN (64)

POSTER - Agronomic Crops II - Soybeans

LOCATION: Exhibit Hall
TIME: 8:00 AM - 9:45 AM Central Time

*PRESENTER † GRADUATE CONTEST ‡
UNDERGRADUATE CONTEST

†**Target Site Resistance to PPO-inhibitor Herbicides in a Giant Ragweed (*Ambrosia trifida*) Accession from Wisconsin.** Felipe de Andrade Faleco*¹, Filipi M. Machado², Lucas Kopecky Bobadilla², David Stoltenberg¹, Patrick J. Tranel², Rodrigo Werle¹; ¹University of Wisconsin - Madison, Madison, WI, ²University of Illinois, Urbana, IL (65)

†**Evaluation of Herbicide Resistance in Waterhemp (*Amaranthus tuberculatus*) Populations from Southern Illinois.** Cristiana B. Rankrape*, Eric J. Miller, Karla L. Gage; Southern Illinois University, Carbondale, IL (66)

Crop Safety Evaluation of Dichlorprop-p and Bromoxynil Preplant Applications. Daniel Beran*¹, Robert Bruss²; ¹Nufarm, Eldora Us, IA, ²Nufarm, Morrisville, NC (67)

†**Tankmix Options with Metribuzin for Broad-Spectrum Weed Control of *Amaranthus* and Other Species.** Oluwaseun T. Ola*¹, Karla L. Gage¹, Eric J. Miller¹, Jason Bond², Kevin W. Bradley³, Alyssa Essman⁴, Joseph T. Ikley⁵, Prashant Jha⁶, Amit J. Jhala⁷, William G. Johnson⁸, Sarah Lancaster⁹, Travis Legleiter¹⁰, Thomas C. Mueller¹¹, Jason K. Norsworthy¹², Christy L. Sprague¹³, Larry Steckel¹⁴, Daniel O. Stephenson,

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IV¹⁵, Rodrigo Werle¹⁶, Bryan G. Young¹⁷, Aaron G. Hager¹⁸;
¹Southern Illinois University, Carbondale, IL, ²Mississippi State University, Stoneville, MS, ³University of Missouri, Columbia, MO, ⁴The Ohio State University, Columbus, OH, ⁵North Dakota State University, Fargo, ND, ⁶Louisiana State University, Baton Rouge, LA, ⁷University of Nebraska - Lincoln, Lincoln, NE, ⁸Purdue University, West Lafayette, IN, ⁹Kansas State University, Manhattan, KS, ¹⁰University of Kentucky, Princeton, KY, ¹¹University of Tennessee, Knoxville, TN, ¹²University of Arkansas, Fayetteville, AR, ¹³Michigan State University, East Lansing, MI, ¹⁴University of Tennessee, Jackson, TN, ¹⁵LSU Ag Center, Alexandria, LA, ¹⁶University of Wisconsin - Madison, Madison, WI, ¹⁷Purdue University, Brookston, IN, ¹⁸University of Illinois, Urbana, IL **(68)**

‡Dicamba "PRE" for Added Weed Control in XtendFlex®

Soybean? Ian Tuma*¹, Isidor Ceperkovic¹, Ryan P. DeWerff², Devin Hammer³, Sarah V. Striegel³, Tyler P. Meyeres³, Rodrigo Werle⁴, Debalin Sarangi⁵; ¹University of Minnesota, Saint Paul, MN, ²University of Wisconsin, Madison, WI, ³Bayer Crop Science, St. Louis, MO, ⁴University of Wisconsin - Madison, Madison, WI, ⁵University of Minnesota, St. Paul, MN **(69)**

Influence of Soil-applied Nitrogen on Weed Control and

Soybean Yield. Eric Jones*, Jill Alms, David Vos; South Dakota State University, Brookings, SD **(70)**

Control of Pervasive Weeds with 2,4-D and Glufosinate in

Soybean. Eric Jones*, David Vos, Jill Alms; South Dakota State University, Brookings, SD **(71)**

†Profile and Patterns of Herbicide Resistance in Waterhemp (*Amaranthus tuberculatus*) in Minnesota.

Navjot Singh*¹, Ryan P. Miller², Thomas J. Peters³, Seth L. Naeve¹, Debalin Sarangi⁴; ¹University of Minnesota, Saint Paul, MN, ²University of Minnesota, Rochester, MN, ³North Dakota State University, Fargo, ND, ⁴University of Minnesota, St. Paul, MN **(72)**

Enversa™: A New Tool for In-season Residual Weed Control.

Kelly A. Backscheider¹, David M. Simpson², Drew Ellis³, Michael Lovelace⁴, Lowell D. Sandell*⁵; ¹Corteva Agriscience, Franklin, IN, ²Corteva Agriscience, Indianapolis, IN, ³Corteva Agriscience, Arlington, TN, ⁴Corteva Agriscience, Newcastle, OK, ⁵Corteva Agriscience, Ankeny, IA **(73)**

†What Should Drive the Application Rate of Preemergence, Residual Herbicides: Weed Control at the Postemergence

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Application Timing or at Crop Harvest? Grant D. Isaacs*¹, Marcelo Zimmer¹, Kevin D. Johnson², Julie M. Young¹, William G. Johnson¹, Bryan G. Young³; ¹Purdue University, West Lafayette, IN, ²Corteva Agriscience, Indianapolis, IN, ³Purdue University, Brookston, IN (74)

Rapidil™, a New Preplant Burndown PPO Herbicide from Valent U.S.A. LLC. Garrison J. Gundy*¹, Patrick A. Clay², Jonathon Kohrt³, John Pawlak⁴, Randall L. Landry⁵, Eric J. Ott⁶, Chad L. Smith⁷; ¹Valent USA LLC, Mcpherson, KS, ²Valent USA LLC, Fresno, CA, ³Valent USA LLC, Zionsville, IN, ⁴Valent USA LLC, Spring Lake, MI, ⁵Valent USA LLC, Seymour, IL, ⁶Valent USA LLC, Greenfield, IN, ⁷Valent USA LLC, Hallsville, MO (75)

†Planting Date, Row Spacing, and Herbicide Program Influence on Weed Management in Soyabean. Salina Raila*, Sarah Lancaster, Hannah Buessing, Christopher Weber, Wade T. Burris, Alec C. Adam, Igor Gustavo Rezende Lima; Kansas State University, Manhattan, KS (76)

POSTER - Horticulture and Specialty Crops

LOCATION: Exhibit Hall

TIME: 8:00 AM - 9:45 AM Central Time

*PRESENTER † GRADUATE CONTEST ‡
UNDERGRADUATE CONTEST

†Evaluating the Effectiveness of Allelopathic Properties of Organic Mulches on Liverwort Control in Containerized Ornamental Production. Manjot Kaur Sidhu*; Michigan State University, East Lansing, MI (77)

†Sensitivity of Dual-Purpose and Fiber Hemp (*Cannabis sativa* L.) Cultivars to S-metolachlor. William G. Hagen*¹, Kaitlin E. Creager¹, Alexander R. Mueth², Eric J. Miller¹, Karla L. Gage¹; ¹Southern Illinois University, Carbondale, IL, ²Purdue University, West Lafayette, IN (78)

Group 15 Herbicide Efficacy on Pigweed Species in Sunflower (*Helianthus annuus*). Quincy D. Law*, Keith Biggers, Kirk A. Howatt, Joseph T. Ikley; North Dakota State University, Fargo, ND (79)

†Use of Silage Tarps for Early-season Weed Management in Small-scale Potato Production. Josue D. Cerritos*, Jeanine Arana, Emmanuel G. Cooper, Stephen L. Meyers; Purdue University, West Lafayette, IN (80)

NCWSS Program

†Adoption of Residual Herbicides for Vineyard Weed Management is Superior to Repeated Application of Postemergence Compounds. Michelle M. Maile*, Reid J. Smeda, Dean Volenberg; University of Missouri, Columbia, MO **(81)**

Response of Dormant Peppermint (*Mentha × piperita*) to Tiafenacil. Carlos A. López Manzano*, Stephen L. Meyers, Jeanine Arana, Emmanuel G. Cooper, Josue D. Cerritos; Purdue University, West Lafayette, IN **(82)**

†Effects of Row-Middle Cover Crops on Strawberry Plasticulture Production. Jeanine Arana*¹, Stephen L. Meyers¹, Wenjing Guan²; ¹Purdue University, West Lafayette, IN, ²Purdue University, West Lafayette, IN **(83)**

‡Waterhemp (*Amaranthus tuberculatus*) Control in Sugarbeet (*Beta vulgaris*) from Ethofumesate as Influenced by Soil-Applied Adjuvant Rate. Mason Miller*¹, Ryan S. Henry², Alexa L. Lystad¹, Adam D. Aberle¹, Quincy D. Law¹, Thomas J. Peters¹; ¹North Dakota State University, Fargo, ND, ²UPL NA Inc., Fort Wayne, IN **(84)**

NCWSS Program

TUESDAY MORNING DECEMBER 12

General Session

LOCATION: Nicollet A
TIME: 10:00 AM - 11:45 AM Central Time
MODERATOR: Dawn Refsell
Corteva Agriscience

***SPEAKER**

- 10:00 AM Welcome to the 78th Annual Meeting of the North Central Weed Science Society.** Dawn Refsell*; Corteva Agriscience, Johnston, IA **(85)**
- 10:05 AM Weed Science Policy Update from DC.** Lee Van Wychen*; Weed Science Society of America, Alexandria, VA **(86)**
- 10:30 AM Welcome from the Minnesota Department of Agriculture.** Commissioner Thom Petersen*; Minnesota Department of Agriculture, Saint Paul, MN **(87)**
- 11:00 AM Presidential Address.** Reid J. Smeda*; University of Missouri, Columbia, MO **(88)**
- 11:30 AM Remembering NCWSS Members and Friends.** Sarah Striegel*; Bayer Crop Science, Creve Coeur, MO **(89)**
- 11:35 AM Program Announcements.** Dawn Refsell*; Corteva Agriscience, Johnston, IA **(90)**
- 11:40 AM Break**

TUESDAY AFTERNOON DECEMBER 12

Grad Student Luncheon

LOCATION: NorthStar A
TIME: 12:00 PM - 1:15 PM

12:00 PM Student Luncheon
Sponsored by Corteva

TUESDAY AFTERNOON DECEMBER 12

ORAL - Agronomic Crops II - Soybeans

LOCATION: Nicollet D1/D2
TIME: 1:30 PM - 5:30 PM Central Time
MODERATOR: Garrison J. Gundy
Valent U.S.A LLC

***SPEAKER † GRADUATE CONTEST**

- 1:30 PM †Various Dicamba Thresholds in Soybean.** Luka Milosevic*¹, Jon Scott¹, Amit J. Jhala¹, Stevan Knezevic²; ¹University of Nebraska - Lincoln, Lincoln, NE, ²University of Nebraska - Lincoln, Concord, NE **(91)**
- 1:45 PM †Does Layered-Residual Herbicide Strategy Impact Soybean Canopy Closure and Growth?** Sithin Mathew*¹, Aaron Lorenz¹, Debalin Sarangi²; ¹University of Minnesota, Minneapolis, MN, ²University of Minnesota, St. Paul, MN **(92)**
- 2:00 PM †Soybean (*Glycine max*) Canopy Response to Sublethal Rates of Dicamba Using Unmanned Aerial Sensing.** Dylan R. Kerr*¹, Jeremy Ruhter¹, Dylan P. Allen¹, Andrew Leakey¹, Dennis Bowman¹, Sheng Wang¹, Nicolas F. Martin¹, Aaron G. Hager¹, Martin M. Williams II²; ¹University of Illinois, Urbana, IL, ²USDA-ARS, Urbana, IL **(93)**

NCWSS Program

- 2:15 PM Comparative Antagonism Effects of a Novel Adjuvant System to Commercial Formulations of Glufosinate and Glyphosate Under Field Conditions.** Thomas C. Mueller*¹, R. Scott Tann², Gianfranco Paganini², Steve Sloan²; ¹University of Tennessee, Knoxville, TN, ²Lamberti, Conroe, TX (94)
- 2:30 PM †Inter-seeding Barley or Oat in Soybean for Management of Herbicide-resistant Weeds.** Vipin Kumar*, Amit J. Jhala; University of Nebraska - Lincoln, Lincoln, NE (95)
- 2:45 PM †Effects of Residual Preemergence Herbicide Programs on Early Versus Normal Planted Soybean.** Matthew S. Goddard*, Christy L. Sprague; Michigan State University, East Lansing, MI (96)
- 3:00 PM Break**
- 3:15 PM †Impact of Cereal Rye Cover Crop on Preemergence Herbicide Fate and *Amaranthus* spp. Control in Soybean.** Jose J. Nunes*¹, Nicholas J. Arneson¹, John M. Wallace², Karla L. Gage³, Eric J. Miller³, Sarah Lancaster⁴, Thomas C. Mueller⁵, Rodrigo Werle¹; ¹University of Wisconsin - Madison, Madison, WI, ²Penn State University, University Park, PA, ³Southern Illinois University, Carbondale, IL, ⁴Kansas State University, Manhattan, KS, ⁵University of Tennessee, Knoxville, TN (97)
- 3:30 PM †Weed Management in Early Planted Soybean.** Estevan Goncalves Cason*; Purdue University, West Lafayette, IN (98)
- 3:45 PM From Liberty 280 (Racemic Glufosinate) to Liberty® ULTRA Herbicide (L-glufosinate), Powered by Glu-L™ Technology.** William J. Vincent*¹, Eric C. Schultz¹, Alice L. Harris¹, Marcel P. Kienle², Ryan B. Aldridge¹, Samuel D. Willingham¹, Ingo Meiners¹, Siyuan Tan³; ¹BASF, Rtp, NC, ²BASF, Limburgerhof, Germany, ³BASF, Cary, NC (99)
- 4:00 PM †Balancing Weed Control and Crop Safety: Impact of Nozzle Selection and Glufosinate/PPO-**

NCWSS Program

Inhibitor Tank-Mixes on Waterhemp, Giant Ragweed, Annual Grasses, and Soybean

Phytotoxicity. Nikola Arsenijevic*¹, Zaim Ugljic¹, Guilherme Chudzik¹, Jacob H. Felsman¹, Ryan P. DeWerff², Ahmadreza Mobli¹, Rodrigo Werle¹;
¹University of Wisconsin - Madison, Madison, WI,
²University of Wisconsin, Madison, WI **(100)**

4:15 PM †Evaluation of Common Post-Emergence Herbicides with Biological Products in Corn and Soybean. Grady L. Rogers*; University of Missouri, Columbia, MO **(101)**

4:30 PM †Optimizing Metribuzin Rates for *Amaranthus* Weed Control in Soybean. Rishabh Singh*¹, Sarah Lancaster¹, Aaron G. Hager², Jason K. Norsworthy³, Karla L. Gage⁴, Bill Johnson⁵, Bryan G. Young⁶, Daniel O. Stephenson, IV⁷, Jason Bond⁸, Kevin W. Bradley⁹, Amit J. Jhala¹⁰, Alyssa Essman¹¹, Larry Steckel¹², Thomas C. Mueller¹³, Christy L. Sprague¹⁴, Travis Legleiter¹⁵, Rodrigo Werle¹⁶, Joseph T. Ikley¹⁷, Prashant Jha¹⁸, Mithila Jugulam¹; ¹Kansas State University, Manhattan, KS, ²University of Illinois, Urbana, IL, ³University of Arkansas, Fayetteville, AR, ⁴Southern Illinois University, Carbondale, IL, ⁵Purdue University, West Lafayette, IN, ⁶Purdue University, Brookston, IN, ⁷LSU Ag Center, Alexandria, LA, ⁸Mississippi State University, Stoneville, MS, ⁹University of Missouri, Columbia, MO, ¹⁰University of Nebraska - Lincoln, Lincoln, NE, ¹¹The Ohio State University, Columbus, OH, ¹²University of Tennessee, Jackson, TN, ¹³University of Tennessee, Knoxville, TN, ¹⁴Michigan State University, East Lansing, MI, ¹⁵University of Kentucky, Princeton, KY, ¹⁶University of Wisconsin - Madison, Madison, WI, ¹⁷North Dakota State University, Fargo, ND, ¹⁸Louisiana State University, Baton Rouge, LA **(102)**

4:45 PM †The Economics of Cover Crops Grown for Weed Management in Soybean. Eric Y. Yu*¹, William Lazarus¹, Axel Garcia y Garcia², Lizabeth Stahl³, Ryan P. Miller⁴, Gregg Johnson⁵, Ce Yang¹, Debalin Sarangi¹; ¹University of Minnesota, St. Paul, MN, ²University of Minnesota, Lamberton, MN, ³University of Minnesota, Worthington, MN,

NCWSS Program

⁴University of Minnesota, Rochester, MN,

⁵University of Minnesota, Waseca, MN (103)

5:00 PM Soybean Injury from Herbicides and Yield Reduction: Fact or Fiction? William L. Patzoldt*¹, Lauren M. Lazaro¹, Michael M. Houston²; ¹Blue River Technology, Sunnyvale, CA, ²Blue River Technology, Greenville, MS (104)

5:15 PM Business Meeting

TUESDAY AFTERNOON DECEMBER 12

ORAL - Weed Biology, Ecology, Management

LOCATION: Lakeshore B-C
TIME: 1:30 PM - 5:30 PM Central Time
MODERATOR: Ahmadreza Mobli
University of Wisconsin - Madison

***SPEAKER † GRADUATE CONTEST**

1:30 PM †The Impact of Three Years of Cover Crop Use on Soil Microbial Activity and Fate of Soil Residual Herbicides. Lucas Oliveira Ribeiro Maia*¹, Bryan G. Young², Eileen J. Kladvko¹, Shalamar Armstrong¹, William G. Johnson¹; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN (105)

1:45 PM †Cereal Rye Termination Time, Not Method, Influences Horseweed Management in Soybean. Claudia R. Walz*, Christy L. Sprague; Michigan State University, East Lansing, MI (106)

2:00 PM †Can Cereal Rye Cover Crop Suppress Giant Ragweed (*Ambrosia Trifida*) But Not Soybean Yield? Guilherme Chudzik*¹, Nicholas J. Arneson¹, Ryan P. DeWerff², Victor de Sousa Ferreira³, Christopher Proctor³, David Stoltenberg¹, Rodrigo Werle¹; ¹University of Wisconsin - Madison, Madison, WI, ²University of Wisconsin, Madison, WI, ³University of Nebraska - Lincoln, Lincoln, NE (107)

NCWSS Program

- 2:15 PM** **Modeling the Effectiveness of Postemergence Corn and Soybean Herbicides Across Varying Weather Environments.** Christopher A. Landau*¹, Erin E. Burns², Kevin W. Bradley³, Michael L. Flessner⁴, Karla L. Gage⁵, Aaron G. Hager⁶, Joseph T. Ikley⁷, Amit J. Jhala⁸, William G. Johnson⁹, Sarah Lancaster¹⁰, Travis Legleiter¹¹, Dwight Lingenfelter¹², Mark Loux¹³, Eric J. Miller⁵, Jason K. Norsworthy¹⁴, Scott A. Nolte¹⁵, Micheal D. Owen¹⁶, Debalin Sarangi¹⁷, Peter H. Sikkema¹⁸, Christy L. Sprague², Mark J. VanGessel¹⁹, Rodrigo Werle²⁰, Bryan G. Young²¹, Martin M. Williams II¹; ¹USDA-ARS, Urbana, IL, ²Michigan State University, East Lansing, MI, ³University of Missouri, Columbia, MO, ⁴Virginia Tech, Blacksburg, VA, ⁵Southern Illinois University, Carbondale, IL, ⁶University of Illinois, Urbana, IL, ⁷North Dakota State University, Fargo, ND, ⁸University of Nebraska - Lincoln, Lincoln, NE, ⁹Purdue University, West Lafayette, IN, ¹⁰Kansas State University, Manhattan, KS, ¹¹University of Kentucky, Princeton, KY, ¹²Penn State University, University Park, PA, ¹³The Ohio State University, Columbus, OH, ¹⁴University of Arkansas, Fayetteville, AR, ¹⁵Texas A&M AgriLife Extension, College Station, TX, ¹⁶Iowa State University, Ames, IA, ¹⁷University of Minnesota, St. Paul, MN, ¹⁸University of Guelph, Ridgetown, ON, Canada, ¹⁹University of Delaware, Georgetown, DE, ²⁰University of Wisconsin - Madison, Madison, WI, ²¹Purdue University, Brookston, IN **(108)**
- 2:30 PM** **†Effect of Plant Height on Control and Seed Production of Acetolactate Synthase (ALS)-inhibitor/atrazine/glyphosate-resistant Palmer Amaranth in Glufosinate/glyphosate-resistant Corn.** Ramandeep Kaur*¹, Yeyin Shi¹, Nevin Lawrence², Parminder S. Chahal³, Stevan Knezevic⁴, Amit J. Jhala¹; ¹University of Nebraska - Lincoln, Lincoln, NE, ²University of Nebraska - Lincoln, Scottsbluff, NE, ³FMC, Gretna, NE, ⁴University of Nebraska - Lincoln, Concord, NE **(109)**
- 2:45 PM** **†Emergence Patterns of Midwestern Shattercane (*Sorghum bicolor* Ssp. *drummondii*) Ecotypes.** Emma L. Gaither*, Reid J. Smeda; University of Missouri, Columbia, MO **(110)**

NCWSS Program

- 3:00 PM Break**
- 3:15 PM Integrating Stale Seedbed Approach in Sugarbeet for Weed Control.** Ramawatar Yadav*¹, Andrew R. Kniss¹, Nevin Lawrence², Jenna Meeks³; ¹University of Wyoming, Laramie, WY, ²University of Nebraska - Lincoln, Scottsbluff, NE, ³University of Wyoming, Torrington, WY **(111)**
- 3:30 PM †A Multi-Tactic Approach for Weed Management in Soybean-Sugar Beet Rotation.** Navjot Singh*¹, Thomas J. Peters², Seth L. Naeve¹, Ryan P. Miller³, Debalin Sarangi⁴; ¹University of Minnesota, Saint Paul, MN, ²North Dakota State University, Fargo, ND, ³University of Minnesota, Rochester, MN, ⁴University of Minnesota, St. Paul, MN **(112)**
- 3:45 PM †Influence of Emergence Timing on the Growth and Development of Multiple Resistant Waterhemp (*Amaranthus tuberculatus*).** Claudia R. Bland*¹, Bryan G. Young², William G. Johnson¹; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN **(113)**
- 4:00 PM Image-based Spectral Reflectance Discrimination Between Glufosinate-resistant and -Susceptible Soybean Plants Under Field Conditions.** Eric Jones*¹, Jill Alms¹, David Vos¹, Ali Nafchi¹, Ronel J. Argueta², Diego J. Contreras², Wesley Everman²; ¹South Dakota State University, Brookings, SD, ²North Carolina State University, Raleigh, NC **(114)**
- 4:15 PM †The Effect of Weed Size and Application Rate on Control of Different Herbicides and Weed Species.** Thiago H. Vitti*¹, Bruno Canella Viera², Christopher Proctor¹, Greg Kruger³, Nevin Lawrence⁴; ¹University of Nebraska - Lincoln, Lincoln, NE, ²Xarvio Digital Farming Solutions, Cologne, Germany, ³Rosen's Inc, Carmel, IN, ⁴University of Nebraska - Lincoln, Scottsbluff, NE **(115)**
- 4:30 PM †Investigation of Metabolic Resistance to Multiple Herbicides in Waterhemp (*Amaranthus tuberculatus*) Accessions from Wisconsin.** Felipe

NCWSS Program

de Andrade Faleco*, Megan Baker, David Stoltenberg, Rodrigo Werle; University of Wisconsin - Madison, Madison, WI (116)

- 4:45 PM †Challenges of Gene Drives for Weed Management.** Lori Croghan*¹, Alan G. Smith¹, Matthew A. Tancos², Neil O. Anderson¹, Roger Becker¹; ¹University of Minnesota, St Paul, MN, ²USDA-ARS, Frederick, MD (117)
- 5:00 PM Multiple Cases of Group 14-Resistant Kochia (*Bassia scoparia*) Confirmed in North Dakota.** Quincy D. Law*¹, Brian Jenks², Kirk A. Howatt¹, Joseph Mettler¹, Joseph T. Ikley¹; ¹North Dakota State University, Fargo, ND, ²North Dakota State University, Minot, ND (118)
- 5:15 PM Business Meeting**

TUESDAY AFTERNOON DECEMBER 12

ORAL - Equipment and Application Methods

LOCATION: Nicollet A
TIME: 1:30 PM - 5:30 PM Central Time
MODERATOR: Matt Faletti
Precision Laboratories

***SPEAKER † GRADUATE CONTEST**

- 1:30 PM †Assessing the Control of Italian Ryegrass (*Lolium perenne ssp. multiflorum*) with a Seed Control Unit in Winter Wheat in Kentucky.** Hayden S. Love*¹, Travis Legleiter²; ¹The University of Kentucky, Lexington, KY, ²University of Kentucky, Princeton, KY (119)
- 1:45 PM Utilizing High Throughput Phenotyping to Evaluate and Demonstrate Herbicide and Adjuvant Efficacy.** Elizabeth Buescher*, Cody Hoerning, Kassi Kosnicki, Marcus Jones; WinField United, River Falls, WI (120)
- 2:00 PM †Comparing the Weed Suppression Potential of Cover Crops, Spray-on Biopolymer-based Films,**

NCWSS Program

and Conventional Herbicide Management in

Soybean (*Glycine max*). Ana Clara Gomes*, Camila Chiaranda Rodrigues, Christopher Proctor, Daran R. Rudnick; University of Nebraska - Lincoln, Lincoln, NE **(121)**

- 2:15 PM** **Parametrization of Pulsing Sprays.** Steven A. Fredericks*, Aszhia K. Albrecht, Elizabeth R. Alonzi; WinField United, River Falls, WI **(122)**
- 2:30 PM** **†Should Variable Soil Residual Herbicide Rates be Determined by Soil Type, Weed Seedbank Densities, or Both?** Alexander R. Mueth*¹, Rose V. Vagedes¹, Zhe Ren¹, Julie M. Young¹, William G. Johnson¹, Bryan G. Young²; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN **(123)**
- 2:45 PM** **Effects of Adjuvants on UAV Spray Deposition, Drift and Swath Coverage.** Ryan J. Edwards*, Lee A. Boles, Steven A. Fredericks; WinField United, River Falls, WI **(124)**
- 3:00 PM** **Break**
- 3:15 PM** **†See Smart - Spray Smart! Quantifying the Relationship Between Weed Infestation and Treated Area with the ONE Smart Spray System and Xarvio's Field Manager.** Zaim Ugljic*¹, Ryan P. DeWerff², Nicholas J. Arneson¹, Anita Dille³, Christopher Proctor⁴, Calvin Miller⁵; ¹University of Wisconsin - Madison, Madison, WI, ²University of Wisconsin, Madison, WI, ³Kansas State University, Manhattan, KS, ⁴University of Nebraska - Lincoln, Lincoln, NE, ⁵BASF, Seymour, IL **(125)**
- 3:30 PM** **Assessing the Correlation Between UAV Indices and Weed Efficacy Ratings.** Lee A. Boles*, Ryan J. Edwards; WinField United, River Falls, WI **(126)**
- 3:45 PM** **†Field Evaluation of the DJI Agras T40 UAV for the Application of Herbicides in Soybean.** Trace M. Thompson*; University of Missouri, Columbia, MO **(127)**
- 4:00 PM** **A Closer Look at Spray Breakup in Aerial Application.** Elizabeth R. Alonzi*, Steven A. Fredericks; WinField United, River Falls, WI **(128)**

NCWSS Program

- 4:15 PM †Herbicide Active, Carrier Volume, and Spray Deposition for Optimizing Drone Herbicide Applications.** Hunter A. Medenwald*¹, Bryan G. Young², Julie M. Young¹, William G. Johnson¹; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN **(129)**
- 4:30 PM A Dual-Tank Spray System Did Not Resolve the Antagonism of Clethodim and Quizalofop from 2,4-D on Volunteer Corn.** Marcelo Zimmer*¹, Diego J. Contreras², Wesley Everman², Chad J. Lammers³, Jess J. Spotanski⁴, Lauren M. Lazaro⁵, William G. Johnson¹, Bryan G. Young⁶; ¹Purdue University, West Lafayette, IN, ²North Carolina State University, Raleigh, NC, ³Kansas State University, Manhattan, KS, ⁴Midwest Research Inc, York, NE, ⁵Blue River Technology, Sunnyvale, CA, ⁶Purdue University, Brookston, IN **(130)**
- 4:45 PM †Overcome Antagonism of Tank-Mixing Select Max (Clethodim) and XtendiMax (Dicamba) for Control of Roundup Ready/Liberty Link Corn Volunteers in XtendFlex Soybean Using John Deere's Dual Tank Sprayer.** Adam Leise*¹, Quentin Cooksley², Amit J. Jhala¹; ¹University of Nebraska - Lincoln, Lincoln, NE, ²AKRS Equipment, Grand Island, NE **(131)**
- 5:00 PM Targeted Precision Weed Control Using the One Smart Sprayer™ in Soybeans.** Isaac Barnhart*¹, Calvin Miller², Greg Kruger³, Christopher Proctor⁴, Thiago H. Vitti⁴, Anita Dille¹; ¹Kansas State University, Manhattan, KS, ²BASF, Seymour, IL, ³Rosen's Inc, Carmel, IN, ⁴University of Nebraska - Lincoln, Lincoln, NE **(132)**
- 5:15 PM Business Meeting**

WEDNESDAY MORNING DECEMBER 13

**ORAL - Herbicide Physiology & Molecular
Biology**

LOCATION: Nicollet A
TIME: 8:15 AM - 10:00 AM Central Time
MODERATOR: Eric L. Patterson
Michigan State University

***SPEAKER † GRADUATE CONTEST**

8:15 AM Business Meeting

8:30 AM †Exploring the Genomic Regions Associated with Resistance to 2,4-D and Dicamba in *Amaranthus tuberculatus*. Isabel S. Werle*, Lucas K. Bobadilla, Damilola A. Raiyemo, Patrick J. Tranel; University of Illinois, Urbana, IL (133)

8:45 AM †Proline-197-Serine/Threonine Substitutions Confer a High-level of ALS-inhibitor Resistance in Three Japanese Brome (*Bromus japonicus*) Populations in Kansas. Manogna Devi Adari*¹, Balaji Aravindhan Pandian², Mithila Jugulam¹, Todd A. Gaines³, Pv Vara Prasad¹; ¹Kansas State University, Manhattan, KS, ²Enko, Mystic, CT, ³Colorado State University, Fort Collins, CO (134)

9:00 AM †Genetic Analysis of Colombian Coca Plants in Response to Glyphosate. Yenny Alejandra Saavedra Rojas*¹, Jhon Eric Rivera Monroy², Eric L. Patterson¹; ¹Michigan State University, East Lansing, MI, ²University of La Salle, Bogota, Colombia (135)

9:15 AM †Overexpression of *CYP81Q32-like* Gene in Wheat (*Triticum aestivum*) to Assess the Response to Triketone Herbicides. Susee Sudhakar*, Yaiphabi Kumam, Hyeonju Lee, Veerendra Kumar Sharma, Harold N. Trick, Mithila Jugulam; Kansas State University, Manhattan, KS (136)

NCWSS Program

- 9:30 AM †Using Phenotyping Technology to Diagnose Chemical Stress in Plants.** Jada N. Davis*¹, Zhongzhong Niu¹, Julie M. Young¹, Jian Jin¹, William G. Johnson¹, Bryan G. Young²; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN **(137)**
- 9:45 AM Kochia: A Houdini Weed in Western North America.** Philip Westra*¹, Eric L. Patterson², Todd A. Gaines¹, John M. Lemas¹, Nick A. Johnson², Charles M. Geddes³; ¹Colorado State University, Fort Collins, CO, ²Michigan State University, East Lansing, MI, ³Agriculture and Agri-Food Canada, Lethbridge, AB, Canada **(138)**
- 10:00 AM Break**

WEDNESDAY MORNING DECEMBER 13

ORAL - Invasive Weeds, Rangeland, Pasture, and Vegetation Management

LOCATION: Nicollet A
TIME: 10:15 AM - 11:30 AM Central Time
MODERATOR: Mark Renz
University of Wisconsin - Madison

***SPEAKER † GRADUATE CONTEST**

- 10:15 AM Differential Response of *Fallopia japonica*, *F. sachalinensis*, and Their Hybrid *F. xbohemica* to Imazapyr and Aminopyralid.** Roger Becker*¹, Ryan S. Mentz², Alan G. Smith¹, Neil O. Anderson¹, Matthew D. Clark¹; ¹University of Minnesota, St Paul, MN, ²Syngenta Seeds, Clinton, IL **(139)**
- 10:30 AM †Evaluation of Electrocutation for Weed Management in Tall Fescue Pastures.** Grant D. Coe*; University of Missouri, Columbia, MO **(140)**
- 10:45 AM Response of *Sericea Lespedeza* and Associated Vegetation to Herbicides.** Walter H. Fick*; Kansas State University, Manhattan, KS **(141)**

NCWSS Program

11:00 AM †Dose-response for a Biodegradable Bio-based Sprayable Mulch for Weed Suppression on Palmer Amaranth (*Amaranthus palmeri*), Venice Mallow (*Hibiscus trionum*), Yellow Foxtail (*Setaria pumila*), Johnsongrass (*Sorghum halepense*) and Volunteer Corn (*Zea mays*).
Camila Chiaranda Rodrigues*, Christopher Proctor, Daran R. Rudnick, Ana Clara Gomes, Muhammad Akram, Loren Isom; University of Nebraska - Lincoln, Lincoln, NE **(142)**

11:15 AM Business Meeting

WEDNESDAY MORNING DECEMBER 13

Extension

LOCATION: Lakeshore B-C
TIME: 8:45 AM - 9:00 AM Central Time
MODERATOR: Nathan Drewitz
Valent U.S.A LLC

8:45 AM Business Meeting

VIDEO - Video Student Contest

LOCATION: Lakeshore B-C
TIME: 9:00 AM - 9:45 AM Central Time

***SPEAKER † GRADUATE CONTEST**

9:00 AM †Quantifying the Influence of Soil and Weed Management Practices on Soil Bulk Density, Aggregate Stability, and Nutrient Availability in Corn and Soybean Rotations. Jacob H. Felsman*¹, Christopher A. Baxter², Nicholas J. Arneson¹, Daniel H. Smith¹, Ryan P. DeWerff³, Rodrigo Werle¹; ¹University of Wisconsin - Madison, Madison, WI, ²University of Wisconsin - Platteville, Platteville, WI, ³University of Wisconsin, Madison, WI **(143)**

9:05 AM †Droplet Penetration in a Corn Canopy from UAV-based Applications. Michelle M. Maile, Andrew T. Vehige, Emma L. Gaither*, Reid J.

NCWSS Program

Smeda; University of Missouri, Columbia, MO
(144)

- 9:10 AM †Weed Management Strategies for Establishing Kentucky Bluegrass as a Perennial Cover Crop.** Erin Haramoto¹, Scott Flynn², Travis Legleiter³, Jonathan Green¹, Brandon Schlautman⁴, Kiera Searcy*¹, Matthew Allen¹; ¹University of Kentucky, Lexington, KY, ²Corteva Agriscience, Lees Summit, MO, ³University of Kentucky, Princeton, KY, ⁴The Land Institute, Salina, KS (145)
- 9:15 AM †Perennial Cover Crops: Evaluating Poaceae Species' Establishment and Weed Suppression Potential.** Hallie A. Sandeen*¹, Erin Haramoto¹, Mathew Allen¹, Tim Phillips¹, Shuizhang Fei², Sara Lira³, Brandon Schlautman⁴; ¹University of Kentucky, Lexington, KY, ²Iowa State University, Ames, IA, ³Corteva Agriscience, Johnston, IA, ⁴The Land Institute, Salina, KS (146)
- 9:20 AM †Evaluation of Deer Repellants with Common Herbicide Tank Mixes in Soybean.** Grady L. Rogers*; University of Missouri, Columbia, MO (147)
- 9:25 AM †Weed Seed Fate When Harvesting Corn.** Trace M. Thompson*; University of Missouri, Columbia, MO (148)
- 9:30 AM †Soil Residual Herbicides Interaction with Cereal Rye Cover Crop Planting and Termination Timing to Suppress Weeds in Soybean.** Aleksandar Grujic*¹, Erin Haramoto¹, Matthew Allen¹, John M. Wallace²; ¹University of Kentucky, Lexington, KY, ²Penn State University, University Park, PA (149)

WEDNESDAY MORNING DECEMBER 13

SYMPOSIUM - Field to Film: Beginners Guide to Video Editing and Production

LOCATION: Lakeshore B-C
TIME: 9:45 AM - 11:45 AM Central Time
MODERATOR: Claudia R. Bland
Purdue University

***SPEAKER**

9:45 AM Introduction

9:50 AM Video-Making As Grad Students: from IDEA to ACTION. Jeanine Arana*; Purdue University, West Lafayette, IN **(150)**

10:05 AM Break

10:15 AM Cultivating Success and Growing Impact: Video as an Agricultural Extension Communication Tool. Rodrigo Werle*; University of Wisconsin - Madison, Madison, WI **(151)**

10:30 AM Bringing the Field to the Farmer: Capturing and Creating Content for Virtual Plot Tours. Mike Probst*; BASF, Mahomet, IL **(152)**

10:45 AM Do's and Don'ts of Crafting Creative, Concise Agricultural Research Videos. Ryan Hamberg*; Texas A&M University, College Station, TX **(153)**

11:00 AM Panel Discussion

WEDNESDAY MORNING DECEMBER 13

ORAL - Horticulture and Specialty Crops

LOCATION: Nicollet D1/D2
TIME: 8:00 AM - 10:15 AM Central Time
MODERATOR: Stephen Meyers
Purdue University

***SPEAKER † GRADUATE CONTEST**

8:00 AM Does Transplanted CBD Hemp Need a Weed Free Period? Harlene M. Hatterman-Valenti*, Mason Hill, Brock Schulz, Collin P. Auwarter; North Dakota State University, Fargo, ND **(154)**

8:15 AM †Weed Control Systems in Truvera Sugarbeet. Ian G. Waldecker*, Christy L. Sprague; Michigan State University, East Lansing, MI **(155)**

8:30 AM Selective Control of Broadleaf Weeds with Phenmedipham in Sugarbeet. Alexa L. Lystad*, Thomas J. Peters, Adam D. Aberle; North Dakota State University, Fargo, ND **(156)**

8:45 AM †Scope of Weed Problems in the U.S. Snap Bean Production and Factors Linked to Management and Environmental Outcomes. Pavle Pavlovic*¹, Yudai Takenaka¹, Jed B. Colquhoun², Nicholas E. Korres³, Rui Liu⁴, Carolyn J. Lowry⁵, Ed Peachey⁶, Barbara Scott⁷, Lynn M. Sosnoskie⁸, Mark J. VanGessel⁷, Martin M. Williams II⁹; ¹University of Illinois, Urbana, IL, ²University of Wisconsin - Madison, Madison, WI, ³University of Ioannina, áRta, Greece, ⁴Washington State University, Prosser, WA, ⁵Penn State University, University Park, PA, ⁶Oregon State University, Corvallis, OR, ⁷University of Delaware, Georgetown, DE, ⁸Cornell University, Geneva, NY, ⁹USDA-ARS, Urbana, IL **(157)**

9:00 AM Ground Rolling Impacts on Weed Density and Management in Dry Bean. Joseph T. Ikley*¹, Nathan H. Haugrud², Stephanie DeSimini¹, Greg Endres³; ¹North Dakota State University, Fargo,

NCWSS Program

ND, ²Syngenta Crop Protection, Fargo, ND, ³North Dakota State University, Carrington, ND (158)

- 9:15 AM** †**Effect of In-row Spacing on Weed Suppression and Yield of 'Covington' and 'Monaco' Sweetpotato (*Ipomoea batatas* L.).** Emmanuel G. Cooper*, Stephen L. Meyers, Jeanine Arana, Josue D. Cerritos; Purdue University, West Lafayette, IN (159)
- 9:30 AM** **Developing Weed Management Strategies for the New Winter Oilseed Crops Pennycress (*Thlaspi arvense*) and Camelina (*Camelina sativa*).** Mark L. Bernards*; USDA-ARS, Morris, MN (160)
- 9:45 AM** †**Natural Products Released from Rice Suppress Waterhemp and Large Crabgrass Emergence and Seedling Growth.** Andrew T. Vehige*, Reid J. Smeda; University of Missouri, Columbia, MO (161)
- 10:00 AM** **Business Meeting**

WEDNESDAY MORNING DECEMBER 13

ORAL - Agronomic Crops I - Corn

LOCATION: Nicollet D1/D2
TIME: 10:15 AM - 11:45 AM Central Time
MODERATOR: Chad L. Smith
Valent USA

***SPEAKER † GRADUATE CONTEST**

- 10:15 AM** †**Effect of Narrow Row Spacing on Weed Suppression in Corn and Soybean in the United States: A Meta-analysis.** Mandeep Singh*¹, Resham Thapa², Navdeep Singh³, Steven Brian Mirsky⁴, Bharat S. Acharya⁵, Amit J. Jhala¹;
¹University of Nebraska - Lincoln, Lincoln, NE,
²Tennessee State University, Nashville, TN,
³Punjab Agricultural University, Ludhiana, India,
⁴USDA-ARS, Beltsville, MD, ⁵Rodale Institute, Chattahoochee Hills, GA (162)

NCWSS Program

- 10:30 AM** †**Johnsongrass (*Sorghum halepense*) Herbicide Sensitivity Spectrum: Determining Population Variation Across the United States.** Connor L. Purvis*, Erin E. Burns; Michigan State University, East Lansing, MI **(163)**
- 10:45 AM** †**Exploring the System: Multi-Year Agronomic and Weed Management Implications of Cereal Rye Cover Crop in Corn and Soybean Rotations.** Jacob H. Felsman*¹, Christopher A. Baxter², Ryan P. DeWerff³, Daniel H. Smith¹, Rodrigo Werle¹; ¹University of Wisconsin - Madison, Madison, WI, ²University of Wisconsin - Platteville, Platteville, WI, ³University of Wisconsin, Madison, WI **(164)**
- 11:00 AM** †**Evaluation of Photosystem II Inhibitor Herbicides on Atrazine-Resistant Waterhemp (*Amaranthus tuberculatus* (Moq.) Sauer).** Alexander J. Lopez*¹, Ryan S. Henry², Kip E. Jacobs³, Patrick J. Tranel¹; ¹University of Illinois, Urbana, IL, ²UPL NA Inc., Fort Wayne, IN, ³UPL NA Inc., Bement, IL **(165)**
- 11:15 AM** †**Integrated Management of Giant Ragweed (*Ambrosia trifida*) in Corn and Soybean.** Venkatanaga Shiva Datta Kumar Sharma Chiruvelli*¹, Gregg A. Johnson², Thomas J. Getts³, Amit J. Jhala⁴, Debalin Sarangi¹; ¹University of Minnesota, St Paul, MN, ²University of Minnesota, Waseca, MN, ³UCCE, Susanville, CA, ⁴University of Nebraska - Lincoln, Lincoln, NE **(166)**
- 11:30 AM** †**Integrated Management of Volunteer Potatoes and Colorado Potato Beetle in Corn.** Hannah M. Johnson*, Erin E. Burns; Michigan State University, East Lansing, MI **(167)**

WEDNESDAY NOON DECEMBER 13

Society Awards Luncheon

LOCATION: NorthStar A
TIME: 12:00 PM - 1:15 PM
MC: Dr. Christy Sprague

WEDNESDAY AFTERNOON DECEMBER 13

ORAL - Agronomic Crops I - Corn

LOCATION: Nicollet D1/D2
TIME: 1:30 PM - 5:15 PM Central Time
MODERATOR: Chad L. Smith
Valent USA

***SPEAKER † GRADUATE CONTEST**

- 1:30 PM Italian Ryegrass (*Lolium multiflorum*) Resistance and Management in Kentucky □ A Five Year Review.** Travis Legleiter*; University of Kentucky, Princeton, KY **(168)**
- 1:45 PM Integrated Waterhemp Management.** Peter H. Sikkema*, Nader Soltani; University of Guelph, Ridgetown, ON, Canada **(169)**
- 2:00 PM Palmer Amaranth (*Amaranthus palmeri*) and Waterhemp (*A. tuberculatus*) Yield Interference in North Dakota Corn (*Zea mays*) and Soybean (*Glycine max*).** Quincy D. Law*, Joseph T. Ikley; North Dakota State University, Fargo, ND **(170)**
- 2:15 PM Tolvera(TM): a New Premix of Tolpyralate and Bromoxynil for Broadleaf and Grass Weed Control in Cereals.** David H. Johnson*¹, Joe Yenish², Ryan M. Humann³, Rory Degenhardt⁴, Kevin G. Falk⁵, Jeff Krumm⁶, Mike Lovelace⁷; ¹Corteva Agriscience, St. Paul, MN, ²Corteva Agriscience, Billings, MT, ³Corteva Agriscience, Fargo, ND, ⁴Corteva Agriscience, Edmonton, AB, Canada, ⁵Corteva Agriscience, Oak Bluff, MB,

NCWSS Program

Canada, ⁶Corteva Agriscience, Hastings, NE,

⁷Corteva Agriscience, Newcastle, OK **(171)**

- 2:30 PM Storen Herbicide - Providing More Consistency and Increased Length of Residual Weed Control in Corn.** Scott E. Cully*¹, Thomas H. Beckett², Mark J. Kitt²; ¹Syngenta Crop Protection, Marion, IL, ²Syngenta Crop Protection, Greensboro, NC **(172)**
- 2:45 PM Storen: A New Corn Herbicide in 2024 That Provides Clean Rows and Clear Results.** Nathan H. Haugrud*¹, Thomas H. Beckett², Mark J. Kitt²; ¹Syngenta Crop Protection, Fargo, ND, ²Syngenta Crop Protection, Greensboro, NC **(173)**
- 3:00 PM Break**
- 3:15 PM Intrava DX: Field Performance Summary.** Kip E. Jacobs*¹, Cody J. Gray², James A. Coday³, Ryan S. Henry⁴; ¹UPL NA Inc., Bement, IL, ²UPL NA Inc., Peyton, CO, ³UPL NA Inc., St. Paul, MN, ⁴UPL NA Inc., Fort Wayne, IN **(174)**
- 3:30 PM Intrava DX: A New Herbicide for the US Corn Acre.** Ryan S. Henry*¹, Kip E. Jacobs², James A. Coday³, Cody J. Gray⁴; ¹UPL NA Inc., Fort Wayne, IN, ²UPL NA Inc., Bement, IL, ³UPL NA Inc., St. Paul, MN, ⁴UPL NA Inc., Peyton, CO **(175)**
- 3:45 PM The Story of an Unlikely Premix of Quizalopfos-p-ethyl and Glufosinate-ammonium.** Richard K. Zollinger*¹, Joseph A. Bruce², Peter J. Porpiglia³; ¹Amvac Chemical Company, Spokane Valley, WA, ²AMVAC Chemical Corporation, Glen Carbon, IL, ³AMVAC Chemical Corporation, Newport Beach, CA **(176)**
- 4:00 PM Kyro Herbicide Provides Effective Postemergence Control of Difficult-to-Control Weeds in Corn.** Kristin K. Rosenbaum*¹, Kelly A. Backscheider², David H. Johnson³, Lowell D. Sandell⁴; ¹Corteva Agriscience, Coffey, MO, ²Corteva Agriscience, Franklin, IN, ³Corteva Agriscience, St. Paul, MN, ⁴Corteva Agriscience, Ankeny, IA **(177)**
- 4:15 PM Introducing Rapidicil™, a Broad-Spectrum Burndown PPO Herbicide from Valent U.S.A. LLC.**

NCWSS Program

Patrick A. Clay*¹, Jonathon Kohrt², John Pawlak³, Garrison J. Gundy⁴, Eric J. Ott⁵, Chad L. Smith⁶, Randall L. Landry⁷; ¹Valent USA LLC, Fresno, CA, ²Valent USA LLC, Zionsville, IN, ³Valent USA LLC, Spring Lake, MI, ⁴Valent USA LLC, Mcpherson, KS, ⁵Valent USA LLC, Greenfield, IN, ⁶Valent USA LLC, Hallsville, MO, ⁷Valent USA LLC, Seymour, IL **(178)**

- 4:30 PM Amicarbazone and Other Residual Herbicide's Behavior in Soil Under Field and Laboratory Conditions.** Thomas C. Mueller*¹, Ryan S. Henry²; ¹University of Tennessee, Knoxville, TN, ²UPL NA Inc., Fort Wayne, IN **(179)**
- 4:45 PM Development of Convintra™ Brand Herbicides for Managing Amaranthus Species in Corn and Soybean: Field Performance Update.** John Buol*, Carl Coburn, Richard Leitz, Zewei Miao, Emily Scholting; Bayer Crop Science, St. Louis, MO **(180)**
- 5:00 PM Business Meeting**

WEDNESDAY AFTERNOON DECEMBER 13

SYMPOSIUM - UAV Pesticide Application
Symposia

LOCATION: Nicollet A
TIME: 1:25 PM - 5:00 PM Central Time
MODERATOR: David M. Simpson
Corteva

- 1:25 PM Introduction**
- 1:30 PM Just How Complicated Can UAV Application Be?**
Bryan G. Young*; Purdue University, Brookston,
IN (181)
- 1:45 PM Unmanned Aerial Pesticide Application System
Task Force: Industry Response to Pesticide
Regulators.** Travis Bui*; Corteva Agriscience,
Indianapolis, IN (182)
- 2:15 PM Evolution of UAS Aerial Application Technology:
Past, Present, and Future.** William Reynolds*;
Leading Edge Aerial Technologies Inc., Daytona
Beach, FL (183)
- 2:45 PM UAV Application for Research and Extension:
Opportunities and Challenges.** Steve Li*; Auburn
University, Auburn, AL (184)
- 3:15 PM Break**
- 3:30 PM Diversity of UAS Applications Across the
Country.** William Reynolds*; Leading Edge Aerial
Technologies Inc., Daytona Beach, FL (185)
- 3:45 PM UAV Pilot Training and Operation Challenges.**
Steve Li*; Auburn University, Auburn, AL (186)
- 4:00 PM First Year Experiences with UAV Custom
Applications.** Jason Leary*; Crystal Valley Coop,
Mankato, MN (187)
- 4:15 PM Panel Discussion**

NCWSS Program

WEDNESDAY AFTERNOON DECEMBER 13

**WORKSHOP - Networking & Mentoring from
Graduate Student to Retirement**

LOCATION: Lakeshore B-C
TIME: 1:30 PM - 5:00 PM Central Time
MODERATOR: Claudia R. Bland
Purdue University

***SPEAKER**

- 1:30 PM Introduction.** John Hinz*; Bayer Crop Science, Story City, IA **(188)**
- 1:35 PM Mentoring Up.** Rebecca Dunning*; NC State University, Raleigh, NC **(189)**
- 2:35 PM Networking - from Ew to Aha!** Ajit Nott*; Corteva Agriscience, Johnston, IA **(190)**
- 3:20 PM Break**
- 3:30 PM Panel Discussion**

WEDNESDAY EVENING DECEMBER 13

NCWSS Society Social

Sponsored by the Sustaining Members – Open to all attendees.

Graduate and Undergraduate Paper and Poster Awards

5:30 - 7:00 pm

Nicollet B-C

THURSDAY MORNING DECEMBER 14

Society Breakfast (Preregistration)

LOCATION: Northstar A
TIME: 7:30 AM - 9:00 AM Central Time
MODERATOR: Ryan S. Henry
UPL NA Inc.

***SPEAKER**

7:30 AM Meal Served

8:00 AM Crafting Chemistry: Maximizing Product Impact and Harmony. Dustyn Sawall*; WinField United, River Falls, WI (191)

8:50 AM Break

What's New in Industry

LOCATION: Northstar A
TIME: 9:00 AM - 10:30 AM Central Time
MODERATOR: Ryan S. Henry
UPL NA Inc.
Fort Wayne, IN

9:00 AM Industry Updates

10:30 AM Industry Business Meeting

THURSDAY MORNING DECEMBER 14

Board of Directors

LOCATION: Greenway J
TIME: 10:00 AM - 12:00 PM Central Time

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NCWSS Information

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Reid Smeda	smedar@missouri.edu
Harlene Hatterman-Valenti, Past Chair	h.hatterman.valenti@ndsu.edu

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NCWSS Recognitions

Honorary Members/Fellows

Honorary Members

1948	L.W. Dephart *	1983	Ronald E. Doersch
1949	A.H. Larson *	1984	Edward W. Stroube *
1950	J.W. Zahnley *		Oliver E. Strand *
1951	R.W. Fuelleman *		Gail A. Wicks *
	Ted F. Yost *	1985	Robert Hiltibran *
1952	Henry E. Wood *	1986	Elroy J. Peters *
1953	George Briggs *		Deane W. Finnerty *
	Walter C. Dutton *		Oliver G. Russ *
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

NCWSS Recognitions

Honorary Members/Fellows (continued)

2004	Duane Rathman David Regehr	2014	Adrian Moses David Stoltenberg
2005	Dallas E. Peterson	2015	Dave Johnson
2006	James R. Martin Bernard H. Zandstra	2016	Mark Wrucke David Simpson
2007	Chris M. Boerboom Michael J. Horak	2017	Curtis Thompson John Hinz
2008	Thomas J. Peters Jeffrey Gunsolus Kassim Al-Khatib	2018	Patrick J. Tranel Anita Dille Mark Peterson
2009	J.D. Green Thomas B. Threewitt Robert N. Klein	2019	Greg Dahl Mark Loux Rich Zollinger
2010	No nominations	2020	Kevin Bradley Dawn Refsell Christy Sprague
2011	Bill Johnson Harlene Hatterman-Valenti Gordon K. Roskamp	2021	Aaron Hager Eric Spandl
2012	Peter H. Sikkema Bob Hartzler	2022	Stott Howard Stevan Knezevic
2013	Bryan Young Roger Becker		

* Deceased

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

NCWSS Recognitions

North Central Weed Science Society Presidents

1944	No President	1985	Messersmith, Calvin G.
1945	Yost, Ted F. *	1986	Wax, Loyd M.
1946	Yost, Ted F. *	1987	Chamberlain, Earl *
1947	Hanson, Noel S. *	1988	Harvey, R. Gordon *
1948	Willard, Charles J. *	1989	Worthington, James P.
1949	Dunham, R. S. *	1990	Martin, Alex R.
1950	Worzella, W. W. *	1991	Taylor, T. Don
1951	Sylwester, Erhardt P. *	1992	Stoller, Edward W.
1952	Buchholtz, Kenneth P. *	1993	Warfield, Ted R.
1953	Gilbert, C. J. *	1994	Bauman, Thomas T. *
1954	Lee, Oliver C. *	1995	Cobia, LeRoy R.
1955	Grigsby, Buford H. *	1996	Dexter, Alan G.
1956	Helgeson, Earl A. *	1997	Miller, Bill
1957	Slife, Fred W. *	1998	Buhler, Douglas D.
1958	Derscheid, Lyle A. *	1999	Orwick, Philip L.
1959	Foster, J. Roe *	2000	Kells, James J.
1960	Holm, Leroy G. *	2001	Rathmann, Duane P.
1961	Alban, E. K. *	2002	Peterson, Dallas E.
1962	Bjerkén Sig. *	2003	Horak, Michael J.
1963	Hemphill, Delbert D. *	2004	Doll, Jerry D.
1964	Hemphill, Delbert D. *	2005	Peters, Tom
1965	Furrer, John D. *	2006	Miller, Stephen D.
1966	Furrer, John D. *	2007	Moses, Adrian
1967	Warden, Robert L. *	2008	Johnson, William G.
1968	Fletcher, O. Hale *	2009	Holm, Mick
1969	Beck, Thomas V. *	2010	Boerboom, Chris
1970	Hannah, Lawrence H. *	2011	Wrucke, Mark
1971	Knake, Ellery *	2012	Young, Bryan
1972	Williams, Jr., James L. *	2013	Johnson, Dave
1973	Meggitt, William	2014	Green, J.D.
1974	Bradfield, Kenneth W. *	2015	Hinz, John
1975	Burnside, Orvin C. *	2016	Dille, Anita
1976	Fink, Rodney J. *	2017	Dahl, Gregory
1977	Carpenter, Will D.	2018	Sprague, Christy L.
1978	Doersch, Ronald E.	2019	Hager, Aaron G.
1979	Nalewaja, John D. *	2020	Howard, Stott
1980	Stroube, Edward W. *	2021	Hatterman-Valenti, Harlene
1981	Herron, James W. *	2022	Simpson, David M.
1982	Benson, Robert L.	2023	Smeda, Reid
1983	DiVall, James W.		
1984	Miller, Gerald R.		* Deceased

NCWSS Recognitions

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 Jeffrey Stachler - Professional Staff

NCWSS Recognitions

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

NCWSS Recognitions

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	Eric Spandl – Industry Mandy Bish – Research Joe Wuerffel – Young Scientist Vipan Kumar – Young Scientist Lisa Behnken – Professional Staff Ram Yadav – Graduate Student
2021	Kevin Thorsness – Industry Michael Weber – Industry Rodrigo Werle – Young Scientists Ryan Edwards – Young Scientists Andrew Toft – Professional Staff
2022	David Nicolai – Education Nathan Haugrud – Graduate Student

NCWSS Recognitions

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
2023	Bayer	Union City, TN

AUTHOR INDEX

Aberle, Adam D.	84, 156
Acharya, Bharat S.	162
Adam, Alec C.	4, 47, 51, 76
Adari, Manogna Devi	62, 134
Akram, Muhammad	34, 142
Albrecht, Aszhia K.	122
Aldridge, Ryan B.	99
Allen, Dylan P.	93
Allen, Mathew	146
Allen, Matthew	145, 149
Alms, Jill	70, 71, 114
Alonzi, Elizabeth R.	122, 128
Anderson, Neil O.	117, 139
Arana, Jeanine	80, 82, 83, 150, 159
Argueta, Ronel J.	114
Armstrong, Shalamar	56, 105
Arneson, Nicholas J.	45, 97, 107, 125, 143
Arsenijevic, Nikola	6, 100
Auwarter, Collin P.	154
Backscheider, Kelly A.	73, 177
Bagavathiannan, Muthukumar	13, 48
Baker, Megan	116
Bamber, Kevin W.	53
Barnhart, Isaac	132, 23
Baxter, Christopher A.	143, 164
Becker, Roger	139, 40, 117
Beckett, Thomas H.	172, 173
Behnken, Lisa M.	20
Beran, Daniel	67
Berghuis, Brandt	2
Bernards, Mark L.	160
Biggers, Keith	79
Bland, Claudia R.	46, 113
Boles, Lee A.	124, 126
Bond, Jason	68, 102
Bowman, Dennis	93
Bradley, Kevin W.	52, 68, 102, 108
Bruce, Joseph A.	176
Bruening, Chris	15, 16
Bruss, Robert	67
Buescher, Elizabeth	120
Buessing, Hannah	76

NCWSS Author Index

Bui, Travis	182
Buol, John	180
Burns, Erin E.	32, 108, 163, 167
Burriss, Wade T.	4, 47, 51, 76
Canella Vieira, Bruno	8
Canella Viera, Bruno	115
Cason, Estevan Goncalves	98
Ceperkovic, Isidor	40, 69
Cerritos, Josue D.	80, 82, 159
Chahal, Parminder S.	109
Chen, Jinyi	26
Chiaranda Rodrigues, Camila	34, 121, 142
Chiruvelli, Venkatanaga Shiva Datta Kumar Sharma	64, 166
Chmielewski, Alex	61
Chudzik, Guilherme	6, 45, 100, 107
Clark, Matthew D.	139
Clay, Patrick A.	75, 178
Coburn, Carl	180
Coday, James A.	174, 175
Coe, Grant D.	14, 140
Colquhoun, Jed B.	157
Contreras, Diego J.	114, 130
Cooksley, Quentin	131
Cooper, Emmanuel G.	80, 82, 159
Corrêa, Bruno Henrique	41
Costa, Ricardo	21
Creager, Kaitlin E.	53, 78
Croghan, Lori	117
Cully, Scott E.	172
Cutti, Luan	27
Davis, Jada N.	137
de Andrade Faleco, Felipe	65, 116
de Sousa Ferreira, Victor	41, 107
Degenhardt, Rory	171
DeSimini, Stephanie	158
DeWerff, Ryan P.	6, 8, 19, 69, 100, 107, 125, 143, 164
Dille, Anita	23, 125, 132
Drewitz, Nathan	63
Dunning, Rebecca	1, 189
Edwards, Ryan J.	2, 23, 124, 126
Ellis, Drew	73
Endres, Greg	158
Essman, Alyssa	68, 102
Estes, Ronald E.	63
Everman, Wesley	114, 130

NCWSS Author Index

Falk, Kevin G.	171
Fei, Shuizhang	146
Felsman, Jacob H.	6, 100, 143, 164
Fick, Walter H.	141
Flessner, Michael L.	9, 53, 108
Flynn, Scott	145
Franca, Lucas X.	52
Franco Teodoro Duarte, Arthur	35
Fredericks, Steven A.	122, 124, 128
G. Hager, Aaron	28
Gage, Karla L.	53, 66, 68, 78, 97, 102, 108
Gaines, Todd A.	134, 138
Gaither, Emma L.	10, 110, 144
Ganske, Brian	4
Garcia y Garcia, Axel	103
Geddes, Charles M.	138
Getts, Thomas J.	166
Gibson, David J.	52
Gill, Bikram S.	31
Goddard, Matthew S.	96
Gogos, George	15, 16
Golus, Jeffrey	7, 11, 43
Gomes, Ana Clara	142, 34, 121
Gray, Cody J.	174, 175
Green, Jonathan	145
Grujic, Aleksandar	149
Guan, Wenjing	83
Gundy, Garrison J.	63, 75, 178
Gyawali, Purushottam	48
Hagen, William G.	78
Hager, Aaron G.	68, 93, 102, 108
Hall, Nathan D.	25, 27
Hamberg, Ryan	13, 153
Hammer, Devin	69
Haramoto, Erin	145, 146, 149
Harris, Alice L.	99
Hart, Nash D.	32
Hatterman-Valenti, Harlene M.	154
Haugrud, Nathan H.	158, 173
Heiman, Jace	2
Henry, Ryan S.	84, 165, 174, 175, 179
Hill, Mason	154
Hinz, John	188
Hoerning, Cody	120
Houston, Michael M.	12, 104
Howatt, Kirk A.	79, 118

NCWSS Author Index

Humann, Ryan M.	171
Hunsinger, Aaron	23
Ikley, Joseph T.	68, 79, 102, 108, 118, 158, 170
Ingram, Mrill	21
Isaacs, Grant D.	74
Islam, Md Mazharul	31
Isom, Loren	142
Jackson, Jon	13
Jacobs, Kip E.	165, 174, 175
Jaramillo, David	35
Jenks, Brian	118
Jha, Prashant	48, 68, 102
Jhala, Amit J.	57, 60, 68, 91, 95, 102, 108, 109, 131, 162, 166
Jin, Jian	137
Johnson, Bill	102
Johnson, David H.	171, 177
Johnson, Gregg	103
Johnson, Gregg A.	166
Johnson, Hannah M.	167
Johnson, Kevin D.	74
Johnson, Nick A.	25, 138
Johnson, William G.	9, 46, 52, 56, 68, 74, 105, 108, 113, 123, 129, 130, 137
Jones, Eric	71, 70, 114
Jones, Marcus	120
Jugulam, Mithila	24, 29, 31, 33, 62, 102, 134, 136
K. Bobadilla, Lucas	28, 133
Kaur, Ramandeep	109
Kells, James	22
Kerr, Dylan R.	93
Kienle, Marcel P.	99
Kitt, Mark J.	172, 173
Kladivko, Eileen J.	56, 105
Knezevic, Stevan	109, 15, 16, 17, 42, 91
Kniss, Andrew R.	111
Kohrt, Jonathon	63, 75, 178
Kopecky Bobadilla, Lucas	49, 65
Korres, Nicholas E.	157
Kosnicki, Kassi	120
Krabbenborg, Danilo J.	3
Kruger, Greg	115, 132
Krumm, Jeff	171
Kumam, Yaiphabi	24, 33, 136
Kumar, Vipin	95
Kumari, Annu	22, 39

NCWSS Author Index

Lagerhausen, Emma	55
Lammers, Chad J.	130
Lancaster, Sarah	4, 47, 51, 68, 76, 97, 102, 108
Landau, Christopher A.	108
Landry, Randall L.	63, 75, 178
Law, Quincy D.	79, 84, 118, 170
Lawrence, Nevin	109, 111, 115
Lazaro, Lauren M.	9, 12, 104, 130
Lazarus, William	103
Leakey, Andrew	93
Leary, Jason	187
Lee, Hyeonju	33, 136
Legleiter, Travis	68, 102, 108, 119, 145, 168
Leise, Adam	131
Leitz, Richard	180
Lemas, John M.	138
Lemes, Gabriel de Souza	7, 11
Li, Steve	184, 186
Lima, Igor G R	51
Lingenfelter, Dwight	18, 108
Lira, Sara	146
Liu, Rui	157
Lopez, Alexander J.	49, 165
López Manzano, Carlos A.	82
Lorenz, Aaron	92
Loux, Mark	108
Love, Hayden S.	119
Lovelace, Michael	73
Lovelace, Mike	171
Lowry, Carolyn J.	157
Lundquist, Peter Knut	26
Lystad, Alexa L.	84, 156
Machado, Filipi M.	28, 65
Mahey, Mohit	26
Maile, Michelle M.	81, 144
Martin, Nicolas F.	93
Marzu, Dan	21
Matheson, Jessica	27
Mathew, Sithin	38, 92
Matthews, Joseph L.	52
Medenwald, Hunter A.	129
Meeks, Jenna	111
Meiners, Ingo	99
Mentz, Ryan S.	139
Mettler, Joseph	118
Meyeres, Tyler P.	69

NCWSS Author Index

Meyers, Stephen L.	80, 82, 83, 159
Miao, Zewei	180
Miller, Eric J.	53, 66, 68, 78, 97, 108
Miller, Calvin	125, 132
Miller, Mason	84
Miller, Ryan P.	20, 72, 103, 112
Milosevic, Luka	15, 16, 17, 42, 91
Miranda, Chelsea	40
Mirsky, Steven Brian	162
Mobli, Ahmadreza	6, 21, 48, 50, 100
Moura Kohmann, Marta	35
Mueller, Thomas C.	68, 94, 97, 102, 179
Mueth, Alexander R.	55, 78, 123
Naeve, Seth L.	72, 112
Nafchi, Ali	114
Nandula, Vijay	22
Niu, Zhongzhong	137
Nolte, Scott A.	108
Norsworthy, Jason K.	48, 68, 102, 108
Nott, Ajit	190
Nunes, Jose J.	21, 45, 97
Ola, Oluwaseun T.	68
Oliveira Ribeiro Maia, Lucas	56, 105
Omielan, Joe	36
Ott, Eric J.	63, 75, 178
Owen, Micheal D.	108
Paganini, Gianfranco	94
Pandian, Balaji Aravindhan	134
Pantic, Aleksandra	7, 11
Patterson, Eric L.	25, 26, 27, 32, 54, 135, 138
Patton, Jamie	21
Patzoldt, William L.	12, 104
Paul, Siddhartho S.	55
Pavlovic, Pavle	48, 157
Pawlak, John	75, 178
Peachey, Ed	157
Peters, Thomas J.	72, 84, 112, 156
Petersen, Commissioner Thom	87
Phillips, Tim	146
Porpiglia, Peter J.	176
Preston, Christopher	31
Probst, Mike	152
Proctor, Christopher	3, 34, 41, 121, 43, 107, 115, 125, 132, 142
Purvis, Connor L.	163
Raila, Salina	4, 47, 51, 76

NCWSS Author Index

Raiyemo, Damilola A.	30, 133
Rankrape, Cristiana B.	66
Refsell, Dawn	85, 90
Ren, Zhe	52, 123
Renz, Mark J.	35, 37
Reynolds, William	183, 185
Rezende Lima, Igor Gustavo	76
Rivera Monroy, Jhon Eric	135
Rodrigues da Silva, Thales	34
Rodriguez, Charlton I.	37
Rogers, Grady L.	101, 147
Rosenbaum, Kristin K.	177
Rudnick, Daran R.	121, 142
Ruhter, Jeremy	93
Saavedra Rojas, Yenny Alejandra	135
Sandeen, Hallie A.	146
Sandell, Lowell D.	73, 177
Sanford, Gregg	21
Sarangi, Debalin	20, 38, 40, 44, 64, 69, 72, 92, 103, 108, 112, 166
Sater, Neil	13
Sawall, Dustyn	5, 191
Schlautman, Brandon	145, 146
Scholting, Emily	180
Schroeder, Kasey P.	43
Schroeder de Souza, Joana	23
Schultz, Eric C.	99
Schulz, Brock	154
Schwartz-Lazaro, Lauren M.	52
Scott, Barbara	157
Scott, Jon	15, 16, 17, 91
Searcy, Kiera	145
Serim, Ahmet Tansel	54
Sharma, Veerendra Kumar	24, 33, 136
Shi, Yeyin	109
Shropshire, Christy H.	59
Sias, Cynthia	22, 39
Sidhu, Manjot Kaur	77
Sikkema, Peter H.	58, 59, 108, 169
Simpson, David M.	73
Singh, Mandeep	57, 60, 162
Singh, Navdeep	162
Singh, Navjot	40, 72, 112
Singh, Rishabh	29, 102
Skelton, Joshua J.	5
Sloan, Steve	94

NCWSS Author Index

Smeda, Reid J.	10, 81, 88, 110, 144, 161
Smith, Alan G.	117, 139
Smith, Chad L.	63, 75, 178
Smith, Daniel H.	21, 143, 164
Soltani, Nader	58, 59, 169
Sosnoskie, Lynn M.	157
Spotanski, Jess J.	130
Spoth, Matthew P.	53
Sprague, Christy L.	68, 96, 102, 106, 108, 155
Stahl, Lizabeth	38, 103
Steckel, Larry	52, 68, 102
Stephenson, IV, Daniel O.	68, 102
Stoltenberg, David	107, 65, 116
Striegel, Sarah	89
Striegel, Sarah V.	69
Stutzman, Wyatt J.	9
Sudhakar, Susee	33, 136
Takenaka, Yudai	157
Tan, Siyuan	99
Tancos, Matthew A.	117
Tann, R. Scott	94
Tardif, Francois	29
Thapa, Resham	162
Thompson, Trace M.	127, 148
Tomberlin, Jeffery K.	40
Tranel, Patrick J.	28, 30, 49, 65, 133, 165
Trick, Harold N.	24, 33, 136
Tuma, Ian	69
Ugljic, Zaim	6, 8, 100, 125
Vagedes, Rose V.	123
Van Wychen, Lee	22, 39, 86
VanGessel, Mark J.	108, 157
Vara Prasad, P.v.	24
Vara Prasad, Pv	62, 134
Vehige, Andrew T.	144, 161
Vincent, William J.	99
Vitti, Thiago H.	3, 43, 115, 132
Volenberg, Dean	81
Vos, David	70, 71, 114
Waldecker, Ian G.	155
Wallace, John M.	97, 149
Walz, Claudia R.	106
Wang, Sheng	93
Weber, Anderson	5
Weber, Christopher	76
Werle, Isabel S.	28, 133

NCWSS Author Index

Werle, Rodrigo	6, 8, 19, 21, 45, 48, 50, 65, 68, 69, 97, 100, 102, 107, 108, 116, 143, 151, 164
Westra, Philip	138
Williams II, Martin M.	48, 93, 108, 157
Willingham, Samuel D.	99
Wilson, Melissa	40
Wilson, Travis	37
Wortman, Sam	43
Yadav, Ramawatar	111
Yang, Ce	103
Yenish, Joe	171
Young, Bryan G.	9, 46, 52, 55, 56, 68, 74, 102, 105, 108, 113, 123, 129, 130, 137, 181
Young, Julie M.	74, 123, 129, 137
Yu, Eric Y.	38, 40, 44, 103
Yu, Qin	25
Zaric, Milos	7, 11, 43
Zhang, Chun	25
Zimmer, Marcelo	9, 74, 130
Zollinger, Richard K.	60, 176

NCWSS Notes

Time Schedule

Mark papers and meetings in the space below.

Time	Tuesday	Wednesday	Thursday
8:00	Poster Session I		Society Breakfast & What's New in Industry
8:15			
8:30			
8:45			
9:00			
9:15			
9:30			
9:45			
10:00	General Session		
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			
1:30			
1:45			
2:00			
2:15			
2:30			
2:45			
3:00			
3:15			
3:30			
3:45			
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

2024 – December 7 – 13

Kansas City, MO

2025 – December 15 – 18

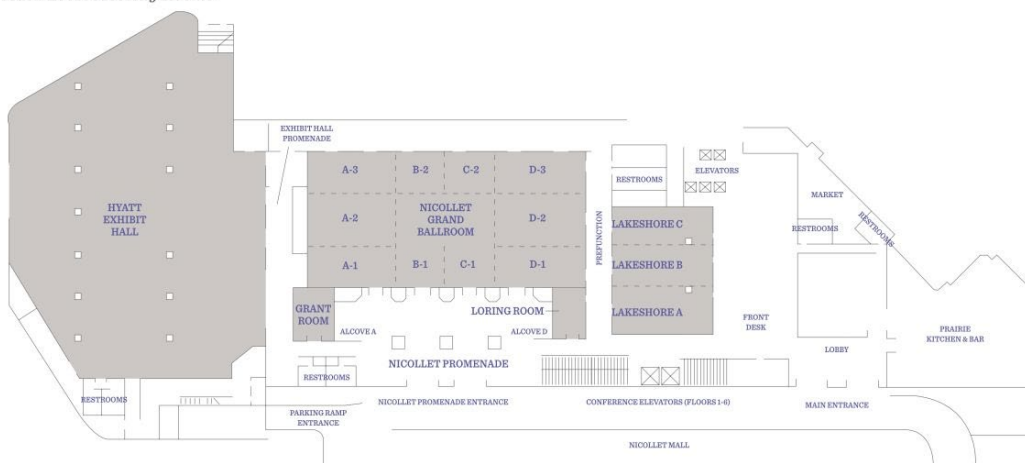
Grand Rapids, MI

Meeting Map

Meeting Space – Hyatt Regency Minneapolis, Minneapolis, MN

FLOOR PLAN

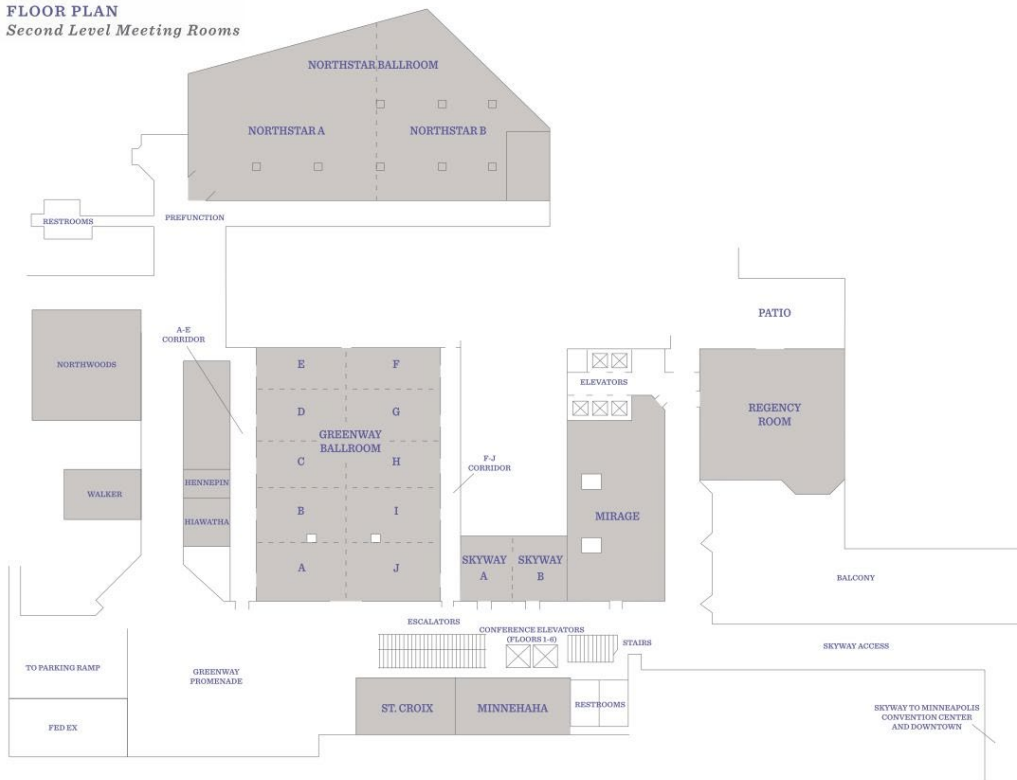
Main Level Meeting Rooms



MAIN LEVEL

FLOOR PLAN

Second Level Meeting Rooms



SECOND FLOOR