

**RESEARCH  
CONFERENCE SCHEDULE  
&  
ABSTRACTS  
VOLUME 29**



**November 17-November 18, 2025**

**Don Tyson Center for Agricultural Sciences  
1371 W Altheimer Dr. Fayetteville, AR 72704**

**STUDENT COMPETITIONS  
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**Student Contest Chair: Terry Spurlock**

**Monday, November 17, 2025**

9:30 – 11:30 **Poster setup**

11:45 - 12:00 **Welcome and Announcements**

<b>Talk times</b>	<b>Titles</b>	<b>Abstract Page #</b>
12:00 - 12:15	<b>Assessing the Economic Benefit of Automatic Insecticide Applications in Soybeans.</b> *A.C. Graves, B.C. Thrash, Bateman, N. R., G.E. Studebaker, W.A. Plummer, T. Davis, S.G. Felts, M.G. Mann, W.A. Fletcher, P.G. Maris, J. Linn. Department of Entomology and Plant Pathology, Fayetteville, AR.....	1
12:15 - 12:30	<b>Comparison of Weed Management Programs in Short- and Full-Stature Corn.</b> *H.C. Barber, J.K. Norsworthy, H. Rudolph, W.T. Herman, H.M. Houser, R.C. Scott, and L.T. Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	1
12:30 - 12:45	<b>Do Preemergence Herbicides and Thrips Infestations Interact Across ThryvOn™ and Non-ThryvOn™ Technologies?</b> *J.C. Malone, L.T. Barber, J.K. Norsworthy, B.C. Thrash, W.A. Plummer, W.A. Fletcher. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	2
12:45 - 1:00	<b>Does Strength of Preemergence Affect the Performance of John Deere See &amp; Spray in Soybean?</b> *Lane Pierce, Jason K. Norsworthy, Amar Godar, Cade Halbrook, Tom Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR...	2
1:00 - 1:15	<b>Evaluation of Thresholds on Tarnished Plant Bug in ThryvOn Cotton.</b> *Anderson Fletcher, Ben Thrash, Nick Bateman, Andrew Plummer, Garrett Felts, Taylor Harris, Gage Maris, Claire Graves. Dept. of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR.....	3
1:15 - 1:30	<b>Weed Management Problems and Practices in Midsouthern Soybean Production: Farmer and Consultant Perspectives.</b> *C.M. Halbrook, J.K. Norsworthy, R.C. Scott, and L.T. Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas.....	3
1:30 - 1:45	<b>Soybean resistance to southern root-knot nematode reduces nematode population density under field conditions.</b> *Emanuel Ferrari do Nascimento <sup>1</sup> , Andrea Acuña <sup>1</sup> , Mariola Usovsky <sup>2</sup> , Amanda Pominville <sup>3</sup> , Travis Faske <sup>4</sup> , Zenglu Li <sup>5</sup> , Melissa G. Mitchum <sup>5</sup> , Henry T. Nguyen <sup>2</sup> , Grover Shannon <sup>2</sup> , Caio Canella Vieira <sup>1</sup> . <sup>1</sup> Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR, <sup>2</sup> University of Missouri, Columbia, MO, <sup>3</sup> Forage Genetics International, Nampa, ID, <sup>4</sup> Dept. of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR <sup>5</sup> University of Georgia, Athens, GA.....	4
1:45 - 2:00	<b>BREAK</b>	
2:00 - 2:15	<b>Preemergence Control Options for White Margin Sedge.</b> *Aidan D. Ross, Jason K. Norsworthy, Hunter R. Rudolph, Susee Sudhakar, Bob Scott. University of Arkansas System Division of Agriculture, Fayetteville, AR.....	4

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**Monday, November 17, 2025 (continued)**

2:15 - 2:30	<b>Integrating SMAF-Based Indicators to Assess Soil Health Dynamics across Grassland Forage Systems in the Southern U.S.</b> *Geraldinn Andrea Cortez Barahona, Amanda J. Ashworth, Gerson L. Drescher, Helen C. Amorim, Gabriela Andrade Leite Mengez, and Joao H. Stibe Silva. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	5
2:30 - 2:45	<b>Exploring the Potential of Biochar for Hydroponics Pest Management.</b> *Soumya Unnikrishnan <sup>1</sup> , Ryan Dickson <sup>2</sup> , Kristen Gibson <sup>3</sup> and Rupesh Kariyat <sup>1</sup> . <sup>1</sup> Department of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR. <sup>2</sup> Department of Horticulture, University of Arkansas, Fayetteville, AR. <sup>3</sup> Department of Food Science, University of Arkansas, Fayetteville, AR.....	5
2:45 - 3:00	<b>Response of ArkTam<sup>TM</sup> and Double Team<sup>TM</sup> Grain Sorghum to Single and Sequential Applications of Quizalofop.</b> *W. T. Herrman, J.K. Norsworthy, O.A. Ajani, C. Ketchum, C. Halbhook, and L.T. Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	6
3:00 - 3:15	<b>Examining the Lignin Biosynthesis Pathway for Pest Management of Sugarcane Aphid in Sorghum.</b> **Alejandro Vasquez <sup>1</sup> , Angel Jose <sup>2</sup> , Joe Louis <sup>3,4</sup> , Rupesh Kariyat <sup>1</sup> . <sup>1</sup> Department of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR, <sup>2</sup> School of Integrative Biological and Chemical Sciences, University of Texas Rio Grande Valley, TX, <sup>3</sup> Department of Entomology, University of Nebraska-Lincoln, Lincoln, NE, <sup>4</sup> Department of Biochemistry, University of Nebraska-Lincoln, Lincoln, NE.....	6
3:15 - 3:30	<b>Assessing the Influence of ThryvOn Technology on Cotton (<i>Gossypium hirsutum</i>) Morpho-Physiological Traits and Impacts on Western Flower Thrips (<i>Frankliniella occidentalis</i>)</b> **Jessica Ayala <sup>1</sup> , Alejandro Diaz <sup>2</sup> , Insha Shafi <sup>1</sup> , Ben Thrash <sup>1</sup> , & Rupesh Kariyat <sup>1</sup> . <sup>1</sup> Department of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR. <sup>2</sup> Upward Bound, University of Arkansas, Fayetteville, AR.....	7
3:30 - 3:45	<b>Insect herbivory and drought affect indirect defenses in soybean.</b> **Manish Gautam, Alejandro Vasquez, Devi Balakrishnan, Insha Shafi, Jessica Ayala, and Rupesh Kariyat. Department of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR..	7
3:45 - 4:00	<b>BREAK</b>	
4:00 - 4:15	<b>Nitrogen management of furrow-irrigated rice on Silt loam and clayey soils.</b> **Ali Ablao, Justin Chlapecka, Courtney Hunt, Jimmy Duvall. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	8
4:15 - 4:30	<b>Detection of QoI-Resistant <i>Rhizoctonia solani</i> (AG1-IA) in Arkansas Rice and Evaluation of Fungicide Efficacy.</b> **Jared B. Linn <sup>1</sup> , Nick Bateman <sup>2</sup> , Rupesh Kariyat <sup>1</sup> , Jarrod Hardke <sup>3</sup> , Rich Adams <sup>1</sup> , Bruna Ronning <sup>2</sup> , Samuel DePaula <sup>2</sup> , and Camila Nicolli <sup>2</sup> . <sup>1</sup> Dept. Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR. <sup>2</sup> Dept. Entomology and Plant Pathology, University of Arkansas, Stuttgart, AR. <sup>3</sup> Dept. Crop, Soil, and Environmental Sciences, University of Arkansas, Stuttgart, AR.....	8
4:30 - 4:45	<b>Is Glufosinate Resistance in Palmer Amaranth Prominent in Crittenden County?</b> **Matthew A. Lombardi, Jason K. Norsworthy, Pamela Carvalho-Moore, and Caio D. Santos. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	9

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**Monday, November 17, 2025 (continued)**

4:45 - 5:00	<b>Managing Spring Dead Spot in Limited-Resource Scenarios.</b> **Michael V. Battaglia <sup>1</sup> , Michael D. Richardson <sup>1</sup> , Terry N. Spurlock <sup>2</sup> , Kona Swift <sup>1</sup> , Wendell J. Hutchens <sup>1</sup> . Dept. of Horticulture, University of Arkansas, Fayetteville, AR, <sup>2</sup> Department of Entomology and Plant Pathology, Lonoke, AR.....	9
5:00 - 5:15	<b>Postemergence Herbicide Options for Glufosinate-Resistant Palmer Amaranth from Crittenden County, Arkansas.</b> **C.C. Ketchum, J.K. Norsworthy, M. Lombardi, Pamela Carvalho-Moore, L.T. Barber, and I. Meiners. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	10
5:15 - 5:30	<b>Implementing Sweep Nets in Rice Water Weevil Scouting and the Efficacy of Foliar Insecticides for Rice Water Weevil Control.</b> **P.G. Maris <sup>1</sup> , N. R. Bateman <sup>2</sup> , B.C. Thrash <sup>3</sup> , J.T. Hardke <sup>4</sup> , R. Kariyat <sup>5</sup> , W.A. Plummer <sup>3</sup> , S.G. Felts <sup>2</sup> , T. Davis <sup>3</sup> , W. A. Fletcher <sup>1</sup> , J. Linn <sup>1</sup> , <sup>1</sup> Department of Entomology and Plant Pathology, Fayetteville, AR. <sup>2</sup> Department of Entomology and Plant Pathology, Stuttgart, AR. <sup>3</sup> Department of Entomology and Plant Pathology, Lonoke, AR. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Stuttgart, AR. <sup>5</sup> Department of Entomology and Plant Pathology, Fayetteville, AR.	10
5:30 - 5:45	<b>Cold Plasma Treatment Improves Pre- and Post Germination Performance in Soybean.</b> **Insha Shafi <sup>1</sup> , Mahfuzur Rahman <sup>2</sup> and Rupesh Kariyat <sup>1</sup> . <sup>1</sup> Department of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR, <sup>2</sup> Department of Food Science, University of Arkansas, Fayetteville, AR.....	11
5:45 - 6:00	<b>BREAK</b>	

**Evening activities**

6:00 – 8:00	<b>Poster viewing and reception featuring heavy hors d’oeuvres and libations.</b>
7:00 – 8:00	<b>Career Roundtables featuring open discussions with Industry, University, and Crop Consultants.</b> Student participants will split into 3 groups and rotate through three 20-minute discussion sessions.

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**Poster presentations**

<b>Poster number</b>	<b>Title</b>	<b>Abstract Page #</b>
1	<b>New Sources of Soybean Resistance to the Southern Root-Knot Nematode.</b> ‡Andrea Acuna Galindo, Emanuel Ferrari do Nascimento, Derrick Harrison, Liliana Florez-Palacios, Chengjun Wu, Daniel Rogers, Rafael Marmo, Travis Faske, and Caio Canella Vieira. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	11
2	<b>A Disruptive Soil Amendment for Soybean Production: Growing Organically with Insect Frass.</b> ‡Helen C. S. Amorim <sup>1,2</sup> , Amanda J. Ashworth <sup>2</sup> , Thomas F. Ducey <sup>3</sup> , Valerie B. Brewer-Gunsaulis <sup>4</sup> , Gerson L. Drescher <sup>1</sup> , Phillip R. Owens <sup>5</sup> , Alana H. Patterson <sup>4</sup> , Giovanna De Blasis <sup>6</sup> , Iris van Straaten <sup>6</sup> . <sup>1</sup> Dept. of Crop, Soil, and Environmental Sciences, Univ. of Arkansas, Fayetteville, AR, <sup>2</sup> USDA-ARS Poultry Production and Product Safety Research Unit, Fayetteville, AR, <sup>3</sup> USDA-ARS Coastal Plain Soil, Water and Plant Conservation Research, Florence, SC, <sup>4</sup> Tyson Foods Inc., Springdale, AR, <sup>5</sup> USDA-ARS Dale Bumpers Small Farms Research Center, Booneville, AR, <sup>6</sup> Protix B.V., Hertogenbosch, The Netherlands.....	12
3	<b>Does water deficit affect soybean canopy architecture?</b> ‡Matheus H. D. Assis, Elvis Elli. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR...	12
4	<b>Temporal Changes in Soil Quality under Native Warm-Season and Tall Fescue Systems across Southern Grasslands.</b> *Geraldinn Andrea Cortez Barahona, Amanda J. Ashworth, Gerson L. Drescher, Helen C. Amorim, Gabriela Andrade Leite Mengez, and Joao H. Stibe Silva. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	13
5	<b>Tolerance of Short- and Full-Stature Corn to Tricor 4F and Intrava™ DX.</b> *H.C. Barber, J.K. Norsworthy, H. Rudolph, W.T. Herman, R.C. Scott, and L.T. Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	13
6	<b>Preemergence Performance of Isoxaflutole Alone and in Tank Mixtures in Axant™ Flex Cotton.</b> *Rhet C. Baxley, Jason K. Norsworthy, Hunter R. Rudolph, Cade M. Halbrosk. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR..	14
7	<b>Evaluation of Long-Term Cover Crop Implementation on Soil Health in Arkansas Soybean Production.</b> *Grant Bennett, Dr. Trenton Roberts, Dr. Kristofor Brye, Dr. Gerson Drescher. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	14
8	<b>Optimizing the soybean seed filling period as a strategy to maximize yields.</b> †Pedro Zanon de Britto and Elvis Elli. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	15
9	<b>Arkansas Palmer Amaranth Accessions: How Effective is Axant Top?</b> *Noah Chandler, Jason K. Norsworthy, Hunter Rudolph, Tom Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	15

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- 10 **Soybean resistance to southern root-knot nematode reduces nematode population density under field conditions.** \*Emanuel Ferrari do Nascimento<sup>1</sup>, Andrea Acuña<sup>1</sup>, Mariola Usovsky<sup>2</sup>, Amanda Pominville<sup>3</sup>, Travis Fasse<sup>4</sup>, Zenglu Li<sup>5</sup>, Melissa G. Mitchum<sup>5</sup>, Henry T. Nguyen<sup>2</sup>, Grover Shannon<sup>2</sup>, Caio Canella Vieira<sup>1</sup>. <sup>1</sup> Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR, <sup>2</sup>University of Missouri, Columbia, MO, <sup>3</sup>Forage Genetics International, Nampa, ID, <sup>4</sup>Dept. of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR <sup>5</sup>University of Georgia, Athens, GA..... 16
- 11 **Identification of Superior Soybean Parental Lines Using Genomic Prediction.** ‡Liliana Florez-Palacios<sup>1</sup>, Derrick Harrison<sup>1</sup>, Andrea Acuna<sup>1</sup>, Chengjun Wu<sup>1</sup>, Rafael Goncalves Marmo<sup>1</sup>, Daniel Rogers<sup>1</sup>, Qijian Song<sup>2</sup>, and Caio Canella Vieira<sup>1</sup>. <sup>1</sup>Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR. <sup>2</sup> USDA-ARS..... 16
- 12 **Mapping genomic regions for Heat resilience: QTL analysis for High night temperature tolerance in Rice (*Oryza sativa*).** \*Prashant Gyanwali, and Christian DeGuzman. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR..... 17
- 13 **Injury Caused by Common HPPD-inhibiting Herbicides Applied Postemergence to Axant™ Flex Cotton.** \*C.M. Halbrook, J.K. Norsworthy, N.M. Chandler, C.C. Ketchum, and L.T. Barber, Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas... 17
- 14 **Association Mapping and Genomic Prediction of Mid-Season Flood Tolerance in Soybean.** \*\*Derrick Harrison<sup>1</sup>, Dr. Chengjun Wu<sup>1</sup>, Dr. Andrea Acuna<sup>1</sup>, Dr. Liliana Florez-Palacios<sup>1</sup>, Daniel Rogers<sup>1</sup>, Rafael Marmo<sup>1</sup>, Emanuel Ferrari do Nascimento<sup>1</sup>, Dr. Heng Ye<sup>2</sup>, Dr. Henry T. Nguyen<sup>2</sup>, Dr. Grover Shannon<sup>3</sup>, Dr. Diego Jarquin<sup>4</sup>, Dr. Caio Canella Vieira<sup>1</sup>. <sup>1</sup>University of Arkansas, <sup>2</sup>University of Missouri, <sup>3</sup>University of Missouri, <sup>4</sup>University of Florida..... 18
- 15 **Impact of Soil-Applied Quizalofop to Conventional and ArkTam Grain Sorghum.** \*W. T. Herrman, J. K. Norsworthy, H. Rudolph, R. Baxley. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR..... 18
- 16 **Impacts of Forested and Agricultural Land Uses Along the Ouachita River on Water, Soil, and Leaf Na Concentrations.** \*\*Maggie Herrmann<sup>1</sup>, Dr. Michelle Evans-White<sup>2</sup>, Dr. Sally Entekin<sup>3</sup>, and Dr. Natalie Clay<sup>1</sup>. <sup>1</sup>University of Arkansas Department of Entomology and Plant Pathology, Fayetteville, AR, <sup>2</sup>University of Arkansas Department of Biological Sciences, Fayetteville, AR, <sup>3</sup>Virginia Tech University Department of Entomology, Blacksburg, VA..... 19
- 17 **Response of Inbred and Hybrid Rice to Late-season Applications of Facet and Gambit.** \*H.M. Houser, J.K. Norsworthy, C.M. Halbrook, H.R. Rudolph. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR..... 19
- 18 **Quantitative trait loci analysis identifying novel genomic regions for off-target dicamba tolerance in soybean [*Glycine max* (L.) Merr.]** ‡Dongho Lee<sup>1</sup>, Emanuel Ferrari do Nascimento<sup>1</sup>, Rafael Marmo<sup>1</sup>, Derrick Harrison<sup>1</sup>, Chengjun Wu<sup>1</sup>, Andrea Acuna-Galindo<sup>1</sup>, Sandra Flore-Palacios<sup>1</sup>, Daniel Rogers<sup>1</sup>, Francia Ravelombola<sup>2</sup>, Feng Lin<sup>2</sup>, Caio C. Vieira<sup>1</sup>. <sup>1</sup>Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR; <sup>2</sup>Plant Science & Technology, University of Missouri, Columbia, MO..... 20

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19	<b>Are There Effective Preemergence Control Options for Glufosinate-Resistant Palmer Amaranth from Crittenden County?</b> **Matthew Lombardi, Michael Houston, Tom Barber, Jason K. Norsworthy, James Rose, Hunter D. Bowman, and Aaron Ross. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	20
20	<b>Cotton Response to Postemergence Herbicide Applications Across ThryvOn™ and Non-ThryvOn™ Technologies.</b> *J.C. Malone, L.T. Barber, J.K. Norsworthy, B.C. Thrash, W.A. Plummer, W.A. Fletcher. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	21
21	<b>Early Identification of High-Yielding and Stable Soybean Genotypes.</b> *Rafael Goncalves Marmo <sup>1</sup> , Adrea Acuna <sup>1</sup> , Liliana Florez-Palacios <sup>1</sup> , Derrick Harrison <sup>1</sup> , Chegjun Wu <sup>1</sup> , Daniel Rogers <sup>1</sup> , Emanuel Ferrari do Nascimento <sup>1</sup> , Qijian Song <sup>2</sup> , Caio Canella Vieira <sup>1</sup> . <sup>1</sup> Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR. <sup>2</sup> Soybean Genomics and Improvement Laboratory, Beltsville Agricultural Research Center, USDA-ARS.....	21
22	<b>Identifying opportunities to optimize seasonal water use in Mid-South soybeans crop systems: a crop modeling approach.</b> †Martina Meira, Elvis F. Elli. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	22
23	<b>How Late is Too Late to Correct Potassium Deficiency in Corn?</b> *Gabriela Andrade Leite Mengez <sup>1</sup> , Gerson L. Drescher <sup>1</sup> , Trenton L. Roberts <sup>1</sup> , Qamar Sarfaraz <sup>1</sup> , Joao H. Stibe Silva <sup>1</sup> , Geraldinn Cortez <sup>1</sup> , Jason Kelley <sup>1</sup> , Michael Popp <sup>2</sup> . <sup>1</sup> Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR. <sup>2</sup> Dept. of Agricultural Economics and Agribusiness, University of Arkansas, Fayetteville, AR.....	22
24	<b>UAV-Based Phenotyping for Rapid Assessment of Soybean Drought Tolerance.</b> ‡Popat S. Pawar, C. Wu, D. Harrison, D. Rogers, Ben Fallen, Caio C. Vieira. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	23
25	<b>Influence of Preemergence Herbicide Selection on Subsequent Postemergence-Targeted Sprays in Cotton.</b> *Lane Pierce, Jason K. Norsworthy, Amar Godar, Gaylon Morgan, Wesley Herrman, Tom Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	23
26	<b>From Physiology to Genes: High-Throughput Phenotyping and GWAS Dissect Yield-Formation Traits in Soybean.</b> ‡Laavanya Rayaprolu, Dongho Lee, Popat Shivaji Pawar, Liliana Florez, Andrea Acuña, Derrick Harrison, Rafael Gonçalves Marmo, Chengjun Wu, Daniel Rogers, Elvis Elli, Caio Canella Viera. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	24
27	<b>The Limited-transpiration Trait (LT) in Corn Can Optimize Yield and Seasonal Water Use in the Mid-South and Western Corn-Belt.</b> *Lucas Romano, Elvis F. Elli. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR....	24
28	<b>Controlling White Margin Sedge: Postemergence Options.</b> *Aidan D. Ross, Jason K. Norsworthy, Matthew A. Lombardi, Susee Sudhakar, Bob Scott. University of Arkansas System Division of Agriculture, Fayetteville, AR.....	25

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29	<b>Tolerance of Axant Flex Cotton to Over-the-Top Applications Topramezone and Fluometuron Mixtures.</b> *H.R. Rudolph, J.K. Norsworthy, L.T. Barber. University of Arkansas Systems Division of Agriculture.....	25
30	<b>Defining Critical Tissue-Potassium Concentrations for Furrow Irrigated Corn Production.</b> *João H. Stibe Silva, Gerson L. Drescher, Trenton L. Roberts, Jason P Kelley, Alden D. Smartt, Qamar Sarfaraz, Wyatt Rongey, Gabriela L. Mengez, Maria R. do Prado. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	26
31	<b>Phenotypic and Genotypic Analysis for Edamame Breeding.</b> ‡Chengjun Wu, Rafael Goncalves Marmo, Liliana Florez-Palacios, Andrea Acuna, Derrick Harrison, Daniel Rogers, Andre Tischler, Caio Canella Vieira. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	26

**Tuesday, November 18, 2025**

<b>7:45 – 8:00</b>	<b>Announcements</b>	
<b>Talk times</b>	<b>Titles</b>	<b>Abstract Page #</b>
<b>8:00 - 8:15</b>	<b>Evaluation of a nanocellulose-based adjuvant and nozzle type (TTI and AIXR) on herbicide efficacy.</b> *Diego Rodriguez, Juan C. Velasquez, Joseph Batta-Mpouma, Nilda Roma-Burgos. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	<b>27</b>
<b>8:15 – 8:30</b>	<b>Evaluation of Long-Term Cover Crop Implementation on Soil Health in Arkansas Soybean Production.</b> *Grant Bennett, Dr. Trenton Roberts, Dr. Kristofor Brye, Dr. Gerson Drescher. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	<b>27</b>
<b>8:30 - 8:45</b>	<b>Late-Season Weed Species and Densities in Arkansas Rice.</b> *H.M. Houser, J.K. Norsworthy, C.M. Halbhook, N.M. Chandler, M.A. Lombardi, L.T. Barber, and R.C. Scott. Dept. Of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	<b>28</b>
<b>8:45 - 9:00</b>	<b>Simulation of Palmer amaranth Weed Control Programs for Vyconic Soybean using Corn as a Surrogate Crop.</b> *H.R. Rudolph, J.K. Norsworthy, H. Barber, and L.T. Barber. University of Arkansas Systems Division of Agriculture.....	<b>28</b>
<b>9:00 – 9:15</b>	<b>Yield Penalty and Growth Responses of Maize to Delayed Planting in the Mid-South United States.</b> *Maximo Nores Allende <sup>1</sup> , Elvis Elli <sup>1</sup> . <sup>1</sup> Department of Crop, Soil and Environmental Sciences, University of Arkansas, Fayetteville, Arkansas, USA.....	<b>29</b>
<b>9:15 – 9:30</b>	<b>Screening of Seed Safeners for Enhancing Rice Tolerance to Group 15 Herbicides.</b> *R.C. Baxley, J.K. Norsworthy, L.D. Pierce, W.T. Herrman, M.A. Lombardi, R.C. Scott. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	<b>29</b>
<b>9:30 – 9:45</b>	<b>End-of-Season Corn Stalk Analysis for Improving Potassium and Nitrogen Fertilizer Management.</b> *Gabriela Andrade Leite Menezes <sup>1</sup> , Gerson L. Drescher <sup>1</sup> , Trenton L. Roberts <sup>1</sup> , Alden D. Smartt <sup>1</sup> , Geraldinn Cortez <sup>1</sup> , Joao H. Stibe Silva <sup>1</sup> , Jason Kelley <sup>1</sup> , Michael Popp <sup>2</sup> . <sup>1</sup> Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR. <sup>2</sup> Dept. of Agricultural Economics and Agribusiness, University of Arkansas, Fayetteville, AR.....	<b>30</b>
<b>9:45 - 10:00</b>	<b>BREAK</b>	
<b>10:00 - 10:15</b>	<b>Clethodim Tank Mixtures for Control of Barnyardgrass and Weedy Rice in HT3 and ROXY rice.</b> *Noah Chandler, Jason K. Norsworthy, Robert Scott, Chad Shelton. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.....	<b>30</b>

‡Denotes Support Personnel †Denotes Undergraduate \*Denotes M.S. Student \*\*Denotes Ph.D. Student

**Tuesday, November 18, 2025 (continued)**

<b>10:15 - 10:30</b>	<b>Early Identification of High-Yielding and Stable Soybean Genotypes.</b> *Rafael Goncalves Marmo <sup>1</sup> , Adrea Acuna <sup>1</sup> , Liliana Florez-Palacios <sup>1</sup> , Derrick Harrison <sup>1</sup> , Chegun Wu <sup>1</sup> , Daniel Rogers <sup>1</sup> , Emanuel Ferrari do Nascimento <sup>1</sup> , Qijian Song <sup>2</sup> , Caio Canella Vieira <sup>1</sup> . <sup>1</sup> Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas Fayetteville, AR. <sup>2</sup> Soybean Genomics and Improvement Laboratory, Beltsville Agricultural Research Center, USDA-ARS, Beltsville, MD.....	<b>31</b>
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<b>11:00 - 11:15</b>	<b>Evaluating the Efficacy of Insecticide Seed Treatments, In-furrow Insecticide Applications, and Foliar Insecticide Applications for control of Thrips in Cotton.</b> †B. Miller <sup>2</sup> , B.C. Thrash <sup>3</sup> , Bateman, N. R. <sup>4</sup> , W.A. Plummer <sup>3</sup> , S.G. Felts <sup>4</sup> , T. Davis <sup>3</sup> , W. A. Fletcher <sup>2</sup> , T.M. Smith <sup>1</sup> , P.G. Maris <sup>2</sup> , A.C. Graves <sup>2</sup> . <sup>1</sup> Department of Crop Soil and Environmental Science, Fayetteville, AR. <sup>2</sup> Department of Entomology and Plant Pathology, Fayetteville, AR. <sup>3</sup> Department of Entomology and Plant Pathology, Lonoke, AR. <sup>4</sup> Department of Entomology and Plant Pathology, Stuttgart, AR.....	<b>32</b>
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<b>11:30 - 12:00</b>	<b>Next Generation Plots: The Future Role of Drones and Robots in Field Research. Dr Jason Davis, Assistant Professor Remote Sensing and Pesticides Application – Extension Specialist,</b> Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas System Division of Agriculture, Batesville, AR.....	<b>33</b>
<b>12:00 - 12:30</b>	<b>Awards, Announcements, and Closing Remarks</b>	
<b>12:30</b>	<b>Adjourn</b>	

## **Abstracts**

*(listed in order of presentation)*

**Assessing the Economic Benefit of Automatic Insecticide Applications in Soybeans.** A.C. Graves, B.C. Thrash, Bateman, N. R., G.E. Studebaker, W.A. Plummer, T. Davis, S.G. Felts, M.G. Mann, W.A. Fletcher, P.G. Maris, J. Linn. Department of Entomology and Plant Pathology, Fayetteville, AR.

Soybean (*Glycine max*) is the most widely grown row crop in Arkansas with approximately three million acres planted in 2025. Insect management in soybean is typically based on scouting. However, automatic insecticide applications between the R3 and R4 growth stages are commonly made in combination with fungicide. These applications are made based off a schedule or the phenology of the crop, not insect populations. Previous research has shown that there is no return on investment when an automatic insecticide application is made on sub-threshold level pest populations. The objective of this study is to re-examine the return on investment from automatic insecticide applications at the R3 and R4 soybean growth stages. This study was conducted at nine locations throughout eastern Arkansas. Lambda cyhalothrin, Heligen (nucleopolyhedrovirus), and Vantacor (chlorantraniliprole) were applied to early and late planted fields. The populations of all soybean pests were monitored weekly, post-application, until the R6.5 growth stage. If pest populations reached the treatment threshold, applications of the appropriate insecticide were made. Automatic insecticide applications were compared to a treat only as needed treatment. Change in yield and cost of the insecticide and application were used to determine return on investment.

**Comparison of Weed Management Programs in Short- and Full-Stature Corn.** H.C. Barber, J.K. Norsworthy, H. Rudolph, W.T. Herman, H.M. Houser, R.C. Scott, and L.T. Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas

As short-stature corn (*Zea mays*) becomes more prevalent across the U.S., there is a need to determine whether weed control programs will respond similarly in shorter-stature hybrids as they do in full-stature hybrids. Hence, in 2025, a field trial was conducted in Fayetteville, AR, to evaluate the effect of one-pass weed control programs on short- and full-stature corn hybrids. The experiment was set up as a split-plot in a randomized complete block design with four replications. The whole-plot factor consisted of corn stature (short- vs. full-stature hybrids), and the subplot factor was herbicide treatments, consisting of either preemergence (PRE) alone, postemergence (POST) alone, or a combination of PRE followed by POST timings that included Dual II Magnum, Aatrex, Acuron, Resicore, Trivolt, Storen, Roundup Powermax 3, Clarity, and Halex GT. Weed control ratings were recorded weekly from the first application through 56 days after the final application. Weed counts were taken using two 10.8 ft<sup>2</sup> quadrats, and yield will be recorded in the coming weeks. The main effect of stature and all interactions were non-significant for the weeds evaluated. At 14 days after the last herbicide application, yellow nutsedge (*Cyperus esculentus*), Palmer amaranth (*Amaranthus palmeri*), broadleaf signalgrass (*Urochloa platyphylla*), and large crabgrass (*Digitaria sanguinalis*) control differed by strength from the PRE and two-leaf applications; however, the two-pass PRE followed by four-leaf application treatment resulted in >97% across all species. Similar control was observed during the 21 days after the last PRE and two-leaf applications; however, the two-pass application provided the strongest control, with >80% across all species. Overall, the two-pass weed control program provided superior control of the weed species compared to the one-pass programs, with no significant difference in injury or weed control observed between corn hybrids.

**Do Preemergence Herbicides and Thrips Infestations Interact Across ThryvOn™ and Non ThryvOn™ Technologies?** J.C. Malone, L.T. Barber, J.K. Norsworthy, B.C. Thrash, W.A. Plummer, W.A. Fletcher. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

The application of multiple preemergence (PRE) residual herbicides applied at planting is the foundation for a successful weed control program in cotton (*Gossypium hirsutum*). However, applying these residuals can lead to seedling injury under certain environmental conditions. Early-season cotton growth is also heavily affected by thrips feeding. The timing of thrips infestations aligning with stress from PRE herbicides can result in delays and potential stand loss. The objective of this experiment was to evaluate potential interactions between PRE herbicides and the choice of ThryvOn™ or non-ThryvOn™ cotton technologies. Research was conducted in 2024 and 2025 growing seasons at the Lon Mann Cotton Branch Experiment Station in Marianna, AR. The experiment was designed as randomized complete block design with a split plot arrangement including 12 treatments and four replications. The experiment was a factorial arrangement of treatments with cotton technology and seed treatment as the whole-plot factors, followed by PRE herbicide program as the sub-plot factor. Three different PRE herbicide programs were applied to treated and untreated plots of both ThryvOn™ and non-ThryvOn™. Herbicide Treatments included fluometuron (Cotoran®) applied alone, fluometuron and fluridone (Brake®) as a tank mixture, and dicamba (Xtendimax®) applied alone. The seed treatment evaluated was Gaucho at 0.375mg/seed. Necrosis, chlorosis, and thrip damage ratings were taken at 7, 14, 21, and 28 days after treatment (DAT). Node counts and plant heights were also recorded periodically. Thrips damage and populations varied greatly between ThryvOn™ and non-ThryvOn™ technologies across years. Thrips damage in ThryvOn™ cotton was significantly lower in comparison to non-ThryvOn™ cotton, in both years Non-ThryvOn™ averaged over 3/5 damage which ThryvOn™ averaged 2/5 on a 0-5 damage scale. The lowest herbicide injury was recorded from a dicamba application at 0-5%, and the highest was from a fluridone and fluometuron tank-mix at 50% chlorosis, recorded at the 3- to 4-leaf stage in 2024. However, similar results were recorded during both growing seasons. The injury in this experiment occurred at similar levels regardless of thrips infestation, therefore no correlation was observed. Yield data will be presented, but the results were not complete at the time of submission of this abstract.

**Does Strength of Preemergence Affect the Performance of John Deere See & Spray in Soybean?** Lane Pierce, Jason K. Norsworthy, Amar Godar, Cade Halbrook, Tom Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

John Deere See & Spray™ is available to the public in three platforms: See & Spray Ultimate, See & Spray Premium, and See & Spray Select. The Ultimate is equipped with a dual-tank system that broadcasts residual herbicides while targeted-spraying weeds with the postemergence (POST) herbicide in a crop. Premium is a single-tank system that can deliver targeted or broadcast sprays, differentiating between crop and weeds. The Select platform is designed for treating green on brown, which is typically used in a burndown scenario. The Ultimate and Premium platforms use five sensitivity settings, applying varying volumes of herbicide based on weed size and density throughout the field. This research evaluated the effectiveness of strong and weak soybean preemergence (PRE) herbicides on weed control and savings from POST-targeted sprays. In 2024 and 2025, a fifteen-treatment trial with four replications was conducted in Keiser, AR. All the plots were sprayed with a strong or weak preemergence herbicide on the day of planting. After emergence, herbicide applications were made using broadcast, Ultimate, and Premium platforms at early POST (EPOST) and mid-POST (MPOST). Every postemergence application included glyphosate, glufosinate, and S-metolachlor, and was applied using various herbicide technologies using See and Spray. Weed control ratings were collected at all POST herbicide applications and 14 and 28 days after MPOST (DAMPOST). In 2024 and 2025, both Palmer amaranth (*Amaranthus palmeri*) and pitted morningglory (*Ipomoea lacunosa*) control was >94% After the MPOST application when compared individually. Herbicide savings were affected by the choice of PRE herbicide at both POST applications, with the weak PRE decreasing the area sprayed by 0 to 16%, and the strong PRE by 18 to 22% at the EPOST application. At the MPOST application, a reduction of 1 to 25% resulted following the weak PRE, whereas area sprayed was reduced by 3 to 42% following the strong PRE. Overall, See & Spray can result in herbicide savings while maintaining equivalent weed control compared to a broadcast application, with the strength of the PRE herbicide dictating the extent to which POST herbicides are not sprayed.

**Evaluation of Thresholds on Tarnished Plant Bug in ThryvOn Cotton.** Anderson Fletcher, Ben Thrash, Nick Bateman, Andrew Plummer, Garrett Felts, Taylor Harris, Gage Maris, Claire Graves. Dept. of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR

ThryvOn™ is the first Bt cotton technology to provide protection to tobacco thrips and tarnished plant bug, as well as several other piercing sucking insect pests of cotton. In contrast to Bt technologies aimed at controlling lepidopteran insect pests such as bollworm, this technology is low-dose for tarnished plant bug, meaning supplemental applications will likely be required to maintain control of the pest. Current research indicates this technology is more active on small nymphal plant bugs, which is in contrast to larger nymphs and adults plant bugs that are more resistant. Research also indicates thresholds for nymphal tarnished plant bugs can be doubled, but changes in the threshold with regard to adult plant bugs is still unclear. ThryvOn cotton was grown at Lon Mann cotton experiment station in Lee County, AR. Eight different thresholds were tested including combinations of different nymphal and adult thresholds as well as a square retention threshold. Plots were sampled twice a week using both sweep nets and drop cloths and square retention was recorded. When plots reached the threshold, they were treated with Transform 1.5 oz/ac. Depending on threshold, plots were treated 1-6 times throughout the growing season. There were no differences between yields in treated plots, but all treated plots yielded greater than the untreated check.

**Weed Management Problems and Practices in Midsouthern Soybean Production: Farmer and Consultant Perspectives.** C.M. Halbrook, J.K. Norsworthy, R.C. Scott, and L.T. Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas.

Farmers and crop consultants are the first to identify imminent problems and trends in crop production, whether that is the evolution of herbicide resistance, the adoption of new cultural practices, or the emergence of a new problematic weed species. Surveying those who perform day-to-day scouting and crop management can provide insight into growers' needs, helping to tailor research and extension programs. A survey was conducted during the winter of 2024-2025 to identify the practices and challenges faced by soybean producers in the Midsouth. Soybean growers and consultants were presented with a quick response (QR) code or a survey link at county production meetings, regional conferences, and online. The questionnaire consisted of 38 questions on general practices, herbicide resistance trait adoption, problematic weed species, and research needs. Responses were recorded from Arkansas, Louisiana, Mississippi, Missouri, and Tennessee, representing 44%, 42%, 27%, 2%, and 6% of the total soybean acreage in each state for the 2024 growing season, respectively. The most common preemergence program was metribuzin + S-metolachlor (33% of respondents), and the most common postemergence-applied herbicide other than glyphosate was dicamba (42%). Auxin resistance in Palmer amaranth was suspected by 47% of respondents, and glufosinate resistance was suspected by 52%. The five most important weeds to manage were Palmer amaranth, Italian ryegrass, barnyardgrass, morningglory species, and yellow nutsedge, with morningglory species rising two places in ranking, barnyardgrass rising three places, and yellow nutsedge rising two places compared to results from a 2016 survey (Schwartz-Lazaro et al. 2018). Overall, a significant portion of the Midsouth soybean acreage is suspected to be infested with auxin- and glufosinate-resistant Palmer amaranth, punctuating the need for alternative management strategies for problematic species.

### **Soybean resistance to southern root-knot nematode reduces nematode population density under field conditions.**

\*Emanuel Ferrari do Nascimento<sup>1</sup>, Andrea Acuña<sup>1</sup>, Mariola Usovsky<sup>2</sup>, Amanda Pominville<sup>3</sup>, Travis Faske<sup>4</sup>, Zenglu Li<sup>5</sup>, Melissa G. Mitchum<sup>5</sup>, Henry T. Nguyen<sup>2</sup>, Grover Shannon<sup>2</sup>, Caio Canella Vieira<sup>1</sup>. <sup>1</sup>Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR, <sup>2</sup>University of Missouri, Columbia, MO, <sup>3</sup>Forage Genetics International, Nampa, ID, <sup>4</sup>Dept. of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR <sup>5</sup>University of Georgia, Athens, GA

The southern root-knot nematode [SRKN, *Meloidogyne incognita* (Kofoid & White) Chitwood] is one of the most yield-limiting soybean pathogens worldwide. With limited control options, genetic resistance remains the primary management strategy. This study aims to evaluate the effectiveness of a major quantitative trait locus (QTL) on chromosome 10 in reducing SRKN population density under field conditions. A total of 76 advanced breeding lines from maturity groups IV and V were assessed. Based on the presence of the major QTL on chromosome 10, 38 breeding lines were classified as resistant and 38 as susceptible to SRKN. Field experiments were conducted in 2018 and 2019 using a randomized complete block design with three replications under high nematode pressure. Soil samples were collected from the two center rows of each four-row plot for nematode extraction and quantification. Nematode population density was expressed as the number of second-stage juveniles (J2) per 100 cm<sup>3</sup> of soil. Over the two-year study, SRKN-resistant breeding lines had, on average, 1,620 SRKN-J2 per 100 cm<sup>3</sup> of soil, while the susceptible group averaged 2,126 J2 per 100 cm<sup>3</sup> of soil ( $p$ -value < 0.001). However, in 2019, prolonged off-target dicamba exposure significantly increased nematode density across all lines. Dicamba-tolerant breeding lines consistently exhibited lower SRKN-J2 densities than dicamba-susceptible lines, regardless of their SRKN resistance. Therefore, soybean resistance suppresses nematode reproduction, allowing effective crop rotation management. However, prolonged off-target dicamba exposure imposes additional stress that may compromise the plant's defense response to SRKN.

**Preemergence Control Options for White Margin Sedge.** Aidan D. Ross, Jason K. Norsworthy, Hunter R. Rudolph, Susee Sudhakar, Bob Scott. University of Arkansas System Division of Agriculture, Fayetteville, AR.

White margin sedge (*Cyperus macrostachyos* Lam.) is a newcomer as a problem weed in Arkansas rice (*Oryza sativa* L.) and has quickly increased in severity and spread since it was first identified as an issue on a Poinsett County farm in 2014. WSSA Group 2 herbicides, such as halosulfuron-methyl (Permit), are typically the best control option for sedge (*Cyperus* spp.) weeds in-crop, but white margin sedge has developed widespread resistance to these herbicides through an Asp-376-Glu substitution in its acetolactate synthase (ALS), the target site of Group 2 herbicides. Very little is known about controlling this new problem weed, and the failure of Group 2 chemicals exacerbates the need for solutions. In an ongoing greenhouse experiment, three accessions of white margin sedge and one accession of rice flatsedge (*Cyperus iria* L.) were tested against 15 different preemergence herbicides labeled for use in rice and/or soybean [*Glycine max* (L.) Merr.]: halosulfuron-methyl, imazethapyr, quinclorac, metribuzin, fluridone, saflufenacil, sulfentrazone, oxyfluorfen, fomesafen, acetochlor, *S*-metolachlor, pyroxasulfone, dimethenamid-P, thiobencarb, and mesotrione. The study was laid out in a completely randomized design with four replications. Data are still being collected and analyzed for final results, with the measures being visual control (0 to 100%), groundcover analyzed via TurfAnalyzer, plant leaf counts, and aboveground biomass. Notable observations, however, include better than 95% control of both weeds provided by acetochlor, *S*-metolachlor, pyroxasulfone, dimethenamid-P, fluridone, sulfentrazone, and oxyfluorfen; as well as the poor performance of halosulfuron-methyl, imazethapyr, and quinclorac.

**Integrating SMAF-Based Indicators to Assess Soil Health Dynamics across Grassland Forage Systems in the Southern U.S.** Geraldinn Andrea Cortez Barahona, Amanda J. Ashworth, Gerson L. Drescher, Helen C. Amorim, Gabriela Andrade Leite Menezes, and Joao H. Stibe Silva. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Soil health dynamics under contrasting forage systems are critical for sustaining livestock productivity across the southern United States. This study quantified spatio-temporal changes in soil health indicators under non-native tall fescue (*Festuca arundinacea*) and native warm-season grasses (NWSG) grazing systems managed replicated across Arkansas, Missouri, and Tennessee. Soil samples (0–15 cm) were collected in 2021 and 2023 and analyzed for total nitrogen, total organic carbon, pH, bulk density, electrical conductivity, and extractable nutrients (P, K, Mg, Ca). Individual Soil Management Assessment Framework (SMAF) scores and overall Soil Quality Index (SQI) values were used to evaluate systems' performance. Significant State × Species and Year × State interactive effects ( $p < 0.05$ ) revealed that NWSG systems maintained or improved soil function across all sites, whereas tall fescue showed variable or declining SQI, particularly in Tennessee. SMAF scores for TOC, EC, and P were the most responsive to management. The integration of SMAF with topographic and physiochemical data demonstrates how native forages can enhance soil resilience across diverse landscapes. Future work will incorporate terrain metrics and microbial indicators to develop predictive soil health models under managed grazing.

**Exploring the Potential of Biochar for Hydroponics Pest Management.** Soumya Unnikrishnan<sup>1</sup>, Ryan Dickson<sup>2</sup>, Kristen Gibson<sup>3</sup> and Rupesh Kariyat<sup>1</sup>. <sup>1</sup>Department of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR. <sup>2</sup>Department of Horticulture, University of Arkansas, Fayetteville, AR. <sup>3</sup>Department of Food Science, University of Arkansas, Fayetteville, AR.

The increasing demand for food production necessitates sustainable and efficient agroecosystems. Controlled environment agriculture (CEA) systems, such as hydroponics, have emerged as promising alternatives to traditional soil-based farming. Although these systems rule out the risk from soil borne pests, sucking pests like aphids still prevail and compromise both crop yield and quality. The use of chemical insecticides in hydroponics poses environmental and health concerns, underscoring the need for sustainable and organic pest management strategies. Biochar, a carbon-rich material produced through pyrolysis of agricultural biomass, has been employed since ancient times to improve soil fertility, yet its potential in hydroponic systems is poorly investigated. This study examined the efficacy of liquid biochar as a substrate amendment in hydroponic lettuce against green peach aphid [*Myzus persicae* (Sulzer)]. Biochar was incorporated into the growing medium at seedling stage in varying concentrations (0%, 1%, 5%, and 10%), and plants were subsequently infested with green peach aphids under controlled conditions. Our results show that substrate amendment using 5% concentration of biochar significantly increased lettuce leaf number, leaf width and chlorophyll content, while there was significant decline in the green peach aphid population density on the plants. We are currently optimising biochar formulation types to evaluate the effects across various crop species and pest complexes in soilless cultivation systems.

## **Response of ArkTam™ and Double Team™ Grain Sorghum to Single and Sequential Applications of Quizalofop.**

W. T. Herrman, J.K. Norsworthy, O.A. Ajani, C. Ketchum, C. Halbrook, and L.T. Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Over the past five years, herbicide resistance traits have been incorporated into grain sorghum [*Sorghum bicolor* (L.) Moench] systems. The Double Team™ and ArkTam™ traits confer resistance to acetyl-coenzyme A carboxylase-inhibiting herbicides, particularly quizalofop-P-ethyl. In 2024 and 2025, field trials were conducted in Fayetteville, AR, to evaluate the effects of single versus sequential applications of quizalofop on sorghum hybrids with either resistance technology. Experiments set up as a randomized complete block design in a split plot were established with four replications of four-row plots with either a Double Team or ArkTam hybrid (main plot factor). The subplot factors were quizalofop rates applied at 0.078 lb ai/A and 0.065 lb ai/A for the single and sequential applications, respectively. Each single and sequential application occurred at the V2, V4, V6, and V8 growth stages, with the subsequent application occurring seven days later. Visible injury ratings were taken one week after the V2 applications and continued weekly until three weeks after the final application. End-of-season stand counts were recorded from the two rows in the center of each plot. Currently, only the yield data from 2024 are available. Across all evaluation timings, sorghum technology was insignificant, indicating that both ArkTam and Double Team sorghum responded similarly to quizalofop applications. At one week after the first herbicide treatment, averaged across sorghum technology and the number of applications, in 2024, applications made to V4 sorghum caused 32% injury, and in 2025, applications made to V2 sorghum caused 50% injury. By the last evaluation, however, sorghum injury declined to 2% in 2024 and was absent in 2025. Sorghum did not suffer any stand loss in either year, regardless of technology, application timing, or the number of applications. No differences in grain yield occurred. Overall, both ArkTam and Double Team grain sorghum have adequate tolerance to quizalofop, and initial injury is transient with no differences between technologies.

**Examining the Lignin Biosynthesis Pathway for Pest Management of Sugarcane Aphid in Sorghum.** Alejandro Vasquez<sup>1</sup>, Angel Jose<sup>2</sup>, Joe Louis<sup>3,4</sup>, Rupesh Kariyat<sup>1</sup>. <sup>1</sup>Department of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR, <sup>2</sup>School of Integrative Biological and Chemical Sciences, University of Texas Rio Grande Valley, TX, <sup>3</sup>Department of Entomology, University of Nebraska-Lincoln, Lincoln, NE, <sup>4</sup>Department of Biochemistry, University of Nebraska-Lincoln, Lincoln, NE

The invasive sugarcane aphid (*Melanaphis sacchari*) remains a major constraint on U.S. sorghum (*Sorghum bicolor*) production, causing yield losses of up to 70%. To combat this, evaluation of host-plant resistance is critical for integrated pest management (IPM) and sustainability. The Brown Midrib (*bmr12*) mutation in sorghum, which reduces lignin biosynthesis through loss of *caffeic acid O-methyltransferase* (COMT) activity, has been extensively studied for improved forage digestibility but rarely for its role in pest management. Here, we evaluated the defensive and physiological consequences of lignin modification across three sorghum lines: RTx430 (wild type), *bmr12* (COMT-deficient), and *11a* (COMT-overexpressing); to determine whether *bmr12* leads to enhanced resistance to against sugarcane aphid. Comprehensive greenhouse and laboratory assays measured germination, growth, physiology, nutrient content, volatile organic compound (VOC) emission, epicuticular wax production, and aphid performance. *bmr12* plants show comparable growth, biomass, and photosynthetic rates to RTx430, indicating no growth and yield penalty; however, aphid infested *bmr12* plants produced significantly higher induced epicuticular wax and greater constitutive VOC emissions than either RTx430 or *11a*, while reducing aphid growth and colonization by 50% after 10 days of feeding. In contrast, *11a* plants displayed increased height and nitrogen content but did not show differences in aphid colonization. These results demonstrate that *bmr12* sorghum enhances both direct (epicuticular wax) and indirect (VOC) defense pathways without compromising physiological performance. Our findings highlight *bmr12* sorghum as a promising candidate for breeding programs aiming to integrate robust strategies host-plant resistance against sugarcane aphid in the United States.

**Assessing the Influence of ThryvOn Technology on Cotton (*Gossypium hirsutum*) Morpho-Physiological Traits and Impacts on Western Flower Thrips (*Frankliniella occidentalis*)** Jessica Ayala<sup>1</sup>, Alejandro Diaz<sup>2</sup>, Insha Shafi<sup>1</sup>, Ben Thrash<sup>1</sup>, & Rupesh Kariyat<sup>1</sup>. <sup>1</sup> Department of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR, 72701. <sup>2</sup> Upward Bound, University of Arkansas, Fayetteville, AR, 72701.

ThryvOn cotton (*Gossypium hirsutum*), a form of Bt (*Bacillus thuringiensis*), was introduced by Bayer as a deterrent against Tarnished Plant Bugs (*Lygus lineolaris*) and Western Flower Thrips (*Frankliniella occidentalis*, WFT). However, we still lack data on the potential effects of ThryvOn on morpho-physiology and indirect defenses, including volatile organic compounds (VOCs). To test this, we examined morphological (height, leaf number, biomass) and physiological data (net photosynthesis, intracellular CO<sub>2</sub>, stomatal conductance, transpiration rate) at two different growth stages following a natural incidence of WFT in both ThryvOn (T) and non-ThryvOn (NT) cotton in a greenhouse setting. Additionally, we collected VOC emissions from both WFT infested and non-infested T and NT cotton plants to evaluate if the presence of ThryvOn influences indirect defenses of cotton through analyzing differences in VOC emission amount and composition. Finally, leaf discs were collected from infested and non-infested T and NT plants to conduct a choice assay- observing WFT choice at 30 minutes, 6, and 24 hours. While both T and NT were impacted by WFT, NT experienced higher WFT damage than T. In the vegetative stage- there was no significant difference in morpho-physiology between T and NT, but in the reproductive stage NT plants had more leaves and NT had increased intracellular CO<sub>2</sub> and stomatal conductance while T had a higher transpiration rate. T plants ultimately produced more cotton bolls, but NT plants produced heavier cotton balls. During the choice assay, WFT preferred NT leaf discs at first; however, at 6 and 24 hours, there were no significant differences. VOC analysis revealed that NT plants without WFT infestation produced more VOC emissions, but once infested, there was no significant difference between T and NT VOC emissions. Overall- there is evidence that ThryvOn technology can increase WFT deterrence early on, but the effect wanes once exposed to heavy WFT infestation.

**Insect herbivory and drought affect indirect defenses in soybean.** Manish Gautam, Alejandro Vasquez, Devi Balakrishnan, Insha Shafi, Jessica Ayala, and Rupesh Kariyat. Department of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR.

Plant defenses play an important role in shaping plant-environment interactions, especially host resistance against abiotic and biotic stressors like drought and insect herbivory. Drought and insect herbivory have prominent effects on plant direct defenses like trichomes and can affect herbivore growth and development. However, cascading effects of drought and herbivory interaction on plant volatiles, a major indirect defense, and its consequences for arthropod community dynamics remain poorly understood. To test this, we imposed drought stress on soybean for 1 week followed by herbivory (SBL-96 hours) and assessed the changes in volatile organic compounds (VOCs). Next, we conducted a common garden experiment by using three different traps (pitfall, pie-pan, and sticky traps) to capture the arthropods attracted to drought (D), drought x herbivory (DH), herbivory (H), and well-watered (WW) treated plants. Analyses of VOCs revealed that drought-stressed plants had the greatest emission, but SBL-damaged plants had the lowest. Interestingly, drought and herbivory treatments had contrasting effects on the abundance of Coleoptera, and Diptera orders; coleopterans were less abundant while dipterans were more abundant under drought stress. Through Y-tube choice assays, we confirmed antixenosis due to drought stress by showing that ladybugs (Coleoptera- predator) and SBL (Lepidoptera- herbivore) were not attracted to drought-induced VOCs compared to WW treatment. These results clearly show that drought stress has prominent impact on herbivores, predators, and pollinators and differentially impact arthropod community dynamics in soybean, thereby affecting multi-trophic interactions.

**Nitrogen management of furrow-irrigated rice on Silt loam and clayey soils.** Ali Ablao, Justin Chlapecka, Courtney Hunt, Jimmy Duvall. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Furrow-irrigated rice (*Oryza sativa* L.), commonly known as row rice, has gained attention as a production system in Arkansas, Missouri, and Northeastern Louisiana. Although some producers have implemented furrow irrigation since the 1980s, widespread adoption has occurred only recently, with the system now accounting for an estimated 16 % of Arkansas rice acreage. Despite its expanding use, limited research-based information is available to guide nitrogen (N) management practices for pure-line varieties under furrow-irrigated conditions. Therefore, this study aimed to identify optimal N management strategies for furrow-irrigated production of two pure-line cultivars, CLL18 and DG263L, grown on silt loam and clay soils. Field experiments were conducted in 2024 and 2025 at multiple clay and silt loam sites in Missouri and Arkansas to evaluate N strategies for furrow-irrigated rice. A split-plot design was used, with field position (top, middle, bottom) as the main plot and N regimes as subplots, arranged in a randomized complete block design. Rice was drill-seeded following soybean, and N was applied manually as single or split applications using NBPT-treated urea. Y-leaf and whole-plant biomass samples were collected at R3 and R4 growth stages to assess N uptake, and grain yield was measured to evaluate its sufficiency. Split N applications totaling 186–220 kg N ha<sup>-1</sup> improved the yield performance of pure-line cultivars CLL18 and DG263L under furrow-irrigation. A three-way split of 67/67/52 kg N ha<sup>-1</sup> on silt loam soils and 84/84/52 kg N ha<sup>-1</sup> on clay soils produced the highest grain yield and N uptake. These rates enhanced N use efficiency and maintained yield stability across landscape variability, including both upper, drier field positions and lower, intermittently flooded areas.

**Detection of QoI-Resistant *Rhizoctonia solani* (AG1-IA) in Arkansas Rice and Evaluation of Fungicide Efficacy.** Jared B. Linn<sup>1</sup>, Nick Bateman<sup>2</sup>, Rupesh Kariyat<sup>1</sup>, Jarrod Hardke<sup>3</sup>, Rich Adams<sup>1</sup>, Bruna Ronning<sup>2</sup>, Samuel DePaula<sup>2</sup>, and Camila Nicolli<sup>2</sup>. <sup>1</sup>Dept. Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR. <sup>2</sup>Dept. Entomology and Plant Pathology, University of Arkansas, Stuttgart, AR. <sup>3</sup>Dept. Crop, Soil, and Environmental Sciences, University of Arkansas, Stuttgart, AR.

Rice sheath blight, caused by *Rhizoctonia solani* AG1-IA, is an important disease of rice. In 2023, an isolate of *R. solani* was collected from rice in Arkansas County, AR where a grower reported poor fungicide performance. The objective of this study was to determine if the collected isolate exhibited resistance to azoxystrobin under laboratory conditions and to evaluate its field-efficacy to azoxystrobin and flutolanil in inoculated rice. To determine if the isolate was resistant to azoxystrobin a dose response assay was conducted to determine the half maximal effective concentration (EC<sub>50</sub>). In the laboratory, the isolate was exposed to amended potato dextrose agar (PDA) with azoxystrobin doses between 0.1 to 10,000 mgL<sup>-1</sup> and after four days the area of the fungal culture was measured. Log-logistic modeling was used to determine the EC<sub>50</sub> estimate. Furthermore, in 2024 and 2025, a field trial consisting of randomized complete blocks with four replications was established at the RREC in Stuttgart, AR. The cultivar DG263L was planted, and fungicide treatments consisted of a non-treated check, Quadris® (azoxystrobin), and Elegia® (flutolanil) applied at maximum rates. Sheath blight severity was rated on a 0-100% scale which described the vertical height of lesions at 50% heading. Efficacy data was analyzed as a one-factor analysis of variance and means separated using Tukey's HSD ( $\alpha=0.05$ ). The EC<sub>50</sub> of PDA assays was estimated as 91.2 mgL<sup>-1</sup> representing a 137-fold (13,595%) increase from an EC<sub>50</sub> estimate of 0.688 mgL<sup>-1</sup> two decades ago. Field data mirrored these results with disease severity being similar between the non-treated check and azoxystrobin averaging 59.1% and 50.2% severity, respectively. However, rice treated with flutolanil averaged 34.3% severity at 50% heading. The presence of QoI resistant *R. solani* in the state was confirmed through genome sequencing, two-year field data results suggest that flutolanil is an effective alternative for disease control.

**Is Glufosinate Resistance in Palmer Amaranth Prominent in Crittenden County?** Matthew A. Lombardi, Jason K. Norsworthy, Pamela Carvalho-Moore, and Caio D. Santos. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Glufosinate is a widely used herbicide with broad-spectrum weed control in corn (*Zea mays* L.), cotton (*Gossypium hirsutum* L.), and soybean [*Glycine max* (L.) Merr.] fields throughout Arkansas. Three distinct glufosinate-resistant Palmer amaranth (*Amaranthus palmeri* S. Wats.) accessions have been confirmed in Northeast Arkansas, and preventing their spread is critical to the sustainability of glufosinate. It will be necessary to evaluate the frequency and origin of resistance to develop and implement preventive measures. This research targeted a glufosinate-resistant Palmer amaranth accession (CCR) from Crittenden County, which was the first confirmed resistance site in the region. The accession showed a 5-fold resistance to glufosinate. The objective of this research was to assess Palmer amaranth mortality of accessions collected around the initial CCR site in response to glufosinate. Palmer amaranth plants were collected from 82 locations within a 10-mile radius of the reference site. A total of 5 to 10 female plants were collected per location. A glufosinate screening was conducted using Liberty at 32 fl oz/acre (labeled rate). Findings showed that 34 of the 82 accessions had mortality rates below 85%. However, there was no correlation between the low mortality rate and either distance, direction, or their interaction from the reference site. Therefore, the results show that resistance is spreading in a random pattern. Further efforts will focus on screening resistant accessions identified in this investigation for their response to alternative postemergence herbicides and on determining the mechanism of resistance in those plants that escape control.

**Managing Spring Dead Spot in Limited-Resource Scenarios.** Michael V. Battaglia<sup>1</sup>, Michael D. Richardson<sup>1</sup>, Terry N. Spurlock<sup>2</sup>, Kona Swift<sup>1</sup>, Wendell J. Hutchens<sup>1</sup>. Dept. of Horticulture, University of Arkansas, Fayetteville, AR. <sup>3</sup>Department of Entomology and Plant Pathology, Lonoke, AR.

Spring dead spot (SDS; *Ophiosphaerella* spp.) is a challenging disease to manage in places that experience sub-freezing wintertime temperatures. Primarily a disease of bermudagrass (*Cynodon Rich* spp.), SDS is often managed using chemical practices, however this can be cost and environmentally prohibitive. Additionally, fungicides are most effective watered-in post application, which may not be feasible for some turfgrass managers, particularly in non-irrigated turfgrass systems. Therefore, studies were conducted in Arkansas to examine strategies to improve fungicidal efficacy against SDS in non-irrigated bermudagrass. Isofetamid and tebuconazole were applied in four carrier volumes (407, 814, 1,628 or 4,070 L ha<sup>-1</sup>) with or without pre-application solid-tine aerification. Neither pre-application aerification nor carrier volume had an effect on SDS incidence. Lastly, multiple studies were conducted in Arkansas to determine if various fungicides can suppress SDS for multiple years, thereby reducing application frequency and costs. Fungicides were applied either once in autumn 2023 or both in autumn 2023 and 2024. Plots were assessed in spring 2025 for % SDS. Out of all fungicides tested, only isofetamid effectively reduced SDS over multiple years. These findings give turfgrass managers alternative and more cost-effective options for improving SDS fungicidal efficiency.

**Postemergence Herbicide Options for Glufosinate-Resistant Palmer Amaranth from Crittenden County, Arkansas.** C.C. Ketchum, J.K. Norsworthy, M. Lombardi, Pamela Carvalho-Moore, L.T. Barber, and I. Meiners. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Palmer amaranth [*Amaranthus palmeri* (S.) Wats] is a highly adaptable, prolific weed, capable of producing up to one million seeds per plant. In Arkansas, there has been confirmed resistance to seven different herbicide sites of action (SOA) within this weed. Glufosinate resistance was confirmed in 2020, and synthetic auxin resistance was confirmed in 2023, limiting postemergence control options. A field study was conducted in 2025 on a Palmer amaranth population collected from Crittenden County, Arkansas (CCR), previously confirmed to be resistant to seven unique SOA in greenhouse studies, to evaluate postemergence control options across major row-crop production systems (fifteen herbicides). Visible percent Palmer amaranth control, height, and density were collected at 2 and 4 weeks after application (WAA), with above-ground biomass collected at 4 WAA. At 2 WAA, visible control was above 80% for paraquat (98%), diuron (87%), and atrazine (85%). Plots treated with standard postemergence Palmer amaranth control options, such as 2,4-D and glufosinate, showed statistically similar results to atrazine, diuron, and paraquat, with 62% and 51% effectiveness, respectively. By 4 WAA, only plots treated with paraquat (99%) and diuron (80%) maintained greater than 80% control, while 2,4-D and glufosinate were statistically similar to diuron, with 61% and 44% visible control, respectively. For above-ground biomass, all treatments except carfentrazone and glyphosate were statistically similar, with paraquat-treated plots providing the lowest biomass. Overall, only paraquat, diuron, and atrazine provided control ratings over 80%. However, the reduction in biomass was similar among most treatments, except for carfentrazone and glyphosate.

**Implementing Sweep Nets in Rice Water Weevil Scouting and the Efficacy of Foliar Insecticides for Rice Water Weevil Control.** P.G. Maris<sup>1</sup>, N. R. Bateman<sup>2</sup>, B.C. Thrash<sup>3</sup>, J.T. Hardke<sup>4</sup>, R. Kariyat<sup>5</sup>, W.A. Plummer<sup>3</sup>, S.G. Felts<sup>2</sup>, T. Davis<sup>3</sup>, W. A. Fletcher<sup>1</sup>, J. Linn<sup>1</sup>, <sup>1</sup>Department of Entomology and Plant Pathology, Fayetteville, AR. <sup>2</sup>Department of Entomology and Plant Pathology, Stuttgart, AR. <sup>3</sup>Department of Entomology and Plant Pathology, Lonoke, AR. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Stuttgart, AR. <sup>5</sup>Department of Entomology and Plant Pathology, Fayetteville, AR.

Rice water weevil (*Lissorhoptrus oryzophilus*: Kuschel) is the most important insect pest of early growth stage rice in Arkansas. The University of Arkansas Cooperative Extension Service recommends that a foliar insecticide application be made when 50 to 60 percent of new leaves show feeding scars from adult rice water weevil (RWW). Scouting by observing leaf scarring is time consuming and has been seen to be inconsistent with resulting larval populations. Scouting with a sweep net increases efficiency and allows the scout to directly quantify the adult RWW population present in the field which could allow them to make better management decisions in regard to controlling the pest. Previous studies have shown that the time of day can influence the insect populations quantified when scouting with a sweep net. In 2023, 2024, and 2025 a study was conducted to determine the effect of sampling time on the number of adult RWW populations caught using a sweep net. Plots were sampled at 7:00 am, 12:00 pm, and 5:00 pm, 24-hours before the permanent flood was established, three, 7, 10, and 14 days after the flood was established. The number of adults collected using a sweep net did not change between the morning and mid-day sample timings but did significantly increase in the evening sample timing. Sampling in the evening showed a consistent increase in the strength of the relationship between adults and larvae and adults and yield reduction. In another study the efficacy of foliar insecticides for control of RWW was tested. Insecticides tested include Warrior II (lambda-cyhalothrin), belay (clothianidin), Vantacor (chlorantraniliprole), and Endigo ZCX (lambda-cyhalothrin + thiamethoxam) which were applied either pre or post-flood. The pre-flood application of Endigo ZCX provided control of RWW adults when compared to all other pre-flood treatments. All insecticide treatments reduced larval populations when compared to the untreated check. No differences in control were observed between post-flood insecticide applications for control of adult RWW but all insecticide treatments reduced larval populations when compared to the untreated check.

**Cold Plasma Treatment Improves Pre- and Post Germination Performance in Soybean.** Insha Shafi<sup>1</sup>, Mahfuzur Rahman<sup>2</sup> and Rupesh Kariyat<sup>1</sup>. <sup>1</sup>Department of Entomology and Plant Pathology, University of Arkansas, Fayetteville, AR, <sup>2</sup>Department of Food Science, University of Arkansas, Fayetteville, AR.

With the increasing demand for food from a rising global population, there is a need for innovative and sustainable technologies that can enhance crop productivity with minimal reliance on chemical inputs. Cold plasma application in agricultural crop production is in its early stages, yet it is emerging as a residue-free treatment to improve plant traits. The application of CP as seed treatment has been reported in a few crops, however its effects on specific seed traits (pre- and post-germination) remain underexplored, especially in soybean. We tested the effect of CP treatment using pin-to-plate method (180 V) at two exposure durations (5 and 10 minutes) on soybean seed traits. We observed that CP exposure of 10 minutes significantly increased the germination rate of soybean seeds compared to 5 minutes or control. Seed length and diameter were significantly increased under CP exposure, with variable response in seed weight. Root traits were also strongly affected, with an enhanced radicle length and increased lateral root formation on CP-treated seeds compared to controls. In terms of nitrogen and protein content, we observed that in first two days, CP-treated soybean cotyledons were significantly lower in nitrogen/protein content compared to control, suggesting faster reserve mobilization during early germination. Overall, CP pre-exposure improved soybean traits both before and after germination, highlighting the potential of CP as a promising sustainable seed priming, residue-free technology in agricultural systems.

**New Sources of Soybean Resistance to the Southern Root-Knot Nematode.** Andrea Acuna Galindo, Emanuel Ferrari do Nascimento, Derrick Harrison, Liliana Florez-Palacios, Chengjun Wu, Daniel Rogers, Rafael Marmo, Travis Faske, and Caio Canella Vieira. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Southern root-knot nematode [*Meloidogyne incognita* (Kofoid & White) Chitwood, SRKN] remains one of the most damaging pests of soybean in the southern United States, causing major yield losses and reducing profitability. Because the current genetic base for SRKN resistance is narrow, identifying and integrating new resistance sources is essential for Arkansas soybean farmers. Our breeding program focuses on expanding SRKN resistance through a coordinated process that combines large-scale screening, genomic validation, and precision phenotyping. Early-generation populations and advanced breeding lines are evaluated under greenhouse and field conditions across Arkansas to identify new resistance alleles. In collaboration with nematologists at the University of Arkansas and Louisiana State University, selected lines from our breeding program are screened to confirm resistance and identify promising sources for further development. Standardized inoculation assays conducted by these collaborating teams ensure accurate differentiation between resistant and susceptible genotypes, while a new in-house greenhouse screening protocol is being established to evaluate galling response and increase the number of lines screened per season. Additionally, using genomic and statistical models, including genomic prediction and principal component analysis, approximately 450 new sources of resistance obtained from the USDA-ARS Germplasm Resources Information Network (GRIN) are being evaluated in-house. Complementary UAV-based imaging of selected lines is also being implemented to detect nematode-induced stress early in the growing season. Validated resistant sources are incorporated into our crossing program with elite, high-yielding parents to combine resistance with desirable agronomic traits and regional adaptability. This integrated approach, supported by collaborations with other public breeding programs, enables the steady introduction of new SRKN-resistant germplasm into the Arkansas soybean breeding pipeline. By combining classical breeding with genomic tools and advanced phenotyping, our program aims to develop high-yielding, nematode-resistant cultivars that strengthen the sustainability and productivity of soybean production in the Mid-South.

**A Disruptive Soil Amendment for Soybean Production: Growing Organically with Insect Frass.** Helen C. S. Amorim<sup>1,2</sup>, Amanda J. Ashworth<sup>2</sup>, Thomas F. Ducey<sup>3</sup>, Valerie B. Brewer-Gunsaulis<sup>4</sup>, Gerson L. Drescher<sup>1</sup>, Phillip R. Owens<sup>5</sup>, Alana H. Patterson<sup>4</sup>, Giovanna De Blasis<sup>6</sup>, Iris van Straaten<sup>6</sup>. <sup>1</sup>Dept. of Crop, Soil, and Environmental Sciences, Univ. of Arkansas, Fayetteville, AR, <sup>2</sup>USDA-ARS Poultry Production and Product Safety Research Unit, Fayetteville, AR, <sup>3</sup>USDA-ARS Coastal Plain Soil, Water and Plant Conservation Research, Florence, SC, <sup>4</sup>Tyson Foods Inc., Springdale, AR, <sup>5</sup>USDA-ARS Dale Bumpers Small Farms Research Center, Booneville, AR, <sup>6</sup>Protix B.V., Hertogenbosch, The Netherlands

Insect frass – the main by-product of insect rearing for animal feed – is a mixture of excreta and exuviae, enriched in macronutrients and a promising soil amendment and plant growth promoter. However, a lack of basic agronomic information prevents frass' widespread use by regional farmers. Here, we assessed impacts of black soldier fly [BSF; *Hermetia illucens* L. (Diptera: Stratiomyidae)] larvae frass on soil health, crop growth and quality, and plant resistance to stress compared to poultry litter in organic systems. Irrigated and non-irrigated soybean (*Glycine max* L. Merr.) received either poultry litter (PL; 5.6 Mg ha<sup>-1</sup>), low (LF) and high (HF) frass rates (5.6 and 11.2 Mg ha<sup>-1</sup>, respectively), or unamended control (CT). In general, soil fertility and biological health (0-15 cm) were unaffected by soil amendments ( $p < 0.05$ ); yet, HF-irrigated soybean had 7% higher P content in grains than non-irrigated, and 13% greater P content than the non-irrigated control ( $p < 0.05$ ), demonstrating frass performance as a soil amendment varies with irrigation conditions. HF reduced soybean leaf damage by 35% and 48% relative to the non-irrigated control and irrigated-PL plots ( $p < 0.05$ ), illustrating frass potential as a natural pesticide. LF had 2-4 times greater nutrient use efficiency than HF and PL, owing to similar yields and much lower nutrient inputs. This study is the first to showcase the multiple benefits of frass to plant protection and grain nutritional value under field conditions. These findings pave the way for frass use as an organic fertilizer and biostimulant and support waste management of a fast-growing, sustainable industry.

**Does water deficit affect soybean canopy architecture?** Matheus H. D. Assis, Elvis Elli. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Canopy structure plays a fundamental role in determining the efficiency with which plants capture and utilize solar radiation. In soybean (*Glycine max* L.), traits such as leaf angles influence the spatial distribution of light within the canopy, directly affecting radiation interception and photosynthetic performance. This study aims to evaluate four soybean genotypes under irrigated and rainfed conditions at the Shult Agricultural Research and Extension Center (SAREC) in Fayetteville, Arkansas, during the 2025 growing season, with a focus on radiation use efficiency (RUE), light interception, and the canopy light extinction coefficient (k). In this study, we investigate how the extinction coefficient and leaf angle of four soybean varieties change in response to water deficit in the US Mid-South. Radiation use efficiency and seed yields are also investigated. This research will contribute to a deeper understanding of the physiological mechanisms behind yield differences and support the development of soybean ideotypes adapted to different water availability scenarios.

### **Temporal Changes in Soil Quality under Native Warm-Season and Tall Fescue Systems across Southern Grasslands.**

Geraldinn Andrea Cortez Barahona, Amanda J. Ashworth, Gerson L. Drescher, Helen C. Amorim, Gabriela Andrade Leite Mengez, and Joao H. Stibe Silva. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Forage species and management practices strongly influence soil health across the southern U.S., where climatic and topographic variability challenge pasture sustainability. This study evaluated changes in soil quality between 2021 and 2023 under native warm-season grasses (NWSG) and tall fescue (TF) systems across Arkansas, Missouri, and Tennessee. Soil samples (0–15 cm) were analyzed for total N, total organic C, pH, bulk density, electrical conductivity, P, and K, and scored using the Soil Management Assessment Framework (SMAF) to derive Soil Quality Index (SQI) values. Significant State × Species interactions ( $p < 0.05$ ) indicated that NWSG systems maintained or improved SQI across sites, while TF declined in Tennessee. SMAF scores for TOC, P, and EC were most responsive to management and environment. Findings highlight that native grasses enhance soil resilience and function under variable conditions, supporting more sustainable grazing systems in the southern U.S.

### **Tolerance of Short- and Full-Stature Corn to Tricor 4F and Intrava™ DX.**

H.C. Barber, J.K. Norsworthy, H. Rudolph, W.T. Herman, R.C. Scott, and L.T. Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Intrava DX and Tricor 4F are registered as preemergence herbicides in many corn (*Zea mays* L.)-producing states. However, neither herbicide is registered for corn in Arkansas. Therefore, in 2025, a field trial was conducted in Fayetteville, AR, to evaluate the effects of Intrava DX and Tricor 4F on short- and full-stature corn hybrids. The experiment was set up as a split-plot in a randomized complete block design with four replications. The whole-plot factor consisted of corn stature (short- vs. full-stature hybrids), and the subplot factor was herbicide treatments, consisting of preemergence timings that included Tricor 4F (metribuzin at 0.25 and 0.5 lb ai/A) and Intrava DX (1:1.75 ratio of metribuzin:amicarbazone) [metribuzin + amicarbazone (0.460, 0.689, 0.921 lb ai/A)]. Crop injury assessments were recorded weekly through 70 days after emergence, and yield will be recorded in the coming weeks. Both hybrids were injured by the herbicides evaluated, and the injury to corn generally did not subside over the evaluation period. At 2 and 3 weeks after emergence (WAE), the high Intrava DX rate resulted in 84% and 69% injury, respectively. During those same weeks, the lowest Tricor 4F rate caused 0 to 19% injury, and no differences during this period occurred between hybrids. However, there was a main effect of hybrid at 8 and 10 WAE, with short-stature injured at 19 and 9%, respectively, compared to full-stature, with 6 and 1% injury at the same evaluations. Based on this study, there were minimal differences in tolerance between the two hybrids tested, albeit some, and additional hybrids are likely needed to confirm that short- and full-stature hybrids respond similarly to the tested herbicides.

**Preemergence Performance of Isoxaflutole Alone and in Tank Mixtures in Axant™ Flex Cotton.** Rhet C. Baxley, Jason K. Norsworthy, Hunter R. Rudolph, Cade M. Halbrook. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

In the United States, Palmer amaranth remains a primary problematic weed species in cotton (*Gossypium hirsutum* L.) production. Palmer amaranth has evolved resistance to a wide array of active ingredients encompassing 9 herbicide sites of action in Arkansas. The anticipated registration of isoxaflutole for preemergence (PRE) use on Axant™ Flex cotton will hopefully give growers a new option of a residual herbicide to control Palmer amaranth. In the summer of 2025, an experiment was established as a randomized complete block at the Milo J. Shult Agricultural Research and Extension Center near Fayetteville to assess the performance of isoxaflutole applied alone or in combination with other residual herbicides commonly used in cotton. Paraquat was applied at planting to remove any existing vegetation, allowing residual activity to be evaluated solely. Preemergence-applied herbicides evaluated alone or with isoxaflutole included fluometuron, fluridone, and fomesafen. Overall crop injury and Palmer amaranth control were assessed on a 0-100% scale at 14 and 28 days after treatment (DAT). Additionally, Palmer amaranth densities were collected from two one-meter squares per plot at 14 and 28 DAT. Little to no injury (0 to 3%) had been observed at either fourteen or twenty-eight DAT. At 14 and 28 DAT, no differences in Palmer amaranth control were detected between isoxaflutole alone or in combination with other residual herbicides. Residual Palmer amaranth control from isoxaflutole combined with either fomesafen or fluridone was 93% compared to 83% observed with isoxaflutole alone; albeit these differences were not significant. Treatments containing isoxaflutole, fluridone, or fomesafen showed average densities of 10 to 33 Palmer amaranth per meter of plot compared to an average of 97 in that of the nontreated plot at 28 DAT. The addition of isoxaflutole to cotton weed control programs provides another site of action in the fight against herbicide-resistant Palmer amaranth.

**Evaluation of Long-Term Cover Crop Implementation on Soil Health in Arkansas Soybean Production.** Grant Bennett, Dr. Trenton Roberts, Dr. Kristofor Brye, Dr. Gerson Drescher. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Cover crop implementation and the concept of soil health in Arkansas row-crop production have been of increasing interest to producers in recent years. Previous research has identified management concerns, yield loss, and time as major barriers to widespread cover crop adoption in Arkansas. The objectives of this study were to evaluate the impact of long-term implementation of various cover crops on soil health and soybean yield. Study sites consisted of three University of Arkansas research stations in Kibler (VRS), Colt (PTRS), and Rohwer, AR (RRS). Treatments implemented at each site included winter fallow as a control, five single species cover crops, and two cover crop blends. Baseline samples were collected at the onset of the project in 2017 with subsequent samples collected in the last year of the study in 2023. Soil health was quantified by measuring soil pH, soil organic matter concentration, total carbon, total nitrogen, and soil respiration. Delta values were calculated for each soil health indicator and used to quantify indicator responses to each cover crop treatment. Soybean yield was recorded in 2023, and treatments were compared to the yield of the fallow control. Results showed that cover crops did not affect soybean yield, which could provide potential relief to producers concerned about yield decreases with cover crop adoption. Across sites, cover crops generally improved soil health indicators. Delta values showed that organic matter, carbon, and nitrogen increased at most locations. However, responses varied by site and may have been influenced by irrigation practices.

**Optimizing the soybean seed filling period as a strategy to maximize yields.** Pedro Zanon de Britto and Elvis Elli. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

The relationship between increased soybean yield and the seed-filling period is directly linked to the leaf area index (LAI). Based on this, a 40-year simulation was conducted using APSIM (Agricultural Production Systems Simulator) in Pine Tree, AR, to understand how extending the seed-filling duration influences the crop's yield potential. The main hypothesis considered the optimization of phenological traits and soil water availability. Two scenarios were analyzed: (1) extending the seed-filling period while keeping the time to flowering constant ("Life cycle extended"); and (2) increasing the seed-filling period while shortening the time to flowering, maintaining the overall crop duration ("Life cycle fixed"). The latter is particularly relevant for northern U.S. regions, where a longer life cycle could prevent soybeans from completing development before killing frosts in the fall. Results showed that longer seed-filling periods enhanced yield, especially under irrigated conditions. When seed filling was extended and flowering shortened, the optimal yield occurred between 550 and 650 photothermal (PT) degrees for irrigated and rainfed systems, respectively. The main reason was the trade-off between an earlier start of seed filling and reduced leaf expansion during vegetative growth. In water-limited environments, a smaller LAI combined with early flowering allowed soil moisture savings, benefiting critical stages such as seed filling. Extending the plant's life cycle up to flowering increased green leaf area persistence, enhancing crop growth rate.

**Arkansas Palmer Amaranth Accessions: How Effective is Axant Top?** Noah Chandler, Jason K. Norsworthy, Hunter Rudolph, Tom Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

BASF Corp. released Axant™ Flex cotton, with tolerance to hydroxyphenylpyruvate dioxygenase (HPPD) inhibitors such as isoxaflutole, with commercial availability beginning in 2024. Other HPPD inhibitors, such as topramezone, have been evaluated for potential use for weed control in Axant Flex cotton. Palmer amaranth (*Amaranthus palmeri* S. Wats.) in Arkansas is resistant to 9 herbicide sites of action, including HPPD inhibitors. Therefore, a study was conducted to determine the response of different Palmer amaranth accessions to Axant TOP (topramezone) applied POST. A single application of Axant Top at 1 fl oz/A (topramezone 24.5 g ai/ha) was applied to 45 Palmer amaranth accessions at the 5- to 6-leaf growth stage in the greenhouse. Visual control was rated relative to the non-treated 14 and 28 days after treatment (DAT), along with survival percentage at 28 DAT. Results showed high variability in the accessions' sensitivity to Axant TOP. Control ranged from 12 to 98% and survival ranged from 2 to 100%. Problematic Palmer amaranth accessions were frequently concentrated in Crittenden County, albeit most accessions evaluated were from this county. These results suggest that Axant TOP can be an effective means of Palmer amaranth control; however, some accessions show minimal control when applied alone. In the future, a more robust statewide survey is needed, and additives with topramezone that could improve Palmer amaranth control need to be identified.

### **Soybean resistance to southern root-knot nematode reduces nematode population density under field conditions.**

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The southern root-knot nematode [SRKN, *Meloidogyne incognita* (Kofoid & White) Chitwood] is one of the most yield-limiting soybean pathogens worldwide. With limited control options, genetic resistance remains the primary management strategy. This study aims to evaluate the effectiveness of a major quantitative trait locus (QTL) on chromosome 10 in reducing SRKN population density under field conditions. A total of 76 advanced breeding lines from maturity groups IV and V were assessed. Based on the presence of the major QTL on chromosome 10, 38 breeding lines were classified as resistant and 38 as susceptible to SRKN. Field experiments were conducted in 2018 and 2019 using a randomized complete block design with three replications under high nematode pressure. Soil samples were collected from the two center rows of each four-row plot for nematode extraction and quantification. Nematode population density was expressed as the number of second-stage juveniles (J2) per 100 cm<sup>3</sup> of soil. Over the two-year study, SRKN-resistant breeding lines had, on average, 1,620 SRKN-J2 per 100 cm<sup>3</sup> of soil, while the susceptible group averaged 2,126 J2 per 100 cm<sup>3</sup> of soil ( $p$ -value < 0.001). However, in 2019, prolonged off-target dicamba exposure significantly increased nematode density across all lines. Dicamba-tolerant breeding lines consistently exhibited lower SRKN-J2 densities than dicamba-susceptible lines, regardless of their SRKN resistance. Therefore, soybean resistance suppresses nematode reproduction, allowing effective crop rotation management. However, prolonged off-target dicamba exposure imposes additional stress that may compromise the plant's defense response to SRKN.

**Identification of Superior Soybean Parental Lines Using Genomic Prediction.** Liliana Florez-Palacios<sup>1</sup>, Derrick Harrison<sup>1</sup>, Andrea Acuna<sup>1</sup>, Chengjun Wu<sup>1</sup>, Rafael Goncalves Marmo<sup>1</sup>, Daniel Rogers<sup>1</sup>, Qijian Song<sup>2</sup>, and Caio Canella Vieira<sup>1</sup>. <sup>1</sup> Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR. <sup>2</sup> USDA-ARS.

Selection of parental lines for hybridization is the first step in soybean breeding. Population development is costly and time-consuming. However, genomic prediction offers a promising approach to identify crosses that theoretically would result in progeny with high mean performance and genetic variance, thereby maximizing genetic gain in a breeding cycle. This study aimed to identify populations with high mean and high genetic variance using genomic prediction models. A total of 2,216 soybean genotypes, maturity groups 3L to 5E, were evaluated for grain yield in two separate subsets in 2023 and 2024. Genotyping was performed with the Soy3KSNP chip. Using the R package 'PopVar', over 2.4 million cross combinations were simulated following Stahl's model with five replications. Progeny mean, genetic variance, and superior progeny mean were predicted using an RR-BLUP model. Cross-validation consisted of 5-folds with five replications. General combining ability (GCA) was estimated as the deviation between each genotype's population mean and the mean of all other predicted populations. Significant variation in GCA among high-yielding genotypes underscored the need to further investigate the genetic basis of superior progenies beyond the breeding adage of crossing 'good by good'. This approach also facilitated the identification of superior populations derived from genotypes in early breeding stages, which may support the faster recycling of elite genotypes. Overall, genomic prediction models may maximize the efficiency of resource allocation in population development and accelerate genetic gain in soybean breeding.

**Mapping genomic regions for Heat resilience: QTL analysis for High night temperature tolerance in Rice (*Oryza sativa*).** Prashant Gyanwali, and Christian DeGuzman. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Rice is a major cereal crop consumed worldwide, the second-largest source of dietary energy. High night temperature stress (HNT) is detrimental to rice production, quality, and yield. A 1°C increase in night temperature can result in yield loss up to 10%. 0.53°C and 1.12°C increases in night temperature have been seen in Arkansas and California since 1940. Yield reduction is due to spikelet infertility, shortened crop period, increased night respiration and grain breakage and chalkiness, due to HNT. Quantitative Trait Locus (QTL) is a powerful tool that helps breeders find the genomic regions linked to HNT tolerance, grain quality, and yield traits. Mapping populations from genetically contrasting parents, phenotypes, and genotypic data are needed for identifying the QTLs. 280 F4 recombinant inbred lines developed from crossing N22 x Diamond population were used for QTL identification. The experiment was conducted in two growth chambers, control and HNT, in a completely randomized design with two replicates. The diurnal environmental conditions for the growth chambers reflected those of a July day in Arkansas gradually declining to 22°C in control and 28°C for HNT from the R2 stage until harvest. HNT resulted in higher chalk impact, lower grain dimensions, lower 100 seed weight, higher biomass, and higher spikelet sterility compared to control. Grain samples were sent for resequencing, and raw SNP data were received for 40,000 markers. After filtering, and binning correlated markers, a final marker count of 2780 was used for the QTL analysis. QTL results will provide a framework for future identification of genes involved in HNT tolerance in rice.

**Injury Caused by Common HPPD-inhibiting Herbicides Applied Postemergence to Axant™ Flex Cotton.** C.M. Halbrook, J.K. Norsworthy, N.M. Chandler, C.C. Ketchum, and L.T. Barber, Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas.

Axant™ Flex is the first commercial herbicide trait safening cotton to 4-hydroxyphenylpyruvate dioxygenase (HPPD) inhibitors. The technology enables the application of novel herbicides in cotton, providing farmers with additional tools to manage problematic weeds. Research was conducted in 2025 at the Milo J. Shult Agricultural Research and Extension Center in Fayetteville, AR, to evaluate Axant Flex cotton tolerance to commonly used HPPD herbicides. A randomized complete block design using a split-plot arrangement was established with four replications and six treatments. Two cotton cultivars, ST5855AXTP and PX4BOW3FE, were utilized in this study. Postemergence (POST) treatments consisted of mesotrione, tolypyralate, tembotrione, isoxaflutole, and topramezone applied at the two-leaf growth stage. Visible crop injury was assessed 7, 14, and 21 days after treatment (DAT), and aboveground biomass was collected 21 DAT. Axant Flex injury was less than 10% for every treatment across all rating times. Mesotrione caused the greatest injury to Axant Flex cotton across all rating times, ranging from 5 to 8%. Isoxaflutole and topramezone caused less than 3% injury at each assessment. No differences in Enlist cotton tolerance to the HPPD herbicides were observed 7 or 14 DAT. At 21 DAT, all treatments caused greater than 75% injury, with tembotrione producing the lowest injury (78%). Biomass did not differ by herbicide treatment within a herbicide technology, and the untreated biomass was not different between the technologies. Axant Flex biomass was greater than Enlist biomass for all herbicide treatments, except Axant Flex treated with isoxaflutole and Enlist treated with tembotrione. Based on these findings, Axant Flex cotton has excellent tolerance to the tested HPPD herbicides with postemergence applications having minimal impact on cotton growth.

**Association Mapping and Genomic Prediction of Mid-Season Flood Tolerance in Soybean.** Derrick Harrison<sup>1</sup>, Dr. Chengjun Wu<sup>1</sup>, Dr. Andrea Acuna<sup>1</sup>, Dr. Liliana Florez-Palacios<sup>1</sup>, Daniel Rogers<sup>1</sup>, Rafael Marmo<sup>1</sup>, Emanuel Ferrari do Nascimento<sup>1</sup>, Dr. Heng Ye<sup>2</sup>, Dr. Henry T. Nguyen<sup>2</sup>, Dr. Grover Shannon<sup>3</sup>, Dr. Diego Jarquin<sup>4</sup>, Dr. Caio Canella Vieira<sup>1</sup>.  
<sup>1</sup>University of Arkansas, <sup>2</sup>University of Missouri, <sup>3</sup>University of Missouri, <sup>4</sup>University of Florida.

Flooding stress is an increasingly critical constraint to soybean (*Glycine max* [L.] Merr.) production due to the rising frequency and severity of extreme precipitation events. While previous studies have identified genomic regions associated with mid-season flood tolerance, a substantial portion of phenotypic variance remains unexplained. This study aimed to identify additional genomic regions contributing to flood tolerance and assess the utility of machine learning for genomic prediction. A panel of 281 soybean plant introductions (PIs) was evaluated over three growing seasons at two locations, using controlled flooding imposed during the early reproductive (R1–R3) growth stages for 8–10 days. Phenotypic response was quantified as foliar damage score (FDS) using a 0–9 scale, where 0 indicated minimal damage and 9 indicated severe necrosis or death. FDS evaluations were conducted seven days after floodwater removal. A genome-wide association study (GWAS) using the Bayesian-information and Linkage-disequilibrium Iteratively Nested Keyway (BLINK) model identified significant loci on chromosomes 3 and 19 (LOD  $\geq$  6). SNP ss715585205 on chromosome 3 was newly identified, while ss715635284 on chromosome 19 had been previously associated with flood tolerance during germination. For genomic prediction, a Random Forest (RF) model was implemented using markers from the SoySNP50K iSelect BeadChip array. Predictors (markers), including the number of trees (ntree) and variables sampled per split (mtry), were optimized through cross-validation, and final predictions were derived by model averaging across iterations. After feature selection, the RF model achieved a prediction accuracy of 0.82 using 62 SNPs, effectively reducing multicollinearity and overfitting. These findings validate the efficacy of machine learning for predicting abiotic stress tolerance in soybean and demonstrate the potential of integrating genomic selection tools into breeding pipelines. This study provides a practical framework for accelerating the development of season-long, flood-tolerant soybean cultivars through data-driven breeding strategies.

**Impact of Soil-Applied Quizalofop to Conventional and ArkTam Grain Sorghum.** W. T. Herrman, J. K. Norsworthy, H. Rudolph, R. Baxley. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

The ArkTam<sup>TM</sup> trait in grain sorghum [*Sorghum bicolor* (L.) Moench] confers resistance to the aryloxyphenoxypropionate class of acetyl-coenzyme A carboxylase-inhibitors, chiefly quizalofop-P-ethyl. While quizalofop product labels recommend postemergence (POST) application for weed control and crop tolerance, the literature shows that the herbicide can be safely used in preemergence (PRE) mixtures in other crops. During the 2024 and 2025 growing seasons, field studies were conducted in Fayetteville, AR, to evaluate the tolerance of ArkTam grain sorghum to PRE applications of quizalofop. A conventional variety of grain sorghum was used for comparison. The experiment utilized a randomized complete block design with four replications and four-row plots. Only the center rows of each plot were treated. Treatments included a nontreated check and quizalofop rates of 0.055, 0.083, and 0.165 lb ai/A applied immediately after planting. The experiment was maintained weed-free. Visible injury was assessed at 28 and 42 days after sorghum emergence (DAE), and stand counts recorded 28 DAE. Currently, only 2024 yield data are available. Across both years, only the conventional sorghum receiving the highest rate of quizalofop showed significant injury (32 and 23%) at 28 and 42 DAE, respectively. Across quizalofop rates and years, conventional grain sorghum experienced an 18% stand reduction, whereas ArkTam did not suffer any stand loss. Yield results showed no differences at any quizalofop rate compared with the corresponding nontreated hybrid. Initial findings show that quizalofop can be applied PRE in ArkTam grain sorghum and may warrant further evaluation in conventional sorghum systems.

**Impacts of Forested and Agricultural Land Uses Along the Ouachita River on Water, Soil, and Leaf Na Concentrations.** Maggie Herrmann<sup>1</sup>, Dr. Michelle Evans-White<sup>2</sup>, Dr. Sally Entrekin<sup>3</sup>, and Dr. Natalie Clay<sup>1</sup>. <sup>1</sup>University of Arkansas Department of Entomology and Plant Pathology, Fayetteville, AR, <sup>2</sup>University of Arkansas Department of Biological Sciences, Fayetteville, AR, <sup>3</sup>Virginia Tech University Department of Entomology, Blacksburg, VA.

Rising salinity in soils and freshwater is a global problem that threatens freshwater services like drinking water, fishing, and irrigation water for agriculture. Agriculture is a major nonpoint source contributor of sodium (Na) to riparian and aquatic ecosystems. Sodium can directly enter streams through subflow, runoff, and groundwater inputs, but also impacts plants in adjacent riparia. Na is a non-essential nutrient for plants but plants often uptake Na proportional to its availability in the soil. However, there is likely considerable variation and plants that uptake more Na may serve in Na-phytoremediation, but this remains little investigated. Our study tested the predictions that Na concentration varies between riparian forests and agricultural buffers in 1) leaf tissues concentrations, 2) soils, and 3) freshwater. Leaves, soils, and water Na concentrations were measured at six paired forested and agricultural buffer sites along the Ouachita River in both Louisiana and Arkansas (N=12 sites; 3 pairs per state). Preliminary results demonstrated that mean water Na concentrations at agricultural buffer sites were ~1.6-fold greater than forested sites. The top four most common tree species sampled were *Quercus lyrata* (Overcup Oak), *Platanus occidentalis* (American Sycamore), *Quercus nigra* (Water Oak), and *Carya aquatica* (Water Hickory) and demonstrated ~10.8-fold variability in Na leaf concentrations across sites. These results suggest that agriculture contributes to increased freshwater salinization, but that common trees could help decrease inputs through increased uptake. The final results of this research may be used by land managers and farmers alike to better inform riparian buffer species selection and will help us understand how linked terrestrial riparian zones and aquatic ecosystems respond to salinity.

**Response of Inbred and Hybrid Rice to Late-season Applications of Facet and Gambit.** H.M. Houser, J.K. Norsworthy, C.M. Halbrook, H.R. Rudolph. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Late weed emergence or inclement weather can lead to unmanaged weeds in fields, prompting the question of whether to make late-season or salvage applications beyond the label's permitted use. In 2024, most Arkansas rice had extremely poor milling quality, a factor speculated to be due to late-season herbicide application. Hence, research was conducted to understand the impacts of these late applications on two rice cultivars – an inbred and a hybrid. In 2025, an experiment in a randomized complete block with four replications was conducted at the Pine Tree Research Station near Colt, AR. Ozark (inbred) and RT7302 (hybrid) were treated with Facet at 43 fl oz/A or Gambit at 2 oz/A at one vegetative and three reproductive timings. A nontreated check was included for comparison, and all plots were kept weed-free. Visible injury among both cultivars and across all application timings was minimal, with the highest recorded injury of 10% two weeks after the application at tillering. Only the main effect of cultivar was significant for rough rice yield, indicating that herbicide and application timing had no effect. Regarding the percentage of whole and total milled rice, none of the tested factors was significant. These results are from a single year but indicate that low milling quality is not due to late-season applications of Facet or Gambit. This experiment will be repeated in 2026, and additional herbicides or late-season herbicide drift should be investigated.

**Quantitative trait loci analysis identifying novel genomic regions for off-target dicamba tolerance in soybean [*Glycine max* (L.) Merr.]** Dongho Lee<sup>1</sup>, Emanuel Ferrari do Nascimento<sup>1</sup>, Rafael Marmo<sup>1</sup>, Derrick Harrison<sup>1</sup>, Chengjun Wu<sup>1</sup>, Andrea Acuna-Galindo<sup>1</sup>, Sandra Flore-Palacios<sup>1</sup>, Daniel Rogers<sup>1</sup>, Francia Ravelombola<sup>2</sup>, Feng Lin<sup>2</sup>, Caio C. Vieira<sup>1</sup>. <sup>1</sup>Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR; <sup>2</sup>Plant Science & Technology, University of Missouri, Columbia, MO.

Significant yield loss from off-target dicamba exposure in conventional soybean [*Glycine max* (L.) Merr.] production areas have been reported following the commercialization of genetically modified dicamba-tolerant (DT) soybean. To meet the demand of growers who prefer a conventional soybean production system, developing new cultivars with natural genetic variations for off-target dicamba tolerance has become imperative. Thus, this study aimed to identify novel genomic regions associated with off-target dicamba tolerance in soybean. The quantitative trait loci (QTL) analysis using a recombinant inbred line population identified six QTLs on chromosomes (Chrs.) 6, 9, 10, 13, 19, and 20. Of these, QTLs on Chrs. 9 (*qDIC\_09.1*; 38,864,545 – 39,823,876 bp) and 13 (*qDIC\_13.1*; 37,963,961 – 39,620,391 bp) were considered major QTLs. Out of 239 genes within the major QTLs, 41 candidate genes were identified based on the functional annotations of the differentially expressed genes studied in a DT mutant line in *Arabidopsis*. Of these, three well-characterized proteins for the plant detoxification process, such as glutathione S-transferase, cytochrome P450, and UDP-Glycosyltransferase superfamily protein, were identified. Nucleotide divergence analyses showed that *qDIC\_13.1* harbored a large selective sweep region (~464 Kbp). This result suggests that most of the genetic diversity near this genomic region has been eroded in modern soybean cultivars, which may have consequently led to the loss of valuable alleles associated with detoxification. The novel findings in this study will provide valuable insights that may facilitate the development of new conventional DT soybean cultivars.

**Are There Effective Preemergence Control Options for Glufosinate-Resistant Palmer Amaranth from Crittenden County?** Michael Houston, Tom Barber, Jason K. Norsworthy, James Rose, Hunter D. Bowman, and Aaron Ross. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Glufosinate resistance was confirmed in three Palmer amaranth (*Amaranthus palmeri* S. Wats.) accessions in 2022, leaving few chemical control options. Previous research has already evaluated preemergence (PRE) and postemergence (POST) control of one of the three glufosinate-resistant accessions. A field experiment was conducted in 2025 to evaluate PRE herbicide control options for an additional glufosinate-resistant Palmer amaranth accession, CCR. This experiment was a randomized complete block design with four replicates. Herbicide treatments consisted of a stand-alone application of acetochlor, atrazine, diflufenican, diuron, flumioxazin, fluridone, fomesafen, imazaquin, isoxaflutole, mesotrione, metribuzin, pendimethalin, pyroxasulfone, saflufenacil, S-metolachlor, or trifludimoxazin at their respective label rates or anticipated label rates. At 2 weeks after treatment (WAT), pyroxasulfone, atrazine, and S-metolachlor provided the highest visual Palmer amaranth control, ranging from 78 to 84%. By 6 WAT, pyroxasulfone resulted in the highest Palmer amaranth control at 63%. All other treatments provided less than 40% control at 6 WAT and did not differ significantly from each other. These results suggest that this Palmer amaranth accession is not effectively controlled with only one PRE application. Further research is needed to characterize effective season-long control options, including both PRE and POST applications that overlap residual herbicides.

## **Cotton Response to Postemergence Herbicide Applications Across ThryvOn™ and Non-ThryvOn™ Technologies.**

J.C. Malone, L.T. Barber, J.K. Norsworthy, B.C. Thrash, W.A. Plummer, W.A. Fletcher. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Early postemergence (POST) applications in cotton (*Gossypium hirsutum*) are a pivotal tool in any weed control program. However, there is the potential for crop injury in some early POST applications. Early-season cotton growth is also heavily affected by thrips feeding. The timing of thrips infestations aligning with stress from early postemergence herbicides can result in delays and potential stand loss. The objective of this experiment was to evaluate potential interactions between POST herbicide injury and thrips damage in ThryvOn™ and non-ThryvOn™ cotton technologies. Research was conducted in 2025 at the Lon Mann Cotton Branch Experiment Station in Marianna, AR. The experiment was designed as a randomized complete block with a split-plot arrangement, including 16 treatments and four replications. The experiment was a factorial arrangement of treatments with cotton technology and seed treatment as the whole-plot factors, followed by POST herbicide program as the sub-plot factor. Three different herbicide programs were evaluated within this experiment across both treated and untreated plots of ThryvOn™ and Non-ThryvOn™ technologies. The herbicide programs evaluated include glufosinate-L (Liberty Ultra®) applied alone, glufosinate-L, dimethenamid-P (Outlook®), and glyphosate (Roundup Powermax 3®) applied as a tank-mixture, dicamba (Xtendimax®) and glyphosate applied as a tank-mixture, followed by no application at the 2- to 3-leaf maturity level. The seed treatment evaluated was Gaucho® at 0.375 mg/seed. Necrosis, chlorosis, and thrip damage ratings were taken at 7, 14, 21, and 28 days after treatment (DAT). Node counts and plant heights were also collected throughout the growing season. No interaction was observed between herbicide injury and thrips damage. The lowest herbicide injury was observed with dicamba, ranging from 0 to 7%. The highest injury occurred with a tank mixture of dimethenamid-P, glufosinate-L, and glyphosate, at 30-35%. Increased thrips damage resulted from applications that included dimethenamid-P and glufosinate-L; however, no direct correlation between injury and thrips damage was observed. Yield data will be presented, but the results were not complete at the time of submission of this abstract.

**Early Identification of High-Yielding and Stable Soybean Genotypes.** Rafael Goncalves Marmo<sup>1</sup>, Adrea Acuna<sup>1</sup>, Liliana Florez-Palacios<sup>1</sup>, Derrick Harrison<sup>1</sup>, Chegjun Wu<sup>1</sup>, Daniel Rogers<sup>1</sup>, Emanuel Ferrari do Nascimento<sup>1</sup>, Qijian Song<sup>2</sup>, Caio Canella Vieira<sup>1</sup>. <sup>1</sup>Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR. <sup>2</sup>Soybean Genomics and Improvement Laboratory, Beltsville Agricultural Research Center, USDA-ARS.

Improving grain yield is the primary goal of most soybean breeding programs. During early-stage yield trials, breeders often evaluate thousands of genotypes; however, limited seed availability constrains the number of tested environments and replications, reducing selection accuracy. Thus, developing genomic prediction models to identify high-yielding and stable genotypes early in the breeding cycle is critical. In this study, 1,382 genotypes ranging from maturity groups III to V were evaluated for grain yield across six environments in 2023 and 2024. Best Linear Unbiased Estimators (BLUES) were calculated for each year-location combination. A Modified Selection Index (MSI) was calculated as the average yield deviation from the checks' mean across tested environments, with zero serving as the baseline. Genotypes with  $MSI \geq -5$  were classified as high-yielding, while those with  $MSI < -5$  were classified as low-yielding. Two classification-based genomic prediction models, Generalized Linear Model via Elastic Net Regularization (GLMNet) and Random Forest (RF), were developed using the SoySNP3K BeadChip markers as predictors and yield classes as the response variables. Overall, RF achieved the most balanced classification across yield classes, outperforming GLMNet in balanced accuracy (0.78 vs. 0.76), F1-score (0.70 vs. 0.68), and negative predictive value (0.86 vs. 0.84). These results suggest that combining MSI with classification-based genomic prediction may improve the efficiency of resource allocation in the early stages of soybean breeding by prioritizing testing efforts in high-yielding materials.

**Identifying opportunities to optimize seasonal water use in Mid-South soybeans crop systems: a crop modeling approach.** Martina Meira, Elvis F. Elli. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Understanding water use is crucial facing an increasing agricultural production under a changing climate scenario, particularly in water-limited environments. Evaluating the performance of cropping systems across years and varying growing season climates will help us better understand water use dynamics. To this end, we will run a global sensitivity analysis using APSIM-Soybean to quantify the contribution of different soil, plant and weather variables on water use and yields.

**How Late is Too Late to Correct Potassium Deficiency in Corn?** Gabriela Andrade Leite Mengez<sup>1</sup>, Gerson L. Drescher<sup>1</sup>, Trenton L. Roberts<sup>1</sup>, Qamar Sarfaraz<sup>1</sup>, Joao H. Stibe Silva<sup>1</sup>, Geraldinn Cortez<sup>1</sup>, Jason Kelley<sup>1</sup>, Michael Popp<sup>2</sup>.  
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Potassium (K) is one of the most yield-limiting nutrients in Arkansas corn (*Zea mays* L.) production. We evaluated how K fertilization timing influences corn yield and tissue-K concentrations on soils with different K availability. Six field trials were conducted across Arkansas during 2024 and 2025. A single fertilizer-K rate (120 lb K<sub>2</sub>O/ac) was applied at different timings: preplant incorporated, and in-season (surface broadcast followed by rainfall or irrigation) at V6, V10, V12, V14, VT, and R2, in addition to a no-K control. Whole-plant samples were collected at V6, and leaf samples (the uppermost mature leaf or ear leaf, when present) were collected before and two weeks after each K application for tissue-K analysis. Corn yield was significantly affected by K fertilization at sites with Very Low and Low soil-test K, where early-season applications (V6–V12) yielded equivalent to preplant fertilization, confirming effective yield recovery when deficiency was corrected during vegetative growth. Late fertilizer-K applications (VT–R2) compromised yield potential and were less effective than early-season applications. No yield response occurred at Medium or Optimum STK sites with adequate soil K supply. Tissue-K concentration increased with K fertilization at all STK levels, but the magnitude of response depended on timing and soil-test K. Early-season K applications effectively corrected tissue-K deficiency, comparable to preplant fertilization in sites with Very Low and Low soil-test K. Late applications (*e.g.*, R1) did not differ from the control, confirming a narrow physiological window for K deficiency correction. Our results indicate that growers have the flexibility to correct K-deficient corn if it is timely diagnosed with tissue testing, as yield potential declines sharply if fertilizer-K is applied after VT. The integration of yield and tissue-K responses emphasizes that K management strategies must consider both soil K availability and crop growth stage to ensure effective nutrient management decisions.

**UAV-Based Phenotyping for Rapid Assessment of Soybean Drought Tolerance.** Popat S. Pawar, C. Wu, D. Harrison, D. Rogers, Ben Fallen, Caio C. Vieira. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Soybean production in the U.S. is predominantly rainfed, making it highly susceptible to drought during flowering and seed fill, which can cause substantial yield losses. Developing drought-tolerant varieties is therefore a priority. This study employed UAV-based high-throughput phenotyping to evaluate canopy traits related to drought response in 23 elite soybean lines (MG4 and MG5) tested under irrigated and rainfed conditions in the USB Drought regional yield trials (USBDT4 and USBDT5) in Stuttgart, AR. Canopy wilting was assessed visually and via UAV imagery at R4/R5 stages. UAV-derived structural (3 traits), spectral (36 traits), and textural (48 traits) measurements captured plant stress responses more effectively than visual scoring and were significantly correlated with yield. Year-wise correlations in 2023 ranged as follows: spectral  $r = -0.35$  to  $0.40$ , structural  $r = -0.23$  to  $0.26$ , and textural  $r = -0.41$  to  $0.46$ ; in 2024: spectral  $r = -0.44$  to  $0.45$ , structural  $r = 0.28$  to  $0.43$ , and textural  $r = -0.41$  to  $0.45$ . Most of the top correlations were statistically significant, except for structural traits in 2023, which were not significant. These findings highlight that UAV phenotyping can effectively quantify drought stress responses and support the selection of drought-resilient soybean lines, facilitating rapid evaluation and breeding for stress tolerance.

**Influence of Preemergence Herbicide Selection on Subsequent Postemergence-Targeted Sprays in Cotton.** Lane Pierce, Jason K. Norsworthy, Amar Godar, Gaylon Morgan, Wesley Herrman, Tom Barber. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

The John Deere See & Spray™ utilizes machine vision technology to precisely apply herbicides directly to weeds. This research evaluates the extent to which the strength of cotton (*Gossypium hisutum*) preemergence (PRE) herbicides affects the timing and herbicide savings of postemergence (POST)-targeted sprays. In 2025, a randomized complete block design experiment with five treatments and four replications was conducted in Keiser, AR. All plots were sprayed with preemergence (PRE) herbicides —fluridone, diuron, fomesafen + diuron, and fomesafen + diuron + pyrithiobac-sodium — along with a nontreated control for comparison. Water was applied with the See and Spray Agronomy Test Machine 2, 3, 4, and 5 weeks after PRE applications to evaluate potential savings in POST herbicide use. Palmer amaranth (*Amaranthus palmeri*) and common purslane (*Portulaca oleracea*) were the predominant weeds in the plots. Fomesafen + diuron and fomesafen + diuron + pyrithiobac-sodium provided 83 and 91% reduction in area sprayed, respectively, 2 weeks after the PRE application. Treatments containing diuron and fluridone resulted in similar POST herbicide savings at 58% and 59%, respectively. Fluridone, fomesafen + diuron, and fomesafen + diuron + pyrithiobac-sodium were comparable, providing > 99% reduction in the Palmer amaranth density 2 weeks after the PRE application. By 4 weeks after the PRE application, weed densities were such that there was no more than 16% reduction in the area sprayed with the targeted applications. Targeted-spray research should be conducted in a field with weed densities more closely resembling those in typical commercial fields rather than in a field with high weed densities typically used to assess herbicide efficacy.

**From Physiology to Genes: High-Throughput Phenotyping and GWAS Dissect Yield-Formation Traits in Soybean.**

Laavanya Rayaprolu, Dongho Lee, Popat Shivaji Pawar, Liliana Florez, Andrea Acuña, Derrick Harrison, Rafael Gonçalves Marmo, Chengjun Wu, Daniel Rogers, Elvis Elli, Caio Canella Viera. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Soybean yield improvement has plateaued due to declining genetic diversity from repeated breeding among elite lines. To address this, we combined physiological analysis, high-throughput phenotyping, and genome-wide association studies (GWAS) to dissect the genetic and physiological basis of yield-formation traits in a diverse panel of 215 soybean genotypes (maturity groups 3–4). Using unmanned aerial systems (UAS) at two Arkansas sites, we captured canopy architecture and vegetation indices across developmental stages. Phenotypic variation was substantial: grain yield ranged from 1,869–2,924 kg ha<sup>-1</sup>, biomass from 2,907–5,816 kg ha<sup>-1</sup>, and harvest index (HI) from 38–53%. Yield correlated strongly with biomass ( $r = 0.53$ ) and moderately with radiation-use efficiency (RUE;  $r = 0.39$ ) and HI ( $r = 0.32$ ), whereas biomass and HI were uncorrelated ( $r = -0.01$ ), suggesting independent contributions to yield formation. GWAS revealed 14 significant SNPs across eight genomic regions on chromosomes 3, 5, 11, 12, 14, 17, and 18, including loci with pleiotropic effects on biomass, yield, and canopy traits particularly a key region on chromosome 3 (42–45.5 Mb). These findings highlight distinct yet complementary genetic architectures governing yield-related traits and underscore opportunities to enhance yield potential through integrated physiological and genomic breeding strategies.

**The Limited-transpiration Trait (LT) in Corn Can Optimize Yield and Seasonal Water Use in the Mid-South and Western Corn-Belt.**

Lucas Romano, Elvis F. Elli. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Water plays a key role in corn cropping systems, especially in environments where this resource is limited. Drought events are becoming more frequent, which is why it is essential for corn producers to recur to environmentally adapted genotypes that can tolerate water stress. The identification of physiological adaptations for drought tolerance is crucial to achieve this goal, and crop modeling provides solid foundation to further investigate potential traits adapted to these environments. We used a crop growth model to explore the impact of the Limited-transpiration Trait (LT) that could optimize corn water use while maximizing yields across different environments in the US. Simulations were made across different environments in the mid-South and Nebraska. We explored the impact of this trait in Water Use Efficiency (WUE) under irrigated and rainfed conditions, as well as multiple sowing dates. These findings could provide actionable insights to seed companies, allowing the adaptation of these genotypes to water limited environments.

**Controlling White Margin Sedge: Postemergence Options.** Aidan D. Ross, Jason K. Norsworthy, Matthew A. Lombardi, Susee Sudhakar, Bob Scott. University of Arkansas System Division of Agriculture, Fayetteville, AR.

Arkansas rice (*Oryza sativa* L.) producers have recently been dealing with a problem weed, white margin sedge (*Cyperus macrostachyos* Lam.). From the moment it was first reported as an issue in Poinsett County in 2014, this weed has spread throughout the rice-growing region of the state and is quickly becoming a chief concern. As a result of an Asp-376-Glu substitution in white margin sedge's acetolactate synthase (ALS)—the target site of WSSA Group 2 herbicides—the weed has become resistant to Group 2 herbicides like halosulfuron-methyl (Permit). These Group 2 herbicides are typically relied upon for control of sedge (*Cyperus* spp.) weeds in rice; their failure, along with limited information on how this weed responds to other chemicals, underscores the urgent need to identify alternative control options. In a greenhouse experiment, three accessions of white margin sedge and one accession of rice flatsedge (*Cyperus iria* L.) were tested against 17 postemergence herbicide treatments available for use in rice and/or soybean [*Glycine max* (L.) Merr.]: halosulfuron-methyl, imazethapyr, triclopyr, florpyrauxifen-benzyl, quinclorac, 2,4-D, propanil, bentazon, glyphosate, glufosinate, acifluorfen, oxyfluorfen, carfentrazone, saflufenacil, paraquat, mesotrione, and halosulfuron-methyl + bentazon. The study was laid out in a completely randomized design with four replications and was repeated. Data collected included visual control ratings (0 to 100%), plant heights through 4 weeks after treatment (WAT), and aboveground biomass 4 WAT. The two most effective treatments were bentazon at 0.75 lb ai/A and florpyrauxifen-benzyl at 0.026 lb ai/A, which provided better than 95% control. Many of the postemergence herbicides evaluated were deemed ineffective.

**Tolerance of Axant Flex Cotton to Over-the-Top Applications Topramezone and Fluometuron Mixtures.** H.R. Rudolph, J.K. Norsworthy, L.T. Barber. University of Arkansas Systems Division of Agriculture.

Axant™ Flex cotton allows producers to utilize 4-hydroxyphenylpyruvate dioxygenase (HPPD)-inhibiting herbicides for preemergence and postemergence weed control. Topramezone (Axant TOP) has proven safe when applied over the top of Axant Flex cotton, but adding low rates of fluometuron (Cotoran), a photosystem II inhibitor, will likely increase weed control and the potential for crop injury due to the synergy often observed between HPPD and PSII herbicides. The objective of the study was to assess the tolerance of Axant Flex cotton to topramezone alone and in mixture with fluometuron. The experiment was conducted in 2025 at the Milo J. Shult Agricultural Research and Extension Center in Fayetteville, AR, and was arranged as a randomized complete block design with four replications with treatments applied at the 4-leaf stage. Each treatment contained glufosinate (Liberty Ultra at 24 fl oz/A), topramezone (Axant Top at 1 or 1.5 fl oz/A), and fluometuron (Cotoran at 2, 4, 8, or 12 fl oz/A) in combination, with one treatment substituting fluometuron for diuron (Direx at 4 fl oz/A). Visual injury ratings were recorded at 14 and 28 days after treatment (DAT) on a 0-100 scale, with 0 indicating no observed injury and 100 indicating complete mortality. Glufosinate plus topramezone caused no more than 6% injury, but when fluometuron (2 fl oz/A) was added, injury to cotton increased to 18% at 14 DAT. The diuron treatment caused the most cotton injury, with 31% and 23% observed at 14 and 28 DAT, respectively. Overall, the addition of fluometuron to topramezone increased the risk of cotton injury, and as the fluometuron rate increased, so did the observed injury. Additional research is needed to determine whether the topramezone plus fluometuron mixture likewise improves control of problematic weeds such as Palmer amaranth.

**Defining Critical Tissue-Potassium Concentrations for Furrow Irrigated Corn Production.** João H. Stibe Silva, Gerson L. Drescher, Trenton L. Roberts, Jason P Kelley, Alden D. Smartt, Qamar Sarfaraz, Wyatt Rongey, Gabriela L. Mengez, Maria R. do Prado. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Potassium (K) is a critical nutrient for adequate corn (*Zea mays* L.) production, and tissue testing is an essential tool to ensure adequate K nutrition. Despite the important role of K in plant physiological functions, there are no calibrated critical tissue-K concentrations (TKc) for furrow-irrigated corn in Arkansas. This study aimed to define critical TKc to maximize corn grain yield in different growth stages. From 2022 to 2024, twelve single-site-year (SSY) and four long-term (LT) field trials were conducted on silt loam soils differing in soil K availability to assess crop yield and TKc responses to fertilizer-K rates (0–200 lb K<sub>2</sub>O ac<sup>-1</sup>). Plant samples were collected at V6 (whole plant), V10 and V12 (uppermost mature leaf), and VT (ear leaf) to assess TKc, and grain yield was measured at maturity. Across 16 field trials, seven SSY trials, with Low (<61 ppm K) or Very Low (61-90 ppm K) K availability, were responsive to K fertilization ( $P < 0.10$ ). Only one LT trial had a significant yield response ( $P > 0.10$ ) to K fertilization, and no significant yield responses were observed at sites with Medium (91-130 ppm K) and Optimum (131-175 ppm K). Yield increases with K application reached up to 694% and 53% on soils with Very Low and Low soil-test K, respectively, and were negligible on soils with Optimum K availability. The critical TKc to maximize corn yield were 2.9% at V6 ( $R^2 = 0.34$ ), 1.4% at V10 and V12 ( $R^2 = 0.56$  and  $0.38$ , respectively), and 1.5% at VT ( $R^2 = 0.41$ ). These findings underscore the importance of proper K management to maximize corn yield and the potential of tissue testing to monitor K nutritional status and fine-tune K use for profitable farming.

**Phenotypic and Genotypic Analysis for Edamame Breeding.** Chengjun Wu, Rafael Goncalves Marmo, Liliana Florez-Palacios, Andrea Acuna, Derrick Harrison, Daniel Rogers, Andre Tischler, Caio Canella Vieira. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Edamame (vegetable soybean) is a green soybean pod and bean food harvested at the R6 growth stage and valued for its high protein, fiber, and nutrient content. With rising global popularity and increasing U.S. market demand over the past two decades, this study aims to select the elite soybean genotypes as core germplasm collection for vegetable soybean breeding and identify SNP markers potentially associated with edamame appearance quality traits for marker-assisted selection and genomic prediction.

**Evaluation of a nanocellulose-based adjuvant and nozzle type (TTI and AIXR) on herbicide efficacy.** Diego Rodriguez, Juan C. Velasquez, Joseph Batta-Mpouma, Nilda Roma-Burgos. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Off-target movement of herbicides can damage sensitive crops or compromise spray coverage of the desired vegetation. Commercial drift reducing agents (DRA) and foliar retention agents are mostly petroleum-derived organic solvents that can be a threat to human and environmental health. BioGrip EC is a nanocellulose-based adjuvant that has emulsifying and shear-thinning properties that can reduce herbicide drift and volatility. This study aimed to assess the efficacy of glyphosate, glufosinate, dicamba, saflufenacil and topramezone in mixture with Biogrip EC or a commercial DRA on weed control. A field experiment was conducted in a split-split-plot design with herbicide as the whole plot, adjuvant (non-treated, a commercial DRA, and Biogrip EC) as the sub-plot, and nozzle type (TTI, AIXR) as a sub-sub plot. Palmer amaranth (PA), Venice mallow (VM), annual grasses (AG) and overall weed control were visually evaluated at 14 and 21 days after treatment (DAT). The results showed that AIXR nozzle type resulted in greater overall weed control than TTI nozzle for glyphosate, glufosinate and saflufenacil. For all herbicides tested, the highest overall weed control was achieved in mixture with a DRA. Biogrip EC and the commercial DRA were not statistically different in PA and AG control. The maximum level of VM control (97%) was achieved with glufosinate and Biogrip mixture, while mixture with the commercial DRA attained 90% control. These findings suggest that BioGrip EC adjuvant performs equally, or better, than the commercial DRA, and highlight the utility of this nanocellulose-based adjuvant as an environmentally friendly tool to reduce off-site movement of herbicides.

**Evaluation of Long-Term Cover Crop Implementation on Soil Health in Arkansas Soybean Production.** Grant Bennett, Dr. Trenton Roberts, Dr. Kristofor Brye, Dr. Gerson Drescher. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Cover crop implementation and the concept of soil health in Arkansas row-crop production have been of increasing interest to producers in recent years. Previous research has identified management concerns, yield loss, and time as major barriers to widespread cover crop adoption in Arkansas. The objectives of this study were to evaluate the impact of long-term implementation of various cover crops on soil health and soybean yield. Study sites consisted of three University of Arkansas research stations in Kibler (VRS), Colt (PTRS), and Rohwer, AR (RRS). Treatments implemented at each site included winter fallow as a control, five single species cover crops, and two cover crop blends. Baseline samples were collected at the onset of the project in 2017 with subsequent samples collected in the last year of the study in 2023. Soil health was quantified by measuring soil pH, soil organic matter concentration, total carbon, total nitrogen, and soil respiration. Delta values were calculated for each soil health indicator and used to quantify indicator responses to each cover crop treatment. Soybean yield was recorded in 2023, and treatments were compared to the yield of the fallow control. Results showed that cover crops did not affect soybean yield, which could provide potential relief to producers concerned about yield decreases with cover crop adoption. Across sites, cover crops generally improved soil health indicators. Delta values showed that organic matter, carbon, and nitrogen increased at most locations. However, responses varied by site and may have been influenced by irrigation practices.

**Late-Season Weed Species and Densities in Arkansas Rice.** H.M. Houser, J.K. Norsworthy, C.M. Halbrook, N.M. Chandler, M.A. Lombardi, L.T. Barber, and R.C. Scott. Dept. Of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Reproductive weeds at rice maturity not only cause issues for harvest but lead to an increase in weed densities in the years following. Understanding what weeds are commonly left unmanaged is crucial for Arkansas' rice producers' current and future weed management strategies. This survey was conducted to better understand weed species distribution throughout Arkansas rice and gain insight into possible species that are not currently viewed as major concerns. In 2025, statewide sampling was conducted assessing reproductive weeds present within commercial rice production fields. The state was broken into five major regions: Central, Northeast Delta, Southeast Delta, Red River Valley, and River Valley and a total of 76 fields were sampled. Quadrants (2500 ft<sup>2</sup>) in three fields for each county that produced at least 1,200 acres of rice were surveyed. If reproductive weed densities were greater than 25 plants in the original quadrant size, a smaller area of 625 ft<sup>2</sup> was surveyed instead. The three most observed species were weedy rice (*Oryza sativa*), barnyardgrass (*Echinochloa crus-galli*), and sprangletops (*Diplachne* spp.), found in 50%, 42%, and 12% of sampled fields, respectively. Barnyardgrass was found to have the highest average density of 3.02 plants/100 ft<sup>2</sup>, and weedy rice was found at an average density of 1.65 plants/100 ft<sup>2</sup>. Differences in weed densities among regions were not significant. Differences were observed in barnyardgrass, Palmer amaranth (*Amaranthus palmeri*), morningglory (*Ipomoea* spp.), and johnsongrass (*Sorghum halepense*) densities among levee, furrow-irrigated, and zero-grade fields. Among the field types, furrow-irrigated fields showed the highest weed density. All counties that met the sampling criteria were not sampled in the 2025 growing season, but the remaining counties will be surveyed during the 2026 growing season to further evaluate the weed spectrum in Arkansas rice production.

**Simulation of Palmer Amaranth Weed Control Programs for Vyconic Soybean using Corn as a Surrogate Crop.** H.R. Rudolph, J.K. Norsworthy, H. Barber, and L.T. Barber. University of Arkansas Systems Division of Agriculture.

Once commercially available, Vyconic™ soybean will allow producers to incorporate 4-hydroxyphenylpyruvate dioxygenase (HPPD)-inhibiting herbicides, specifically mesotrione, as an additional option for weed control, in addition to the trait enabling glyphosate, glufosinate, 2,4-D, and dicamba. When mixing HPPD herbicides with those that inhibit photosystem II, improved weed control is often realized. Hence, an experiment was conducted in Fayetteville, AR, in 2025 to evaluate the effectiveness of HPPD-based herbicide programs in combination with metribuzin and other herbicides on control a multi-resistant Palmer amaranth population. Vyconic™ soybean was not available for this research; therefore, corn was used as a surrogate crop since all herbicides evaluated would be labeled in both crops. The experiment was established as a randomized complete block design with four replications. Palmer amaranth control was visually rated and densities recorded at 14 and 28 days after the preemergence treatment (14 DAT PRE and 28 DAT PRE) and the postemergence treatment (14 DAT POST and 28 DAT POST). Preemergence treatments consisted of *S*-metolachlor (Dual II Magnum) plus metribuzin (Tricor), or mesotrione (Callisto) plus metribuzin. Both preemergence treatments provided comparable levels of Palmer amaranth control at 14 DAT PRE (averaging 98%) and 28 DAT PRE (averaging 67%). Palmer amaranth counts supported the control data showing an increase in densities from the 14 to 28 DAT PRE, then a decrease in densities at 14 DAT POST. The corn exhibited a high level of tolerance to the herbicides evaluated and the corn canopy development appeared somewhat similar to that of a non-Vyconic soybean grown adjacent to this experiment. While it is imperative that Vyconic soybean be used when testing weed control programs in the crop, it does appear that the herbicide programs evaluated here were effective in controlling a Palmer amaranth population with resistance to at least 9 herbicide sites of action.

**Yield Penalty and Growth Responses of Maize to Delayed Planting in the Mid-South United States.** Maximo Nores Allende<sup>1</sup>, Elvis Elli<sup>1</sup>. <sup>1</sup> Department of Crop, Soil and Environmental Sciences, University of Arkansas, Fayetteville, Arkansas, USA.

Maize production has increased substantially over the past two decades in the Mid-South United States. However, delayed planting can differentially affect grain yield depending on environmental conditions. This study aimed to (i) quantify the yield penalty associated with late planting across diverse environments, and (ii) evaluate the combined effects of planting date and relative maturity on harvest index and total aboveground biomass. High-resolution field experiments were conducted during the 2024 and 2025 growing seasons across five locations in Arkansas using a strip-plot design with three replicates. Planting dates ranged from March 27 to June 4, and hybrids with relative maturities from 90 to 120 days were evaluated. Results showed that maize grain yield decreased by 0.048 t ha<sup>-1</sup> (48 kg ha<sup>-1</sup>) for each day of planting delay, highlighting the strong sensitivity of yield to planting date under Mid-South conditions.

**Screening of Seed Safeners for Enhancing Rice Tolerance to Group 15 Herbicides.** R.C. Baxley, J.K. Norsworthy, L.D. Pierce, W.T. Herrman, M.A. Lombardi, R.C. Scott. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

The sustainability of profitable rice production in the state of Arkansas has been impeded by the ongoing evolution of herbicide resistance in problematic species, such as barnyardgrass [*Echinochloa crus-galli* (L.) Beauv.] and weedy rice (*Oryza sativa* L.). Conventional herbicide options for rice that are currently available continue to decline in control of such key weed species, thus necessitating the implementation of new herbicide sites of action (SOA's) in chemical programs for rice. In the summer of 2025, a randomized complete block was initiated at the Milo J. Shult Agricultural Research and Extension Center, near Fayetteville, Arkansas, to evaluate the crop safety of herbicide safener seed treatments to protect rice against injury from group 15 herbicides. 'Ozark' rice seed was treated with one of seven safeners and compared to the rice that received no seed treatment. Two group 15 herbicides, microencapsulated acetochlor and S-metolachlor, were evaluated at preemergence (PRE) and delayed-preemergence (DPRE) application timings to determine whether any seed treatments could provide adequate tolerance to the herbicides. Overall crop injury was assessed at 7, 14, 21, and 28 days after emergence (DAE). Crop densities were collected from two one-meter measurements of row per plot. At 21 DAE, rice that received either fenclorim or benoxacor exhibited a reduction of phytotoxicity (38% & 19%) that was significant when compared to rice without a seed treatment (67%) following the PRE application of microencapsulated acetochlor. The extent of phytotoxicity differed between the two herbicides and between the PRE and DPRE timings. The PRE S-metolachlor applications exhibited undesirable injury to rice, with no significant differences, let alone successful safening, identified among seed treatments. Additionally, there was no safening observed among seed treatments when S-metolachlor was applied DPRE. Nonetheless, these results at least indicate the potential of seed safeners to reduce herbicide injury to rice following PRE applications of microencapsulated acetochlor.

**End-of-Season Corn Stalk Analysis for Improving Potassium and Nitrogen Fertilizer Management.** Gabriela Andrade Leite Mengez<sup>1</sup>, Gerson L. Drescher<sup>1</sup>, Trenton L. Roberts<sup>1</sup>, Alden D. Smartt<sup>1</sup>, Geraldinn Cortez<sup>1</sup>, Joao H. Stibe Silva<sup>1</sup>, Jason Kelley<sup>1</sup>, Michael Popp<sup>2</sup>. <sup>1</sup>Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR. <sup>2</sup>Dept. of Agricultural Economics and Agribusiness, University of Arkansas, Fayetteville, AR.

Optimizing corn (*Zea mays* L.) yield requires precise nutrient management, and tissue analysis serves as an important tool for enhancing fertilizer recommendation accuracy. While the corn stalk nitrate test (CSNT) is well established for assessing nitrogen (N) management, a comparable diagnostic approach for potassium (K) nutrition still needs to be developed. This study aimed to define end-of-season critical corn stalk-K concentration to monitor K management in furrow-irrigated corn production in Arkansas. Eight field trials were conducted during 2023 and 2024 on silt loam soils with varying K availability (Very Low, Low, and Optimum) to evaluate grain yield responses to fertilizer-K rates (0, 40, 80, 120, 160, and 200 lb K<sub>2</sub>O/ac). Corn stalk sections (15–35 cm above the soil surface) were collected at physiological maturity and analyzed for K and NO<sub>3</sub>-N concentrations following extraction with deionized water and CaCl<sub>2</sub> solutions. Stalk-K concentrations increased consistently with increased fertilizer-K application rate. Deionized water proved to be effective for quantifying both K and NO<sub>3</sub>-N, whereas CaCl<sub>2</sub> tended to overestimate K and showed weaker correlation with grain yield ( $R^2 = 0.17$ ,  $P < 0.001$ ), though it remained suitable for nitrate determination. The moderate to strong relationship between water-extractable stalk-K and relative grain yield ( $R^2 = 0.54$ ,  $P < 0.001$ ) supported the establishment of diagnostic thresholds for K sufficiency, defined as deficient (<3,353 mg K kg<sup>-1</sup>), optimum (3,353–7,142 mg K kg<sup>-1</sup>), and excessive (>7,142 mg K kg<sup>-1</sup>). These findings demonstrate that end-of-season corn stalk analysis can serve as a practical tool for assessing both K and N nutrition, promoting more precise fertilizer management and improving farming profitability.

**Clethodim Tank Mixtures for Control of Barnyardgrass and Weedy Rice in HT3 and ROXY rice.** Noah Chandler, Jason K. Norsworthy, Robert Scott, Chad Shelton. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Arkansas rice production faces many challenges, namely, herbicide-resistant weeds. According to Arkansas growers and industry workers, two of the most problematic rice weeds are barnyardgrass (*Echinochloa crus-galli*) and weedy rice (*Oryza sativa*). Albaugh LLC. and Cibus Inc. propose a potential solution to these problematic weeds by releasing the HT3 rice (clethodim resistance) trait, combined with the ROXY rice (oxyfluorfen resistance). Two studies were conducted in 2025 to evaluate clethodim and oxyfluorfen as tank mixtures for control of barnyardgrass and weedy rice. The studies were conducted in Fayetteville and near Colt, AR, as a randomized complete block design with four replications. The treatments evaluated were clethodim alone, two rates of oxyfluorfen alone, and clethodim mixed with both oxyfluorfen rates. The treatments were applied to 3-leaf weedy rice and barnyardgrass. Visual control ratings were taken relative to the non-treated at 14, 21, and 28 days after treatment, along with above-ground biomass at the last rating. Colby's method ( $E = A+B * (A-B)/100$ ) was used to calculate an expected response (E) for each mixture and to deem it antagonistic, synergistic, or additive by comparing E and the observed response. Improved weedy rice control was achieved with both tank mixtures, with the Colt location (quizalofop-resistant weedy rice) and Fayetteville location (quizalofop-susceptible weedy rice) showing synergy when clethodim was mixed with the high rate of oxyfluorfen. At both locations and across all treatments, effective barnyardgrass control was achieved with the mixtures. These results indicate that clethodim plus oxyfluorfen can be a good control option for barnyardgrass and weedy rice, including quizalofop-resistant populations.

**Early Identification of High-Yielding and Stable Soybean Genotypes.** Rafael Goncalves Marmo<sup>1</sup>, Adrea Acuna<sup>1</sup>, Liliana Florez-Palacios<sup>1</sup>, Derrick Harrison<sup>1</sup>, Chegjun Wu<sup>1</sup>, Daniel Rogers<sup>1</sup>, Emanuel Ferrari do Nascimento<sup>1</sup>, Qijian Song<sup>2</sup>, Caio Canella Vieira<sup>1</sup>. <sup>1</sup>Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas Fayetteville, AR. <sup>2</sup>Soybean Genomics and Improvement Laboratory, Beltsville Agricultural Research Center, USDA-ARS, MD.

Improving grain yield is the primary goal of most soybean breeding programs. During early-stage yield trials, breeders often evaluate thousands of genotypes; however, limited seed availability constrains the number of tested environments and replications, reducing selection accuracy. Thus, developing genomic prediction models to identify high-yielding and stable genotypes early in the breeding cycle is critical. In this study, 1,382 genotypes ranging from maturity groups III to V were evaluated for grain yield across six environments in 2023 and 2024. Best Linear Unbiased Estimators (BLUES) were calculated for each year-location combination. A Modified Selection Index (MSI) was calculated as the average yield deviation from the checks' mean across tested environments, with zero serving as the baseline. Genotypes with  $MSI \geq -5$  were classified as high-yielding, while those with  $MSI < -5$  were classified as low-yielding. Two classification-based genomic prediction models, Generalized Linear Model via Elastic Net Regularization (GLMNet) and Random Forest (RF), were developed using the SoySNP3K BeadChip markers as predictors and yield classes as the response variables. Overall, RF achieved the most balanced classification across yield classes, outperforming GLMNet in balanced accuracy (0.78 vs. 0.76), F1-score (0.70 vs. 0.68), and negative predictive value (0.86 vs. 0.84). These results suggest that combining MSI with classification-based genomic prediction may improve the efficiency of resource allocation in the early stages of soybean breeding by prioritizing testing efforts in high-yielding materials.

**Long-Term Effects of Cover Cropping and Potassium Fertilization on Soil Test Results and Crop Yield.** João H. Stibe Silva, Gerson L. Drescher, Alden D. Smart, Natan A. Slaton, Trenton L. Roberts, Qamar Sarfaraz, Gabriela L. Mengez, Maria R. do Prado. Department of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Cover crops (CC) can influence potassium (K) availability and crop yield by affecting nutrient cycling. This study evaluated the long-term effects of CC and K fertilization on cotton (*Gossypium hirsutum* L.) yield and soil-test-K (STK). Two field-scale experiments were established in 2017 on silt loam soils at Lon Mann Cotton Research Station (LMCRS) and Rohwer Research Station (RRS) to assess how fertilizer-K rates (0, 60, 120, and 180 lb K<sub>2</sub>O/ac) and winter CC [cereal rye (*Secale cereale* L.) + hairy vetch (*Vicia villosa*)] impact crop yield and STK in a corn (*Zea mays* L.)-soybean (*Glycine max* L. Merr.)-cotton rotation. Soil samples (0 to 6-inch depth) were collected after CC planting (Fall) and before termination (Spring) to measure Mehlich-3 extractable K. Cotton was grown in 2024, and yield was measured at maturity. Initial STK levels were 110 ppm K (Medium) at LMCRS and 175 ppm K (Optimum) at RRS. Fertilization of K significantly affected STK, which declined over time in the no K-control, reaching 36 and 61 ppm at LMCRS and RRS, respectively, after 90 months of trial establishment. A moderate fertilization of 60 lb K<sub>2</sub>O/ac maintained STK near 100 ppm K, matching crop removal. Higher K rates of 120 and 180 lb K<sub>2</sub>O/ac increased STK up to 150 and 200 ppm, respectively, after 50 months at LMCRS. Seedcotton yield increased significantly only at LMCRS, for all fertilizer-K rates compared to the no-K control, reaching up to 137 and 18% in winter fallow and CC, respectively. Our results show that adequate K management is key to building or maintaining STK, impacting long-term crop yield response, emphasizing the importance of site-specific K management to sustain productivity.

**Tissue Sampling as a tool for management of Nitrogen, Phosphorus, and Potassium in Rice.** T.M. Smith, J.T. Hardke, T.L. Roberts. Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR.

Arkansas produced 49.8% of the United States (U.S.) rice (*Oryza sativa* (L.) crop in 2024 and was responsible for 1.284 million acres in 2025. Fertilizer and nutrient management rank first as the greatest annual expense for Arkansas rice growers. Nitrogen (N), phosphorus (P), and potassium (K) are the three most important nutrients involved in rice growth and development. Tissue sampling serves as a potential tool to provide information about plant nutrient concentrations to maximize nutrient management and profitability for Arkansas rice growers. More information is needed to validate critical plant tissue concentrations at which additional fertilizer inputs may be warranted to maximize rice production and profitability. Additionally, the window of opportunity for nutrient application to make meaningful impacts on rice yield needs to be defined for each of these nutrients. Trials were conducted in 2024 and 2025 at the Rice Research and Extension Center near Stuttgart, the Pine Tree Research Station near Colt, and the Northeast Research and Extension Center near Keiser. A randomized complete block design with split block arrangement was utilized. Treatments included an unfertilized control, a soil test recommended rate, and weekly timings from panicle initiation (PI) up to PI plus 28 days. Fertilizer sources utilized urea (46-0-0), triple super phosphate (TSP; 0-46-0) for P, and muriate of potash (0-0-60) for K applied at rates equivalent to 100lbs product per acre. There were no significant differences among treatments of P and K at different application timings for nutrient concentration or yield. For N nutrient concentration, across all locations the soil test recommended rate was not significantly different than the unfertilized control. Significant differences were observed for PI+14 and PI+21 treatment timings compared to the unfertilized control. Significant yield increases were observed for N at PI+7 and PI+14 timings.

**Evaluating the Efficacy of Insecticide Seed Treatments, In-furrow Insecticide Applications, and Foliar Insecticide Applications for control of Thrips in Cotton.** B. Miller<sup>2</sup>, B.C. Thrash<sup>3</sup>, Bateman, N. R.<sup>4</sup>, W.A. Plummer<sup>3</sup>, S.G. Felts<sup>4</sup>, T. Davis<sup>3</sup>, W. A. Fletcher<sup>2</sup>, T.M. Smith<sup>1</sup>, P.G. Maris<sup>2</sup>, A.C. Graves<sup>2</sup>. <sup>1</sup>Department of Crop Soil and Environmental Science, Fayetteville, AR. <sup>2</sup>Department of Entomology and Plant Pathology, Fayetteville, AR. <sup>3</sup>Department of Entomology and Plant Pathology, Lonoke, AR. <sup>4</sup>Department of Entomology and Plant Pathology, Stuttgart, AR.

Tobacco thrips (*Frankliniella fusca*) infest 100% of seedling cotton in Arkansas and are a major pest throughout the mid-southern US. Severe thrips damage can lead to stand loss, delayed maturity, and yield loss. Thrips have become increasingly problematic in recent years due to insecticide resistance, poor seedling vigor, and the use of herbicides that slow cotton growth. Field trials were conducted at the Lon Mann Cotton Research Station in Marianna, Arkansas and the Delta Research and Extension Center in Stoneville, Mississippi in 2023, 2024, and 2025. Treatments are a full factorial with the first factor being seed treatment and the second factor being foliar insecticide application. Seed treatments include an untreated check, gauch (imidacloprid), or gauch plus admire pro (imidacloprid) applied in furrow. Foliar insecticide applications include no insecticide application or intrepid edge (methoxyfenozide + spinetoram) applied at 3 oz/acre. Timings for insecticide application include 2<sup>nd</sup> true leaf, 1<sup>st</sup> and 3<sup>rd</sup> true leaf, or 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup>, true leaf. The objective of this study was to examine the efficacy of insecticide seed treatments and in furrow insecticide treatments in combination with foliar insecticide applications for management of tobacco thrips in cotton. Thrips counts and damage ratings were recorded, along with yield.

**Development of Defoliation Thresholds in Hybrid and Pureline Rice Cultivars.** H. Newkirk<sup>1</sup>, Bateman, N. R.<sup>2</sup>, B.C. Thrash<sup>3</sup>, W.A. Plummer<sup>3</sup>, S.G. Felts<sup>2</sup>, T. Harris<sup>3</sup>, P.G. Maris<sup>4</sup>, A. Fletcher<sup>4</sup><sup>1</sup>Department of Entomology and Plant Pathology, Stuttgart, AR. <sup>2</sup>Department of Entomology and Plant Pathology, Stuttgart, AR.<sup>3</sup>Department of Entomology and Plant Pathology, Lonoke, AR.<sup>4</sup>Department of Entomology and Plant Pathology, Fayetteville, AR.

Armyworms are commonly found in rice fields across Arkansas and have the capability to cause severe defoliation to rice plants which can lead to significant yield losses. Recent studies have established a damage threshold in pure-line and hybrid rice cultivars for armyworms. However, this threshold is based on a single defoliation event. The current threshold needs to be evaluated against a “continuous” defoliation more similar to what is observed when armyworms infest a field. To address this issue, a study was conducted in 2025 at the Rice Research and Extension Center in Stuttgart, AR to compare the yield loss caused by a one-time defoliation event compared to continuous defoliation. A hybrid (RT 7421 FP) and pureline (Ozark) were planted in April, May, and June to determine plant response and yield loss at the varying defoliation schemes across the rice planting window. The one-time defoliation treatments were mechanically defoliated to 100% foliage destruction. Continuous defoliation plots were mechanically defoliated to 25% at the initiation timing and subsequently defoliated to 25% four and eight days after initial defoliation. Defoliation events were initiated at the two-three leaf, mid-tiller, and greenring growth stages. A difference in yield was observed between the defoliation schemes at the 2-3 leaf growth stage for April planted Ozark. There were no differences between continuous and single defoliation events for the mid-tiller and greenring defoliation timings however, all treatments reduced yield when compared to the untreated check. There were no differences in yield loss between single and multiple defoliation events at any growth stage for RT 7421 FP planted at the early planting date. In the second planting date, the single defoliation event reduced yield to a greater degree than the prolonged defoliation on both the Ozark and the RT 7421 FP cultivars. At the third planting date, there were no differences in yield at any defoliation timing in the Ozark cultivar. Yield differences were observed between the two defoliation forms in the RT 7421 FP cultivar in the third planting date. Continuous defoliation caused greater yield loss in 2-3 leaf rice while greenring rice experienced greater yield loss from the single defoliation event. The results from this study suggest there may be minor differences between the defoliation schemes and that the current thresholds are correct. These studies will continue to be repeated to ensure that our defoliation thresholds in rice are correct to help protect growers from economic losses caused by defoliation events.

**Next Generation Plots: The Future Role of Drones and Robots in Field Research. Dr Jason Davis, Assistant Professor Remote Sensing and Pesticides Application – Extension Specialist,** Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas System Division of Agriculture, Batesville, AR.

Small plot agricultural research trials are the backbone of advancement in plant science, weed science, entomology, and plant pathology. Each of these valuable research units has long demanded hours of manual labor for planting, spraying, and evaluation. We now stand on the cusp of automation technologies set to transform the way we do fieldwork and change how near-future plot work is conducted. This talk explores how software and algorithms, drones, and robotics may handle the mundane in the immediate future, increasing accuracy, slashing labor, and broadening your research impact.