

President's Welcome

2020 North Central Weed Science Society Meeting

Welcome to the 75th annual meeting of the North Central Weed Science Society (NCWSS)!! As a result of the COVID 19 pandemic and with the health and safety of our membership a priority the Board of Directors voted early in the year to convert the meeting from our traditional face-to-face meeting to a virtual format. This meant that the 'recipe' for our annual meeting that had been developed and refined over the previous 74 years needed to change significantly....in fact, there was not any aspect of the annual meeting program that was not touched by this change in format. The Program Committee and Board of Directors have had dozens and dozens of meetings since May to agree the agenda format and conference delivery logistics. Indeed, Harlene Hatterman-Valenti (Program Chair), Eric Spandl (Local Arrangements) and Kelley Mazur (Executive Secretary) along with the support of the Board of Directors have spent a Herculean amount of time delivering this event to you. It has been very inspirational to see these volunteers give their time so generously to our society. The names of the 2020 Program Committee are worth noting and when you have the opportunity please extend to them appreciation for ensuring an unbroken chain of tradition for the NCWSS annual meeting!

Parminder Chahal (Extension)

Garrison Gundy (Resident Education)

Harlene Hatterman-Valenti (President-Elect & Program Chair)

Amit Jhala (Secretary-Treasurer)

Kelley Mazur (Executive Secretary)

Lowell Sandell (Industry)

David Simpson (Vice President)

Eric Spandl (Local Arrangements)

Joe Wuerffel (Proceedings Editor)

Milos Zaric (Graduate Student Representative)

As you review the program you will see an offering of two symposia: 'Technology in Application: Learning from the Past and Building into the Future' and 'Training Tomorrow's Extension Leaders: What is Working and Where Can We Grow'. In addition, there are papers and posters covering a wide range of topics including herbicide antagonism, weed control programs in herbicide tolerant soybeans, Amaranthus biology, cover crops for weed control and surveys of PPO, SMOC and HPPD resistant Amaranthus. All topics are very relevant and timely for advancing the weed science discipline!

Several committee meetings are scheduled during the conference and your participation is encouraged and welcome! These meetings are open to all society members and your ideas and inputs are very important in helping to guide the future and vitality of our society. Given the virtual format of our meeting these Zoom meetings have been scheduled independently by the committee chair. Please see the program for committee times and reach out to the committee chair for engagement details should you wish to participate.

I would like to express my appreciation to the Sustaining Members of our Society. Their generosity provides critical financial support for our annual meeting (whether face-to-face or virtual) and other activities throughout the year such as the student weed contest. And regarding the student weed contest, thank you to the organizers for 2021 (North Dakota State University) and 2022 (Corteva) for their flexibility in delaying hosting duties by a year!

Throughout the year I have relied upon several past presidents for their indispensable advice and counsel. In particular, I need to thank Aaron Hager for his steadfast leadership and thoughtful bearing. As Past President of our society he has set a formidable bench-mark for those that follow.

Finally, I want to express my appreciation to the NCWSS membership for the opportunity to serve as President in 2020. Here's to a prosperous and safe New Year!! And....**a student weed contest and face-to-face annual meeting in 2021!**

Stott Howard, President

2020 NCWSS Committee meetings

Board of Directors

Monday November 30 at 09:00 AM
Wednesday December 2 at 06:30 PM

Extension

Monday November 30 at 05:00 PM

Graduate Student Committee

What After Graduate School?
Monday November 30 at 02:30 PM
2021 Election
Wednesday December 2 at 12:00 PM

Industry

Monday November 30 at 02:30 PM

Resident Education, Summer Contest Subcommittee of Resident Education, Contest Rules Subcommittee, Poster Session, and Graduate Student Paper Awards

Monday November 30 at 02:30 PM

Strategic Planning

Monday November 30 at 03:00 PM

Distinguished Achievement Award and Graduate Student subcommittee

Monday November 30 at 08:30 AM

Fellow Committee

Monday November 30 at 08:00 AM

Finance Steering and Policy Committee

Monday November 30 at 12:00 PM

Future Site Selection Committee

Mark Loux has arranged

Invasive Plants Committee/Invasive Plants Business Meeting

Monday November 30 at 02:30 PM

Local Arrangements

Eric Spandl has arranged

Nominating Committee

Monday November 30 at 12:30 PM

Program Committee and Section Program Chairs

Monday November 30 at 03:00 PM

Resolutions and Necrology Committee

Monday November 30 at 08:00 AM

Program Section Business Meetings

Poster Session

Wednesday 09:00am Zoom link to be provided/scheduled

Equipment and Application Methods

Tuesday 06:00 PM- Stay in the Virtual Meeting Room

Agronomic Crops I (Corn)

Tuesday 04:30 PM- separate Zoom link

Herbicide Physiology

Tuesday 09:45 AM- Stay in the Virtual Meeting Room

Agronomic and Specialty Crop

Tuesday 12:00 PM- Stay in the Virtual Meeting Room

Invasive Weeds, Rangeland and Vegetation Management

Monday 02:30 PM- Zoom meeting

Weed Biology, Ecology and Management

Tuesday 11:45 AM- Stay in the Virtual Meeting Room

Agronomic Crops II (Soybeans)

Wednesday 04:15 PM- Stay in the Virtual Meeting Room

Extension

Tuesday 04:45 PM- Stay in the Virtual Meeting Room

What's New in Industry

Wednesday 07:45 AM- TBD Virtual Room or Zoom link

Symposia

Technology in Application: Learning from the Past and Building into the Future

Wednesday 09:00 – 11:30 AM

Training Tomorrow's Extension Leaders: What is Working and Where Can We Grow

Wednesday 02:00 – 04:00 PM

CONDENSED PROGRAM

Poster Session

Posters will be available for viewing for starting Monday, November 30 through Thursday, December 3.

All authors must be present between Wednesday, 8-9am to answer questions via chatroom.

MONDAY NOVEMBER 30

Poster Session	08:00 AM	Web
Board of Directors	09:00 AM – 11:30 AM	Zoom
General Session	01:00 PM - 02:30 PM	Virtual Session 1
Quiz Bowl Sponsored by BASF	04:00 PM - 05:00 PM	Web

TUESDAY DECEMBER 1

Poster Session	08:00 AM	Web
ORAL - Herbicide Physiology & Molecular Biology	08:00 AM - 09:45 AM	Virtual Session 1
ORAL - Weed Biology, Ecology, Management	08:00 AM - 11:45 AM	Virtual Session 2
ORAL - Agronomic and Specialty Crops (All other agronomic and horticultural crops)	10:00 AM - 12:00 PM	Virtual Session 1
Women in Weed Science	12:00 PM – 1:00 PM	Zoom Room TBD
ORAL - Equipment and Application Methods	01:00 PM - 06:00 PM	Virtual Session 1
ORAL - Agronomic Crops I - Corn	01:00 PM - 04:30 PM	Virtual Session 2
ORAL - Extension	04:30 PM - 04:45 PM	Virtual Session 2

WEDNESDAY DECEMBER 2

Poster Session Q&A	08:00 AM – 09:00 AM	Chat
ORAL - Agronomic Crops II - Soybeans	08:00 AM - 12:00 PM	Virtual Session 1
ORAL - Invasive Weeds, Rangeland, Pasture, and Vegetation Management	08:00 AM - 09:00 AM	Virtual Session 2
SYMPOSIUM - Technology in Application: Learning From the Past and Building into the Future	09:00 AM - 12:00 PM	Virtual Session 2
ORAL - Agronomic Crops II - Soybeans	02:00 PM - 04:15 PM	Virtual Session 1
SYMPOSIUM - Training Tomorrow's Extension Leaders: What is Working and Where Can We Grow	02:00 PM - 05:00 PM	Virtual Session 2

Board of Directors	09:00 AM – 11:30 AM	Zoom
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THURSDAY DECEMBER 3

Industry Virtual Tours	09:00 AM - 01:00 PM	Virtual Session 1
Poster Session	08:00 AM – 05:00 PM	Web

PROGRAM

MONDAY MORNING NOVEMBER 30 – THURSDAY
AFTERNOON DECEMBER 3

POSTER - Agronomic and Specialty Crops (All other agronomic and horticultural crops)

LOCATION: Virtual Poster Section
Q&A TIME: Wednesday 08:00 AM - 09:00 AM

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

Bicyclopurone Use Patterns in Minor Crops. Scott A. Payne*¹, Timothy L. Trower², Eric K. Rawls³, Tom H. Beckett⁴, Pete M. Eure⁴; ¹Syngenta Crop Protection, Slater, IA, ²Syngenta Crop Protection, Baraboo, WI, ³Syngenta Crop Protection, Vero Beach, FL, ⁴Syngenta Crop Protection, Greensboro, NC (62)

†Screening of Industrial Hemp (*Cannabis sativa*) Tolerance to Corn and Soybean Herbicides. Haleigh J. Ortmeier-Clarke*, Maxwell Coura Oliveira, Nicholas J. Arneson, Shawn P. Conley, Rodrigo Werle; University of Wisconsin-Madison, Madison, WI (63)

Structured PRE and POST programs for crop tolerance and weed control in Industrial Hemp. Stevan Knezevic*¹, Ivan B. Cuvaca², Rodrigo Werle³, Jon Scott²; ¹University of Nebraska-Lincoln, Concord, NE, ²University of Nebraska-Lincoln, Lincoln, NE, ³University of Wisconsin-Madison, Madison, WI (64)

Exploratory PRE and POST treatments for crop tolerance in Industrial hemp. Jon Scott*¹, Ivan B. Cuvaca¹, Stevan Knezevic²; ¹University of Nebraska-Lincoln, Lincoln, NE, ²University of Nebraska-Lincoln, Concord, NE (65)

†Phytotoxicity of Industrial Hemp (*Cannabis sativa* L.) Extracts. Avery Shikanai*¹, Karla L. Gage²; ¹Southern Illinois University, Evanston, IL, ²Southern Illinois University, Carbondale, IL (66)

Industrial Hemp Variety Tolerance to PRE-Herbicides. Ivan B. Cuvaca*¹, Amit J. Jhala¹, Jon Scott¹, Stevan Knezevic²; ¹University of Nebraska-Lincoln, Lincoln, NE, ²University of Nebraska-Lincoln, Concord, NE (67)

Fall-seeded cereal rye suppresses horseweed in sugarbeet. Brian Stiles*¹, Christy Sprague²; ¹Michigan State University, Durand, MI, ²Michigan State University, East Lansing, MI (68)

‡Comparison of Available ACC-ase Inhibiting Herbicides for Use in Industrial Hemp. Marija Savic*, Milos Zaric, Jeffrey A. Golus, Kasey P. Schroeder, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (69)

Weed Control and Cabbage/Cauliflower Response to Pyridate. Sushila Chaudhari*, Bernard Zandstra, Nicole Soldan; Michigan State University, East Lansing, MI (70)

Sunflower, Dry Pea, Chickpea, and Lentil Tolerance to Fall-Applied 2,4-D and Dicamba. Brian Jenks*¹, Caleb D. Dalley²; ¹North Dakota State University, Minot, ND, ²North Dakota State University, Hettinger, ND (71)

**MONDAY MORNING NOVEMBER 30 – THURSDAY
AFTERNOON DECEMBER 3**

POSTER - Agronomic Crops I - Corn

LOCATION: Virtual Poster Section
Q&A TIME: Wednesday 08:00 AM - 09:00 AM

***PRESENTER † GRADUATE CONTEST**

†Influence of Cover Crops on Soil Microbial Activity and Degradation of S-Metolachlor. Lucas Oliveira Ribeiro Maia*¹, William G. Johnson¹, Bryan G. Young², Joshua R. Widhalm¹, Eileen J. Kladvik¹, Shalamar Armstrong¹; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN (72)

†Interaction Effects of Herbicide and Nitrogen Inhibitors on Nitrification and Weed Suppression in Corn. William H. Neels*¹, Amit J. Jhala¹, Javed Iqbal¹, Bijesh Maharjan², Laila Puntel¹, Richard Little¹; ¹University of Nebraska-Lincoln, Lincoln, NE, ²University of Nebraska-Lincoln, Scottsbluff, NE (73)

†Photosynthetic Response of Drought Tolerant Corn Hybrids to Water Stress and Weed Competition. Nash D. Hart*¹, Allyson M. Rumler², Erin E. Burns²; ¹Michigan State University, Durand, MI, ²Michigan State University, East Lansing, MI (74)

**MONDAY MORNING NOVEMBER 30 – THURSDAY
AFTERNOON DECEMBER 3**

POSTER - Agronomic Crops II - Soybeans

LOCATION: Virtual Poster Section
Q&A TIME: Wednesday 08:00 AM - 09:00 AM

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

†Antagonism of ACCase Inhibitor Herbicides Used for Control of Volunteer Corn in Enlist E3 Soybean Systems. Marcelo Zimmer*¹, Bryan G. Young², William G. Johnson¹; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN (75)

Waterhemp Management in Southern Wisconsin Using a Layered Residual Approach in Glufosinate-Resistant Soybeans. Daniel H. Smith*, Nicholas J. Arneson, Ryan P. DeWerff, Maxwell Coura Oliveira, Rodrigo Werle; University of Wisconsin-Madison, Madison, WI (76)

†Soybean Symptomology and Yield Response to Sub-Labeled Doses of 2,4-D and Dicamba as Influenced by Varieties. Jesaelen Gizotti de Moraes*, Vitor M. Muller Anunciato, Jeffrey A. Golus, Kasey P. Schroeder, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (77)

Interaction of 2,4-D applied in combination with glyphosate or graminicides on grass weed control in Enlist E3[®] soybeans. Rui Liu*¹, Isaac N. Effertz², Taylor Lambert¹, Amit J. Jhala³, Prashant Jha⁴, Vipin Kumar¹; ¹Kansas State University, Hays, KS, ²Kansas State University, Manhattan, KS, ³University of Nebraska-Lincoln, Lincoln, NE, ⁴Iowa State University, Ames, IA (78)

†Integrative Analysis of Soybean Weed Management in Kansas. Tyler P. Meyeres*, Dallas E. Peterson, Sarah Lancaster; Kansas State University, Manhattan, KS (79)

Interaction of dicamba applied in combination with glyphosate or graminicides on grass weed control in Roundup Ready 2 Xtend® soybeans. Rui Liu*¹, Isaac N. Effertz², Taylor Lambert¹, Amit J. Jhala³, Prashant Jha⁴, Vipin Kumar¹; ¹Kansas State University, Hays, KS, ²Kansas State University, Manhattan, KS, ³University of Nebraska-Lincoln, Lincoln, NE, ⁴Iowa State University, Ames, IA (80)

Assessment of Soybean (*Glycine max*) Tolerance to Pre-emergence Exposure of Trifludimoxazin, and other PPO-Inhibiting Herbicides in a Hydroponic System. Nicholas R. Steppig*¹, Samuel D. Willingham², Douglas A. Findley², Bryan G. Young³; ¹Purdue University, West Lafayette, IN, ²BASF Corporation, Research Triangle Park, NC, ³Purdue University, Brookston, IN (81)

‡Effects of Cereal Rye Seeding Rate on Soybean Growth and Early-season Emergence of Waterhemp and Foxtail Species. Jacob E. Vaughn*, Brian Dintelmann, Eric G. Oseland, Mandy Bish, Kevin W. Bradley; University of Missouri, Columbia, MO (82)

Utilization of residual herbicides in 2,4-D tolerant soybean production. Jon Scott*¹, Ivan B. Cuvaca¹, Stevan Knezevic²; ¹University of Nebraska-Lincoln, Lincoln, NE, ²University of Nebraska-Lincoln, Concord, NE (83)

Glyphosate-Tolerant Soybean Response to 2,4-D Micro Rates. Ivan B. Cuvaca*¹, Jon Scott¹, Stevan Knezevic²; ¹University of Nebraska-Lincoln, Lincoln, NE, ²University of Nebraska-Lincoln, Concord, NE (84)

†Effect of Soybean Chaff on Emergence Patterns of Waterhemp, Velvetleaf, and Giant Foxtail. Avery J. Bennett*, Prashant Jha, Ramawatar Yadav, Alexis L. Meadows, Edwards Dearden, Ryan C. Hamberg; Iowa State University, Ames, IA (85)

Dicamba-Tolerant Soybean Response to 2,4-D Micro Rates. Stevan Knezevic*¹, Jon Scott², Ivan B. Cuvaca²; ¹University of Nebraska-Lincoln, Concord, NE, ²University of Nebraska-Lincoln, Lincoln, NE (86)

Herbicide Programs for Weed Control in Isoxaflutole-Resistant Soybean. Vipin Kumar*¹, Isaac N. Effertz², Taylor Lambert¹, Rui Liu¹; ¹Kansas State University, Hays, KS, ²Kansas State University, Manhattan, KS (87)

‡The effect of cereal rye cover crop with various rates and application timings of acetochlor on common waterhemp control. Alexander R. Mueth*, Madison R. Decker, Karla L. Gage; Southern Illinois University, Carbondale, IL (88)

Identification of Soybean Lines with Differential Sensitivity to Dicamba. Matthew Osterholt*¹, Scott McAdam¹, Katy Rainey¹, Caio Canella Vieira², Pengyin Chen², Bryan G. Young¹; ¹Purdue University, West Lafayette, IN¹; University of Missouri – Fisher Delta Research Center, Portageville, MO² (89)

Variability in Response of Horseweed (*Conyza canadensis*) Populations to Dicamba and Glufosinate from Five Soybean Production States. Nick T. Harre*¹, Julie M. Young², Kevin W. Bradley³, Karla L. Gage⁴, Aaron Hager⁵, Greg R. Kruger⁶, Mark Loux⁷, Jason K. Norsworthy⁸, Larry Steckel⁹, Bryan G. Young¹⁰; ¹Purdue University, West Lafayette, IN, ²Affiliation Not Specified, Brookston, IN, ³University of Missouri, Columbia, MO, ⁴Southern Illinois University, Carbondale, IL, ⁵University of Illinois, Urbana, IL, ⁶University of Nebraska-Lincoln, North Platte, NE, ⁷Ohio State University, Columbus, OH, ⁸University of Arkansas, Fayetteville, AR, ⁹University of Tennessee, Jackson, TN, ¹⁰Purdue University, Brookston, IN (90)

**MONDAY MORNING NOVEMBER 30 – THURSDAY
AFTERNOON DECEMBER 3**

POSTER - Equipment and Application Methods

LOCATION: Virtual Poster Section
Q&A TIME: Wednesday 08:00 AM - 09:00 AM

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

†Assessing soil variability in commercial fields and the potential impact on weed management. Rose V. Vagedes^{*1}, Bryan G. Young², William G. Johnson¹; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN (91)

†Efficacy of postemergent formulated dicamba, glufosinate, glyphosate, 2,4-D and un-formulated glufosinate on common lambsquarters. Ely D. Anderson^{*1}, Bruno C. Vieira¹, Jeffrey A. Golus¹, J. Susan Sun², Greg R. Kruger¹; ¹University of Nebraska-Lincoln, North Platte, NE, ²Croda Inc., New Castle, DE (92)

†Effects of Drift-reducing Nozzles and Adjuvants on Dicamba Efficacy. Milos Zaric^{*}, Kasey P. Schroeder, Jesaalen Gizotti de Moraes, Bruno Canella Vieira, Guilherme Sousa Alves, Jeffrey A. Golus, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (93)

Measuring Weed Control Efficacy in Small Research Plots Using Aerial Imagery. Lee A. Boles^{*1}, Ryan J. Edwards¹, Heather L. Matthees²; ¹WinField United, River Falls, WI, ²WinField United, Arden Hills, MN (94)

†Damage on Soybean Caused by Spray Drift from a dicamba + glyphosate Tank-mixture. Antonio Augusto Correa Tavares^{*}, Joao Victor de Oliveira, Rone Batista de Oliveira, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (95)

‡Drift Potential of Glufosinate when Applied with a Single, Double or Triple Fan Nozzle. Livia I. Pereira^{*}, Leandro H S Guimaraes, Barbara Vukoja, Guilherme Sousa Alves, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (96)

†Deposition of a Four Rotor UAS as Influenced by Flight Speed, Flight Height, and Nozzle. Trenton W. Houston^{*}, Brad K. Fritz, Clint W. Hoffmann, Antonio Augusto Correa Tavares, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (97)

Evaluation of Dicamba Vapor Reducing Agents Across Different Environments. Sarah V. Striegel^{*1}, Ryan D. Langemeier², Bruno C. Vieira³, Steve Li², Greg R. Kruger³, Rodrigo Werle¹; ¹University of Wisconsin-Madison, Madison, WI, ²Auburn University, Auburn, AL, ³University of Nebraska-Lincoln, North Platte, NE (98)

†Influence of Surfactant-humectant Adjuvants on Efficacy of Glufosinate Herbicides on Horseweed and Palmer Amaranth Control. Estefania Gomiero Polli^{*1}, Guilherme Sousa Alves¹, Frank Sexton², Greg R. Kruger¹; ¹University of Nebraska-Lincoln, North Platte, NE, ²Exacto, Inc, Sharon, WI (99)

†Glufosinate Control and Physical-chemical Properties With Different Adjuvants on *Chenopodium album* and *Bassia scoparia*. Joao Victor de Oliveira^{*1}, Antonio Augusto Correa Tavares¹, Estefania Gomiero Polli¹, Leandro H S Guimaraes¹, Jesaalen Gizotti de Moraes¹, Rone Batista de Oliveira², Greg R. Kruger¹; ¹University of Nebraska-Lincoln, North Platte, NE, ²University of Northern Paraná, Bandeirantes, Brazil (100)

†Influence of droplet size in control of velvetleaf and lambsquarter treated with fomesafen. Vitor M. Muller Anunciato^{*1}, Antonio Augusto Correa Tavares¹, Joao Victor de Oliveira¹, Jesaalen

Gizotti de Moraes¹, Caio A. Carbonari², Greg R. Kruger¹; ¹University of Nebraska-Lincoln, North Platte, NE, ²UNESP, Botucatu, Brazil (101)

Analyzing spray coverage and herbicide efficacy with Hypro ULD nozzles for Liberty and Enlist tank mixtures. Josh Skelton*, Anderson Weber, Aszhia Albrecht, Amanda Flipp; Winfield United, River Falls, WI (102)

†Efficiency of tank cleaning different dicamba formulations. Vinicius Velho*, Guilherme Sousa Alves, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (103)

‡Single vs twin fan nozzle coverage on broadleaf weeds. Jessica B. Oliveira*, Bruno C. Vieira, Kasey P. Schroeder, Jeffrey A. Golus, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (104)

***MONDAY MORNING NOVEMBER 30 – THURSDAY
AFTERNOON DECEMBER 3***

POSTER - Extension

LOCATION: Virtual Poster Section
Q&A TIME: Wednesday 08:00 AM - 09:00 AM

***PRESENTER**

Weed Seed Dispersal Management Outreach– Wisconsin Combine Cleaning Clinic. Daniel H. Smith*, Nicholas J. Arneson, Rodrigo Werle; University of Wisconsin-Madison, Madison, WI (105)

Weed Seed Dispersal Management Outreach – Wisconsin Combine Case Study. Nicholas J. Arneson*, Daniel H. Smith, Rodrigo Werle; University of Wisconsin-Madison, Madison, WI (106)

North Central Weed Science Society Meeting Papers and Posters: An overview of the past 20 years using text analysis. Maxwell Coura Oliveira*¹, Sarah M. Matos Marinho², Rodrigo Werle¹; ¹University of Wisconsin-Madison, Madison, WI, ²University of Sao Paulo, Sao Paulo, Brazil (107)

Creating an In-person, Self-guided Research Plot Tour. Ryan P. Miller*¹, Lisa M. Behnken¹, Phyllis M. Bongard²; ¹University of Minnesota, Rochester, MN, ²University of Minnesota, Farmington, MN (108)

***MONDAY MORNING NOVEMBER 30 – THURSDAY
AFTERNOON DECEMBER 3***

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

LOCATION: Virtual Poster Section
Q&A TIME: Wednesday 08:00 AM - 09:00 AM

***PRESENTER**

Evaluation of Poison Hemlock Control Options. Joe Omielan*; University of Kentucky, Lexington, KY (109)

Garlic mustard monitoring efforts inform a coupled weed-herbivore population model for simulating the release of potential biocontrol agents. Mary Marek-Spartz*¹, Roger Becker¹, George Heimpel¹, Lori Knosalla², Rebecca Montgomery¹, Laura Van Riper²; ¹University of Minnesota, St. Paul, MN, ²Minnesota Department of Natural Resources, St. Paul, MN (110)

An Update: Biological Control of Garlic Mustard with Crown-Boring and Seed-Feeding Weevils. Jeanie Katovich*¹, Roger Becker¹, Ghislaine Cortat², Harriet Hinz², Laura VanRiper³, Mary Marek-Spartz¹; ¹University of Minnesota, St. Paul, MN, ²CABI, Delemont, Switzerland, ³Minnesota Department of Natural Resources, St. Paul, MN (111)

**MONDAY MORNING NOVEMBER 30 – THURSDAY
AFTERNOON DECEMBER 3**

POSTER - Weed Biology, Ecology, Management

LOCATION: Virtual Poster Section
Q&A TIME: Wednesday 08:00 AM - 09:00 AM

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

†Effect of row spacing and overlapping residual herbicides in 2,4-D and isoxaflutole-resistant soybeans. Chad J. Lammers*, Sarah Lancaster, Tyler P. Meyeres; Kansas State University, Manhattan, KS (112)

†Response of a Putative ALS-resistant Fall Panicum Accession from Wisconsin to Nicosulfuron and Other POST Herbicides. Jose J. Nunes*¹, Alexandre T. Rosa², Nicholas J. Arneson¹, Jeff Laufenberg³, Rodrigo Werle¹; ¹University of Wisconsin-Madison, Madison, WI, ²University of Nebraska-Lincoln, Lincoln, NE, ³Syngenta Crop Protection, Fond Du Lac, WI (113)

†Current Status of Herbicide-Resistant Waterhemp (*Amaranthus tuberculatus*) in Iowa Corn and Soybean Fields. Ryan C. Hamberg*, Prashant Jha, Ramawatar Yadav, Avery J. Bennett, Alexis L. Meadows, Edward S. Dearden, Iththiphonh A. Macvilay; Iowa State University, Ames, IA (114)

Foxtail Management in Smooth Brome Hay Meadows. Stewart Duncan*, Sarah Lancaster; Kansas State University, Manhattan, KS (115)

‡Waterhemp Control as Affected by Respray Order and Timing Using Single Active Ingredient Applications of Glufosinate, Dicamba, 2,4-D and Glyphosate. Elaina M. Crawford*, Kinsey E. Tiemann, Brent S. Heaton, Mark L. Bernards; Western Illinois University, Macomb, IL (116)

‡Weed Control in and Yield of Soybean Planted into Green Rye Treated with Supplemental Nitrogen. Kinsey E. Tiemann*, Brent S. Heaton, Joel Gruver, Mark L. Bernards; Western Illinois University, Macomb, IL (117)

‡Interaction of Tank-mixtures of Glyphosate and Dicamba on Glyphosate-resistant Horseweed Control. Leandro H S Guimaraes*¹, Estefania Gomiero Polli¹, Jose H. Scarparo de Sanctis², Guilherme Sousa Alves¹, Greg R. Kruger¹; ¹University of Nebraska-Lincoln, North Platte, NE, ²University of Nebraska-Lincoln, Lincoln, NE (118)

Stubble Height Does Not Influence Weed Suppression by Triticale. Tyler P. Meyeres*, Malynda M. Smith, Sarah Lancaster; Kansas State University, Manhattan, KS (119)

†Impact of Soil Management Practices on the Persistence of S-metolachlor and Sulfentrazone. Kolby Grint*¹, Rodrigo Werle², Nicholas J. Arneson², Daniel H. Smith², Ryan P. DeWerff²;

¹University of Wisconsin-Madison Agronomy Department, Madison, WI, ²University of Wisconsin-Madison, Madison, WI (120)

†Evaluation of Putative Resistance in Wisconsin Giant Ragweed (*Ambrosia trifida*) to Group 2, 9, and 14 Herbicides. Felipe A. Faleco*, David E. Stoltenberg, Rodrigo Werle; University of Wisconsin-Madison, Madison, WI (121)

†Using Multi-Tactic Strategies to Manage Herbicide-Resistant Waterhemp in Corn-Soybean Rotations of the Midwest. Ramawatar Yadav*, Prashant Jha, Damian D. Franzburg, Iththiphonh A. Macvilay, Ryan C. Hamberg, Avery J. Bennett, Edward S. Dearden, Alexis L. Meadows; Iowa State University, Ames, IA (122)

Physical mapping of amplified copies of *EPSPS* gene in glyphosate-resistant *Bromus diandrus*. Sathishraj Rajendran*¹, Dal-Hoe Koo¹, Christopher Preston², Mithila Jugulam¹; ¹Kansas State University, Manhattan, KS, ²University of Adelaide, Adelaide, Australia (123)

†Role Reversal: Glufosinate Control of Suspected Glyphosate-Resistant Johnsongrass (*Sorghum halepense*) in XtendFlex® Soybean. Sarah E. Dixon*¹, Neha Rana², Justin Pollard³, Reid J. Smeda¹; ¹University of Missouri, Columbia, MO, ²Bayer Crop Science, St Louis, MO, ³Bayer Crop Science, Camden Point, MO (124)

†Weed Seed Dynamics in an Interseeded System of Corn Silage and Alfalfa. Sarah A. Chu*, Erin E. Burns; Michigan State University, East Lansing, MI (125)

†Crop canopy development influences waterhemp (*A. tuberculatus*) growth. Nikola Arsenijevic*¹, Nicholas J. Arneson², Maxwell Coura Oliveira², Rodrigo Werle²; ¹University of Wisconsin-Madison, Madison, WI, ²University of Wisconsin-Madison, Madison, WI (126)

The development of Ames 25286: a herbicide sensitive reference population for *Amaranthus tuberculatus*. Brent P. Murphy*, Patrick Tranel; University of Illinois, Urbana, IL (127)

‡Field pennycress (*Thlaspi arvense*) Response to Simulated Carryover of Group 27 Herbicides in the Greenhouse. Daniela R. McConville*¹, Claudia R. Bland², Brent S. Heaton¹, Mark L. Bernards¹; ¹Western Illinois University, Macomb, IL, ²Purdue University, West Lafayette, IN (128)

‡Field Pennycress (*Thlaspi arvense*) Population and Growth Following Corn Treated with Group 27 Herbicides. Jacob W. Johnson*, Brent S. Heaton, Mark L. Bernards; Western Illinois University, Macomb, IL (129)

Resistance Fighter: Local Partnerships Drive Better Herbicide Recommendations. Marshall Hay*¹, Peter Eure², Ethan T. Parker¹, Dane L. Bowers³; ¹Syngenta Crop Protection, Vero Beach, FL, ²Syngenta Crop Protection, Greensboro, NC, ³Syngenta Crop Protection, Greensboro, NC (130)

‡Field Pennycress (*Thlaspi arvense*) Response to Simulated Carryover of Group 15 Herbicides in the Greenhouse. Nathan L. Stufflebeam*¹, Mason R. Blickenstaff¹, Claudia R. Bland², Brent S. Heaton¹, Mark L. Bernards¹; ¹Western Illinois University, Macomb, IL, ²Purdue University, West Lafayette, IN (131)

†The effects of cereal rye (*Secale cereale*) seeding rate and termination timing on weed control and soybean yield. Alyssa Essman*, Mark Loux, Alexander Lindsey, Anthony Dobbels; Ohio State University, Columbus, OH (12)

**MONDAY MORNING NOVEMBER 30 – THURSDAY
AFTERNOON DECEMBER 3**

POSTER - Herbicide Physiology & Molecular Biology

LOCATION: Virtual Poster Section
Q&A TIME: Wednesday 08:00 AM - 09:00 AM

***PRESENTER † GRADUATE CONTEST**

†The Effect of Trifludimoxazin on the Frequency of the ?G210 Target Site Mutation in Field Populations of Waterhemp. Jesse A. Haarmann*¹, Bryan G. Young², William G. Johnson¹; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN (133)

†Resistance to S-metolachlor in HPPD-resistant Palmer amaranth from Nebraska. Carlos Alberto G. Rigon*¹, Anita Küpper², Todd A. Gaines¹; ¹Colorado State University, Fort Collins, CO, ²Bayer Crop Science, Frankfurt, Germany (134)

†Effect of Increased Temperature on Lactofen Efficacy on PPO-Inhibitor-Resistant and -Susceptible Palmer amaranth. Ednaldo A. Borgato*, Sathishraj Rajendran, Anita Dille, Mithila Jugulam; Kansas State University, Manhattan, KS (135)

†Predominance of Metabolic Resistance in a Six-way-resistant Palmer amaranth (*Amaranthus palmeri*) population. Chandrima Shyam*, Ednaldo A. Borgato, Dallas E. Peterson, Anita Dille, Mithila Jugulam; Kansas State University, Manhattan, KS (136)

MONDAY AFTERNOON NOVEMBER 30

General Session

LOCATION: Virtual Session 1
TIME: 01:00 PM - 02:30 PM
MODERATOR: Harlene M. Hatterman-Valenti
North Dakota State University
Fargo, ND

01:00 PM Lee Van Wychen*; National and Regional Weed Science Societies, Alexandria, VA.

01:15 PM NCWSS past, present, and future: An academic perspective. Calvin Messersmith*; Professor Emeritus, North Dakota State University, Fargo, ND.

01:40 PM NCWSS past, present, and future: An industry perspective. Thomas Peters*; Associate Professor, North Dakota State University, Fargo, ND.

02:00 PM Presidential Address. Stott Howard*; Syngenta Crop Protection, Des Moines, IA.

02:20 PM Remembering NCWSS Members and Friends. Nathan Drewitz*; University of Minnesota, St. Paul, MN.

02:25 PM Presenters Panel Discussion for Questions

MONDAY AFTERNOON NOVEMBER 30

Quiz Bowl Sponsored by BASF

LOCATION: Virtual Session 1
TIME: 04:00 PM - 05:00 PM

***SPEAKER † GRADUATE CONTEST**

TUESDAY MORNING DECEMBER 1

ORAL - Herbicide Physiology & Molecular Biology

LOCATION: Virtual Session 1
TIME: 08:00 AM - 09:45 AM
MODERATOR: Nick T. Harre
Purdue University
West Lafayette, IN

Virtual Session 1

***SPEAKER † GRADUATE CONTEST**

- 08:00 AM** †Quantitative expression analysis of homoeologous wheat CYP81A-like genes following single and combined halauxifen-methyl and cloquintocet-mexyl foliar treatments. Olivia A. Obenland*, Brendan V. Jamison, Kris N. Lambert, Dean E. Riechers; University of Illinois, Urbana, IL (1)
- 08:15 AM** The genetics of multiple glyphosate resistant kochia plants from Colorado sugarbeet fields. Philip Westra*¹, Andrew Effertz², Todd A. Gaines¹, Crystal D. Sparks¹, Sarah Moran¹; ¹Colorado State University, Fort Collins, CO, ²Colorado State University, Ft Collins, CO (2)
- 08:30 AM** †Transcriptomics-based identification of candidate genes responsible for reduced dicamba sensitivity in waterhemp (*Amaranthus tuberculatus*). Lucas K. Bobadilla*¹, Patrick Tranel²; ¹University of Illinois, Champaign, IL, ²University of Illinois, Urbana, IL (4)
- 08:45 AM** Metabolite profiling of waterhemp (*Amaranthus tuberculatus*) populations reveals the resistance mechanism to a non-selective HPPD-inhibiting herbicide. Jeanafior Crystal T. Concepcion*¹, Shiv S. Kaundun², Sarah-Jane Hutchings², James A. Morris², Anatoli V. Lygin¹, Dean E. Riechers¹; ¹University of Illinois, Urbana, IL, ²Syngenta Crop Protection, Bracknell, United Kingdom (5)
- 09:00 AM** †QTLs for HPPD-inhibitor resistance in a Nebraska *Amaranthus tuberculatus* population. Brent P. Murphy*, Patrick Tranel; University of Illinois, Urbana, IL (6)
- 09:15 AM** Indaziflam resistance in *Poa annua* L. Jinyi Chen*; Michigan State University, East Lansing, MI (7)
- 09:30 AM** †Mechanism of Lactofen Resistance in Palmer amaranth from Kansas. Ednaldo A. Borgato*, Balaji Aravindhan Pandian, Sathishraj Rajendran, Anita Dille, Mithila Jugulam; Kansas State University, Manhattan, KS (8)

09:45 AM Business Meeting

TUESDAY MORNING DECEMBER 1

ORAL - Weed Biology, Ecology, Management

LOCATION: Virtual Session 2
TIME: 08:00 AM - 11:45 AM
MODERATOR: Shawn T. McDonald
University of Nebraska-Lincoln
Lincoln, NE

***SPEAKER † GRADUATE CONTEST**

- 08:00 AM** †Evaluation of Italian Ryegrass (*Lolium perenne* spp. *multiflorum*) Seed Retention and Distribution in Wheat at Harvest. Amber L. Herman*, Travis Legleiter; University of Kentucky, Princeton, KY (9)
- 08:15 AM** †Comparative growth of Palmer amaranth (*Amaranthus palmeri*) and waterhemp (*A. tuberculatus*) in Iowa. Rebecca S. Baker*; Iowa State University, Ames, IA (10)
- 08:30 AM** †Evaluating Indiana Palmer amaranth populations for resistance to dicamba. Claudia R. Bland*; Purdue University, West Lafayette, IN (11)
- 08:45 AM** Inhibiting Herbicide-Resistant Amaranthus by Suppressing Reproduction. Efrat Lidor Nili*¹, Ido Shwartz¹, Herve Huet¹, Miriam Aminia¹, Yuval Kadan¹, Micheal D. Owen², Orly Noivirt-Brik³; ¹WeedOUT, Ness Ziona, Israel, ²Affiliation Not Specified, Ames, IA, ³WeedOUT Ltd., Ness Ziona, Israel (13)
- 09:00 AM** †Identifying and quantifying resistance to soil-applied herbicides in waterhemp (*Amaranthus tuberculatus*) populations from Illinois using a soilless method. Dylan R. Kerr*¹, Seth A. Strom², Jeanafior Crystal T. Concepcion², Dean E. Riechers²; ¹University of Illinois, Champaign, IL, ²University of Illinois, Urbana, IL (14)
- 09:15 AM** †Termination timing and cover crop species influence weed suppression in corn. Malynda M. Smith*, Anita Dille, Sarah Lancaster, Kraig Roozeboom; Kansas State University, Manhattan, KS (15)
- 09:30 AM** **Break**
- 10:00 AM** †Quantifying the Effect of Norflurazon as a Component of Synergistic Tank Mixtures for Control of Multiple Herbicide-Resistant Waterhemp. Kip E. Jacobs*, Seth A. Strom, Dean E. Riechers; University of Illinois, Urbana, IL (16)
- 10:15 AM** †Widespread Geographic Distribution of Herbicide-Resistant Waterhemp (*Amaranthus tuberculatus*) in Wisconsin. Felipe A. Faleco*, Nicholas J. Arneson, Mark J. Renz, David E. Stoltenberg, Rodrigo Werle; University of Wisconsin-Madison, Madison, WI (17)
- 10:30 AM** Differential gene expression between males and females in dioecious *Amaranthus* species. YouSoon Baek*, Patrick Tranel; University of Illinois, Urbana, IL (18)
- 10:45 AM** †Cover crop termination interacts with residual herbicides for Palmer amaranth control in no-till soybean. Isaac N. Effertz*¹, Vipin Kumar², Anita Dille¹; ¹Kansas State University, Manhattan, KS, ²Kansas State University, Hays, KS (19)

- 11:00 AM** †Confirmation of Glyphosate Resistance in a Johnsongrass (*Sorghum halepense*) Biotype from Missouri. Sarah E. Dixon*¹, Justin Pollard², Reid J. Smeda¹; ¹University of Missouri, Columbia, MO, ²Bayer Crop Science, Camden Point, MO (20)
- 11:15 AM** †Patterns in the Inheritance of Resistance to ALS-Inhibiting Herbicides in Giant Ragweed Infers Link with Self-Incompatibility. Benjamin C. Westrich*¹, Subramanian Sankaranarayanan¹, Sharon A. Kessler¹, Bryan G. Young²; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN (21)
- 11:30 AM** †Effect of degree of water stress on growth and fecundity of velvetleaf (*Abutilon theophrasti*) using soil moisture sensors. Jasmine M. Mausbach*¹, Suat Irmak¹, Parminder S. Chahal², Debalin Sarangi³, John Lindquist¹, Amit J. Jhala¹; ¹University of Nebraska-Lincoln, Lincoln, NE, ²FMC Corporation, Lincoln, NE, ³University of Minnesota, St. Paul, MN (3)
- 11:45 AM Business Meeting**

TUESDAY MORNING DECEMBER 1

ORAL - Agronomic and Specialty Crops (All other agronomic and horticultural crops)

LOCATION: Virtual Session 1
 TIME: 10:00 AM - 12:00 PM
 MODERATOR: Harlene Hatterman-Valenti
 North Dakota State University
 Fargo, ND

Virtual Session 1

*SPEAKER † GRADUATE CONTEST

- 10:00 AM** †Assessment of Industrial Hemp Susceptibility to Off-target Movement of Commonly Applied Corn and Soybean Postemergence Herbicides. Milos Zaric*, Bruno Canella Vieira, Marija Savic, Barbara Vukoja, Guilherme Sousa Alves, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (22)
- 10:15 AM** Examining Weed Control with Pendimethalin Options for Onion in North Dakota. Harlene M. Hatterman-Valenti*, Collin Auwarter; North Dakota State University, Fargo, ND (23)
- 10:30 AM** †Response of newly planted peppermint (*Mentha x piperita*) to pyroxasulfone: a greenhouse study. Jeanine Arana*, Stephen L. Meyers, Brandi C. Woolam; Purdue University, West Lafayette, IN (24)
- 10:45 AM** Herbicide options for use in Kernza™ perennial grain: IR-4 update. Clair L. Keene*¹, Eugene P. Law², Jacob Jungers³; ¹North Dakota State University, Williston, ND, ²Cornell University, Ithaca, NY, ³University of Minnesota, St. Paul, MN (25)
- 11:00 AM** †Cucurbit Response to Simulated Dicamba Drift. Lindsey Orphan*, S. Alan Walters, Karla L. Gage. Southern Illinois University-Carbondale, Carbondale, IL (26)
- 11:15 AM** Response of peppermint (*Mentha x piperita*) to tiafenacil applied post-harvest. Brandi C. Woolam*, Stephen L. Meyers, Jeanine Arana; Purdue University, West Lafayette, IN (27)

- 11:30 AM** †Buffer distance impact on dicamba damage to potato, tomato and watermelon. Timothy C. Rice*, Reid J. Smeda; University of Missouri, Columbia, MO (28)
- 11:45 AM** Response of winter squashes and bell pepper to fomesafen applied PRE. Stephen L. Meyers*, Jeanine Arana, Brandi C. Woolam; Purdue University, West Lafayette, IN (29)
- 12:00 PM** **Business Meeting**

TUESDAY AFTERNOON DECEMBER 1

Women in Weed Science

LOCATION: Anita's Zoom Room
TIME: 12:00 PM - 01:00 PM
MODERATOR: Anita Dille
Kansas State University
Manhattan, KS

TUESDAY AFTERNOON DECEMBER 1

ORAL - Equipment and Application Methods

LOCATION: Virtual Session 1
TIME: 01:00 PM - 06:00 PM
MODERATOR: Stephen A. Valenti
Bayer
Fargo, ND

***SPEAKER † GRADUATE CONTEST**

- 01:00 PM** †Impact of Drift Reducing Adjuvants on Spray Pattern Uniformity of Dicamba Tank-Mixtures. Jesaelen Gizotti de Moraes*, Milos Zaric, Guilherme Sousa Alves, Bruno Canella Vieira, Jeffrey A. Golus, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (30)
- 01:15 PM** †Influence of Temperature on Droplet Size and Physical-chemical Properties of Glufosinate Tank-mixtures With Different Adjuvants. Joao Victor de Oliveira*¹, Antonio Augusto Correa Tavares¹, Vitor M. Muller Anunciato¹, Estefania Gomiero Polli¹, Rone Batista de Oliveira², Greg R. Kruger¹; ¹University of Nebraska-Lincoln, North Platte, NE, ²University of Northern Paraná, Bandeirantes, Brazil (31)
- 01:30 PM** Hooded Sprayer for Application of Nonselective Herbicides in Sugarbeet. Thomas J. Peters*, Alexa Lystad; North Dakota State University, Fargo, ND (32)
- 01:45 PM** †Comparison of Spray Drift as Predicted by AGDISP with Field Applications Using Air Inclusion Nozzles. Barbara Vukoja*, Guilherme Sousa Alves, Kasey P. Schroeder, Jeffrey A. Golus, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (33)

- 02:00 PM** See & Spray™ Technology Improves Weed Control Input Efficiency. William L. Patzoldt*; Blue River Technology, Sunnyvale, CA (34)
- 02:15 PM** †Influence of Boom Height on Spray Drift of Herbicides Application. Antonio Augusto Correa Tavares*, Guilherme Sousa Alves, Joao Victor de Oliveira, Rone Batista de Oliveira, Vitor Muller Anunciato, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (35)
- 02:30 PM** A Novel Approach for Decreasing Dicamba Volatility Problems. Donald Penner*, Jan Michael; Michigan State University, East Lansing, MI (36)
- 02:45 PM** †How Does Weed Density Impact Foliar Herbicide Efficacy? Tomas F. Delucchi*¹, William G. Johnson¹, Bryan G. Young²; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN (37)
- 03:00 PM** The Importance of Adjuvants and Making the Selection Easier. Joe V. Gednalske*; CPDA, River Falls, WI (38)
- 03:15 PM** †Effect of surfactants on postemergent applications of dicamba, glufosinate, and 2,4-D on Palmer amaranth and kochia. Ely D. Anderson*, Bruno C. Vieira, Jeffrey A. Golus, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (39)
- 03:30 PM** **Break**
- 04:00 PM** †Methodology to Estimate and Analyze UAS Swath Width Using Different Application Parameters. Trenton W. Houston*¹, Bradley K. Fritz², Wesley C. Hoffmann³, Greg R. Kruger¹; ¹University of Nebraska-Lincoln, North Platte, NE, ²USDA ARS, College Station, TX, ³Prology Consulting, College Station, TX (40)
- 04:15 PM** The Optify Line of Adjuvants: Versatile Products for a Complicated World. Ryan J. Edwards*¹, Gregory K. Dahl², Lillian C. Magidow¹, Mark A. Risley¹; ¹WinField United, River Falls, WI, ²WinField United, Eagan, MN (41)
- 04:30 PM** †Dicamba plus Glufosinate Tank Mixtures Affected by Storage Time and Temperature. Estefania Gomiero Polli*, Guilherme Sousa Alves, Jesaalen Gizotti de Moraes, Joao Victor de Oliveira, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (42)
- 04:45 PM** Reducing Dicamba Buffers in Soybeans with Redball Hooded Sprayers! Steve Claussen*; Willmar Fabrication, LLC, Benson, MN (43)
- 05:00 PM** †Evaluation of Electrocuting as a Method of Controlling Weed Escapes in Soybean. Haylee E. Schreier*, Mandy Bish, Kevin W. Bradley, Brian Dintelmann; University of Missouri, Columbia, MO (44)
- 05:15 PM** †Adoption of UAVs for pest management. Emma L. Gaither*, Reid J. Smeda; University of Missouri, Columbia, MO (46)
- 05:30 PM** Influence of Sodium Cation and Various AMS Adjuvants on the Performance of Various Glyphosate Formulations. Gregory K. Dahl*¹, Amanda Flipp², Laura J. Hennemann², Joshua J. Skelton³, Ryan J. Edwards²; ¹WinField United, Eagan, MN, ²WinField United, River Falls, WI, ³WinField United, St. Paul, MN (47)
- 05:45 PM** †Non-dicamba tolerant soybean response to reinstate from different cleaning procedures of dicamba and clethodim tank mixtures. Vinicius Velho*, Guilherme Sousa Alves, Greg R. Kruger; University of Nebraska-Lincoln, North Platte, NE (48)
- 06:00 PM** **Business Meeting**

TUESDAY AFTERNOON DECEMBER 1

ORAL - Agronomic Crops I - Corn

LOCATION: Virtual Session 2
TIME: 01:00 PM - 04:30 PM
MODERATOR: Michael Weber
Bayer
Indianola, IA

Virtual Session 2

***SPEAKER † GRADUATE CONTEST**

- 01:00 PM** †Influence of Cover Crops on Soil Microbial Activity and Degradation of Atrazine and Mesotrione. William G. Johnson¹, Lucas Oliveira Ribeiro Maia*¹, Eileen J. Kladienko¹, Shalamar Armstrong¹, Bryan G. Young², Joshua R. Widhalm¹; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN (49)
- 01:15 PM** Acuron XR herbicide - Residual Weed Control, Crop Safety and Yield in Corn. Scott E. Cully*¹, Tom H. Beckett², Mark J. Kitt²; ¹Syngenta Crop Protection, Marion, IL, ²Syngenta Crop Protection, Greensboro, NC (50)
- 01:30 PM** †Survey of Stakeholders to Assess Management Practices and Problem Weeds in Nebraska Cropping Systems. Shawn T. McDonald*¹, Debalin Sarangi², Jenny Rees³, Chris Proctor¹, Prashant Jha⁴, Amit J. Jhala¹; ¹University of Nebraska-Lincoln, Lincoln, NE, ²University of Minnesota, St. Paul, MN, ³University of Nebraska-Lincoln, York, NE, ⁴Iowa State University, Ames, IA (51)
- 01:45 PM** Effectiveness of Group 15 Herbicides for Preemergence Control of Waterhemp (*Amaranthus tuberculatus*) Populations with Differing Sensitivities at Multiple Locations in Illinois. Seth A. Strom*, Kip E. Jacobs, Adam Davis, Dean E. Riechers, Aaron Hager; University of Illinois, Urbana, IL (52)
- 02:00 PM** †Variable weather, weed control, and corn management effects on yield loss due to weeds. Christopher A. Landau*¹, Aaron Hager¹, Martin Williams²; ¹University of Illinois, Urbana, IL, ²USDA-ARS, Urbana, IL (53)
- 02:15 PM** **Break**
- 02:45 PM** †Control of Multiple-Herbicide-Resistant Waterhemp in Corn with Postemergence Herbicides. Darren E. Robinson¹, Peter Sikkema¹, Amit J. Jhala², David C. Hooker¹, Christian A. Willemse*¹; ¹University of Guelph, Ridgetown, ON, Canada, ²University of Nebraska-Lincoln, Lincoln, NE (54)
- 03:00 PM** BCS-720: A New Residual Herbicide Combination for Weed Management in Corn. Eric Riley*¹, Mike Weber²; ¹Bayer Crop Science, St. Louis, MO, ²Bayer Crop Science, Indianola, IA (55)
- 03:15 PM** †Herbicide Safener Effects on Goss's Wilt Severity in Corn. Nathan H. Haugrud*, Joseph T. Ikley; North Dakota State University, Fargo, ND (56)
- 03:30 PM** Acuron GT Launch: T-minus spring 2021. Ryan D. Lins*¹, Tom H. Beckett², Mark J. Kitt²; ¹Syngenta Crop Protection, Rochester, MN, ²Syngenta Crop Protection, Greensboro, NC (57)

- 03:45 PM** †Assessing the Impact of Drought on Weed Communities and Corn Hybrids with Differing Drought Tolerance. Allyson M. Rumler*, Erin E. Burns; Michigan State University, East Lansing, MI (58)
- 04:00 PM** Future efficacy of preemergence herbicides in corn is threatened by more variable weather. Martin Williams*¹, Christopher A. Landau², Aaron Hager², Patrick Tranel², Adam Davis², Nicolas Martin²; ¹USDA-ARS, Urbana, IL, ²University of Illinois, Urbana, IL (59)
- 04:15 PM** †Determination of the Critical Period of Weed Control in an Interseeded System of Corn Silage and Alfalfa. Sarah A. Chu*, Erin E. Burns; Michigan State University, East Lansing, MI (60)
- 04:30 PM** **Business Meeting**

TUESDAY AFTERNOON DECEMBER 1

ORAL - Extension

LOCATION: Virtual Session 2
TIME: 04:30 PM - 04:45 PM
MODERATOR: Parminder Chahal
FMC Corporation
Lincoln, NE

Placed right after Agronomic Crops 1 - Corn

***SPEAKER**

- 04:30 PM** Survey Update on Herbicide-Resistant Palmer Amaranth in Kansas. Vipin Kumar*, Rui Liu, Taylor Lambert, Phillip W. Stahlman; Kansas State University, Hays, KS (61)
- 04:45 PM** **Business Meeting**

WEDSDAY MORNING DECEMBER 2

What's New in Industry

LOCATION: Virtual Session 1
TIME: 7:00 AM - 08:00 AM
MODERATOR: Lowell Sandell
Valent
Lincoln, NE

08:00 AM **Business Meeting**

WEDNESDAY MORNING DECEMBER 2

ORAL - Agronomic Crops II - Soybeans

LOCATION: Virtual Session 1
TIME: 08:00 AM - 12:00 PM
MODERATOR: Cody Evans
Bayer
Franklin, IL

***SPEAKER † GRADUATE CONTEST**

- 08:00 AM** †The Biologically Effective Dose of Bromoxynil, Applied Alone and Tankmixed with Metribuzin, for the Control of Glyphosate-Resistant Canada Fleabane [*Conyza Canadensis* (L.) Cronq.] Applied Preplant in Soybean. David Westerveld*, Peter Sikkema, Darren E. Robinson, David C. Hooker; University of Guelph, Ridgetown, ON, Canada (137)
- 08:15 AM** †Assessment of dicamba movement in Missouri using a large-scale field trial. Jerri Lynn Henry*¹, Ryan Rector², Reid J. Smeda¹; ¹University of Missouri, Columbia, MO, ²Bayer Crop Science, St Louis, MO (138)
- 08:30 AM** †Interactions of Dicamba, Glyphosate, and Glufosinate Tank-Mixtures for Control of Glyphosate-Resistant Weeds. Adam L. Constine*, Christy Sprague; Michigan State University, East Lansing, MI (139)
- 08:45 AM** Pollen-Mediated Gene Flow from Glyphosate- and Dicamba-Resistant to Conventional Soybean (*Glycine max*). Zahoor A. Ganie*¹, Parminder S. Chahal², Amit J. Jhala³; ¹FMC Corporation, Newark, DE, ²FMC Corporation, Lincoln, NE, ³University of Nebraska-Lincoln, Lincoln, NE (140)
- 09:00 AM** †Optimizing Horseweed Management with Fall-Seeded Cover Crops and Soybean Row Widths. Justine L. Fisher*, Christy Sprague; Michigan State University, East Lansing, MI (141)
- 09:15 AM** †Antagonism of ACCase Inhibitor Herbicides Used in Xtend Soybean Systems for Control of Volunteer Corn. Marcelo Zimmer*¹, Bryan G. Young², William G. Johnson¹; ¹Purdue University, West Lafayette, IN, ²Purdue University, Brookston, IN (142)
- 09:30 AM** †Influence of agronomic practices on soybean canopy development and PRE-emergence herbicide fate. Nikola Arsenijevic*¹, Ryan P. DeWerff², Shawn P. Conley², Matthew Ruark², Rodrigo Werle²; ¹University of Wisconsin-Madison, Madison, WI, ²University of Wisconsin-Madison, Madison, WI (143)
- 09:45 AM** **Break**
- 10:15 AM** †Glyphosate Alternatives for Cereal Rye Termination with Different Application Timings in Soybean. Jose H. de Sanctis*, Amit J. Jhala; University of Nebraska-Lincoln, Lincoln, NE (144)
- 10:30 AM** †Interference of Interseeded Winter Wheat on Soybean Growth and Weed Suppression. Madison R. Decker*, Ronald F. Krausz, Karla L. Gage; Southern Illinois University, Carbondale, IL (145)

- 10:45 AM** †Oat Companion Crop Effects on *Amaranthus spp.* Suppression and Iron Deficiency Chlorosis in Soybean. Jeffery K. Stith*; North Dakota State University, Fargo, ND (146)
- 11:00 AM** Efficacy of PRE herbicides with single and multiple active ingredients on residual waterhemp control in Wisconsin. Alexandre T. Rosa*¹, Nicholas J. Arneson², Daniel H. Smith², Ryan P. DeWerff², Maxwell Coura Oliveira², Rodrigo Werle²; ¹University of Nebraska-Lincoln, Lincoln, NE, ²University of Wisconsin-Madison, Madison, WI (147)
- 11:15 AM** †Influence of Environment and Soybean Trait Adoption on Dicamba and 2,4-D Concentrations in Rainwater and Air Deposits Collected throughout Missouri. Eric G. Oseland*, Mandy Bish, Kevin W. Bradley; University of Missouri, Columbia, MO (148)
- 11:30 AM** †Economics of herbicide programs for weed management in dicamba/glufosinate/glyphosate-resistant soybean. Adam Striegel*, Amit J. Jhala; University of Nebraska-Lincoln, Lincoln, NE (149)
- 11:45 AM** †Evaluation of the Seed Terminator™ as a Harvest Weed Seed Control Tool in Missouri Soybean Production Systems. Travis Winans*, Brian Dintelmann, Mandy Bish, Kevin W. Bradley; University of Missouri, Columbia, MO (150)

WEDNESDAY MORNING DECEMBER 2

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

LOCATION: Virtual Session 2
 TIME: 08:00 AM - 09:00 AM
 MODERATOR: Joseph Omielan
 University of Kentucky
 Lexington, KY

***SPEAKER † GRADUATE CONTEST**

- 08:00 AM** Saltcedar Control Using Herbicides on the Cimarron National Grasslands. Walter H. Fick*; Kansas State University, Manhattan, KS (151)
- 08:15 AM** †Interaction between clethodim and dicamba in control of volunteer corn. Vitor M. Muller Anunciato*¹, Gabrielle Castro Macedo², Daniel Araujo Doretto³, Caio A. Carbonari³, Jeff A. Golus¹, Greg R. Kruger¹; ¹University of Nebraska-Lincoln, North Platte, NE, ²Teejeet, Sao Paulo, Brazil, ³UNESP, Botucatu, Brazil (152)
- 08:30 AM** Effect of 2,4-D + florypyrauxifen applications on weed control, clover tolerance and forage biomass in grass-legume pastures in Wisconsin. Jose Luiz Carvalho de Souza Dias¹, Garrett N. Imhoff*², Scott Flynn³, Mark J. Renz²; ¹University of Wisconsin-Madison, Madison, WI, ²University of Wisconsin-Madison, Madison, WI, ³Corteva Agriscience, Lees Summit, MO (153)
- 08:45 AM** Is there a magic bullet? Greenhouse screening of herbicides on Bohemian knotweed (*Fallopia x bohemica*). Roger Becker*, Alan G. Smith, Neil O. Anderson, Ryan Mentz, Jeanie Katovich, Mary Marek-Spartz; University of Minnesota, St. Paul, MN (154)

WEDNESDAY MORNING DECEMBER 2

**SYMPOSIUM - Technology in Application: Learning From the Past and
Building into the Future**

LOCATION: Virtual Session 2
TIME: 09:00 AM - 12:00 PM
MODERATOR: Stephen A. Valenti
Bayer
Fargo, ND

***SPEAKER**

- 09:00 AM** Fifty Years of Pesticide Application Technology. Robert Klein*; University of Nebraska, North Platte, NE (160)
- 09:15 AM** Application Technology: Where We Are Going. Greg Kruger*; University of Nebraska - Lincoln, North Platte, NE (161)
- 09:30 AM** Spatial modeling of canopy penetration. Rone Batista de Oliveira*; UENP, Fargo, Brazil (155)
- 09:45 AM** Battling resistant weeds with spot spray technology WEED-IT. Albert Bosscha¹, Hans IJken^{*2}, ¹Rometron, Don't Know, Netherlands, ²Rometron, Steenderen, Netherlands (162)
- 10:00 AM** Engineering Considerations Associated with the Application of Agrochemicals Using Unmanned Aerial Systems (UAS). Bradley K. Fritz*; USDA, College Station, TX (156)
- 10:15 AM** Automatic weed spectrum and weed pressure assessment using imagery data. Marek M. Schikora*; BASF, Langenfeld, Germany (157)
- 10:30 AM** Untapped opportunities for wind tunnel testing. Steven A. Fredericks*; Winfield United, River Falls, WI (158)
- 10:45 AM** Electronically Actuated Nozzle Bodies – Enabling Hands Free Nozzle Switching. Nicholas J. Fleitz^{*1}, Luis Dowling²; ¹Pentair Hypro, New Brighton, MN, ²Pentair Hypro, Lincoln, NE (159)
- 11:00 AM** Panel Discussion

WEDSDAY AFTERNOON DECEMBER 2

Awards Luncheon

LOCATION: Virtual Session 1
TIME: 12:30 PM - 02:00 PM
MODERATOR: Harlene Hatterman-Valenti
North Dakota State University
Fargo, ND

- 12:30 PM** Distinguished Achievement and Fellow Awards
Student Paper, Poster, and Video Awards

WEDNESDAY AFTERNOON DECEMBER 2

ORAL - Agronomic Crops II - Soybeans

LOCATION: Virtual Session 1
TIME: 02:00 PM - 04:15 PM
MODERATOR: Cody Evans
Bayer
Franklin, IL

***SPEAKER † GRADUATE CONTEST**

- 02:00 PM** Management of velvetleaf by tank-mixing glufosinate and fluthiacet-methyl in glufosinate-resistant soybean. Parminder S. Chahal*¹, Zahoor A. Ganie², Amit J. Jhala³; ¹FMC Corporation, Lincoln, NE, ²FMC Corporation, Newark, DE, ³University of Nebraska-Lincoln, Lincoln, NE (163)
- 02:15 PM** Influence of Various Broadleaf Herbicides on the Control of Corn and Other Grasses with Clethodim Herbicides. Gregory K. Dahl*¹, Joshua J. Skelton², Ryan J. Edwards³, Laura J. Hennemann³, Lee A. Boles³; ¹WinField United, Eagan, MN, ²WinField United, St. Paul, MN, ³WinField United, River Falls, WI (164)
- 02:30 PM** A23372A - A Broad-Spectrum Solution for Superior Weed Management in Soybean. Brett R. Miller*¹, Tom H. Beckett², Peter Eure³; ¹Syngenta Crop Protection, Fargo, ND, ²Syngenta Crop Protection, Greensboro, NC, ³Syngenta Crop Protections, Greensboro, NC (165)
- 02:45 PM** Control of volunteer Enlist E3[®] corn (*Zea mays*) in Enlist E3[®] soybean (*Glycine max*). Rui Liu*¹, Isaac N. Effertz², Taylor Lambert¹, Vipin Kumar¹; ¹Kansas State University, Hays, KS, ²Kansas State University, Manhattan, KS (166)
- 03:00 PM** **Break**
- 03:15 PM** Influence of Multiple Sites of Action and Residual Herbicide Application Timing on Season-Long Waterhemp (*Amaranthus tuberculatus* (Moq.) J. D. Sauer) Control in Soybean. Travis Legleiter*¹, J D. Green²; ¹University of Kentucky, Princeton, KY, ²University of Kentucky, Lexington, KY (167)
- 03:30 PM** Influence of Glufosinate Tank-mix Combinations with PPO-inhibitors on Waterhemp Control, Crop Injury and Yield in Enlist E3 Soybeans. Rodrigo Werle*¹, Nicholas J. Arneson¹, Ryan P. DeWerff¹, Daniel H. Smith¹, Nikola Arsenijevic², Mark L. Bernards³; ¹University of Wisconsin-Madison, Madison, WI, ²Universtiy of Wisconsin-Madison, Madison, WI, ³Western Illinois University, Macomb, IL (168)
- 03:45 PM** Herbicide Weed Control Program in XtendFlex[®] Soybean. Neha Rana¹, Cody Evans², Devin Hammer*³, Ryan E. Rapp⁴, Rod Stevenson⁵, Carl Coburn¹, Blake Barlow⁶; ¹Bayer Crop Science, St Louis, MO, ²Bayer Crop Science, Franklin, IL, ³Bayer Crop Science, Mankato, MN, ⁴Bayer Crop Science, Mitchell, SD, ⁵Bayer Crop Science, Delton, MI, ⁶Bayer Crop Science, Columbia, MO (169)
- 04:00 PM** Weed Efficacy and Crop Safety with MON 51817 in Roundup Ready[®] Xtend Crop System. Neha Rana¹, Ryan Rector*¹, Ryan E. Rapp², Cody Evans³, Devin Hammer⁴, Carl Coburn¹, Rod Stevenson⁵, Blake Barlow⁶; ¹Bayer Crop Science, St Louis, MO, ²Bayer Crop Science, Mitchell, SD, ³Bayer Crop Science, Franklin, IL, ⁴Bayer Crop Science, Mankato, MN, ⁵Bayer Crop Science, Delton, MI, ⁶Bayer Crop Science, Columbia, MO (170)
- 04:15 PM** **Business Meeting**

WEDNESDAY AFTERNOON DECEMBER 2

**SYMPOSIUM - Training Tomorrow's Extension Leaders: What is Working
and Where Can We Grow**

LOCATION: Virtual Session 2
TIME: 02:00 PM - 05:00 PM
MODERATOR: Nicholas J. Arneson
University of Wisconsin-Madison
Madison, WI

***SPEAKER**

- 02:00 PM** Introduction to Symposium and Call to Action. Nicholas J. Arneson*; University of Wisconsin-Madison, Madison, WI (171)
- 02:20 PM** Café Talks: Meeting Farmers in their Comfort Zone. Abby M. Wick*; North Dakota State University, Fargo, ND (172)
- 02:40 PM** The Nebraska On-Farm Research Network: Innovative and Impactful Extension Work During COVID and Beyond. Laura Thompson*; University of Nebraska-Lincoln, Lincoln, NE (173)
- 03:00 PM** Extensions Community-based Efforts to Combat Palmer Amaranth and Steward Pesticide Use in Georgia. A Stanley Culpepper*; University of Georgia, Tifton, GA (174)
- 03:20 PM** 'App'-riculture: Putting Plant Disease Prediction in the Hands of Farmers. Damon Smith*; University Wisconsin, Madison, WI (175)
- 03:40 PM** Panel Discussion

THURSDAY MORNING DECEMBER 3

Student Industry Virtual Tours

LOCATION: Virtual Session 1
TIME: 09:00 AM - 01:00 PM
MODERATOR: Milos Zaric
University of Nebraska, Lincoln
Lincoln, Nebraska

***SPEAKER**

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Agronomic Crops I (Corn)

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Agronomic Crops II (Soybeans)

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Agronomic and Specialty Crops

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1978	Melwin K. McCarty *		Robert G. Wilson
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			William W. Witt

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2001	LeRoy R. Cobia	2011	Bill Johnson Harlene Hatterman-Valenti Gordon K. Roskamp
2002	James J. Kells	2012	Peter H. Sikkema Bob Hartzler Roger Becker
2003	Karen Ann Renner Charles Slack Phillip Stahlman	2013	Bryan Young
2004	Duane Rathman David Regehr	2014	Adrian Moses David Stoltenberg
2005	Dallas E. Peterson	2015	Dave Johnson Mark Wrucke
2006	James R. Martin Bernard H. Zandstra	2016	David Simpson Curtis Thompson
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2008	Thomas J. Peters Jeffrey Gunsolus Kassim Al-Khatib	2018	Anita Dille Mark Peterson
2009	J.D. Green Thomas B. Threewitt Robert N. Klein	2019	Greg Dahl Mark Loux Rich Zollinger

* Deceased

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

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1945	Yost, Ted F. *	1983	DiVall, James W.
1946	Yost, Ted F. *	1984	Miller, Gerald R.
1947	Hanson, Noel S. *	1985	Messersmith, Calvin G.
1948	Willard, Charles J. *	1986	Wax, Loyd M. *
1949	Dunham, R. S. *	1987	Chamberlain, Earl *
1950	Worzella, W. W. *	1988	Harvey, R. Gordon *
1951	Sylwester, Erhardt P. *	1989	Worthington, James P.
1952	Buchholtz, Kenneth P. *	1990	Martin, Alex R.
1953	Gilbert, C. J. *	1991	Taylor, T. Don
1954	Lee, Oliver C. *	1992	Stoller, Edward W.
1955	Grigsby, Buford H. *	1993	Warfield, Ted R.
1956	Helgeson, Earl A. *	1994	Bauman, Thomas T.
1957	Slife, Fred W. *	1995	Cobia, LeRoy R.
1958	Derscheid, Lyle A. *	1996	Dexter, Alan G.
1959	Foster, J. Roe *	1997	Miller, Bill
1960	Holm, Leroy G. *	1998	Buhler, Douglas D.
1961	Alban, E. K. *	1999	Orwick, Philip L.
1962	Bjerken Sig. *	2000	Kells, James J.
1963	Hemphill, Delbert D. *	2001	Rathmann, Duane P.
1964	Hemphill, Delbert D. *	2002	Peterson, Dallas E.
1965	Furrer, John D. *	2003	Horak, Michael J.
1966	Furrer, John D. *	2004	Doll, Jerry D.
1967	Warden, Robert L. *	2005	Peters, Tom
1968	Fletchall, O. Hale *	2006	Miller, Stephen D.
1969	Beck, Thomas V. *	2007	Moses, Adrian
1970	Hannah, Lawrence H. *	2008	Johnson, William G.
1971	Knake, Ellery *	2009	Holm, Mick
1972	Williams, Jr., James L. *	2010	Boerboom, Chris
1973	Meggitt, William	2011	Wrucke, Mark
1974	Bradfield, Kenneth W. *	2012	Young, Bryan
1975	Burnside, Orvin C.	2013	Johnson, Dave
1976	Fink, Rodney J.	2014	Green, J.D.
1977	Carpenter, Will D.	2015	Hinz, John
1978	Doersch, Ronald E.	2016	Dille, Anita
1979	Nalewaja, John D.	2017	Dahl, Gregory
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1980	Stroube, Edward W.	2019	Hager, Aaron
1981	Herron, James W. *	2020	Stott Howard

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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
Michael 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
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