



2022

77th Annual Meeting

North Central Weed Science Society

www.ncwss.org

December 5 – 8, 2022

**Hyatt Regency St. Louis at the Arch,
St. Louis, MO**

President's Welcome

2022 North Central Weed Science Society Meeting

Welcome to the 77th annual meeting of the North Central Weed Science Society (NCWSS) at the Hyatt Regency at the Arch in St. Louis, Missouri. It has been my great pleasure to serve as NCWSS President in 2022. My first NCWSS annual meeting was in 1991 in Indianapolis. In the past 32 years, I have benefited from the technical knowledge, scientific discussion and fellowship found at the annual meeting that has helped shaped my career development. I look forward to this week every year as an opportunity to renewed old friendships and meet new weed scientists, particularly new students, in an exchange of ideas, experiences, opinions and information to enhance the future of weed control. During the meetings this week, I hope that you find time to engage with NCWSS membership and seek the opportunity to influence the next generation of weed scientists.

Karla Gage and the Local Arrangement Committee have been doing an amazing job to prepare for the meeting. While their efforts will largely go unrecognized by most members, the meeting would not be a success without their efforts. When you see a member of this year's Local Arrangement Committee, please take a moment to stop and thank them for contributions to the meeting or buy them a beverage in the evening.

Reid Smeda is the President Elect and Program Chair for the 2022 annual meeting. This year program has over 90 oral presentations, 90 poster presentations and 5 video presentations. Additionally, there are two symposia on Wednesday afternoon for members to attend, including: "Impact of the Endangered Species Act on herbicide registration and regulation" moderated by Bill Johnson and "New Frontiers in Application Technology" moderated by Greg Kruger. Don't miss out on networking opportunities at the Student Mixer on Monday, Graduate Student Luncheon on Tuesday, Women in Weed Science Networking Breakfast on Wednesday, and Industry Breakfast on Thursday. Please note that the Student Mixer is open to the entire society.

Please attend the award luncheon on Wednesday to recognize the Distinguished Achievement and Fellow award winners. Join us at the NCWSS Society Social on Wednesday evening where the Undergraduate and Graduate contests winners will be announced.

The NCWSS is a volunteer organization which needs your involvement for continued success. If you are not on a committee than please consider joining one. There are numerous committee meetings scheduled during this week which are open to all NCWSS members. Please see the program for committee times and meeting rooms and attend as many of the committee meetings that interest you. If there is a committee you want to serve on, please contact the committee chair, Reid Smeda, or myself.

To the Sustaining Members of the Society, let me extend my sincere thanks to you for your generous support of the NCWSS. Through the Sustaining Members financial support, we can defray the costs of the annual meeting. Volunteers from our Sustaining Members serve as judges at the annual meeting and the summer weed contest.

In closing, I thank the entire NCWSS for this opportunity to serve as President. Have a great meeting and safe travels.

David Simpson
President

Conference Headquarters

All sessions of the conference and the meeting events will be held at the Hyatt Regency St. Louis, 315 Chestnut Street, St. Louis, MO 63102.

Registration Hours

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

Meeting Rooms

All sessions and meetings will be in the Hyatt Regency St. Louis. Additional meetings may be arranged any time during the conference by contacting Karla Gage, Local Arrangements Chair.

Proceedings

2022 NCWSS Proceedings will be available following the meeting online at the NCWSS website.

Sustaining Members

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

Health and Safety

Smoking is allowed in designated areas only.

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

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

Please keep your personal belongings with you at all times.

No photographs or videos

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

NCWSS Mobile Meeting App – Crowd Compass

The 77th 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 #NCWSS2022.

Program Symbols

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

Meal Functions of the Society 2022

Meal Functions

Breaks

Tuesday, 9:40 – 10:00 am	Regency BCDE Foyer
Tuesday, 3:15 – 3:30 pm	Regency BCDE Foyer
Wednesday, 10:00 – 10:15 am	Regency BCDE Foyer
Wednesday, 3:15 pm – 3:30 pm	Regency BCDE Foyer

Presidential Reception

– Open to 2022 Distinguished Award Winners, New and Current Fellows, Current Board Members

Monday, 6:00 – 7:00 pm	Presidential Suite
------------------------	--------------------

Student Mixer

Sponsored by BASF Corporation – Open to all attendees

Monday, 6:30 – 10:00 pm	Regency AB
-------------------------	------------

Paper Judges Breakfast

Tuesday, 7:00 am	Regency A
------------------	-----------

Poster Judges Breakfast

Tuesday, 7:00 am	Regency A
------------------	-----------

Student Luncheon/Business Meeting

Sponsored by Corteva Agriscience – Open to all students

Tuesday, 12:00 – 1:15 pm	Regency A
--------------------------	-----------

Women in Weed Science Networking Breakfast

Open to all

Wednesday, 7:00 – 8:45 am	18 th Floor, Gateway East
---------------------------	--------------------------------------

Society Awards Luncheon

Wednesday, 12:00 – 1:15 pm	Regency CD
----------------------------	------------

Society Social and Contest Awards

Sponsored by Sustaining Members – Open to all

Wednesday, 5:30 – 7:00 pm	Regency C
---------------------------	-----------

Industry Breakfast (Cost \$45)

Thursday, 7:00 – 8:15 am	Regency AB
--------------------------	------------

Tours of the Society 2022

Graduate Student Chesterfield Tour

Hosted by Bayer - Busses leave no later than 9:15 am

Monday, 10:00 am – 4:30 pm	Buses at 4th St. entrance
----------------------------	---------------------------

Meetings of the Society 2022

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 2024.

NCWSS Committee Meetings

Local Arrangement Committee

Monday, 10:00 am Sterling 4

Board of Directors

Monday, 1:00 pm Sterling 6

Resident Education, Summer Contest and Contest Rules Joint meeting

Monday, 5:00 pm Sterling 3

NCWSS Fellows*

Monday, 5:00 pm Sterling 1

Resolutions & Necrology

Monday, 5:00 pm Sterling 2

Program Committee and Section Chairs

Monday, 7:30 pm (*section moderators*) Sterling 6

Distinguished Achievement Awards

Tuesday, 12:00 pm Sterling 4

Nominating*

Tuesday, 5:15 pm Sterling 7

Strategic Planning

Tuesday, 5:15 pm Sterling 3

Finance, Steering & Policy

Tuesday, 6:00 pm Sterling 7

Paper Judges

Tuesday, 7:00 am with breakfast Regency A

Wednesday, 11:30 am Sterling 9

Poster Judges

Tuesday, 7:00 am with breakfast Regency A

Wednesday, 11:30 am Sterling 9

Industry

Thursday, 10:00 am Regency D

Board of Directors

Thursday, 10:15 am Sterling 7

Meetings of the Society 2022

Program Section Business Meetings

Weed Biology, Ecology & Management	
Tuesday, 5:00 pm	Regency F
Agronomic Crops II (Soybeans)	
Tuesday, 4:45 pm	Regency D
Equipment and Application Methods	
Tuesday, 5:00 pm	Regency C
Horticulture and Specialty Crops	
Wednesday, 10:00 am	Regency E
Extension	
Wednesday, 9:55 am	Regency B
Invasive Weeds, Rangeland, Pasture, and Vegetation Management	
Wednesday, 11:00 am	Regency B
Herbicide Physiology & Molecular Biology	
Wednesday, 11:15 am	Regency F
Agronomic Crops I (Corn)	
Wednesday, 3:15 pm	Regency A

Symposia

Impact of the Endangered Species Act on Herbicide Registration and Regulation	
Wednesday, 1:30 – 3:55 pm	Regency B
New Frontiers in Application Technology	
Wednesday, 1:30 – 4:45 pm	Regency EF
What’s New in Industry	
Thursday, 8:30 – 10:00 am	Regency D

Condensed Program – NCWSS 2022

Monday, December 5

10:00 - 12:00	Local Arrangements	Sterling 4
1:00 - 5:00	Board of Directors	Sterling 6
10:00 - 9:00	Poster Setup	Regency BCDE Foyer
5:00 - 6:00	NCWSS Fellows	Sterling 1
5:00 - 6:00	Resident Education and subcommittees	Sterling 3
5:00 - 6:00	Resolutions and Necrology Committee	Sterling 2
6:00 - 7:00	Presidents Reception	Presidential Suite
6:30 - 9:30	Graduate Student Mixer	Regency AB
7:30 - 9:00	Program Committee and Section Program Chairs	Sterling 6

Tuesday, December 6

7:00 - 8:00	Paper Judges Breakfast	Regency A
7:00 - 8:00	Poster Judges Breakfast	Regency A
8:00 - 9:45	Poster Session I	Regency BCDE Foyer
10:00 - 12:00	General Session	Regency C
12:00 – 1:00	Distinguished Achievement Award Committee	Sterling 4
12:00 – 1:15	Graduate Student Luncheon	Regency A
1:30 - 5:15	Equipment and Application Methods	Regency C
1:30 - 5:00	Agronomic Crops II - Soybeans	Regency D
1:30 - 5:15	Weed Biology, Ecology, Management	Regency F
5:15 - 6:00	Nominating Committee	Sterling 7
5:15 - 6:00	Strategic Planning	Sterling 3
5:30 - 6:30	Poster Session II	Regency BCDE Foyer
6:00 - 6:45	Finance Steering and Policy Committee	Sterling 7

Wednesday, December 7

6:30 - 7:45	Women in Weed Science Breakfast	18 th Floor, Gateway East
7:00 - 5:00	Poster Viewing	Regency BCDE Foyer
9:00 - 10:10	Extension	Regency B
8:00 - 10:15	Horticulture and Specialty Crops	Regency E
9:00 - 11:30	Herbicide Physiology & Molecular Biology	Regency F

9:00 - 11:15	Agronomic Crops I - Corn	Regency A
10:15 - 11:00	Invasive Weeds, Rangeland, Pasture, and Vegetation Management	Regency B
11:30 - 12:00	Poster Final Grades Submission	Sterling 9
12:00 - 1:15	Society Awards Luncheon	Regency CD
1:30 - 3:00	Agronomic Crops I - Corn Implications of the	Regency A
1:30 - 3:55	Endangered Species Act on Herbicide Registration and Regulation	Regency B
1:30 - 4:45	New Frontiers in Application Technology	Regency EF
5:30 - 7:00	Society Social and Contest Awards	Regency C

Thursday, December 8

7:00 - 8:15	Industry Breakfast (Ticket required)	Regency A
8:30 - 10:00	What's New in Industry	Regency D
10:00 - 10:15	Industry Business Meeting	Regency D
10:15 - 11:15	Board of Directors	Sterling 7
10:30 - 11:30	Local Arrangements	Sterling 3

Poster Sessions

Room: Regency BCDE Foyer

Chairperson and Moderator: Nick Arneson

Poster Setup

Posters can be set up between 10:00 am and 9:00 pm on Monday, December 5. All NCWSS posters will be on display on Tuesday, December 6 from 7:00 am until 6:30 pm and on Wednesday, December 7 from 7:00 am until 5:00 pm. Posters must be removed by 4:30 pm on Wednesday, December 7.

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

Tuesday, December 6

8:00 – 9:45 am Poster Session I

5:30 – 6:30 pm Poster Session II

Poster Removal

All posters must be removed by 4:30 pm on Wednesday, December 7.

NCWSS Sustaining Member Exhibitors

Tuesday & Wednesday

Regency BCDE Foyer

Set up Monday afternoon.

Program Symbols

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

PROGRAM

TUESDAY MORNING DECEMBER 6

General Session

LOCATION: Regency C
TIME: 8:00 AM - 10:00 AM
MODERATOR: Reid J. Smeda
University of Missouri
Columbia, MO

***SPEAKER**

- 8:00 AM Welcome to the 77th Annual Meeting of the North Central Weed Science Society.** Reid J. Smeda*; University of Missouri, Columbia, MO **(1)**
- 8:05AM Weed Science Policy Update from DC.** Lee Van Wychen*; Weed Science Society of America, Alexandria, VA **(2)**
- 8:30 AM Horseradish; the Spicy Root Condiment of Southern Illinois.** Stuart A. Walters*; Southern Illinois University, Carbondale, IL **(3)**
- 9:00 AM Presidential Address.** David M. Simpson*; Corteva, Indianapolis, IN **(4)**
- 9:30 AM Remembering NCWSS Members and Friends.** Sarah Striegel*; Bayer Crop Science, Creve Coeur, MO **(5)**
- 9:35 AM Program Announcements.** Reid J. Smeda*; University of Missouri, Columbia, MO **(6)**
- 9:40 AM Break**

TUESDAY MORNING DECEMBER 6

POSTER - Agronomic Crops I - Corn

LOCATION: Regency BCDE Foyer
TIME: 10:00 AM - 11:50 AM
MODERATOR: Nicholas J. Arneson
University of Wisconsin-Madison
Madison, WI

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

†Rescue Post-emergence Herbicide Options for Control of Multiple Herbicide-resistant Palmer Amaranth (*Amaranthus palmeri*) in Glyphosate/glufosinate-resistant Corn.

Ramandeep Kaur*, Stevan Z. Knezevic, Parminder Chahal, Nevin Lawrence, Yeyin Shi, Rachana Jhala, Amit J. Jhala; University of Nebraska, Lincoln, NE (7)

†Planting Green in Corn: Evaluation of Soil Residual Herbicide Interaction, Weed Suppression, and Corn Yield.

Trey P. Stephens*, Amit J. Jhala; University of Nebraska, Lincoln, NE (8)

†Volunteer Rapeseed Infestation in Corn and its Management. Vipin Kumar*¹, Vijay Singh², Michael L. Flessner³; ¹Virginia Polytechnic Institute and State University, Painter, VA, ²Virginia Tech, Painter, VA, ³Virginia Tech, Blacksburg, VA (9)

†Evaluating Spot Application of Herbicide Using a Dual Tank Sprayer for Weed Management in Corn. Adam Leise*¹, Amit J. Jhala¹, Tsuky Khait²; ¹University of Nebraska, Lincoln, NE,

²Greeneye, Tel Aviv, Israel (10)

New Corn Herbicide Programs in Nebraska. Jon E. Scott*¹, Stevan Knezevic²; ¹University of Nebraska, Lincoln, NE,

²University of Nebraska, Concord, NE (11)

Maverick™ Corn Herbicide: Rate Breakdown and Component Comparison for Residual Control. Garrison J. Gundy*¹, Jonathon Kohrt², Chad L. Smith³, Trevor D. Israel⁴, John Pawlak⁵; ¹Valent USA, McPherson, KS, ²Valent USA, West Des Moines, IA, ³Valent USA, Hallsville, MO, ⁴Valent USA, Harrisburg, SD, ⁵Valent USA, Spring Lake, MI (12)

†Efficacy Limits of Group 15 Herbicides Following Severe Rainfall Events. Bradley J. Decker*, Eric J. Miller, Karla L. Gage; Southern Illinois University, Carbondale, IL **(13)**

‡Greenhouse Evaluation of Corn Preemergence Herbicide Carry Over Potential for Early-season Drill Interseeded Cover Crops. Bruno J. Eltink*¹, Victor de Sousa Ferreira¹, Leonardo Carmona¹, Christopher Proctor¹, Rodrigo Werle², Tatiane Severo Silva³; ¹University of Nebraska, Lincoln, NE, ²University of Wisconsin-Madison, Madison, WI, ³University of Wisconsin-Madison Department of Agronomy, Madison, WI **(14)**

Maverick™ Corn Herbicide: A New Burndown and Residual Premix in No-Till Corn. Randall L. Landry*¹, Garrison J. Gundy², Jonathon Kohrt³, Trevor D. Israel⁴, Chad L. Smith⁵, John A. Pawlak⁶, Ron E. Estes¹, Eric Ott⁷, Pat Clay⁸; ¹Valent USA, Seymour, IL, ²Valent USA, McPherson, KS, ³Valent USA, West Des Moines, IA, ⁴Valent USA, Harrisburg, SD, ⁵Valent USA, Hallsville, MO, ⁶Valent USA, Spring Lake, MI, ⁷Valent USA, Greenfield, IN, ⁸Valent USA, Fresno, CA **(15)**

†Isoxadifen-ethyl Safener Associated with Goss's Wilt Severity in Corn. Nathan H. Haugrud*, Andrew J. Friskop, Joseph T. Ikley; North Dakota State University, Fargo, ND **(16)**

Maverick™ Corn Herbicide: A New PRE and POST Herbicide in Conventional Tillage Corn. Chad L. Smith*¹, Jonathon Kohrt², Garrison J. Gundy³, Trevor D. Israel⁴, John Pawlak⁵, Ron Estes⁶, Randall L. Landry⁷, Eric Ott⁸; ¹Valent USA, Hallsville, MO, ²Valent USA, West Des Moines, IA, ³Valent USA, McPherson, KS, ⁴Valent USA, Harrisburg, SD, ⁵Valent USA, Spring Lake, MI, ⁶Valent USA, IL, ⁷Valent USA, Seymour, IL, ⁸Valent USA, Greenfield, IN **(17)**

†Evaluating Establishment of Early-season Drill Interseeded Cover Crop Mixture in Corn Across Different Rates of dimethenamid-P + Saflufenacil Applied Preemergence. Kayla M. Safarik*¹, Daniel H. Smith², Rodrigo Werle², Chris Proctor¹, Tatiane Severo Silva², Victor de Sousa Ferreira¹; ¹University of Nebraska, Lincoln, NE, ²University of Wisconsin, Madison, WI **(18)**

†Herbicide Programs for Weed Control in Conventional (Non-GMO) Corn. Venkatanaga Shiva Datta Kumar Sharma

Posters 2022

Chiruvelli*, Debalin Sarangi; University of Minnesota, St Paul, MN (19)

Comparison of Atrazine Based Post-emergence Treatments in Corn. Koray Kaçan*¹, Luka Milosevic¹, Jon E. Scott¹, Stevan Knezevic²; ¹University of Nebraska, Lincoln, NE, ²University of Nebraska, Concord, NE (20)

TUESDAY MORNING DECEMBER 6

POSTER - Agronomic Crops II - Soybeans

LOCATION: Regency BCDE Foyer
TIME: 10:00 AM - 11:50 AM

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

†Weed Management in Early-Planted Illinois Soybean. Logan Miller*¹, Aaron Hager²; ¹University of Illinois, Chenoa, IL, ²University of Illinois, Urbana, IL (21)

Herbicide Management Strategies for ALS, PPO, Triazine, Glyphosate, and Dicamba Resistant Waterhemp in Xtendflex and E3 Soybean. Claudia R. Bland*, Bryan G. Young, William G. Johnson; Purdue University, West Lafayette, IN (22)

†Impact of Esterified Seed Oil Adjuvant (Efficax) on Spray Deposition and Efficacy of PRE-emergence Herbicides in Wisconsin Soybean Production. Laura D. Rodriguez Baquero*, Jose J. Nunes, Ryan P. DeWerff, Rodrigo Werle; University of Wisconsin, Madison, WI (23)

†This or That? Looking into Late Cereal Rye Cover Crop Termination Techniques in Wisconsin Soybean Systems. Jacob H. Felsman*, Nicholas J. Arneson, Ryan P. DeWerff, Rodrigo Werle; University of Wisconsin, Madison, WI (24)

†Soybean Growth and Development as Influenced by Glyphosate Micro-Rates. Luka Milosevic*¹, Jon E. Scott¹, Stevan Knezevic²; ¹University of Nebraska, Lincoln, NE, ²University of Nebraska, Concord, NE (25)

Soybean Yield as Influenced by Glyphosate Micro-Rates. Jon E. Scott*¹, Luka Milosevic¹, Stevan Knezevic²; ¹University of

Posters 2022

Nebraska, Lincoln, NE, ²University of Nebraska, Concord, NE
(26)

Control of Glyphosate-Resistant Palmer Amaranth with Late-Season Applications of Glufosinate in XtendFlex Soybean. Vipin Kumar*, Sachin Dhanda, Rui Liu, Taylor Lambert; Kansas State University, Hays, KS (27)

Corteva New Residual Soybean Herbicide for PRE and POST Application. Kelly A. Backscheider*¹, David M. Simpson²; ¹Corteva Agriscience, Franklin, IN, ²Corteva Agriscience, Indianapolis, IN (28)

†Comparison of POST-emergence Herbicide Programs without Dicamba in XtendFlex Soybean Systems: Waterhemp Control and Crop Response. Arthur F. T. Duarte*, Rodrigo Werle, Ryan P. DeWerff, Jose J. Nunes, Nicholas J. Arneson; University of Wisconsin, Madison, WI (29)

Glufosinate, 2,4-D, and Dicamba Respray Intervals for Optimal Control of Palmer Amaranth (*Amaranthus palmeri*). Emma A. Mitchell*, Stephanie DeSimini, Joseph T. Ikley; North Dakota State University, Fargo, ND (30)

Investigations of Suspected Weed Resistance to XtendiMax^{&Reg;} Herbicide with VaporGrip^{&Reg;} Technology. Aruna V. Varanasi*, Jeffrey Herrmann, John Willis, Chandra V. Aradhya; Bayer CropScience, Chesterfield, MO (31)

†Effect of Growth Stage on the Sensitivity of Resistant and Susceptible Palmer Amaranth to 2,4-D. Monica R. Marrs*¹, Vipin Kumar², Anita Dille¹, Rui Liu², Augustine Obour²; ¹Kansas State University, Manhattan, KS, ²Kansas State University, Hays, KS (32)

Integrating Ecological Tactics to Manage Herbicide-Resistant Waterhemp and Palmer Amaranth in Soybean. Prashant Jha*¹, Jason K. Norsworthy², Vipin Kumar³, Karla L. Gage⁴; ¹Iowa State University, Ames, IA, ²University of Arkansas, Fayetteville, AR, ³Kansas State University, Hays, KS, ⁴Southern Illinois University, Carbondale, IL (33)

To Terminate or Not to Terminate? Cereal Rye Cover Crop Management in an Early-Planted Soybean System. Ryan P. DeWerff*, Nicholas J. Arneson, Rodrigo Werle; University of Wisconsin, Madison, WI (34)

†Tank Mixing Metobromuron with Soybean Preemergence Herbicides Improves Residual Weed Control. Eric Y. Yu*, Debalin Sarangi; University of Minnesota, St. Paul, MN **(35)**

Soybean Response to Dicamba Vapor is Influenced by Canopy Conductance During the Exposure Event. Matthew Osterholt*, Scott Am McAdam, Bryan G. Young; Purdue University, West Lafayette, IN **(36)**

†Influence of Herbicide Application Timing and Sequence on Weed Control in Soybean. Navjot Singh*¹, Ryan P. Miller², Thomas J. Peters³, Seth L. Naeve¹, Debalin Sarangi¹; ¹University of Minnesota, St. Paul, MN, ²University of Minnesota, Rochester, MN, ³North Dakota State University, Fargo, ND **(37)**

‡Evaluation of Dicamba and Soil Residual Herbicide Tank Mixtures for Early-Season Weed Control in Glyphosate/Dicamba-Resistant Soybean. Ian Tuma*¹, Devin Hammer², Sarah Striegel³, Debalin Sarangi⁴; ¹University of Minnesota, Morris, MN, ²Bayer CropScience, St. Louis, MO, ³Bayer Crop Science, Mapleton, MN, ⁴University of Minnesota, St. Paul, MN **(38)**

TUESDAY MORNING DECEMBER 6

POSTER - Equipment and Application Methods

LOCATION: Regency BCDE Foyer
TIME: 10:00 AM - 11:50 AM

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

Effect of Adjuvants on Development and Formation of Arrested Ear Syndrome. Ryan J. Edwards*¹, Lee A. Boles¹, Gregory K. Dahl²; ¹WinField United, River Falls, WI, ²Winfield United, Eagan, MN **(39)**

‡The Influence of Electrocution Height and Soil and Plant Moisture on the Control of Waterhemp. Kaden W. Bollmann*,

Posters 2022

Haylee E. Schreier, Kevin W. Bradley; University of Missouri, Columbia, MO (40)

†A Dual Tank/boom Sprayer Reduced the Antagonism of Clethodim from Dicamba on Volunteer Corn Control in Soybean. Marcelo Zimmer*¹, Bryan G. Young¹, William G. Johnson¹, Tristen H. Avent², Jason K. Norsworthy², Diego J. Contreras³, Wesley Everman³, Michael M. Houston⁴, Lauren M. Lazaro⁵, William L. Patzoldt⁵; ¹Purdue University, West Lafayette, IN, ²University of Arkansas, Fayetteville, AR, ³North Carolina State University, Raleigh, NC, ⁴Blue River Technology, Greenville, MS, ⁵Blue River Technology, Sunnyvale, CA (41)

†Delivering POST Herbicides on the Spot: Evaluating A Novel Smart Sprayer Technology. Zaim Ugljic*¹, Nicholas J. Arneson¹, Ryan P. DeWerff¹, Anita Dille², Chris Proctor³, Greg Kruger⁴, Miller Calvin⁵, Rodrigo Werle¹; ¹University of Wisconsin, Madison, WI, ²Kansas State University, Manhattan, KS, ³University of Nebraska, Lincoln, NE, ⁴University of Nebraska, North Platte, NE, ⁵BASF, Seymour, IL (42)

†Can Glufosinate Tank-mix Combinations with PPO-inhibitors and Proper Nozzle Selection Enhance Waterhemp Control? Nikola Arsenijevic*, Rodrigo Werle; University of Wisconsin, Madison, WI (43)

Locating Weeds and Patches with Precision Sprayers. Isaac H. Barnhart*¹, Thiago H. Vitti², Chris Proctor², Calvin A. Miller³, Greg Kruger⁴, Anita Dille¹; ¹Kansas State University, Manhattan, KS, ²University of Nebraska, Lincoln, NE, ³BASF, Seymour, IL, ⁴University of Nebraska, North Platte, NE (44)

‡Employment of Multiple-Fan Nozzles and Application Volume Affected Spray Coverage and Herbicide Efficacy in Three Troublesome Broadleaf Species. Taíris Duarte Vasconcelos*, Alina Gava, Zachary Halsted, Barbara Houston, Kasey P. Schroeder, Jeffrey Golus, Milos Zaric; University of Nebraska, North Platte, NE (45)

†Hooded Booms Reduce Particle Drift of Dicamba Applications. Andrew T. Vehige*¹, Shaun M. Billman¹, Reid J. Smeda¹, Naresh Pai², Sarah Striegel³, Justin Pollard³, Devin J. Hammer⁴, Jose J. Nunes⁵, Arthur Franco Teodoro Duarte⁵, Guilherme Chudzik⁵, Ryan P. DeWerff⁵, Rodrigo Werle⁵; ¹University of Missouri, Columbia, MO, ²Bayer Crop Science, Chesterfield, MO, ³Bayer Crop Science, Creve Coeur, MO,

Posters 2022

⁴Bayer Crop Science, St. Charles, MO, ⁵University of Wisconsin, Madison, WI (46)

†Application Antagonism Negates Benefit of Foliar Herbicide Combinations for Resistance Management. Estevan Goncalves Cason*, Julie M. Young, Bryan G. Young; Purdue University, West Lafayette, IN (47)

TUESDAY MORNING DECEMBER 6

POSTER - Extension

LOCATION: Regency BCDE Foyer
TIME: 10:00 AM - 11:50 AM

***PRESENTER † GRADUATE CONTEST**

Telling Your Extension Weed Science Story: Innovating Outreach Efforts in Wisconsin Through ArcGIS Tools. Nicholas J. Arneson*, Jose J. Nunes, Kolby Grint, Rodrigo Werle; University of Wisconsin, Madison, WI (48)

Interseeding Cover Crops into Corn in the North Central Region. Daniel H. Smith*¹, Tatiane Severo Silva¹, Ryan P. DeWerff¹, Nicholas J. Arneson¹, Ahmadreza Mobli¹, Kayla Safarik², Victor de Sousa Ferreira², Chris Proctor², Rodrigo Werle¹; ¹University of Wisconsin, Madison, WI, ²University of Nebraska, Lincoln, NE (49)

Mature Alfalfa Tolerance to Flaming. Stevan Knezevic*¹, Jon E. Scott², Luka Milosevic²; ¹University of Nebraska, Concord, NE, ²University of Nebraska, Lincoln, NE (50)

Podcasting to Communicate Weed Management Principles. Sarah Lancaster*¹, Joseph T. Ikley², Mandy Bish³, Alyssa Essman⁴; ¹Kansas State University, Manhattan, KS, ²North Dakota State University, Fargo, ND, ³University of Missouri, Columbia, MO, ⁴The Ohio State University, Columbus, OH (51)

†Influence of Cover Crop Termination Strategies on Weed Suppression and Residual Herbicide Availability in the Soil. Hunter A. Medenwald*, Lucas Oliveira Ribeiro Maia, Bryan G. Young; Purdue University, West Lafayette, IN (52)

Posters 2022

An Air Tractor Simulator for Safety Training and Proficiency in Application Techniques for Agricultural Pilots. Jeffrey Golus*¹, Thomas May²; ¹University of Nebraska, North Platte, NE, ²Flying M Enterprises, Holdrege, NE (53)

Managing Volunteer Corn in 2,4-D Tolerant Soybeans. Ryan P. Miller*¹, Lisa M. Behnken¹, Nathaniel M. Drewitz¹, Debalin Sarangi²; ¹University of Minnesota, Rochester, MN, ²University of Minnesota, St. Paul, MN (54)

TUESDAY MORNING DECEMBER 6

POSTER - Herbicide Physiology & Molecular Biology

LOCATION: Regency BCDE Foyer
TIME: 10:00 AM - 11:50 AM

*PRESENTER † GRADUATE CONTEST
‡ UNDERGRADUATE CONTEST

Enhancing Herbicide Efficacy with a Novel Ethoxylated Phospholipid. Lia Marchi Werle*¹, Glen R. Obear¹, Nongnuch Sutivisedsak¹, Keith Rowley², Felipe de Andrade Faleco³, Rodrigo Werle³; ¹Exacto Inc, Sharon, WI, ²Exacto, Madison, WI, ³University of Wisconsin, Madison, WI (55)

†Discovering Site of Action of Herbicide Indaziflam. Mohit Mahey*¹, Jinyi Chen², Peter Knut Lundquist¹, Eric Lloyd Patterson¹; ¹Michigan state university, East Lansing, MI, ²Nanjing agricultural university, Nanjing, China (56)

†Effectiveness of Early Post Emergence Tank Mix for *Amaranthus palmeri* Management. Devin W. Koester*¹, Dean E. Riechers², Jeanafior Crystal T. Concepcion²; ¹University of Illinois, Elizabeth, IL, ²University of Illinois, Urbana, IL (57)

†Inheritance of S-Metolachlor Resistance in a Waterhemp (*Amaranthus tuberculatus*) Population from Illinois. Isabel S. Werle*¹, Lucas K. Bobadilla², Aaron G. Hager¹, Patrick J. Tranel¹; ¹University of Illinois, Urbana, IL, ²University of Illinois, Champaign, IL (58)

Posters 2022

‡Evaluating Herbicide Resistance of Giant Ragweed (*Ambrosia trifida* L.). Emma J. Lagerhausen*, Alexander R. Mueth, Eric J. Miller, Cristiana B. Rankrape, Karla L. Gage; Southern Illinois University, Carbondale, IL **(59)**

‡Mechanisms of Resistance to Indaziflam in *Poa Annua*. Sarah E. Holmes*¹, Mohit Mahey², Eric L. Patterson²; ¹Truman State University, Kirksville, MO, ²Michigan state university, East Lansing, MI **(60)**

†Confirmation and Characterization of ALS-Inhibitor Resistance in Japanese Brome. Manogna Devi Adari*¹, Balaji Aravindhnan Pandian², Vara Prasad Pv¹, Mithila Jugulam¹; ¹Kansas State University, Manhattan, KS, ²Enko, Mystic, CT **(61)**

†Differential Sensitivity of Winter Wheat to HPPD-Inhibitors. Susee Sudhakar*¹, Sridevi Nakka², Asif Mohammad³, Harold Trick¹, Vara Prasad Pv¹, Mithila Jugulam¹; ¹Kansas state university, Manhattan, KS, ²Tritica Biosciences, Manhattan, KS, ³Heartland Plant Innovations, Manhattan, KS **(62)**

†Is Detoxification Contributing to PPO Inhibitor Resistance in Waterhemp (*Amaranthus tuberculatus*)? Jesse A. Haarmann*¹, Bryan G. Young¹, William G. Johnson²; ¹Purdue University, West Lafayette, IN, ²Purdue University, West Lafayette In, IN **(63)**

Distribution of Target Site Mutations in PPO2 Gene in Waterhemp (*A. Tuberculatus*) and Palmer Amaranth (*A. Palmeri*) Populations in the USA. Jacob S. Montgomery¹, Daljit Singh*², Jaishree Chittoor², Chandrashekar Aradhya², Alejandro Perez-Jones²; ¹Colorado State University, Fort Collins, CO, ²Bayer Crop Science, Chesterfield, MO **(64)**

Investigating the Effect of S-Metolachlor and Cereal Rye Cover Crops in Weeds. Rama Paudel*¹, Martin M. Williams II², Adam Davis¹, Dean Edward Riechers¹; ¹University of Illinois, Urbana, IL, ²USDA-ARS, Urbana, IL **(65)**

TUESDAY MORNING DECEMBER 6

POSTER - Horticulture and Specialty Crops

LOCATION: Regency BCDE Foyer
TIME: 10:00 AM - 11:50 AM

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

†Evaluation of Weed Removal Timing for Three Sweetpotato Cultivars. Emmanuel G. Cooper*, Stephen L. Meyers, Jeanine Arana; Purdue University, West Lafayette, IN **(66)**

‡Onion Response to Simulated 2,4-D and Dicamba Drift. Hope Thome*¹, Monique Mose², Sushila Chaudhari²; ¹Michigan State University, East Lansing, MI, ²Michigan State University, East Lansing, MI **(67)**

Combinations of PRE and Layby Herbicides in Watermelon. Josue D. Cerritos*, Stephen L. Meyers, Jeanine Arana, Emmanuel G. Cooper, Luis F. Medina, Carlos A. López Manzano; Purdue University, West Lafayette, IN **(68)**

†Effect of POST Herbicides Applied to the Distal Portion of Pumpkin Vines. Jeanine Arana*, Stephen L. Meyers, Emmanuel G. Cooper, Luis F. Medina, Josue D. Cerritos, Carlos A. López Manzano; Purdue University, West Lafayette, IN **(69)**

‡Impact of Herbicide, Application Method, and Variety on Celery Plant Meltdown. Rachel Mickey*, Monique Mose, Christopher Galbraith, Sushila Chaudhari; Michigan State University, East Lansing, MI **(70)**

Transplanted Banana Pepper Response to Clomazone PRE. Luis F. Medina*, Stephen L. Meyers, Jeanine Arana, Emmanuel G. Cooper, Josue D. Cerritos, Carlos A. López Manzano; Purdue University, West Lafayette, IN **(71)**

†Weed Surveys of Snap Bean Fields in Midwest Production Systems. Pavle Pavlovic*¹, Caio Brunharo², Jed B. Colquhoun³, Nicholas Emmanuel Korres⁴, Carolyn Lowry², Scott Lukas⁵, Ed Peachey⁶, Barbara Scott⁷, Lynn M. Sosnoskie⁸, Yudai Takenaka¹, Mark J. VanGessel⁷, Martin M. Williams II⁹; ¹University of Illinois, Urbana, IL, ²Pennsylvania State University, University

Posters 2022

Park, PA, ³University of Wisconsin, Madison, WI, ⁴University of Ioannina, Árta, Greece, ⁵Oregon State University, Hermiston, OR, ⁶Oregon State University, Corvallis, OR, ⁷University of Delaware, Georgetown, DE, ⁸Cornell University, Geneva, NY, ⁹Global Change and Photosynthesis Research Unit, USDA-ARS, Urbana, IL **(72)**

‡Phytotoxicity, Plant Height, and Biomass Response of Two Industrial Hemp Cultivars to Quizalofop-ethyl Tank Mixtures with Various Adjuvants. Alina Gava*, Tairis Duarte Vasconcelos, Jeff Golus, Milos Zaric, Kelly Bruns; University of Nebraska, North Platte, NE **(73)**

Peppermint Response to Tiafenacil and Saflufenacil Applied Postharvest. Carlos A. López Manzano*, Stephen L. Meyers, Jeanine Arana, Emmanuel G. Cooper, Josue D. Cerritos, Luis F. Medina; Purdue University, West Lafayette, IN **(74)**

†Response of Trees to Dicamba and 2,4-D Simulated Drift. Allyssa Boerngen*, Eric J. Miller, Karla L. Gage; Southern Illinois University, Carbondale, IL **(75)**

‡Golden Pennycress Response to Simulated Carryover of Group 14 Soybean Herbicides. Claudia J. Duarte*, Brent S. Heaton, Mark L. Bernards; Western Illinois University, Macomb, IL **(76)**

†Comparison of ACCase Inhibiting Herbicides for Use in Two Industrial Hemp Cultivars. Milos Zaric*¹, Marija Savic², Greg Kruger¹, Sam E. Wortman³, Kelly Bruns¹; ¹University of Nebraska, North Platte, NE, ²University of Nebraska, North Platte, NE, ³University of Nebraska, Lincoln, NE **(77)**

†Residual vs Post Emergence Herbicides for Weed Management in Vineyards. Michelle M. Maile*, Reid J. Smeda, Dean S. Volenberg; University of Missouri, Columbia, MO **(78)**

TUESDAY MORNING DECEMBER 6

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

LOCATION: Regency BCDE Foyer
TIME: 10:00 AM - 11:50 AM

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

†Allelopathic Characteristics That Drive Johnsongrass (*Sorghum halepense*) Competition: Accessing Dhurrin Gene Expression. Connor L. Purvis*, Erin E. Burns; Michigan State University, East Lansing, MI **(79)**

Control Options for Japanese Knotweed Along Roadsides - Initial Results. Joseph Omielan*; University of Kentucky, Lexington, KY **(80)**

†Evaluating the Weed Suppression Potential of Spray-on Biopolymer-based Films for Use in Midwest Row-Crop Systems. Camila Chiaranda Rodrigues*, Christopher Proctor, Bruno Eltink, Leonardo Inveninato Carmona; University of Nebraska, Lincoln, NE **(81)**

†Grazing Winter Cover Crops: Does it Affect Weed Suppression in Kansas? Lily A. Woitaszewski*, Bruno Pedreira, DooHong Min, Sarah Lancaster; Kansas State University, Manhattan, KS **(82)**

Waterhemp (*Amaranthus tuberculatus*) Regeneration from Callus Culture: A Step Forward to Genome Editing in Weed Management. Yaiphabi Kumam*¹, Harold Trick², Vara Prasad Pv¹, Mithila Jugulam¹; ¹Kansas State University, Manhattan, KS, ²Kansas State University, Manhattan, KS **(83)**

‡Evaluation of Chemical and Non-Chemical Options for Cereal Rye Cover Crop Termination. Mark Timper*¹, Navjot Singh¹, Eric Y. Yu¹, Elizabeth Stahl², Debalin Sarangi¹; ¹University of Minnesota, St. Paul, MN, ²University of Minnesota, Worthington, MN **(84)**

TUESDAY MORNING DECEMBER 6

**POSTER - Weed Biology, Ecology,
Management**

LOCATION: Regency BCDE Foyer
TIME: 10:00 AM - 11:50 AM

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

†Impact of Simulated Rainfall on Atrazine Wash Off from Roller Crimped and Standing Cereal Rye Residue Onto the Soil. Lucas Oliveira Ribeiro Maia*, Bryan G. Young, Eileen J. Kladvik, Shalamar Armstrong, William G. Johnson; Purdue University, West Lafayette, IN **(85)**

†Water Stress Effects on Weed Germination, Growth, and Seed Production: A Global Meta-analysis. Mandeep Singh*¹, Resham Thapa², Meetpal S. Kukal³, Suat Irmak³, Steven Mirsky⁴, Amit J. Jhala¹; ¹University of Nebraska, Lincoln, NE, ²North Carolina State University, Raleigh, NC, ³Pennsylvania State University, University Park, PA, ⁴USDA-ARS Beltsville Agricultural Research Center, Beltsville, MD **(86)**

Evaluation of Foliar Corn-soybean Herbicides on Giant Ragweed and Waterhemp Control in Wisconsin. Ahmadreza Mobli*, Nicholas J. Arneson, Ryan DeWerff, Rodrigo Werle; University of Wisconsin, Madison, WI **(87)**

†Lack of Effective Control of a Wisconsin Waterhemp Accession with Soil-applied PPO-inhibitor Herbicides. Felipe de Andrade Faleco*, Nicholas J. Arneson, Rodrigo Werle; University of Wisconsin, Madison, WI **(88)**

†Effect of Cereal Rye Cover Crop Biomass on Waterhemp Emergence and Soil Abiotic Parameters. Jose J. Nunes*, Guilherme Chudzik, Arthur F. Teodoro, Nicholas J. Arneson, Rodrigo Werle; University of Wisconsin, Madison, WI **(89)**

Response of Herbicide Resistant Palmer Amaranth to Combinations of Herbicide Groups 5 and 27 Applied Preemergence and Postemergence. Tyler P. Meyeres*¹, Christopher M. Weber¹, Lily A. Woitaszewski¹, Mithila Jugulam¹,

Posters 2022

Sarah Lancaster¹, Marshall Hay²; ¹Kansas State University, Manhattan, KS, ²Syngenta Crop Protection, Vero Beach, FL (90)

†Impact of Cereal Rye Cover Crop Termination Time, Soybean Planting Time, and Residual Herbicide on Giant Ragweed (*Ambrosia trifida*) Control in Nebraska and Wisconsin.

Guilherme Chudzik^{*1}, Nicholas J. Arneson¹, Ryan P. DeWerff¹, Victor de Sousa Ferreira², Christopher Proctor², David Stoltenberg¹, Rodrigo Werle¹; ¹University of Wisconsin, Madison, WI, ²University of Nebraska, Lincoln, NE (91)

‡The Critical Weed Free Period in Hemp (*Cannabis sativa* L.).

Charles M. Williams^{*1}, Eric J. Miller¹, Matthew P. Spoth², Michael L. Flessner³, Karla L. Gage¹; ¹Southern Illinois University, Carbondale, IL, ²Virginia Polytechnic Institute and State University, Blacksburg, VA, ³Virginia Tech, Blacksburg, VA (92)

Survey of Herbicide Resistance in Pigweed Escapes in North

Dakota. Stephanie DeSimini^{*1}, Zack Bateson², Megan O'Neil², Michael J. Christoffers¹, Joseph T. Ikley¹; ¹North Dakota State University, Fargo, ND, ²National Agricultural Genotyping Center, Fargo, ND (93)

†Plastomes of Dioecious *Amaranthus* Species and Evolutionary Implications in Weed Science. Damilola A. Raiyemo^{*}, Patrick Tranel; University of Illinois, Urbana, IL (94)

‡The Effect of Planting Density and Herbicide Program on Weed Control in Hemp (*Cannabis sativa* L.). Grant D. Isaacs^{*1}, Eric J. Miller¹, Matthew P. Spoth², Michael L. Flessner³, Karla L. Gage¹; ¹Southern Illinois University, Carbondale, IL, ²Virginia Polytechnic Institute and State University, Blacksburg, VA, ³Virginia Tech, Blacksburg, VA (95)

Functional Structure of the Seedbank Shows Weed Trait Gradients in Glyphosate-resistant Cropping Systems in the U.S.

Zhe Ren^{*1}, Bryan G. Young², David J. Gibson³, Karla L. Gage⁴, Micheal Dk Owen⁵, Joseph L. Matthews⁴, David L. Jordan⁶, David R. Shaw⁷, Stephen C. Weller², Robert G. Wilson⁸; ¹Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN, ²Purdue University, West Lafayette, IN, ³Southern Illinois University, Carbondale, IN, ⁴Southern Illinois University, Carbondale, IL, ⁵Iowa State University, Ames, IA, ⁶North Carolina State University, Raleigh, NC, ⁷Mississippi State University, Mississippi State, MS, ⁸University of Nebraska, Scottsbluff, NE (96)

Posters 2022

†Emergence Patterns of Midwestern Shattercane (*Sorghum bicolor*) Biotypes. Emma L. Gaither*, Reid J. Smeda; University of Missouri, Columbia, MO **(97)**

‡Evaluating Establishment and Weed Suppression Potential of Early-season Drill Interseeded Cover Crop into Corn. Leonardo Inveninato Carmona*; University of Nebraska, Lincoln, NE **(98)**

The Effects of Interseeding Winter Wheat on Weed Suppression in Soybean Across Multiple States. Karla L. Gage*¹, Eric J. Miller¹, Nicholas J. Arneson², Anthony F. Dobbels³, Alyssa Essman⁴, Joseph T. Ikley⁵, Prashant Jha⁶, Amit J. Jhala⁷, Mark M. Loux⁴, Christy L. Sprague⁸, Reid J. Smeda⁹, Rodrigo Werle²; ¹Southern Illinois University, Carbondale, IL, ²University of Wisconsin, Madison, WI, ³The Ohio State University, South Charleston, OH, ⁴The Ohio State University, Columbus, OH, ⁵North Dakota State University, Fargo, ND, ⁶Iowa State University, Ames, IA, ⁷University of Nebraska, Lincoln, NE, ⁸Michigan State University, East Lansing, MI, ⁹University of Missouri, Columbia, MO **(99)**

†Evolutionary Stability of Dioecy in the Genus *Amaranthus*. Alexander J. Lopez*¹, Lucas Kopecky Bobadilla², Patrick Tranel¹; ¹University of Illinois, Urbana, IL, ²University of Illinois, Champaign, IL **(100)**

‡Effects of Soybean Chaff Lining on *Amaranthus* spp. Seed Viability. Kylee S. Watkins*¹, Alexander R. Mueth¹, Nicholas J. Arneson², Gabrielle LaBiche³, Vipin Kumar⁴, Travis Legleiter⁵, Rodrigo Werle², Lauren M. Lazaro³, Eric J. Miller¹, Karla L. Gage¹; ¹Southern Illinois University, Carbondale, IL, ²University of Wisconsin, Madison, WI, ³Louisiana State University AgCenter, Baton Rouge, LA, ⁴Kansas State University, Hays, KS, ⁵University of Kentucky, Princeton, KY **(101)**

TUESDAY AFTERNOON DECEMBER 6

Grad Student Luncheon

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

12:00 PM Student Luncheon
Sponsored by Corteva

TUESDAY AFTERNOON DECEMBER 6

ORAL - Agronomic Crops II - Soybeans

LOCATION: Regency D
TIME: 1:30 PM - 5:00 PM
MODERATOR Michael Weber
Bayer Res. & Dev. Services
Indianola, IA

***SPEAKER † GRADUATE CONTEST**

- 1:30 PM †Control of Multiple-Herbicide-Resistant Waterhemp (*Amaranthus tuberculatus*) with Acetochlor-based Tank Mixtures in Soybean.** Hannah E. Symington^{*1}, Nader Soltani¹, Allan Kaastra², David C. Hooker¹, Darren E. Robinson¹, Peter Sikkema¹; ¹University of Guelph, Ridgetown, ON, Canada, ²Bayer Crop Science, Guelph, ON, Canada **(102)**
- 1:45 PM †Planting Soybean Green: Agronomic and Weed Management Benefits and Challenges.** Jose J. Nunes^{*1}, Nicholas J. Arneson¹, Bill Johnson², Bryan G. Young², Joseph T. Ikley³, John M. Wallace⁴, Karla L. Gage⁵, Prashant Jha⁶, Sarah Lancaster⁷, Travis Legleiter⁸, Vipin Kumar⁹, Rodrigo Werle¹; ¹University of Wisconsin, Madison, WI, ²Purdue University, West Lafayette, IN, ³North Dakota State University, Fargo, ND,

Tuesday Papers 2022

⁴Pennsylvania State University, University Park, PA, ⁵Southern Illinois University, Carbondale, IL, ⁶Iowa State University, Ames, IA, ⁷Kansas State University, Manhattan, KS, ⁸University of Kentucky, Princeton, KY, ⁹Kansas State University, Hays, KS **(103)**

- 2:00 PM Soybean and Dicamba: Hormesis or Not.** Luka Milosevic*¹, Jon E. Scott¹, Stevan Knezevic²; ¹University of Nebraska, Lincoln, NE, ²University of Nebraska, Concord, NE **(104)**
- 2:15 PM †Synergistic and Antagonistic Herbicide Interactions for Control of Volunteer Corn in glyphosate/glufosinate/2,4-D-resistant Soybean.** Emily Duenk*¹, Nader Soltani¹, Robert T. Miller², David C. Hooker¹, Darren E. Robinson¹, Peter H. Sikkema¹; ¹University of Guelph, Ridgetown, ON, Canada, ²BASF, Mississauga, ON, Canada **(105)**
- 2:30 PM †Survey of Corn-Soybean Weed Management During the 2021 Growing Season and Current Stakeholder Perception on Targeted Spraying Technologies.** Zaim Ugljic*¹, Maxwell Coura Oliveira¹, Anita Dille², Chris Proctor³, Rodrigo Werle¹; ¹University of Wisconsin, Madison, WI, ²Kansas State University, Manhattan, KS, ³University of Nebraska, Lincoln, NE **(106)**
- 2:45 PM Effects of Micro-Rates of 2,4-D and Dicamba on Sensitive Soybeans.** Stevan Knezevic*¹, Jon E. Scott², Luka Milosevic²; ¹University of Nebraska, Concord, NE, ²University of Nebraska, Lincoln, NE **(107)**
- 3:00 PM †Impact of Planting Date and Soybean Row Width on Weed Suppression and Yield.** Matthew S. Goddard*, Christy L. Sprague, Maninderpal Singh; Michigan State University, East Lansing, MI **(108)**
- 3:15 PM Break**
- 3:30 PM †Influence of Glufosinate Tank-mix Combinations with PPO-inhibitors on Waterhemp Control and Soybean Development and Yield.** Nikola Arsenijevic*¹, Nicholas J.

Tuesday Papers 2022

Arneson¹, Ryan P. DeWerff¹, Daniel H. Smith¹,
Rodrigo Werle¹, Mark L. Bernards²; ¹University of
Wisconsin, Madison, WI, ²Western Illinois
University, Macomb, IL **(109)**

- 3:45 PM †Optimizing Dicamba and Glufosinate Application Timings for Weed Control in Xtendflex Soybeans in Central Kansas.** Monica R. Marrs^{*1}, Vipin Kumar², Anita Dille¹, Rui Liu², Augustine Obour²; ¹Kansas State University, Manhattan, KS, ²Kansas State University, Hays, KS **(110)**
- 4:00 PM Comparisons of Pre-emergence Herbicide Programs with and without XtendiMax^{&Reg;} Herbicide with VaporGrip^{&Reg;} Technology in Dicamba-Tolerant Soybean Systems.** Devin Hammer^{*1}, Cody Evans², Neha Rana¹, Ananda Datta¹; ¹Bayer CropScience, St. Louis, MO, ²Bayer CropScience, Franklin, IL **(111)**
- 4:15 PM †Integrated Management of Giant Ragweed in Soybean.** Venkatanaga Shiva Datta Kumar Sharma Chiruvelli^{*1}, Debalin Sarangi¹, Thomas J. Peters², Gregg A. Johnston¹; ¹University of Minnesota, St Paul, MN, ²North Dakota State University, Fargo, ND **(112)**
- 4:30 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 Sarangi¹; ¹University of Minnesota, St. Paul, MN, ²North Dakota State University, Fargo, ND, ³University of Minnesota, Rochester, MN **(113)**
- 4:45 PM Business Meeting**

TUESDAY AFTERNOON DECEMBER 6

ORAL - Equipment and Application Methods

LOCATION: Regency C
TIME: 1:30 PM - 5:00 PM
MODERATOR: Matt Faletti
Precision Lab
Waukegan, IL

***SPEAKER † GRADUATE CONTEST**

- 1:30 PM †Evaluating Even Flat-fan Nozzle Coverage for Spot Spraying Applications with a One or Two-boom System.** Thiago H. Vitti*; University of Nebraska, Lincoln, NE **(114)**
- 1:45 PM Setting the Standard for Quantitative Data Collection with Tractor-Mounted Sensor Technology in Agriculture.** Lauren M. Lazaro*, Scott Brown, Jesaelen Gizotti de Moraes, Michael Houston, William L. Patzoldt; Blue River Technology, Sunnyvale, CA **(115)**
- 2:00 PM †Multi-State Evaluation of Electrocutation for Control of Escaped Weeds in Soybean.** Jacob E. Vaughn*¹, Karla L. Gage², Prashant Jha³, Amit J. Jhala⁴, Sarah Lancaster⁵, Bryan G. Young⁶, Kevin W. Bradley¹; ¹University of Missouri, Columbia, MO, ²Southern Illinois University, Carbondale, IL, ³Iowa State University, Ames, IA, ⁴University of Nebraska, Lincoln, NE, ⁵Kansas State University, Manhattan, KS, ⁶Purdue University, West Lafayette, IN **(116)**
- 2:15 PM Comparison of Banded and Broadcast Herbicide Applications in Soybean with a Cereal Rye Cover Crop.** Eric J. Miller*, Alex Mueth, Karla L. Gage; Southern Illinois University, Carbondale, IL **(117)**
- 2:30 PM †Evaluating the Control of Italian Ryegrass (*Lolium perenne* spp. *Multiflorum*) Using a Seed Control Unit (SCU) in Winter Wheat at Harvest.** Hayden S. Love*¹, Travis Legleiter²; ¹The

Tuesday Papers 2022

University of Kentucky, Lexington, KY, ²University of Kentucky, Princeton, KY (118)

- 2:45 PM Impact of Weed Electrocutation on Earthworm Survival and Soil Microflora and Fauna.** Haylee E. Schreier*, Kevin W. Bradley; University of Missouri, Columbia, MO (119)
- 3:00 PM †Impact of Herbicide Application by UAV on *Phragmites australis*.** Emma L. Gaither*, Reid J. Smeda, Sarah E. Dixon; University of Missouri, Columbia, MO (120)
- 3:15 PM Break**
- 3:30 PM Utilizing UAV Indices to Measure Weed Control Efficacy.** Lee A. Boles*, Ryan J. Edwards; WinField United, River Falls, WI (121)
- 3:45 PM †Sources of Spatial Soil Data for Developing Variable-Rate Residual Herbicide Management Zones.** Rose V. Vagedes*¹, Jason Ackerson², William G. Johnson¹, Bryan G. Young¹; ¹Purdue University, West Lafayette, IN, ²Soil Health Institute, West Lafayette, IN (122)
- 4:00 PM †Comparison of Weed Control Outcomes When Using Precision Sprayers Versus Traditional Approaches.** Isaac H. Barnhart*¹, Greg Kruger², Calvin A. Miller³, Chris Proctor⁴, Rodrigo Werle⁵, Anita Dille¹; ¹Kansas State University, Manhattan, KS, ²University of Nebraska, North Platte, NE, ³BASF, Seymour, IL, ⁴University of Nebraska, Lincoln, NE, ⁵University of Wisconsin, Madison, WI (123)
- 4:15 PM Effect of Adjuvants on Canopy Deposition with a UAV Spray Platform.** Ryan J. Edwards*¹, Lee A. Boles¹, Gregory K. Dahl², Steven A. Fredericks¹; ¹WinField United, River Falls, WI, ²Winfield United, Eagan, MN (124)
- 4:30 PM Evaluation of Drift Reduction Adjuvants Via Biological Injury on Soybeans from Simulated Dicamba Drift in a Low-speed Wind Tunnel.** Aszhia K. Albrecht*¹, Elizabeth R. Alonzi¹, Anderson Weber¹, Joshua J. Skelton², Steven A.

Tuesday Papers 2022

Fredericks¹; ¹Winfield United, River Falls, WI,

²WinField United, Saint Paul, MN (125)

4:45 PM A Novel Tool for Improving Selection of Nozzles & Adjuvants, CPDA's New *Application Enhancement Certification* Program. James Reiss*; James Reiss, Waukegan, IL (126)

5:00 PM Business Meeting

TUESDAY AFTERNOON DECEMBER 6

ORAL - Weed Biology, Ecology, Management

LOCATION: Regency F
TIME: 1:30 PM - 4:45 PM
MODERATOR: Debalin Sarangi
 University of Minnesota
 St. Paul, MN

***SPEAKER † GRADUATE CONTEST**

1:30 PM †Characterization of Six Herbicide Resistance Traits in an Indiana Waterhemp Population. Claudia R. Bland*, Bryan G. Young, William G. Johnson; Purdue University, West Lafayette, IN (127)

1:45 PM †Effect of Soil Microbial Activity on the Degradation of Soil Residual Herbicides in Cover Cropping Systems. Lucas Oliveira Ribeiro Maia*, Bryan G. Young, Shalamar Armstrong, Eileen Kladvko, William G. Johnson; Purdue University, West Lafayette, IN (128)

2:00 PM †Assessment of Non-target Site Resistance to 2,4-D, Atrazine, and Mesotrione in Waterhemp Accessions from Wisconsin and Their Response to Climate Warming. Felipe de Andrade Faleco*, Laura D. Rodriguez Baquero, Nicholas J. Arneson, David E. Stoltenberg, Rodrigo Werle; University of Wisconsin, Madison, WI (129)

Tuesday Papers 2022

- 2:15 PM** **Genomic Profiling of Dioecious *Amaranthus* Species Reveals Genes with Roles in Sex Function.** Damilola A. Raiyemo*¹, Lucas Kopecky Bobadilla², Patrick Tranel¹; ¹University of Illinois, Urbana, IL, ²University of Illinois, Champaign, IL **(130)**
- 2:30 PM** **†Water Use Characteristics of Weeds: A Global Systematic Review, Best Practices, and Future Directions.** Mandeep Singh*¹, Meetpal S. Kukal², Suat Irmak², Amit J. Jhala¹; ¹University of Nebraska, Lincoln, NE, ²Pennsylvania State University, University Park, PA **(131)**
- 2:45 PM** **†Effect of Cereal Rye Cover Crop on Seed Viability of *Amaranthus* spp.** Lily A. Woitaszewski*¹, Anita Dille¹, Mandy Bish², Kevin W. Bradley², Joseph Ikley³, William Johnson⁴, Rodrigo Werle⁵, Sarah Lancaster¹; ¹Kansas State University, Manhattan, KS, ²University of Missouri, Columbia, MO, ³North Dakota State University, Fargo, ND, ⁴Purdue University, West Lafayette, IN, ⁵University of Wisconsin, Madison, WI **(132)**
- 3:00 PM** **†Cereal Rye Termination Method Effects on Horse Weed Management in Soybean.** Claudia R. Walz*, Christy L. Sprague; Michigan State University, East Lansing, MI **(133)**
- 3:15 PM** **Break**
- 3:30 PM** **†Female vs Male Palmer Amaranth: How Can We Explore Gender's Biology as a Management Approach?** Edinaldo A. Borgato*, Eduardo C. Rudell, Mithila Jugulam, Anita Dille; Kansas State University, Manhattan, KS **(134)**
- 3:45 PM** **†Evaluating the Competitive Ability of Clopyralid Resistant Common Ragweed (*Ambrosia artemisiifolia*).** Nash D. Hart*¹, Erin E. Burns²; ¹Michigan State University, Durand, MI, ²Michigan State University, East Lansing, MI **(135)**
- 4:00 PM** **Non-target Site Glyphosate Resistance: Movement Within a Johnsongrass (*Sorghum halepense*) Population from Missouri.** Sarah E.

Tuesday Papers 2022

Dixon*, Reid J. Smeda; University of Missouri, Columbia, MO **(136)**

- 4:15 PM †Emergence, Growth, and Flowering of Palmer Amaranth Cohorts.** Ethan C. Denson*; Kansas State University, Manhattan, KS **(137)**
- 4:30 PM †Effect of Cereal Rye Cover Crop Seeding Rate and Termination Timing on Weed Management in Corn-Soybean Rotation in Minnesota.** Eric Y. Yu*¹, Axel Garcia y Garcia¹, Lizabeth Stahl², Ryan P. Miller³, Gregg Johnson¹, Ce Yang¹, William Lazarus¹, Debalin Sarangi¹; ¹University of Minnesota, St. Paul, MN, ²University of Minnesota, Worthington, MN, ³University of Minnesota, Rochester, MN **(138)**
- 4:45 PM †Assessing the Impact of Controlled-release Fertilizer Placements on Liverwort Growth, Reproduction, and its Competitiveness with Ornamentals in Container Production.** Manjot Kaur Sidhu*, Debalina Saha; Michigan State University, East Lansing, MI **(139)**
- 5:00 PM Business Meeting**

WEDNESDAY MORNING DECEMBER 7

Women in Weed Science Breakfast

LOCATION: 18th Floor, Gateway East

TIME: 6:30 AM - 8:45 AM

***SPEAKER**

**7:00 AM Women in Weed Science
Sponsored by Bayer**

ORAL - Extension

LOCATION: Regency B

TIME: 9:00 AM - 9:30 AM

MODERATOR: Prashant Jha
Iowa State University
Ames, IA

***SPEAKER**

**9:00 AM A Year without Glyphosate: How Two
Conventional Farmers' Concerns Led to Timely
Weed Management Recommendations in
Wisconsin Corn Production. Nicholas J. Arneson*,
Ryan P. DeWerff, Ahmadreza Mobli, Rodrigo
Werle; University of Wisconsin, Madison, WI
(140)**

**9:15 AM Symptoms of Synthetic Auxin Herbicides on
Dicamba-resistant Soybean. Amit J. Jhala*;
University of Nebraska, Lincoln, NE (141)**

WEDNESDAY MORNING DECEMBER 7

VIDEO - Extension/Education

LOCATION: Regency B
TIME: 9:30 AM - 9:50 AM
MODERATOR: Prashant Jha
Iowa State University
Ames, IA

***SPEAKER † GRADUATE CONTEST**

- 9:30 AM †Using Black Soldier Fly Larvae Composting to Reduce Weed Seed Germination.** Jeanine Arana*¹, Stephen L. Meyers¹, Luz Aide Cardona Giraldo¹, Nathaly Belen Vargas Arroyo¹, Laura D. Rodriguez Baquero²; ¹Purdue University, West Lafayette, IN, ²University of Wisconsin, Madison, WI **(142)**
- 9:35 AM †Evaluate Herbicide Programs for Weed Control in Dicamba/glufosinate/glyphosate Soybean.** Ramandeep Kaur*; University of Nebraska, Lincoln, NE **(143)**
- 9:40 AM †Concerned About Herbicide Carryover Impacting Cover Crop Establishment? Try a Bioassay!** Tatiane Severo Silva*¹, Nicholas J. Arneson¹, Ryan P. DeWerff¹, Daniel H. Smith¹, Daniel Valadão Silva², Rodrigo Werle¹; ¹University of Wisconsin, Madison, WI, ²Federal Rural University of the Semi-Arid Region, Mossoró, Brazil **(144)**
- 9:45 AM †Challenges and Opportunities for Weed Management in Organic and Conventional Hopyards.** Milos Zaric*; University of Nebraska, North Platte, NE **(145)**

WEDNESDAY MORNING DECEMBER 7

VIDEO - Research

LOCATION: Regency B
TIME: 9:50 AM - 9:55 AM
MODERATOR: Prashant Jha
Iowa State University
Ames, IA

***SPEAKER † GRADUATE CONTEST**

9:50 AM †Herbicide Interactions of Quizalofop, 2,4-D Choline, and Glufosinate for Control of Glyphosate/glufosinate-resistant Volunteer Corn in Corn. Mandeep Singh^{*1}, John Lindquist¹, Stevan Knezevic², Suat Irmak³, Vipin Kumar⁴, Amit J. Jhala¹; ¹University of Nebraska, Lincoln, NE, ²University of Nebraska, Concord, NE, ³Pennsylvania State University, University Park, PA, ⁴Kansas State University, Hays, KS **(146)**

9:55 AM Business Meeting

WEDNESDAY MORNING DECEMBER 7

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

LOCATION: Regency B
TIME: 10:15 AM - 11:15 PM
MODERATOR: Steve Valenti
Bayer Crop Science
Fargo, ND

***SPEAKER**

10:15 AM Evaluation of Herbicides for Control of Snow-on-the-Mountain in Kansas Pastures. Walter H. Fick^{*1}, Rod Schaub², Scott Flynn³; ¹Kansas State University, Manhattan, KS, ²Kansas State

Wednesday Papers 2022

University, Lyndon, KS, ³Corteva Agriscience,
Indianapolis, IN (147)

10:30 AM Can Cover Crops, Mowing or Herbicides Improve Establishment of Forbs in Conservation Plantings? Mark Renz*; University of Wisconsin, Madison, WI (148)

10:45 AM Reducing Tick Populations in Wisconsin Forests by Managing Japanese Barberry (*Berberis thunbergii*) Infestations. Mark J. Renz*; University of Wisconsin, Madison, WI (149)

11:00 AM Business Meeting

WEDNESDAY MORNING DECEMBER 7

ORAL - Horticulture and Specialty Crops

LOCATION: Regency E
TIME: 9:00 AM - 11:15 AM
MODERATOR: Nathan H. Haugrud
North Dakota State University
Fargo, ND

***SPEAKER † GRADUATE CONTEST**

9:00 AM IR-4 Weed Science Update - Food Crops. Roger B. Batts*, Jerry Baron, Venkat Pedibhotla; North Carolina State University, Raleigh, NC (150)

9:15 AM †Newly Planted Peppermint Response to S-Metolachlor. Jeanine Arana*, Stephen L. Meyers, Brandi C. Woolam; Purdue University, West Lafayette, IN (151)

9:30 AM S-Metolachlor- an Effective Option for Transplanted Bulbing Onions on Small Farms. Stephen L. Meyers*, Jeanine Arana, Emmanuel G. Cooper, Josue D. Cerritos, Luis F. Medina; Purdue University, West Lafayette, IN (152)

Wednesday Papers 2022

- 9:45 AM** **Our Experiences with Acifluorfen in Sugarbeet.**
Thomas J. Peters*, Alexa L. Lystad, Emma L. Burt;
North Dakota State University, Fargo, ND **(153)**
- 10:00 AM** **Break**
- 10:15 AM** **Group 14 and 15 Herbicide Safety and Efficacy in Pinto Bean.** Nathan H. Haugrud*, Joseph T. Ikley; North Dakota State University, Fargo, ND **(154)**
- 10:30 AM** **Volunteer Hemp Resilience to Spring Burndown Herbicide Application in Soybean and Corn.**
Milos Zaric*¹, Kasey P. Schroeder¹, Thiago H. Vitti², Christopher Proctor², Jeffrey A. Golus¹, Sam E. Wortman², Kelly W. Bruns¹; ¹University of Nebraska, North Platte, NE, ²University of Nebraska, Lincoln, NE **(155)**
- 10:45 AM** **Is a Critical Weed Free Period Needed for Transplanted Floral Hemp?** Harlene M. Hatterman-Valenti*, Collin M. Auwarter; North Dakota State University, Fargo, ND **(156)**
- 11:00 AM** **Business Meeting**

WEDNESDAY MORNING DECEMBER 7

ORAL - Herbicide Physiology & Molecular Biology

LOCATION: Regency F
TIME: 9:00 AM - 11:15 AM
MODERATOR: Eric L. Patterson
 Michigan State University
 East Lansing, MI

***SPEAKER † GRADUATE CONTEST**

- 9:00 AM** **†Halauxifen-methyl Metabolism in *Triticum aestivum* is Regulated by Genes on Group 5 Chromosomes.** Olivia A. Landau*¹, Jeanafior Crystal T. Concepcion¹, Norbert M. Satchivi², Dean

Wednesday Papers 2022

E. Riechers¹; ¹University of Illinois, Urbana, IL,

²Corteva Agriscience, Indianapolis, IN (157)

- 9:15 AM** †**Candidate Genes for Gender Determination in Palmer Amaranth (*Amaranthus palmeri*): the First Step Towards a Genetic Weed Control Strategy.** Lucas Kopecky Bobadilla*¹, YouSoon Baek², Patrick Tranel²; ¹University of Illinois, Champaign, IL, ²University of Illinois, Urbana, IL (158)
- 9:30 AM** †**An Epidemiological Study of *Conyza canadensis*: Linking Management History to Herbicide Resistance.** Juliano Sulzback*¹, Eric L. Patterson², Erin E. Burns²; ¹Michigan State Univeristy, East Lansing, MI, ²Michigan State University, East Lansing, MI (159)
- 9:45 AM** †**PPO-inhibitor Metabolism and Inheritance of Resistance in Palmer Amaranth from Kansas.** Ednaldo A. Borgato*, Aarthiy Thiagarayaselvam, Lily A. Woitaszewski, Eduardo C. Rudell, Manogna Devi Adari, Anita Dille, Mithila Jugulam; Kansas State University, Manhattan, KS (160)
- 10:00 AM** Break
- 10:15 AM** †**Subtelomeric Rearrangements Cause Glyphosate Resistance in *Eleusine indica*.** Nicholas A. Johnson*¹, Nathan D. Hall¹, Qin Yu², Chun Zhang³, Eric L. Patterson¹; ¹Michigan State University, East Lansing, MI, ²University of Western Australia, Perth, Australia, ³Guangdong Academy of Agricultural Sciences, Guangzhou, China (161)
- 10:30 AM** †**Confirmation of PPO Inhibitor Resistant Waterhemp (*Amaranthus tuberculatus*) Lacking Resistance Conferring Target Site Mutations.** Jesse A. Haarmann*¹, Bryan G. Young¹, William G. Johnson²; ¹Purdue University, West Lafayette, IN, ²Purdue University, West Lafayette In, IN (162)
- 10:45 AM** †**Mesotrione Detoxification in Multiple-resistant Palmer Amaranth (*Amaranthus palmeri*) Populations.** Jeanafior Crystal T. Concepcion*¹,

Wednesday Papers 2022

Shiv S. Kaundun², Autumn N. Brandenburg¹,
Alison C. Ross¹, Noeleen K. Brown¹, James A.
Morris², Sarah-Jane Hutchings², Dean E.
Riechers¹; ¹University of Illinois, Urbana, IL,
²Syngenta Crop Protection, Bracknell, United
Kingdom **(163)**

**11:00 AM Comparative Genomics of Kochia and Russian
Thistle.** Philip Westra*¹, Todd A. Gaines¹, Eric
Patterson²; ¹Colorado State University, Fort
Collins, CO, ²Michigan State University, East
Lansing, MI **(164)**

11:15 AM Business Meeting

WEDNESDAY MORNING DECEMBER 7

ORAL - Agronomic Crops I - Corn

LOCATION: Regency A
TIME: 9:00 AM - 11:15 AM
MODERATOR: Ryan D. Lins
Syngenta Crop Protection, LLC
Rochester, MN

***SPEAKER † GRADUATE CONTEST**

**9:00 AM †Herbicide Options for Control of Multiple
Herbicide-resistant Palmer Amaranth
(*Amaranthus palmeri*) in Corn Resistant to 2,4-D
Choline/glufosinate/glyphosate.** Ramandeep
Kaur*, Stevan Knezevic, Parminder Chahal, Nevin
Lawrence, Yeyin Shi, Rachana Jhala, Amit J. Jhala;
University of Nebraska, Lincoln, NE **(165)**

**9:15 AM †Does Spray Volume Effect Residual Herbicide
Efficacy in Corn?** Tyler P. Meyeres*¹, Christopher
M. Weber¹, Christopher Mayo², Sarah Lancaster¹;
¹Kansas State University, Manhattan, KS, ²Bayer
Crop Science, Salina, KS **(166)**

**9:30 AM Efficacy Comparison of Multiple Herbicide
Programs in Short-stature and Traditional Tall
Corn.** Ross A. Recker*¹, Devin Hammer², John

Wednesday Papers 2022

Buol², Patrick Miner³, Ananda Datta²; ¹Bayer Crop Science, Smithton, IL, ²Bayer CropScience, St. Louis, MO, ³Bayer Crop Science, Tripoli, IA **(167)**

- 9:45 AM** **†Selecting PRE-emergence Herbicides for Effective Soil Residual Weed Control and Successful Establishment of Interseeded Cover Crops in Wisconsin Corn Production Systems; What a Challenge!** Tatiane Severo Silva*¹, Nicholas J. Arneson¹, Ryan P. DeWerff¹, Daniel H. Smith¹, Daniel Valadão Silva², Rodrigo Werle¹; ¹University of Wisconsin, Madison, WI, ²Federal Rural University of the Semi-Arid Region, Mossoro, Brazil **(168)**
- 10:00 AM** **Break**
- 10:15 AM** **Simulating Postemergence Optical Spot Spraying Applications Following Acuron Applied Preemergence.** R Joseph Wuerffel*¹, Jason W. Adams², Rob Lind³, Taylor Glenn³, David Belles³; ¹Syngenta Crop Protection, Gerald, MO, ²Syngenta Crop Protection, Vero Beach, FL, ³Syngenta Crop Protection, Greensboro, NC **(169)**
- 10:30 AM** **A23980B: Exceptional Corn Weed Control from Four Complimentary Active Ingredients.** Seth A. Strom*¹, Tom Beckett², Mark Kitt²; ¹Syngenta Crop Protection, Monticello, IL, ²Syngenta Crop Protection, Greensboro, NC **(170)**
- 10:45 AM** **A23980B: A Step Change for Residual Weed Control in Corn.** Scott E. Cully*¹, Mark J. Kitt², Thomas H. Beckett²; ¹Syngenta Crop Protection, Marion, IL, ²Syngenta Crop Protection, Greensboro, NC **(171)**
- 11:00 AM** **Maverick™ : Valent's New Broad-spectrum Corn Herbicide with Application Flexibility.** Trevor D. Israel*¹, Jonathon Kohrt², Ron E. Estes³, Garrison J. Gundy⁴, Randall L. Landry³, Eric Ott⁵, Chad L. Smith⁶, John A. Pawlak⁷; ¹Valent USA, Harrisburg, SD, ²Valent USA, West Des Moines, IA, ³Valent USA, Seymour, IL, ⁴Valent USA, Mcpherson, KS, ⁵Valent USA, Greenfield, IN, ⁶Valent USA, Hallsville, MO, ⁷Valent USA, Spring Lake, MI **(172)**

WEDNESDAY MORNING DECEMBER 7

Society Luncheon

LOCATION: Regency CD
TIME: 12:00PM - 1:15 PM

***SPEAKER**

12:00 PM NCWSS Awards Luncheon

WEDNESDAY AFTERNOON DECEMBER 7

**SYMPOSIUM - New Frontiers in Application
Technology**

LOCATION: Regency EF
TIME: 1:30 PM - 4:45 PM
MODERATOR: Greg Kruger
BASF Corp.
Durham, NC

***SPEAKER**

- 1:30 PM See & Spray™ Ultimate - A New Tool for Weed Management in Agronomic Crops.** William L. Patzoldt^{*1}, Scott Brown¹, Lauren M. Lazaro¹, Jesaelen G. Moraes¹, Michael M. Houston¹, Gaylia C. Ostermeier², Chad Yagow³; ¹Blue River Technology, Sunnyvale, CA, ²Deere and Company, Urbandale, IA, ³Deere and Company, Champaign, IL **(173)**
- 1:50 PM BBSF Smart Sprayer: Combining Equipment and Digital.** Greg Kruger^{*}; BASF Corp., Durham, NC **(174)**
- 2:10 PM Agronomic Strengths, Weaknesses, and Opportunities for Spray Drones.** Trenton Houston^{*}; Bayer Crop Science, Gothenburg, NE **(175)**

Wednesday Papers 2022

- 2:30 PM** **Grower Perspectives on the Emerging Technology for Pesticide Applications.** Aaron Studebaker*; Grower, Davey, NE **(176)**
- 2:40 PM** **Top 3 Reasons Why I Hate Custom Application and So Will You!** Pete Cullan*; Country Partners Cooperative, Gothenburg, NE **(177)**
- 2:50 PM** **The Importance of Guidance on the Correct Use of New Technologies and How it Will Impact Product Design.** Brett A. Martin*, Marcella G. Wehrle; Corteva, Indianapolis, IN **(178)**
- 3:00 PM** **Advancements in Precision Application and Site-Specific Weed Management Technologies: Will These be the Major Frameshift Change We've Been Waiting For?** Bryan G. Young*; Purdue University, Brookston, IN **(179)**
- 3:30 PM** **Break**
- 3:45 PM** **Regulatory Landscape of UAV Pesticide Applications in North America.** Jane Teng*; Bayer Crop Science, Chesterfield, MO **(180)**
- 4:05 PM** **Panel discussion**
- 4:25 PM** **Data, Data, Data; What Do We Do with the Data?** Andrew D. Hunt*, Erik Hass; BASF Corp., Durham, NC **(181)**
- 4:45 PM** **Opportunities for Site-specific Weed Management: BMP Considerations for Weed Control with Precision Application Equipment.** Anita Dille*; Kansas State University, Manhattan, KS **(182)**

WEDNESDAY AFTERNOON DECEMBER 7

SYMPOSIUM - Impact of the Endangered Species Act on Herbicide Registration and Regulation

LOCATION: Regency B
TIME: 1:30 PM - 3:55 PM
MODERATOR: Reid J. Smeda
University of Missouri
Columbia, MO

***SPEAKER**

- 1:30 PM Endangered Species Act and Herbicides; Who's Endangered?** Reid J. Smeda*¹, William G. Johnson²; ¹University of Missouri, Columbia, MO, ²Purdue University, West Lafayette, IN **(195)**
- 1:40 PM Regulatory Considerations for Current and New Herbicide Registrations.** Reuben D. Baris*¹, David M. Simpson²; ¹Corteva Agriscience, Indianapolis, IN, ²Corteva, Indianapolis, IN **(183)**
- 2:00 PM Monarchs, Milkweeds and the Endangered Species Act.** Robert G. Hartzler*, Steven P. Bradbury; Iowa State University, Ames, IA **(184)**
- 2:20 PM Endangered Species Act Regulations: Perceptions and Reactions in the Mid-South.** Thomas R. Butts*; University of Arkansas System Division of Agriculture, Lonoke, AR **(185)**
- 2:40 PM Thoughts from the Field Around ESA.** Amy Asmus*; Asmus Farm Supply, Inc, Rake, IA **(186)**
- 3:00 PM Did State Pesticide Regulatory Agencies See ESA Label Mitigation Measures Coming & Do They Have a Plan for Ensuring Compliance?** David Scott*; Office of IN State Chemist, West Lafayette, IN **(187)**
- 3:20 PM Break**

Wednesday Papers 2022

- 3:30 PM** **Endangered Species Act: Thoughts on How and Why Labels Will Change.** Bill Chism*; Retired, EPA Office of Pesticide Programs, Xx, IN **(188)**
- 3:50 PM** **Panel discussion**

WEDNESDAY AFTERNOON DECEMBER 7

ORAL - Agronomic Crops I - Corn

LOCATION: Regency A
TIME: 1:30 PM - 3:15 PM
MODERATOR: Ryan D. Lins
 Syngenta Crop Protection, LLC
 Rochester, MN

***SPEAKER † GRADUATE CONTEST**

- 1:30 PM** **Diflufenican: a Tool for Managing *Amaranthus* Species in Corn and Soybean Cropping Systems.** John Buol*, Carl Coburn, Richard Leitz, Eric Riley, Ananda Datta; Bayer Crop Science, St. Louis, MO **(189)**
- 1:45 PM** **Waterhemp Yield Interference in North Dakota Corn and Soybean.** Quincy D. Law*, Joseph T. Ikley; North Dakota State University, Fargo, ND **(190)**
- 2:00 PM** **A New Postemergence Herbicide for Weed Management in Corn.** Kristin K. Rosenbaum*¹, Kelly A. Backscheider², Kevin Johnson³, Lowell Sandell⁴; ¹Corteva Agriscience, Coffey, MO, ²Corteva Agriscience, Franklin, IN, ³Corteva Agriscience, Lafayette, IN, ⁴Corteva Agriscience, Ankeny, IA **(191)**
- 2:15 PM** **Fitting Pennycress Grown as a Cash Cover Crop into a Corn and Soybean Rotation - Herbicide Considerations.** Mark L. Bernards*, Brent S. Heaton; Western Illinois University, Macomb, IL **(192)**

Wednesday Papers 2022

2:30 PM Factors Influencing See & Spray™ Weed Management in Corn Production. William L. Patzoldt*¹, Michael M. Houston¹, Bryan G. Young², Marcelo Zimmer², Aaron G. Hager³, Jason W. Niekamp³, Jasmine M. Mausbach³, Lauren M. Lazaro¹; ¹Blue River Technology, Sunnyvale, CA, ²Purdue University, West Lafayette, IN, ³University of Illinois, Urbana, IL **(193)**

2:45 PM Resicore XL Herbicide for Weed Control in Corn. David M. Simpson¹, Kristin K. Rosenbaum², Kelly A. Backscheider³, David H. Johnson⁴, Kevin D. Johnson*⁵; ¹Corteva Agriscience, Indianapolis, IN, ²Corteva Agriscience, Coffey, MO, ³Corteva Agriscience, Franklin, IN, ⁴Corteva Agriscience, St. Paul, MN, ⁵Corteva Agriscience, Lafayette, IN **(194)**

3:00 PM Business Meeting

NCWSS Society Social

Sponsored by the Sustaining Members – Open to all attendees.

Graduate and Undergraduate Paper and Poster Awards

5:30 - 7:00 pm

Regency C

North Central Weed Science Society Information **Industry Breakfast (Tickets Required)**

LOCATION: Regency AB
TIME: 07:00 AM – 8:15 AM
MODERATOR: Ryan Henry

07:30 AM It's Corn: Beyond Just Feel-Good & Onward to Forward-Thinking. Robyn Allscheid, Director of Research and Productivity, National Corn Growers Association

What's New in Industry?

LOCATION: Regency D
TIME: 08:30 AM – 10:00 AM
MODERATOR: Ryan Henry

8:30 AM What's New in Industry?

10:00 AM Business Meeting

2022 Officers/Executive Committee

President

David Simpson	Corteva Agriscience 317-337-3959 david.simpson@corteva.com
---------------	--

President-Elect

Reid Smeda	University of Missouri 573-882-1329 smedar@missouri.edu
------------	---

Vice-President

Dawn Refsell	Corteva Agriscience 515-201-7238 dawn.refsell@corteva.com
--------------	---

Past President

Harlene Hatterman-Valenti	North Dakota State University 701-353-8536 h.hatterman.Valenti@ndsu.edu
---------------------------	---

Secretary/Treasurer

Amit Jhala	University of Nebraska-Lincoln 402-472-1534 Amit.jhala@unl.edu
------------	--

Editor, NCWSS Proceedings

Joe Wuerffel	Syngenta 618-363-6231 Joe.wuerffel@syngenta.com
--------------	---

Editor, NCWSS Communications

Joe Ikley	North Dakota State University 701-231-8157 joseph.ikley@ndsu.edu
-----------	--

WSSA Representative

Brett Miler	Syngenta 701-318-8957 Brett.miller@syngenta.com
-------------	---

CAST Representative

John Hinz	Bayer 515-290-4810 John.hinz@bayer.com
-----------	--

Executive Secretary

Kelley Mazur	Interactive Management, Inc. 303-327-8016 kelley@imigroup.org info@ncwss.org
--------------	---

North Central Weed Science Society Information

Directors at Large

Prashant Jha	Extension 406-647-1427 pjha@iastate.edu
Monica Marrs	Graduate Students 720-320-9441 monmarrs@ksu.edu
Ryan Henry	Industry 308-520-2301 Ryan.henry@upl-ltd.com
Debalin Sarangi	Resident Education 402-416-6647 dsarangi@umn.edu
Sarah Lancaster	Strategic Planning (2022) 785-532-7240 slancaster@ksu.edu
Travis Legleiter	Eastern (2024) 859-562-1323 travis.legleiter@uky.edu
Dan Smith	Central (2024) 608-219-5170 dhsmith@wisc.edu
Trevor Israel	Western (2024) 605-679-0297 trevor.israel@valent.com

NCWSS Interest Group Committees

Extension

Prashant Jha, Chair	406-647-1427	pjha@iastate.edu
Nathaniel Drewitz, Vice Chair	608-515-4414	ndrewitz@umn.edu
Nicholas "Nick" Arneson, Past Chair	402-676-1618	njarneson@wisc.edu

Graduate Student Committee

Monica Marrs, Chair		monmarrs@ksu.edu
Lily Woitaszewski, Vice Chair	308-390-8954	Lwoitaszewski2@ksu.edu
Ednaldo A. Borgato, Past Chair	785-473-8921	bortgato@ksu.edu

Industry

Ryan Henry, Chair	308-520-2301	ryan.henry@upl-ltd.com
Seth Strom, Vice Chair	217-480-7820	Seth.strom@syngenta.com
Lowell Sandell, Past Chair	402-432-2683	Lowell.Sandell@valent.com

Resident Education

Debalin Sarangi, Chair	612-625-8130	dsarangi@umn.edu
Travis Legleiter, Vice Chair	859-562-1323	travis.legleiter@uky.edu
Devin Hammer, Past Chair	217-821-3426	devin.hammer@bayer.com
Nicholas "Nick" Arneson, Second Chair	402-676-1618	njarneson@wic.edu

Summer Contest Subcommittee of

Resident Education

Dawn Refsell, Host	515-201-7238	dawn.refsell@corteva.com
Debalin Sarangi, Chair	612-625-8130	dsarangi@umn.edu
Travis Legleiter, Vice Chair	859-562-1323	travis.legleiter@uky.edu

North Central Weed Science Society Information

Strategic Planning

Sarah Lancaster, Chair (KS)	636-248-2482	slancaster@ksu.edu
Travis Legleiter (KY) (Eastern)	859-562-1323	travis.legleiter@uky.edu
Trevor Israel (SD)(Western)	605-679-0297	trevor.israel@velent.com
Dan Smith (WI)(Central)	608-219-5170	dhsmith@wisc.edu
Prashant Jha (IA)	406-647-1427	pjha@iastate.edu
Cody Evans (IL)	217-204-6587	Cody.evans@bayer.com
Debalin Sarangi (MN)	612-625-8130	dsarangi@umn.edu
Chad Smith (MO)	662-379-3111	chad.smith@valent.com
John Schramski (MI)	517-388-7502	John.schramski@bayer.com
Stephen Meyers (IN)	812-314-5973	slmeyers@purdue.edu
Nader Soltani (ON)	519-902-1221	soltanin@uoguelph.ca
Alyssa Lamb (OH)	740-207-5096	lamb.223@osu.edu
Aaron Franssen (NE)	402-209-3618	aaron.franssen@syngenta.com
Angela Kazmierczak (ND)	701-205-9423	angela.kazmierczak@bayer.com

NCWSS Standing Committees

Strategic Planning

Sarah Lancaster, Chair (KS)	636-248-2482	slancaster@ksu.edu
Travis Legleiter (KY) (Eastern)	859-562-1323	travis.legleiter@uky.edu
Trevor Israel (SD)(Western)	605-679-0297	trevor.israel@velent.com
Dan Smith (WI)(Central)	608-219-5170	dhsmith@wisc.edu
Prashant Jha (IA)	406-647-1427	pjha@iastate.edu
Cody Evans (IL)	217-204-6587	Cody.evans@bayer.com
Travis Legleiter (KY)	859-562-1323	travis.legleiter@uky.edu
Debalin Sarangi (MN)	612-625-8130	dsarangi@umn.edu
Chad Smith (MO)	662-379-3111	chad.smith@valent.com
John Schramski (MI)	517-388-7502	John.schramski@bayer.com
Stephen Meyers (IN)	812-314-5973	slmeyers@purdue.edu
Nader Soltani (ON)	519-902-1221	soltanin@uoguelph.ca
Alyssa Lamb (OH)	740-207-5096	lamb.223@osu.edu
Parminder Chahal (NE)	402-580-2319	parminder.chahal@fmc.com
Angela Kazmierczak (ND)	701-205-9423	angela.kazmierczak@bayer.com

Distinguished Achievement Award

Harlene Hatterman-Valenti, Chair	701-353-8536	h.hatterman.valenti@ndsu.edu
David Simpson, Vice Chair	317-607-2775	david.simpson@corteva.com
Stott Howard, Past Chair	515-321-7469	stott.howard@syngenta.com

Distinguished Achievement Awards, Graduate Student subcommittee

Harlene Hatterman-Valenti, Chair	701-353-8536	h.hatterman.valenti@ndsu.edu
David Simpson, Vice Chair	317-607-2775	david.simpson@corteva.com
Doug Nord	620-285-3380	dwnord@gbta.net
Steven Bowe	919-547-2559	steven.bowe@basf.com
Eric Spandl	651-261-5067	epspandl@landolakes.com
Prashant Jha	406-647-1427	pjha@iastate.edu
Nick Harre	618-314-0581	nharre4@gmail.com
Joe Armstrong	559-396-6482	joe.armstrong@corteva.com
Stott Howard, Past Chair	515-321-7469	stott.howard@syngenta.com

Fellow Committee

John Hinz, Chair	515-290-4810	john.hinz@bayer.com
JD Green, Vice Chair	859-257-4898	jdgreen@uky.edu
Amit Jhala	402-840-2259	amit.jhala@unl.edu
Pat Tranel	217-333-1531	tranel@illinois.edu
Mark Peterson	765-479-1441	Sdpete58@hotmail.com
Peter Sikkema	519-674-1500	psikkema@uoguelph.ca
Dave Johnson, Past Chair	515-423-3810	david.h.johnson@corteva.com

Finance Steering and Policy Committee

Amit Jhala, Chair	402-840-2259	amit.jhala@unl.edu
Harlene Hatterman-Valenti, Chair	701-353-8536	h.hatterman.valenti@ndsu.edu
Stephen Valenti	701-799-9328	stephen.valenti@bayer.com
Christy Sprague	517-353-0224	sprague1@msu.edu
Bill Johnson	765-494-4656	wgj@purdue.com

North Central Weed Science Society Information

Dan Smith	608-219-5170	dhsmith@wisc.edu
Eric Spandl	651-261-5067	epsandl@landolakes.com
David Simpson, Past Chair	317-337-3959	david.simpson@corteva.com

Future Site Selection Committee

Mark Loux, Chair	614-292-9081	loux.1@osu.edu
Aaron Hager	217-333-9646	hager@illinois.edu
Harlene Hatterman-Valenti	701-353-8536	h.hatterman.valenti@ndsu.edu
Eric Spandl	651-261-5067	epsandl@landolakes.com
Greg Dahl	651-261-1817	GKDahl@landolakes.com

Invasive Plants Committee

Joe Omielan, Chair	859-967-6205	joe.omielan@uky.edu
David Hillger, Vice Chair	317-504-6130	david.hillger@corteva.com
Roger Becker, Chair	612-625-5753	becke003@umn.edu

Local Arrangements

Karla Gage, Chair	618-453-7679	kgage@siu.edu
Greg Elmore	314-308-6181	greg.elmore@bayer.com
Devin Hammer	608-449-0800	devin.hammer@bayer.com
Cody Evans	217-204-6587	Cody.evans@bayer.com
Kevin Bradley	573-882-4039	bradleyke@missouri.edu
Jared Roskamp	217-219-1677	jared.roskamp@basf.com
Marshall Hay	772-299-8506	marshall.hay@syngenta.com
Scott Cully	618-982-9224	scott.cully@syngenta.com
Neha Rana	636-288-2609	neha.rana@bayer.com
Alejandro Perez-Jones	314-415-0478	alejandro.perez-jones@bayer.com
Aaron Hager	217-621-8963	hager@illinois.edu
Pat Tranel	217-333-1531	tranel@illinois.edu
Joe Bruce	224-319-2000	joeb@amvac.com
Cristin Weber	217-671-5273	cristin.weber@syngenta.com
Seth Strom	217-480-7820	seth.strom@syngenta.com
Mike Probst	217-552-3303	michael.probst@basf.com
Rick Leitz	314-258-6389	richard.leitz@bayer.com
Eric Miller	618-559-9459	ericmiller1@siu.edu
Matt Geiger	618-306-4633	matt.geiger@syngenta.com
Christy Sprague, Past Chair	517-353-0224	sprague1@msu.edu

Nominating Committee

Karen Renner, Chair	517-290-2368	renner@msu.edu
Peter Sikkema, Vice Chair	519-674-1500	psikkema@uoguelph.ca
Stott Howard	515-321-7469	stott.howard@syngenta.com
Reid Smeda	573-882-1329	smedar@missouri.edu
Amit Jhala, Past Chair	402-840-2259	amit.jhala@unl.edu

Resolutions and Necrology Committee

Sarah Striegel	507-500-0549	sarah.striegel@bayer.com
Derek Potratz, Past Chair	920-252-3381	derek@tilthag.com

Program Committee

Reid Smeda, Chair	573-882-1329	smedar@missouri.edu
David Simpson, Past Chair	317-607-2775	david.simpson@corteva.com
Karla Gage, Chair	618-453-7679	kgage@siu.edu
Joe Wuerffel	618-363-6231	joe.wuerffel@syngenta.com
Amit Jhala	402-840-2259	amit.jhala@unl.edu
Kelley Mazur	303-327-8016	kelley@imigroup.org
Ryan Lins	507-251-5524	ryan.lins@syngenta.com
Angela Kazmierczak	701-205-9423	angela.kazmierczak@bayer.com
Debalin Sarangi	612-625-8130	dsarangi@umn.edu
Prashant Jha	406-647-1427	pjha@iastate.edu
Nathan Haugrud	701-446-6876	nathan.haugrud@ndsu.edu
Mike Weber	515-201-9995	michael.weber3@bayer.com
Kristin Rosenbaum	660-425-1793	kristin.rosenbaum@corteva.com

North Central Weed Science Society Information

Section Program Chairs

General Program

Reid Smeda	Chair	573-882-1329	smedar@missouri.edu
------------	-------	--------------	---------------------

Poster Session

Nicholas "Nick" Arneson	Chair	402-676-1618	njarneson@wisc.edu
-------------------------	-------	--------------	--------------------

Graduate Student Paper Awards

Travis Legleiter	Chair	573-808-2357	travis.legleiter@uky.edu
------------------	-------	--------------	--------------------------

Graduate Student Poster Awards

Nick Arneson	Chair	402-676-1618	njarneson@wisc.edu
--------------	-------	--------------	--------------------

Undergraduate Student Poster Awards

Debalin Sarangi	Chair	612-625-8130	dsarangi@umn.edu
-----------------	-------	--------------	------------------

Agronomic Crops I (Corn)

Ryan Lins	Chair	507-251-5524	ryan.lins@syngenta.com
Chad Smith	Vice Chair	662-379-3111	chad.smith@valent.com

Agronomic Crops II (Soybeans)

Mike Weber	Chair	515-201-9995	michael.weber3@bayer.com
Garrison Gundy	Vice Chair	316-303-7316	garrison.gundy@valent.com

Horticulture and Specialty Crops

Nathan Haugrud	Chair	701-446-6878	nathan.haugrud@ndsu.edu
Stephen Meyers	Vice Chair	812-314-5973	slmeyers@purdue.edu

Equipment and Application Methods

Angela Kazmierczak	Chair	701-367-6422	angela.kazmierczak@bayer.com
Matt Faletti	Vice Chair	224-280-4835	mfaletti@precisionlab.com
Ryan Edwards	Past Chair	651-319-6479	rjedwards@landolakes.com

Extension

Prashant Jha	Chair	406-647-1427	pjha@iastate.edu
Nathaniel Drewitz	Vice Chair	608-515-4414	ndrewitz@umn.edu
Travis Legleiter	Past Chair	573-808-2357	travis.legleiter@uky.edu

Herbicide Physiology

Eric Patterson	Chair	303-328-5580	patte543@msu.edu
Nick Harre	Past Chair	618-314-0581	nharre4@gmail.com

Invasive Weeds, Rangeland, Pasture & Vegetation Management

Sam Ingram	Chair	706-521-9333	sam.ingram@corteva.com
Steve Valenti	Vice Chair	701-799-9328	stephen.valenti@bayer.com
David Hillger	Past Chair	317-504-6130	david.hillger@corteva.com

Weed Biology, Ecology and Management

Debalin Sarangi	Chair	612-625-8310	dsarangi@umn.edu
Chandrima Shyam	Vice Chair	785-532-2755	chandrima@ksu.edu
Marshall Hay	Past Chair	772-299-8506	marshall.hay@syngenta.com

North Central Weed Science Society Information

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 Hiltibrant *
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

North Central Weed Science Society Information

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		
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.

North Central Weed Science Society Information

North Central Weed Science Society Presidents

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

Distinguished Achievement Awards

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

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

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

Distinguished Achievement Awards (continued)

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

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

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

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

2020 Eric Spandl – Industry
 Mandy Bish – Research
 Joe Wuerffel – Young Scientist
 Vipin 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

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

Ackerson, Jason	122
Adams, Jason W.	169
Adari, Manogna Devi	160, 61
Albrecht, Aszhia K.	125
Alonzi, Elizabeth R.	125
Aradhya, Chandrashekar V.	31, 64
Arana, Jeanine	66, 68, 69, 71, 74, 142, 151, 152
Armstrong, Shalamar	85, 128
Arneson, Nicholas J.	24, 29, 34, 42, 48, 49, 87, 88, 89, 91, 99, 101, 103, 109, 129, 140, 144, 168
Arsenijevic, Nikola	43, 109
Asmus, Amy	186
Auwarter, Collin M.	156
Avent, Tristen H.	41
Backscheider, Kelly A.	28, 191, 194
Baek, YouSoon	158
Baris, Reuben D.	183
Barnhart, Isaac H.	44, 123
Baron, Jerry	150
Bateson, Zack	93
Batts, Roger B.	150
Beckett, Thomas H.	170, 171
Behnken, Lisa M.	54
Belles, David	169
Bernards, Mark L.	76, 109, 192
Billman, Shaun M.	46
Bish, Mandy	51, 132
Bland, Claudia R.	22, 127
Bobadilla, Lucas K.	58
Boerngen, Allyssa	75
Boles, Lee A.	39, 121, 124
Bollmann, Kaden W.	40
Borgato, Edinaldo A.	134, 160
Bradbury, Steven P.	184
Bradley, Kevin W.	40, 116, 119, 132
Brandenburg, Autumn N.	163
Brown, Noeleen K.	163

Brown, Scott	115, 173
Brunharo, Caio	72
Bruns, Kelly W.	72, 73, 77, 155
Buol, John	167, 189
Burns, Erin E.	79, 135, 159
Burt, Emma L.	153
Butts, Thomas R.	185
Cardona Giraldo, Luz Aide	142
Carmona, Leonardo	14
Cerritos, Josue D.	68, 69, 71, 74, 152
Chahal, Parminder	7, 165
Chaudhari, Sushila	67, 70
Chen, Jinyi	56
Chiaranda Rodrigues, Camila	81
Chiruvelli, Venkatanaga Shiva Datta Kumar Sharma	19, 112
Chism, Bill	188
Chittoor, Jaishree	64
Christoffers, Michael J.	93
Chudzik, Guilherme	46, 89, 91
Clay, Pat	15
Coburn, Carl	189
Colquhoun, Jed B.	72
Concepcion, Jeanafior Crystal T.	57, 157, 163
Contreras, Diego J.	41
Cooper, Emmanuel G.	66, 68, 69, 71, 74, 152
Coura Oliveira, Maxwel	106
Cullan, Pete	176
Cully, Scott E.	171
Dahl, Gregory K.	39, 124
Datta, Ananda	111, 167, 189
Davis, Adam	65
de Andrade Faleco, Felipe	55, 88, 129
de Sousa Ferreira, Victor	14, 18, 49, 91
Decker, Bradley J.	13
Denson, Ethan C.	137

DeSimini, Stephanie	30, 93
DeWerff, Ryan P.	23, 24, 29, 34, 42, 46, 49, 87, 91, 109, 140, 144, 168
Dhanda, Sachin	27
Dille, Anita	32, 42, 44, 106, 110, 123, 132, 134, 160, 181
Dixon, Sarah E.	120, 136
Dobbels, Anthony F.	99
Drewitz, Nathaniel M.	54
Duarte, Arthur F. T.	29
Duarte, Claudia J.	76
Duenk, Emily	105
Edwards, Ryan J.	39, 121, 124
Eltink, Bruno J.	14, 81
Essman, Alyssa	51, 99
Estes, Ron E.	15, 17, 172
Evans, Cody	111
Everman, Wesley	41
Felsman, Jacob H.	24
Fick, Walter H.	147
Flessner, Michael L.	9, 92, 95
Flynn, Scott	147
Franco Teodoro Duarte, Arthur	46
Fredericks, Steven A.	124, 125
Friskop, Andrew J.	16
Gage, Karla L.	13, 33, 59, 75, 92, 95, 96, 99, 101, 103, 116, 117
Gaines, Todd A.	164
Gaither, Emma L.	97, 120
Galbraith, Christopher	70
Garcia y Garcia, Axel	138
Gava, Alina	45, 73
Gibson, David J.	96
Gizotti de Moraes, Jesaelen	115
Glenn, Taylor	169
Goddard, Matthew S.	108

Golus, Jeffrey A.	45, 53, 73, 155
Goncalves Cason, Estevan	47
Grint, Kolby	48
Gundy, Garrison J.	12, 15, 17, 172
Haarmann, Jesse A.	63, 162
Hager, Aaron G.	58, 121, 193
Hall, Nathan D.	161
Halsted, Zachary	45
Hammer, Devin J.	38, 46, 111, 167
Hart, Nash D.	135
Hartzler, Robert G.	184
Hass, Erik	180
Hatterman-Valenti, Harlene M.	156
Haugrud, Nathan H.	16, 154
Hay, Marshall	90
Heaton, Brent S.	76, 192
Herrmann, Jeffrey	31
Holmes, Sarah E.	60
Hooker, David C.	102, 105
Houston, Barbara	45
Houston, Michael M.	41, 115, 173, 193
Hunt, Andrew D.	180
Hutchings, Sarah-Jane	163
Ikley, Joseph T.	16, 30, 51, 93, 99, 103, 132, 154, 190
Inveninato Carmona, Leonardo	81, 98
Irmak, Suat	86, 131, 146
Isaacs, Grant D.	95
Israel, Trevor D.	12, 15, 17, 172
Jha, Prashant	33, 99, 103, 116
Jhala, Amit J.	7, 131, 165, 8, 10, 86, 99, 116, 141, 146
Jhala, Rachana	7, 165
Johnson, Bill	103
Johnson, David H.	194
Johnson, Gregg	138

Johnson, Kevin D.	191, 194
Johnson, Nicholas A.	161
Johnson, William G.	41, 63, 85, 122, 128, 132, 162, 195, 22, 127
Johnston, Gregg A.	112
Jordan, David L.	96
Jugulam, Mithila	61, 62, 83, 90, 134, 160
Kaastra, Allan	102
Kaçan, Koray	20
Kalvin, Miller	42
Kaundun, Shiv S.	163
Kaur, Ramandeep	7, 143, 165
Khait, Tsuky	10
Kitt, Mark J.	170, 171
Kladivko, Eileen J.	85, 128
Knezevic, Stevan Z.	7, 11, 20, 25, 26, 50, 104, 107, 146, 165
Koester, Devin W.	57
Kohrt, Jonathon	12, 15, 17, 172
Kopecky Bobadilla, Lucas	100, 130, 158
Korres, Nicholas Emmanuel	72
Kruger, Greg	42, 44, 77, 123, 174
Kukal, Meetpal S.	86, 131
Kumam, Yaiphabi	83
Kumar, Vipan	9, 27, 32, 33, 101, 103, 110, 146
LaBiche, Gabrielle	101
Lagerhausen, Emma J.	59
Lambert, Taylor	27
Lancaster, Sarah	51, 82, 90, 103, 116, 132, 166
Landau, Olivia A.	157
Landry, Randall L.	15, 17, 172
Law, Quincy D.	190
Lawrence, Nevin	7, 165
Lazaro, Lauren M.	41, 101, 115, 173, 193
Lazarus, William	138
Legleiter, Travis	101, 103, 118
Leise, Adam	10

Leitz, Richard	189
Lind, Rob	169
Lindquist, John	146
Liu, Rui	27, 32, 110
Lopez, Alexander J.	100
López Manzano, Carlos A.	68, 69, 71, 74
Loux, Mark M.	99
Love, Hayden S.	118
Lowry, Carolyn	72
Lukas, Scott	72
Lundquist, Peter Knut	56
Lystad, Alexa L.	153
Mahey, Mohit	56, 60
Maile, Michelle M.	78
Marchi Werle, Lia	55
Marrs, Monica R.	32, 110
Martin, Brett A.	177
Matthews, Joseph L.	96
Mausbach, Jasmine M.	193
May, Thomas	53
Mayo, Christopher	166
McAdam, Scott Am	36
Medenwald, Hunter A.	52
Medina, Luis F.	68, 69, 71, 74, 152
Meyeres, Tyler P.	90, 166
Meyers, Stephen L.	66, 68, 69, 71, 74, 142, 151, 152
Mickey, Rachel	70
Miller, Eric J.	13, 59, 75, 92, 95, 99, 101, 117
Miller, Calvin A.	44, 123
Miller, Logan	21
Miller, Robert T.	105
Miller, Ryan P.	37, 54, 113, 138
Milosevic, Luka	20, 25, 26, 50, 104, 107
Min, Doohong	82
Miner, Patrick	167
Mirsky, Steven	86
Mitchell, Emma A.	30

Mobli, Ahmadreza	49, 87, 140
Mohammad, Asif	62
Montgomery, Jacob S.	64
Moraes, Jesaelen G.	173
Morris, James A.	163
Mose, Monique	67, 70
Mueth, Alexander R.	59, 101, 117
Naeve, Seth L.	37, 113
Nakka, Sridevi	62
Niekamp, Jason W.	193
Norsworthy, Jason K.	33, 41
Nunes, Jose J.	23, 29, 46, 48, 89, 103
Obear, Glen R.	55
Obour, Augustine	32, 110
Oliveira Ribeiro Maia, Lucas	52, 85, 128
Omielan, Joseph	80
O'Neil, Megan	93
Osterholt, Matthew	36
Ostermeier, Gaylia C.	173
Ott, Eric	15, 17, 172
Owen, Micheal Dk	96
Pai, Naresh	46
Pandian, Balaji Aravindhan	61
Patterson, Eric L.	60, 159, 161, 164
Patterson, Eric Lloyd	56
Patzoldt, William L.	41, 115, 173, 193
Paudel, Rama	65
Pavlovic, Pavle	72
Pawlak, John A.	12, 15, 17, 172
Peachey, Ed	72
Pedibhotla, Venkat	150
Pedreira, Bruno	82
Perez-Jones, Alejandro	64
Peters, Thomas J.	37, 112, 113, 153
Pollard, Justin	46
Proctor, Christopher	14, 18, 42, 44, 49, 81, 91, 106, 123, 155

Purvis, Connor L.	79
Pv, Vara Prasad	61, 62, 83
Raiyemo, Damilola A.	94, 130
Rana, Neha	111
Rankrape, Cristiana B.	59
Recker, Ross A.	167
Reiss, James	126
Ren, Zhe	96
Renz, Mark J.	148, 149
Riechers, Dean E.	57, 65, 157, 163
Riley, Eric	189
Robinson, Darren E.	102, 105
Rodriguez Baquero, Laura D.	23, 129, 142
Rosenbaum, Kristin K.	191, 194
Ross, Alison C.	163
Rowley, Keith	55
Rudell, Eduardo C.	134, 160
Safarik, Kayla M.	18, 49
Saha, Debalina	139
Sandell, Lowell	191
Sarangi, Debalin	19, 35, 37, 38, 54, 84, 112, 113, 138
Satchivi, Norbert M.	157
Savic, Marija	77
Schaub, Rod	147
Schreier, Haylee E.	40, 119
Schroeder, Kasey P.	45, 155
Scott, Barbara	72
Scott, David	187
Scott, Jon E.	11, 20, 25, 26, 50, 104, 107
Severo Silva, Tatiane	49, 144, 168, 14, 18
Shaw, David R.	96
Shi, Yeyin	7, 165
Sidhu, Manjot Kaur	139
Sikkema, Peter H.	102, 105
Silva, Daniel Valadão	144, 168
Simpson, David M.	4, 28, 183, 194

Singh, Daljit	64
Singh, Mandeep	86, 131, 146
Singh, Maninderpal	108
Singh, Navjot	37, 84, 113
Singh, Vijay	9
Skelton, Joshua J.	125
Smeda, Reid J.	1, 6, 46, 78, 97, 99, 120, 136, 195
Smith, Chad L.	12, 15, 17, 172
Smith, Daniel H.	18, 49, 109, 144, 168
Soltani, Nader	102, 105
Sosnoskie, Lynn M.	72
Spoth, Matthew P.	92, 95
Sprague, Christy L.	99, 108, 133
Stahl, Elizabeth	84, 138
Stephens, Trey P.	8
Stoltenberg, David E.	91, 129
Striegel, Sarah	5, 38, 46
Strom, Seth A.	170
Studebaker, Aaron	175
Sudhakar, Susee	62
Sulzback, Juliano	159
Sutivisedsak, Nongnuch	55
Symington, Hannah E.	102
Takenaka, Yudai	72
Teng, Jane	179
Teodoro, Arthur F.	89
Thapa, Resham	86
Thiagarayaselvam, Aarthy	160
Thome, Hope	67
Timper, Mark	84
Tranel, Patrick J.	58, 94, 100, 130, 158
Trick, Harold	62, 83
Tuma, Ian	38
Ugljic, Zaim	42, 106
Vagedes, Rose V.	122
Van Wychen, Lee	2
VanGessel, Mark J.	72

Varanasi, Aruna V.	31
Vargas Arroyo, Nathaly Belen	142
Vasconcelos, Tairis Duarte	45, 73
Vaughn, Jacob E.	116
Vehige, Andrew T.	46
Vitti, Thiago H.	44, 114, 155
Volenberg, Dean S.	78
Wallace, John M.	103
Walters, Stuart A.	3
Walz, Claudia R.	133
Watkins, Kylee S.	101
Weber, Anderson	125
Weber, Christopher M.	90, 166
Wehrle, Marcella G.	177
Weller, Stephen C.	96
Werle, Isabel S.	58
Werle, Rodrigo	14, 18, 23, 24, 29, 34, 42, 43, 46, 48, 49, 55, 87, 88, 89, 91, 99, 101, 103, 106, 109, 123, 129, 132, 140, 144, 168
Westra, Philip	164
Williams, Charles M.	92
Williams II, Martin M.	65, 72
Willis, John	31
Wilson, Robert G.	96
Woitaszewski, Lily A.	82, 90, 132, 160
Woolam, Brandi C.	151
Wortman, Sam E.	77, 155
Wuerffel, R Joseph	169
Yagow, Chad	173
Yang, Ce	138
Young, Bryan G.	22, 36, 41, 47, 52, 63, 85, 96, 103, 116, 122, 127, 128, 162, 178, 193
Young, Julie M.	47
Yu, Eric Y.	35, 84, 138
Yu, Qin	161
Zaric, Milos	45, 73, 77, 145, 155

Zhang, Chun	161
Zimmer, Marcelo	41, 193

NCWSS Sustaining Members

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

Gold

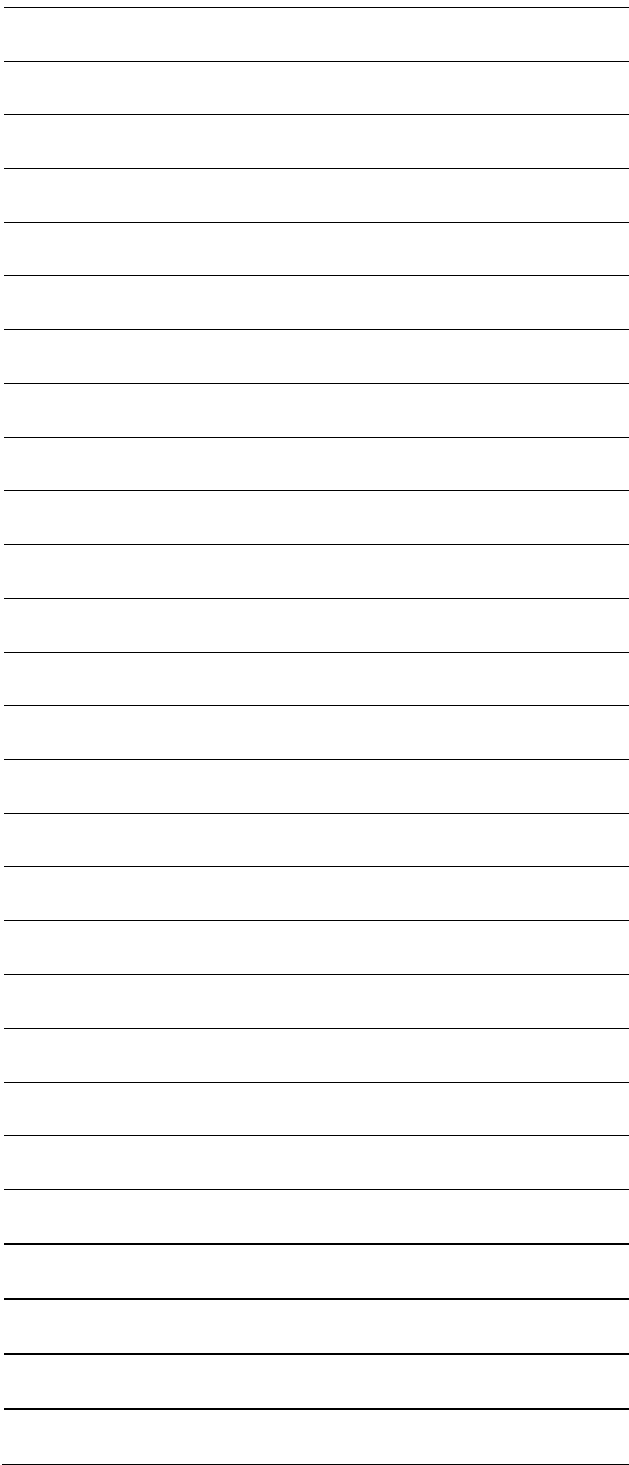
**BASF Corporation
Bayer CropScience
Corteva Agriscience
Syngenta Crop Protection
United Phosphorus Inc.
Winfield United**

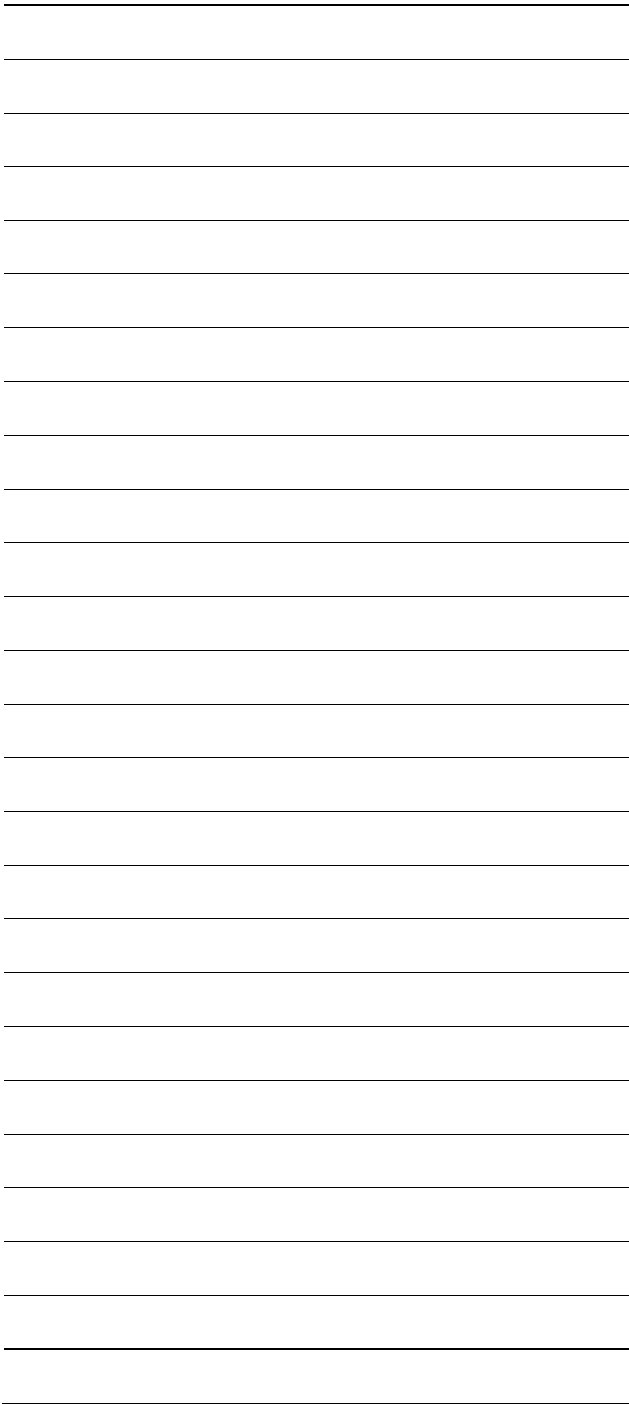
Silver

**AMVAC
Belchim
FMC Corporation
Gowan
Valent**

Bronze

**ABG Ag Services
ADAMA
BellSpray Inc.
Blue River Technology
Clariant Chemical Corporation
Greenleaf Technologies
Growmark
GDM Solutions Inc.
KayJay Ag Services Inc.
Lamberti
Midwest Research Inc.
NuFarm
Precision Laboratories, Inc.
Stepan
TeeJet Technologies
Warnke Research Services**





[illegible]

[illegible]

Time Schedule

Mark papers and meetings in the appropriate space.

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

2023 – December 11 – 14 Minneapolis, MN

2024 – December 7 – 13 Kansas City, MO

Meeting Map

Meeting Space – Hyatt Regency St. Louis at the Arch, St. Louis, MO

