ARKANSAS CORN AND SORGHUM PROMOTION BOARD SPECIAL CALLED MEETING—DAY 1
Zoom Option

Minutes

February 21, 2024
3:00 p.m.

Members Present in Person:	Trent Dabbs, Tommy Young, & Kenny Falwell
Members Present via Zoom:	Jason Felton
Members Absent:	Matt Smith, Matt Gammill, & Jacob Appleberry

Chairman Tommy Young commenced the promotion board meeting at 3:00 p.m. and welcomed all members and guests. Administrator Scott Bray called role and a quorum was established. Chairman Young then provided an overview of the meeting agenda and welcomed the board's newest member, Matt Smith, noting Smith's excitement to begin working with the board.

Chairman Young then opened the floor to Administrator Bray for any Department comments. Administrator Bray and Chairman Young both provided general housekeeping information for the board to have a successful meeting.

Chairman Young then asked if there were any questions and there were none.

Administrator Bray then presented the minutes from the board's special called meeting held on January 30th, 2024.

Chairman Young then asked for a motion to approve the previous meeting minutes.

Moved by Kenny Falwell, seconded by Trent Dabbs.

Motion carried.

Chairman Young then asked Mr. Inoussa Zaki to present the board's expenses and financial reports. **ATTACHMENT 1**

Zaki then presented the board's financial report period that ended January 31st, 2024, stating that the board started the Fiscal Year July 1st, 2023, with $2,483,014 total.

Zaki also mentioned that in gross collections for this same reporting period, the total was $738,221. In treasury charges, there was $22,531 total, or 3.1% of the gross collections.

Zaki stated that the board netted $715,690 through the end of this reporting period. The total expenditures for this reporting period were $25,356.

Zaki also stated that with expenditures at $25,356 and total revenue around $3.2 million, that this leaves the board with $1,881,050 available to fund future projects.

Chairman Young then asked Zaki if that money included the money that has already transferred to the university.

Mr. Zaki answered that the $1.3 million is the total outstanding projects that the board approved that have not yet been dispersed to date. In other words, if the board funds were all dispersed, there would be approximately $1.8 million left.

Chairman Young then asked Dr. Nathan McKinney if the university has $400,000 on account for the board. Dr. McKinney answered that yes, the board has exactly $400,000 on account with them. Chairman Young asked if this amount was included in this $1.8 million figure, and Dr. McKinney felt it did not. Some discussion ensued about this separate interest-baring account that the board gave the university in 2018.

Board member Falwell then asked Dr. McKinney to remind the board what the plan for the $400,000 in the interest-baring account was for and some discussion ensued.

Dr. McKinney explained that this account was essentially a "rainy-day" account that the board can draw from at any time. He also stated that the board permits the university to take the interest drawn from this account to use toward purchasing equipment. Some discussion ensued.

Inoussa continued his financial report, presenting a slide of projections based off historical data from USDA-NASS. **ATTACHMENT 1**

In the current Fiscal Year (Production Year 2023), the board is currently at 48% of the total gross collected, stating that he also expects an additional $300,000 added to these numbers for a total of around $1,070,000.

Zaki presented his last slide report, stating that the internal control compliance assessment audit for 2022/2023 came back clean and compliant for this board, with no reportable findings.

Zaki then concluded his financial report.

Chairman Young then asked for a motion to approve the Department's financial report.

Moved by Kenny Falwell, seconded by Trent Dabbs.

Motion carried.

Chairman Young then opened the floor to Matt Frostic to present the report from the National Corn Growers Association (NCGA). **ATTACHMENT 2**

Before Frostic's presentation, Chairman Young made a point of order to ensure that Matt Frostic continues to provide communication and information to the AR Department of Agriculture staff pertaining to the NCGA board liaison for Arkansas. Frostic agreed that he will get that information and continue dialog with the Department.

Frostic then presented his update from the NCGA. His presentation addressed trade with Mexico, including their resistance to biotech corn measures, saying that this has been a priority for NCGA. He also discussed the importance of free trade markets and building relationships in markets like India and China.

Frostic also addressed the slow progress of the next Farm Bill and mentioned that this bill will take some time to get passed and implemented. He stressed the importance of the farm bill so that there is better stability in the markets.

Chairman Young then asked Frostic a question about regarding the reasoning behind putting mandatory instead of voluntary base acres in the farm bill.

Frostic answered that one side is saying that if you are going to have base acre updates, it must be mandatory otherwise it will not work. He also mentioned that this is a contentious issue and that the upcoming corn congress would include further discussion about this policy.

Chairman Young then said we should look at the whole country before we start voicing opinions on behalf of everyone, especially how it would affect southern states. Jason Felton added that the National Cotton Council was pushing for voluntary base acres.

Frostic then moved on to discuss Ethanol extraction markets, highlighting the importance of the relationship between ethanol and livestock, as well as the potential of ethanol as a fuel for aircraft, known as sustainable aviation fuel (SAF).

Chairman Young then asked Frostic what the NCGA position on the SAF market topic was, and if the industry should be pushing toward this market.

Frostic answered that SAF industry is not in their top priorities, but there are internal discussions ongoing. He agreed that this was the future and that the NCGA and the industry should be fighting for this future market.

Frostic then moved on to discuss the NCGA funding request for FY2024. He discussed the base funding breakdown, also mentioning that that the total funding request from the board for FY2024 is $28,500.

Chairman Young then asked where the board has their action team funding slated to go to and some discussion ensued.

Chairman Young then opened the floor for any board member questions or comments.
Chairman Young then introduced the next report from Ellen Zimmerman with the U.S. Grains Council (USGC). **ATTACHMENT 3**

Zimmerman discussed the USGC's organization, including their budgeting process and structure, key markets and products, and their impact on global trade via their operations. She also addressed the budget breakdown for their funding request, for a funding total of $71,266, which is a 4% increase from the previous year.

She also addressed how U.S. grain and U.S. ethanol were being exported in 2022/2023.

Chairman Young then asked Zimmerman if the U.S. was the number one consumer of ethanol.

Zimmerman said she would get a number on this information and get back to the board.

Zimmerman then addressed the status of DDGs in the U.S., the International Aquaculture Conference, and top corn exports in the U.S. for 2022/2023, with top customers being Mexico and China.

Zimmerman also discussed the USGC's marketing superior performance in India, highlighted the top corn markets as of February 8th, 2024, and spoke about the newer Corn Sustainability Assistance Protocol (CSAP), which helps create records of sustainability.

Trent Dabbs then asked about Mexico's purchasing of corn, asking about the difference between before the free trade dispute versus now.

Zimerman said that there is not a huge difference and said it's not a record-breaking year this year. She mentioned a border closure just before Christmas that was going into Mexico, but there were no significant impact of sales to Mexico, as they are still the number one customer for the year.

Chairman Young then mentioned that the Regional Agriculture Promotion Program (RAPP) was brought about from our state Senator John Boozeman.

Zimmerman then addressed the value of exports of grain in all forms to Arkansas, totaling a value of around $728,700,000 and representing around 4,579 jobs.

Chairman Young then took the opportunity to congratulate Jason Felton on his five (5) years of service to the board of delegates for the USGC and presented a plaque in his name recognizing the honor.

Zimmerman then concluded her presentation.

Chairman Young then introduced Spencer Parkinson with Decision Innovations Solutions (DIS) for his funding request presentation. **ATTACHMENT 4**

Parkinson gave a brief history of their economic research and analysis firm based in Iowa.

Parkinson discussed the DIS process, saying that they partner with clients to conduct research in phases, starting with a discovery phase and continuing through a support and enhancement phase. Parkinson said that this process ensures that research is done on time, on task and on budget.

Parkinson then discussed the first DIS proposal before the board, providing background on feed flow analysis for Arkansas's critical livestock and poultry industries. He also addressed some of the core elements of the proposed research, including feed ingredient analysis and determining potential gaps in feed supply. This proposed core budget for this first proposal is $32,850, with any additional scenarios around $6,975 each.

Trent Dabbs then asked Parkinson what "45Z" and "45Q" are as part of this first proposal. David Miller with DIS then answered that these are tax credits.

David Miller then presented the second proposal from DIS: "Historical Livestock and Poultry Feed Demand in Arkansas; Economic Impact Study." Miller presented the background on the proposal and addressed some of the core elements of this proposed research study, for a proposed funding amount of $29,925. This proposed research project also included an optional component of $3,825 per economic impact study from increased livestock/poultry production.

The third proposal from DIS looked at Carbon Intensity implications for Arkansas Commodities. The core elements of this research included calculating the CI scores of Arkansas corn and grain sorghum, as well as to estimate the CI score of the major feed ingredients used in Arkansas broiler and hog production. This proposed project funding amount was $19,575. There was an optional component of expansion of the set of livestock and poultry products for which the feed CI scores will be calculated, for $11,250.

Chairman Young then asked the board members if there were any questions on the presentation and there were none.

Chairman Young then asked Carson Horn with the Communications Group to give their presentation. **ATTACHMENT 5**

Horn began his presentation regarding the AR Corn & Grain Sorghum Board's website. Horn began his presentation with a situation analysis, mentioning that an audit of the board's website indicated that the website was performing below acceptable industry standards. He addressed some of the challenges associated with the board's website.

Horn also addressed some of the deliverables that the Communications Group have worked on, including content refreshing, essential website updates, and routine website maintenance. He also provided a Summary of Updates including some general routine updates, performance insights, and other updates. He also addressed the website traffic and average user duration time.

Horn concluded his presentation with recommendations for the board to continue to monitor and track website performance, and asked the board if they had any questions.

Chairman Young then asked if the board's website could be somehow linked to the AR Department of Agriculture's main webpage.

Amy Lyman, Communications Director for the AR Department of Agriculture, then mentioned that the board's website is currently already linked to the Department's website.

Shayla Crowder with the Communications Group then presented three different proposal recommendations for the board involving organic website maintenance and social media use.

Chairman Young then made a comment regarding how he wants to properly use the board's funds so long that there is no duplication of what the university is doing on their website versus what the Department is doing on their website.

Chairman Young then gave the floor to Dr. McKinney, who shared an exciting development from one of the university research labs that could potentially generate royalties for the board, while emphasizing the need for confidentiality until the patent is filed.

Chairman Young then gave his photograph slideshow presentation on his mission's trip with the USGC to Vietnam and Thailand.

He then asked the board if there were any questions and there were none.

Chairman Young then asked for a motion to recess until the next morning.

Moved by Kenny Falwell, seconded by Jason Felton.

Meeting recessed.

Tommy Young, Chairman

ARKANSAS CORN AND SORGHUM PROMOTION BOARD MEETING—DAY 2
Zoom Option

Minutes

February 22, 2024
8:30 a.m.

Members Present in Person:	Trent Dabbs, Tommy Young, Kenny Falwell, & Jason Felton
Members Present via Zoom:	None
Members Absent:	Matt Smith, Matt Gammill, & Jacob Appleberry

Chairman Tommy Young commenced the second day of the AR Corn & Grain Sorghum Promotion Board meeting at 8:38 a.m. and welcomed all members and guests. Administrator Scott Bray confirmed that a quorum was established. Chairman Young quickly recapped the previous day's meeting items and mentioned he was ready to begin hearing the research project proposals.

Chairman Young then addressed some general housekeeping rules to ensure a successful and productive meeting.

Chairman Young then introduced Dr. Nathan McKinney from the UofA who provided more general housekeeping information regarding the University research proposal presentations.

Chairman Young then introduced Dr. Jason Kelley from the UofA who provided the introduction to the University Reports and Proposals. Dr. Kelley gave a short presentation on the current state of corn and grain sorghum production in Arkansas. For corn he mentioned that there was a 183-bushel average in 2023, which is slightly up compared to the 2022 season. Dr. Kelley mentioned that 2023 was a good overall corn year, with about 830,000 acres harvested from about 850,000 acres planted.

Dr. Kelley also mentioned that grain sorghum acres had about 12,000 acres planted in Arkansas in 2023. He gave a short overview of other crop market prices compared to corn, saying that the corn-soybean ratio is slightly favoring soybeans currently, but not by as much as you would think.

Chairman Young then asked a few follow up questions including about how the University is feeling about the upcoming season. Dr. Kelley answered that they are excited to get the season started at UofA, maybe a little more excited than the producers. Some discussion ensued.

Member Falwell then asked Dr. Kelley if they are making any recommendations that may be different than from what they as a University may have recommended in the past. Dr. Kelley said that they are not making any changes to recommendations, referencing some seed and economic data. Some discussion ensued.

Chairman Young then asked if there were any further questions from the presenter and there were none.

Chairman Young then asked Dr. McKinney if he had any opening comments before beginning the research project proposal presentations. Some discussion ensued, including how corn bushel averages have increased in the state over time.

Dr. McKinney then introduced the first ***new*** research project proposal before the board, reminding presenters that they have eight (8) minutes to give their presentations.

The first new research project proposal entitled, "Exploring Plasma-Activated Water for Enhanced biocontrol of Aflatoxins and diseases in corn plants" was then presented before the board, requesting a proposed funding amount of $63,195. **ATTACHMENT 6, PAGE 5**

Board members asked several questions and discussion ensued.

Dr. McKinney then introduced the next new research project proposal entitled, "Economic Analysis of Corn and Grain Sorghum Production and Marketing Practices," which was presented before the board, requesting a proposed funding amount of $5,777. **ATTACHMENT 6, PAGE 9**

Chairman Young reminded the board that this is research that Dr. Deaton conducts every year, and asked Dr. Deaton where corn growers would be able to find the 2022/2023 economic information published from previous season projects. Dr. Deaton answered that this information is posted on the AR Corn & Grain Sorghum Board's website, also mentioning that he plans on publishing an entire historical database of this project information that goes all the way back to the 1980s.

Dr. McKinney also mentioned that this information is published annually within the UofA's research study series.

Chairman Young asked if there were any questions and there were none.

Dr. McKinney then introduced the next new research project proposal entitled, "Corn Yield Forecast System for the US Mid-South," which was presented before the board, requesting a proposed funding amount of $56,652. **ATTACHMENT 6, PAGE 13**

Board members asked several questions and discussed ensued.

Dr. McKinney then introduced the next new research project proposal entitled, "University of Arkansas System Division of Agriculture Feed Kits," which was presented before the board, for a proposed funding amount of $2,500. **ATTACHMENT 6, PAGE 17.** Presenter Allison Harman passed around two (2) example feed kits for the board members to see as part of their presentation.

Board members asked several questions and some discussion ensued.

Dr. McKinney then introduced the next new research project proposal entitled, "Use of Corn Protein Concentrate in Plant-Based Diets for Largemouth Bass to Optimize Production Sustainability and Profitability," which was presented before the board, requesting a proposed funding amount of $32,741. **ATTACHMENT 6, PAGE 21**

Board members asked several questions and discussion ensued. Chairman Young then reminded the board that the purpose of this board is to fund projects that would benefit Arkansas and national corn producers, asking the presenter, Dr. Lochmann, with whom this information would be released or shared with. Dr. Lochmann answered that this data and information would be provided to feed producers. Chairman Young also asked if Dr. Lochmann would consider expanding the research project to include other species of fish, and Dr. Lochmann said yes this would be possible in future research project years. Dr. Lochmann also said they would entertain any proposed research project changes that the board might have for their project.

Chairman Young asked if there were any further questions or comments and there were none.

Dr. McKinney then introduced the next new research project proposal entitled, "Remote sensing-based mid-season corn nitrogen fertilizer rate recommendations and web-tool extension," which was presented before the board, requesting a proposed funding amount of $56,000. **ATTACHMENT 6, PAGE 25**

Board members asked several questions and some discussion ensued.

Dr. McKinney then introduced the next new research project proposal entitled, "Generating a high-value wax material from sorghum bran using an innovate green approach," which was presented before the board, requesting a proposed funding amount of $42,761. **ATTACHMENT 6, PAGE 45**

Board members asked several questions and discussion ensued. Chairman Young asked the AR Department of Agriculture's Chief Financial Officer, Inoussa Zaki, what the revenue for grain sorghum production in 2022/2023 was. Zaki answered that it was $5,538 for 2022 season. He also answered that so far in 2023, that were at $254,000 in revenue, while Dr. Kelley mentioned that he suspected the number to be approximately around $8,000 in 2023 based off acres and yield data.

Chairman Young then had a request for Administrator Bray, requesting that the AR Department of Agriculture to investigate the procedure to submit a proposal with the National Sorghum Checkoff Program.

Chairman Young then called on Tyler Oxner from the Arkansas Farm Bureau to further explain this process with the National Sorghum Checkoff Program. Oxner mentioned that they do not pay for proposals upfront but will reimburse a specific amount on the backend.

Dr. McKinney then mentioned that he does send those reports to the National Sorghum Checkoff Program. Member Felton asked one more question about applying the high-value wax on things like blackberries and strawberries, and further discussion ensued.

Chairman Young then asked if there were any questions and there were none.

Dr. McKinney then introduced the next new research project proposal entitled, "Utilizing Plasma Technology to Inhibit Tannin Effects in Grain Sorghum for Enhanced digestibility and protein quality," which was presented before the board, requesting a proposed funding amount of $43,101. **ATTACHMENT 6, PAGE 29**

Board members asked several questions and discussion ensued.

Dr. McKinney then introduced the next new research project proposal entitled, "Improving Nitrogen Management for Arkansas Corn Production," which was presented before the board, requesting a proposed funding amount of $78,547. **ATTACHMENT 6, PAGE 33**

Chairman Young then asked presenter if they could put a knife comparison in their proposal to see if there would be any benefit compared to other methods. The presenter answered that their goal is to add that comparison, also adding that they are unfortunately limited where they can do the knifing, but they will be adding it in the future.

Board members asked several questions, and some discussion ensued.

Dr. McKinney then introduced the next new research project proposal entitled, "Determining disease resistance and susceptibility of corn and grain sorghum hybrids," which was presented before the board, requesting a proposed funding amount of $40,000. **ATTACHMENT 6, PAGE 37**

The presenter asked the board members if there were any questions about the proposal and there were none.

The presenter then proceeded to their next new research project proposal presentation entitled, "Developing a satellite-based field scouting tool for corn," which was presented before the board, requesting a proposed funding amount of $15,000. **ATTACHMENT 6, PAGE 41**

Chairman Young asked the board members if there were any questions about the two proposals from Dr. Spurlock. Members asked several questions and some discussion ensued.

Dr. McKinney then introduced the next new research project proposal entitled, "Development and verification of a stand counting application using drone imagery for research and production decision support," which was presented before the board, requesting a proposed funding amount of $19,660. **ATTACHMENT 6, PAGE 49**

Chairman Young asked if there were any questions and there were none.

This presentation concluded the ***new*** research project proposals presented before the board. All other projects presented before the board are considered renewal or continuation projects.

Chairman Young then called for a quick break at 11:08 a.m.

Meeting called back to order at 11:18 a.m.

The next series of presentations were considered ***renewal*** or ***continuation*** research project proposals before the board.

The first ***agronomic***-related continuation research project proposal entitled, "Optimizing Plant Population and Nitrogen Rate in Corn," was presented before the board, requesting a proposed funding amount of $34,000. **ATTACHMENT 6, PAGE 53**

Chairman Young asked if there were any questions and there were none.

Dr. McKinney then introduced the next agronomic-related continuation research project proposal entitled, "Cover Crops in Corn Rotations—What works and What Doesn't?," which was presented before the board, requesting a proposed funding amount of $39,729. **ATTACHMENT 6, PAGE 57**

Chairman Young asked if there were any questions and there were none.

Dr. McKinney then introduced the first ***diseases***-related continuation research project proposal entitled, "Towards a comprehensive aflatoxin solution: Creating and integrating novel aflatoxin control resources for an effective, sustainable management strategy," which was presented before the board, requesting a proposed funding amount of $45,000. **ATTACHMENT 6, PAGE 61**

Chairman Young asked if there were any questions and there were none.

Dr. McKinney then introduced the next diseases-related continuation research project proposal entitled, "Assess Management Options for Corn Nematodes in Arkansas," which was presented before the board, requesting a proposed funding amount of $55,401. **ATTACHMENT 6, PAGE 65**

Some discussion ensued regarding products for corn nematodes. Chairman Young asked if there were any further questions and there were none.

Dr. McKinney then the first ***fertility***-related continuation research project proposal entitled, "Fine-tuning Potassium Recommendations and Investigating Intensive Tissue Analysis for Sustainable Corn Production," which was presented before the board, requesting a proposed funding amount of $56,395. **ATTACHMENT 6, PAGE 74**

Chairman Young asked if there were any questions and there were none.

Dr. McKinney then introduced the first ***insect***-related continuation research project proposal entitled, "Assessing Susceptibility of Insect Pests of Corn in Storage to Selected Insecticides," which was presented before the board, requesting a proposed funding amount of $40,891. **ATTACHMENT 6, PAGE 78**

Some discussion about the project ensued. Chairman Young asked if there were any questions and there were none.

Dr. McKinney then introduced the first ***irrigation***-related continuation research project proposal entitled, "Improving Irrigation Technology for Corn Production in Arkansas," which was presented before the board, requesting a proposed funding amount of $185,280. **ATTACHMENT 6, PAGE 84**

The presenter then immediately went into their next irrigation-related continuation research project presentation entitled, "The Arkansas Irrigation Yield Contest," which was presented before the board, requesting a proposed funding amount of $10,000. **ATTACHMENT 6, PAGE 83**

Members asked several questions from the presenter and some discussion ensued.

Chairman Young then took time to officially honor retired AR Corn & Grain Sorghum Board members with a plaque, officially recognizing Keith Wolverton, David Gammill, & John Caroll for their years of service to this great board. Chairman Young shared kind words and thanked the members for their contributions to the corn and sorghum grain industries in Arkansas.

Chairman Young then called for a lunch break at 12:05 p.m.

The meeting resumed at 12:35 p.m.

Dr. McKinney then introduced the first ***miscellaneous*** continuation research project proposal entitled, "Arkansas Discovery Farms," which was presented before the board, requesting a proposed funding amount of $5,000. **ATTACHMENT 6, PAGE 88**

Chairman Young asked if there were any questions and there were none.

The next miscellaneous continuation research project proposal entitled, "Arkansas Corn & Grain Sorghum Research Studies Series, an annual report and archival system for all Board-funded research," was presented to the board, requesting a proposed funding amount of $4,667. **ATTACHMENT 6, PAGE 91**

Chairman Young asked if there were any questions and there were none.

Dr. McKinney then introduced the next miscellaneous continuation research project proposal entitled, "Use of gossypol to inhibit reproduction in domestic hogs as a model for feral hog

control," which was presented before the board, requesting a proposed funding amount of $60,016. **ATTACHMENT 6, PAGE 95**

Chairman Young asked if there were any questions and there were none.

Dr. McKinney then introduced the next miscellaneous continuation project proposal entitled, "Arkansas Future Ag Leaders Tour," which was presented before the board, requesting a proposed funding amount of $5,000. **ATTACHMENT 6, PAGE 99**

Chairman Young asked the presenter if Arkansas students in this program get preference, and the presenter confirmed that they do, also mentioning they have never turned anyone away.

Chairman Young then asked if there were any further questions and there were none.

Dr. McKinney then introduced the next miscellaneous continuation research project proposal entitled, "Performance Crop Insurance as a risk management tool for corn and grain sorghum producers in Arkansas," which was presented before the board, requesting a proposed funding amount of $29,987. **ATTACHMENT 6, PAGE 103**

Discussion ensued. Chairman Young then asked if there were any questions and there were none.

Dr. McKinney then introduced the first ***economic***-related continuation research project proposal entitled, "Corn and grain sorghum enterprise budgets and production economic analysis," which was presented before the board, requesting a proposed funding amount of $10,000. **ATTACHMENT 6, PAGE 69**

Discussion ensued. Chairman Young asked if there were any questions and there were none.

Dr. McKinney then introduced the first ***verification***-related continuation research project proposal entitled, "Corn and Grain Sorghum Research Verification Program," which was presented before the board, requesting a proposed funding amount of $130,000. **ATTACHMENT 6, PAGE 107**

Chairman Young asked if there were any questions and there were none.

Dr. McKinney then introduced the first ***weed control***-related continuation research project proposal entitled, "Evaluation of new herbicides, premixes, programs, and application methods for improved control of problematic weeds," which was presented before the board, requesting a proposed funding amount of $87,293. **ATTACHMENT 6, PAGE 111**

Members asked a few questions from the presenter and some discussion ensued.

This concluded the renewal or continuation research project proposal presentations.

Chairman Young then launched into a discussion about the board potentially funding a $49,900 neon sign that would sit out front of the AR Corn & Grain Sorghum Producers Building in Jackson County. Chairman Young felt this project was especially impactful because of the amount of traffic that travels the highway where the neon sign would exist.

Chairman Young then introduced Dr. McKinney for a few general announcements from the UofA regarding final project completion reports to the board. Dr. McKinney then thanked all the presenters who made time to travel down to the department to present before the board.

The Chairman then kindly asked the presenters to leave the room as the board launched into discussion and determinations of funding research and promotion projects.

Chairman Young then asked Administrator Bray if he had received any report or communication from Deane Robinson Seed Company. Administrator Bray answered in the negative. Chairman Young then asked Tyler Oxner of Farm Bureau if any report or communication was sent to him from the company, and he answered in the negative.

Chairman Young then asked the board for a motion to prevent further funding to Deane Robinson Seed Company until a member of their company presents a report to their board.

Jason Felton moved, Seconded by Falwell.

Motion carried.

Chairman Young then quickly applauded the Department of Agriculture staff for their hard work on presenting this board meeting.

Chairman Young then began discussion surrounding the board's participation at the Commodity Classic Conference in Houston, TX.

Chairman Young then gave the floor to Member Kenny Falwell for his report on the National Corn Growers Association ("NCGA") and Corn Congress. Member Falwell gave a quick synopsis about the NCGA and this board's involvement with the organization at the national level.

Chairman Young then asked if there were any issues from Arkansas that needed to be brought forth at the NCGA Corn Congress by Member Falwell.

Member Falwell then mentioned that he as Arkansas delegate to Corn Congress plans on discussing the mandatory base acreage changes proposed by midwestern states, which Member Falwell says is not good for rice farmers/producers in Arkansas.

Chairman Young then proceeded to the next agenda item to discuss the board's determination of funding projects.

Chairman Young had a question for Dr. McKinney regarding inflated proposed prices of funding projects. The board requested some clarification from the UofA on how the inflated prices of research project proposals were being handled, and some discussion ensued.

Dr. McKinney clarified that the UofA investigators send him the research project proposals, showing him what exactly they are going to do and how much it will cost them to do it, on an annual basis, including for the renewal projects.

Dr. McKinney also mentioned that UofA has unspent funds around approximately $159,000 as of 2/22/2024 but feels as though the board can expect a $100,000 credit in unspent funds by the end of the fiscal year.

Chairman Young then asked the AR Department of Agriculture's CFO Inoussa Zaki to total the amount to fund existing continuation projects. Zaki answered that this total was $768,556, which is $9,542 more than the previous year.

Chairman Young then asked Zaki to total the new proposal projects amount. Zaki answered that this total amount would be $495,934.

Chairman Young then asked Zaki what the grand total would be if the board funded all the existing and new projects. Zaki answered that this total amount would be $1,224,490.

Chairman Young then asked Zaki what the board's total available funding for future projects. Zaki answered that the total amount was $1,881,050.42.

Chairman Young then asked Member Dabbs how much reserve the board usually retains. Member Dabbs answered that it was usually around $750,000.

This means that if all projects presented were funded, the board would have approximately $656,560.42 in reserve for future projects.

Chairman Young then addressed the proposed promotion projects, referencing the department's excel spreadsheet, and instructing members to speak up if they object to any potential funding for a project they discuss.

The board decided to fund the NCGA for $28,500.

The board decided to fund the US Grains Council for $71,266.

The board decided to fund the US Grain Council's Export Exchange for $15,000.

Chairman Young then asked the board for a motion to not fund the promotion projects from Decision Innovation Solutions.

Moved by Kenny Falwell, seconded by Jason Felton.

Motion carried.

Chairman Young then began discussion regarding The Communications Group proposals. Some discussion about the board's website use ensued, including from the AR Department of Agriculture's Director of Marketing & Communications, Amy Lyman.

Chairman Young then proposed that they only pay for the organic website plan proposal from The Communications Group for $8,000, asking for a motion from board members.

Moved by Kenny Falwell, seconded by Trent Dabbs.

Motion carried.

Chairman Young then asked for a motion to approve the $49,900 neon sign promotion project to be installed at the Jackson County Extension Center for the AR Corn and Grain Sorghum Producers Building.

Discussion ensued.

Moved by Kenny Falwell, Jason Felton seconded.

Motion carried.

Chairman Young then requested an available funds update from Zaki, and discussion ensued.

Zaki informed the board that there was now $189,828.42 available to fund future projects, maintaining the board's $750,000 reserve. Zaki also told the board that they are forecasted to collect another $300,000.

Chairman Young then proceeded to discuss the new research project proposal entitled, "Exploring Plasma-Activated Water for Enhanced Biocontrol of Aflatoxins and Diseases in Corn Plants." Some discussion about this project ensued. The board decided to shelve this project.

Chairman Young then proceeded to discuss the new research project proposal entitled, "Economic Analysis of Corn and Grain Sorghum Production and Marketing Practices," mentioning that this is a project that the board funds every year. The board decided to fund this project for $5,777, adding it to their list of funded projects.

The board then proceed to discuss the new research project proposal entitled, "Corn Yield Forecast System for the US Mid-South." The board decided to not fund this project.

Chairman Young then proceeded to discuss the research project proposal entitled, "University of Arkansas System Division of Agriculture Feed Kits." The board decided to fund this project for $2,500, adding it to their list of funded projects.

Chairman Young then proceeded to discuss the research project proposal entitled, "Use of Corn Protein Concentrate in Plant-Based Diets for Largemouth Bass to Optimize Production Sustainability and Profitability." The board discussed that they would like to add different species to this research, proposing to fund the project for $50,000. The board also mentioned that they may call another meeting with the presenter to discuss what the board would like to see as part of their research project.

Chairman Young then proceeded to discuss the research project proposal entitled, "Remote sensing-based mid-season corn nitrogen fertilizer rate recommendations and web-tool extension." The board decided to fund this project for $56,000, adding it to their list of funded projects.

Chairman Young then proceeded to discuss the research project proposal entitled, "Utilizing Plasma Technology to Inhibit Tannin Effects in Grain Sorghum for Enhanced Digestibility and Protein Quality." The board decided not to fund this project.

Chairman Young then proceeded to discuss the research project proposal entitled, "Improving Nitrogen Management for Arkansas Corn Production." Some discussion about this project ensued. The board decided to fund this project for $78,547, adding it to their list of funded projects.

Chairman Young then proceeded to discuss the research project proposal entitled, "Determining Disease resistance and susceptibility of corn and grain sorghum hybrids." Some discussion ensued. The board decided to fund this project for $40,000, adding it to their list of funded projects.

Chairman Young then proceeded to discuss the research project proposal entitled, "Developing a satellite-based field scouting tool for corn." Some discussion ensued. The board decided not to fund this project.

Chairman Young then proceeded to discuss the research project proposal entitled, "Generating high-value wax material from sorghum bran using an innovative green approach." The board decided to fund this project for $42,761, adding it to their list of funded projects.

Chairman Young then proceeded to discuss the research project proposal entitled, "Development and verification of a stand counting application using drone imagery for research and production decision support." Some discussion ensued. The board decided to fund this project for $19,660, adding it to their list of funded projects.

Chairman Young then asked Zaki what the total remaining balance was, and Zaki answered that the board had $492,911 in reserve.

Chairman Young then asked if there were any questions or concerns about the decisions they have made as a board, and there were none.

Some discussion ensued.

Chairman Young then asked for a motion to approve funding for both new and existing promotion and research projects as discussed by the board. This includes a funding amount of $182,666 used for promotion and $1,053,801 used for research, resulting in a total expenditure of $1,236,467 for projects endorsed by this board.

Motion by Kenny Falwell, seconded Trent Dabbs.

Motion carried.

Chairman Young then asked Zaki how much money this leaves the board with in-reserve. Zaki answered that this leaves the board with $944,583.42 on reserve.

Chairman Young then mentioned that this was the best board meeting he had been to in a very long time. He also applauded the hard work from UofA researchers and investigators, and for the AR Department of Agriculture staff for putting on such a successful meeting.

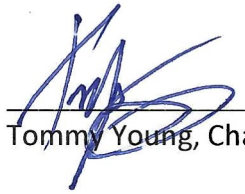
Chairman Young also applauded the work of Dr. Nathan McKinney, mentioning that the board will dearly miss him, and wishing him luck on future endeavors in his retirement.

Dr. McKinney expressed a heartfelt thank you to the board. Dr. McKinney also mentioned that there is $400,000 sitting in a dedicated account that is drawing interest for this board. He also mentioned that this account is considered a rainy-day fund to be included with what the board already has on reserve.

Chairman Young then asked for a motion to adjourn.

Moved by Kenny Falwell, seconded by Trent Dabbs.

Meeting adjourned.



Tommy Young, Chairman

ATTACHMENT 1

Corn and Grain Sorghum Board Financials
Total Annual Collections

	June 2018	June 2019	June 2020	June 2021	June 2022	June 2023	January 2024	Forecast 2024
Beginning Fund Balance	**$ 906,520**	**$ 611,975**	**$ 540,103**	**$ 787,097**	**$ 1,386,425**	**$ 2,156,313**	**$ 2,483,014**	**$ 2,483,014**
Revenue								
Gross Collections	$ 1,127,802	$ 1,068,141	$ 1,155,588	$ 1,257,966	$ 1,516,473	$ 1,050,172	$ 715,378	$ 1,070,077
Corn	$ 1,123,889	$ 1,060,950	$ 1,141,977	$ 1,244,519	$ 1,450,919	$ 1,044,635	$ 708,745	$ 1,063,230
Grain Sorghum	$ 3,913	$ 7,191	$ 13,611	$ 13,447	$ 65,554	$ 5,538	$ 6,633	$ 6,847
Rev. & Treas. Dept. 3%	$ 36,090	$ 34,181	$ 36,979	$ 40,255	$ 48,527	$ 33,606	$ 22,531	$ 33,172
Other Income	$ 46,387	$ 1,770	$ 2,642	$ -	$ 5,538	$ -	$ 22,843	$ -
Transfers to CGSPB (Net)	**$ 1,138,099**	**$ 1,035,730**	**$ 1,121,251**	**$ 1,217,711**	**$ 1,473,485**	**$ 1,016,567**	**$ 715,690**	**$ 1,036,905**
Total Revenue	**$ 2,044,619**	**$ 1,647,706**	**$ 1,661,355**	**$ 2,004,807**	**$ 2,859,909**	**$ 3,172,880**	**$ 3,198,705**	**$ 3,519,919**
Expenses								
Payments to Research	$ 883,689	$ 943,000	$ 764,633	$ 482,275	$ 492,117	$ 965,315		$ 947,120
Payments to Research						$ 492,117	$ 10,000	$ 345,178
Payments to Research						$ 351,470		$ 1,255,007
Preapproved Research	$ 400,000							
AMCOE								
Grains Council								
Membership	$ 56,000	$ 58,000	$ 63,800	$ 66,352	$ 67,679	$ 68,525		$ 68,535
Promotion	$ 14,000			$ 12,000				$ 12,000
U.S. Grains Meeting						$ 1,169		
NCGA								
Membership	$ 10,000	$ 11,500	$ 11,500	$ 12,000	$ 22,000	$ 28,000		$ 28,500
Promotion	$ 2,734			$ 10,000				
Commodity Classic	$ 7,792	$ 8,306	$ 4,506			$ 2,438		$ 8,000
AR Foundation for Ag								
County Meetings	$ 5,000			$ 3,228	$ 10,000			$ 5,001
Ag in the Classroom	$ 15,000	$ 60,000			$ 10,000	$ 10,000		$ 10,000
Producer Conference	$ 2,293							$ 5,001
Other Promotion	$ 21,900	$ 22,250	$ 23,000	$ 30,000	$ 94,000	$ 271,500		$ 4,500
Total Promotion	**$ 134,719**	**$ 160,056**	**$ 102,806**	**$ 133,580**	**$ 203,679**	**$ 381,632**	**$ -**	**$ 141,537**
Board Travel Lodging	$ 3,009	$ 1,677	$ 3,348	$ 528	$ 6,301	$ 4,133	$ 3,057	$ 7,001
Board Travel Meals	$ 5,227	$ 1,858	$ 1,971			$ 1,771	$ 3,280	$ 10,001
Board Travel Other							$ 1,713	
Board Travel Mileage							$ 313	
Office Supplies							$ 45	
Postage							$ -	
Admin Expenses							$ 4,423	
Board Exp.	**$ 8,236**	**$ 3,535**	**$ 5,318**	**$ 528**	**$ 6,301**	**$ 5,904**	**$ 12,831**	**$ 17,002**
Website	$ 6,000	$ 1,011	$ 1,500	$ 2,000	$ 1,500	$ 9,000	$ 2,526	$ 9,000
Total Board Exp.	**$ 14,236**	**$ 4,547**	**$ 6,818**	**$ 2,528**	**$ 7,801**	**$ 14,904**	**$ 15,356**	**$ 26,002**
Total Expenditures	**$ 1,432,644**	**$ 1,107,602**	**$ 874,258**	**$ 618,383**	**$ 703,597**	**$ 2,205,438**	**$ 25,356**	**$ 2,714,844**
Outstanding Commitment							$ 1,292,298	
Ending Fund Balance	**$ 611,975**	**$ 540,103**	**$ 787,097**	**$ 1,386,425**	**$ 2,156,313**	**$ 967,442**	**$ 1,881,050**	**$ 805,075**

USDA NASS Gross Collections vs Arkansas Actual Gross Collections
USDA NASS Arkansas acreage, yield, production, and check-off rate per bushel with estimated maximum gross collections for years 2011 to 2023

PRODUCTION YEAR FISCAL YEAR, JULY 01 - JUNE30	**2011** FY12	**2012** FY13	**2013** FY14	**2014** FY15	**2015** FY16	**2016** FY17	**2017** FY18	**2018** FY19	**2019** FY20	**2020** FY21	**2021** FY22	**2022** FY23	**2023*** FY24
CORN - ACRES PLANTED	560,000	710,000	880,000	540,000	460,000	760,000	620,000	660,000	770,000	620,000	850,000	710,000	850,000
CORN, GRAIN - ACRES HARVESTED	520,000	695,000	870,000	530,000	445,000	745,000	595,000	645,000	735,000	605,000	830,000	695,000	830,000
CORN, GRAIN - PRODUCTION, MEASURED IN BU	73,320,000	123,710,000	161,820,000	99,110,000	80,545,000	127,395,000	108,885,000	116,745,000	128,625,000	111,320,000	152,720,000	120,235,000	151,890,000
CORN, GRAIN - YIELD, MEASURED IN BU / ACRE	141	178	186	187	181	171	183	181	175	184	184	173	183
SORGHUM - ACRES PLANTED	100,000	140,000	130,000	170,000	450,000	47,000	9,000	12,000	10,000	10,000	87,000	8,984	
SORGHUM, GRAIN - ACRES HARVESTED	90,000	135,000	125,000	165,000	440,000	44,000	7,000	10,000	10,000	10,000	87,000	8,984	12,227
SORGHUM, GRAIN - PRODUCTION, MEASURED IN BU	6,480,000	11,340,000	12,750,000	16,005,000	43,120,000	3,212,000	546,000	770,000	700,000	700,000	6,090,000	628,880	978,160
SORGHUM, GRAIN - YIELD, MEASURED IN BU / ACRE	72	84	102	97	98	73	78	77	70	70	70	70	80
CORN & SORGHUM - ACRES PLANTED	660,000	850,000	1,010,000	710,000	910,000	807,000	629,000	672,000	780,000	630,000	937,000	718,984	850,000
CORN & SORGHUM - ACRES HARVESTED	610,000	830,000	995,000	695,000	885,000	789,000	602,000	655,000	745,000	615,000	917,000	703,984	842,227
CORN & SORGHUM - PRODUCTION, MEASURED IN BU	79,800,000	135,050,000	174,570,000	115,115,000	123,665,000	130,607,000	109,431,000	117,515,000	129,325,000	112,020,000	158,810,000	120,863,880	152,868,160
RATE													
Rate - Arkansas assessment at the rate of one cent (1¢) per bushel on all corn and grain sorghum grown within the state.													
100% GROSS CORN & SORGHUM COLLECTION	$798,000	$1,350,500	$1,745,700	$1,151,150	$1,236,650	$1,306,070	$1,094,310	$1,175,150	$1,293,250	$1,120,200	$1,588,100	$1,208,639	$1,528,682
95% GROSS CORN & SORGHUM COLLECTION	$758,100	$1,282,975	$1,658,415	$1,093,593	$1,174,818	$1,240,767	$1,039,595	$1,116,393	$1,228,588	$1,064,190	$1,508,695	$1,148,207	$1,452,248
90% GROSS CORN & SORGHUM COLLECTION	$718,200	$1,215,450	$1,571,130	$1,036,035	$1,112,985	$1,175,463	$984,879	$1,057,635	$1,163,925	$1,008,180	$1,429,290	$1,087,775	$1,375,813
AR CORN AND GRAIN SORGHUM PROMOTION GROSS COLLECTION	$682,960	$1,192,907	$1,473,510	$987,234	$1,096,898	$1,058,251	$1,127,416	$1,068,645	$1,156,092	$1,257,078	$1,515,170	$1,050,922	$738,221
AR CORN AND GRAIN SORGHUM PROMOTION % GROSS COLLECTION	86%	88%	84%	86%	89%	81%	103%	91%	89%	112%	95%	87%	48%

Thank you for considering NCGA's 2024 funding proposal. NCGA recognizes that our ability to advance the corn industry is undoubtedly greater when we collaborate with state corn grower organizations. We value our partnership with each state corn grower association and understand it takes each of us working together to achieve our common goals. We look forward to presenting this request to you fully at your upcoming meeting and encourage you to reach out if you have any questions or concerns before that time.

Harold Wolle
NCGA President

Matt Frostic
NCGA Corn Board Member
Arkansas Corn Growers Liaison

NCGA FY2024 FUNDING REQUEST

Base Funding	$14,000
Action Team Funding	$14,500
TOTAL:	**$28,500**

BASE FUNDING: Base funding supports the fundamental work of NCGA, including events like Corn Congress, NCGA leadership programs, membership growth, program staff salaries and some operating expenses including office space. Base funding does not include NCGA's federal advocacy efforts, which are funded through industry partner support and the National Corn Yield Contest.

ACTION TEAM FUNDING: NCGA's seven action teams drive the organization forward to reach its strategic goals. Each team, made up of grower leaders, focuses on developing programs that support a specific aspect of the corn industry.

NCGA ACTION TEAMS

Sustainable Ag Research
Translating research into solutions for growers and building a strong STEM workforce to support the agriculture sector.

Market Development
Growing demand through partnerships in the food and livestock industries, fostering new uses, and stabilizing international trade.

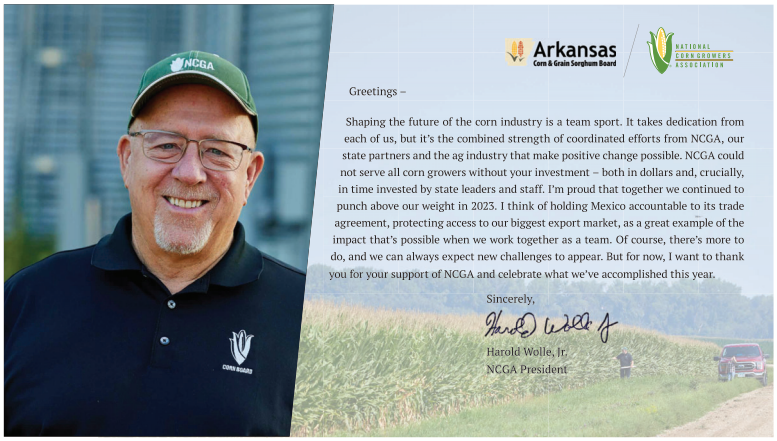
Production Technology Access
Ensure access to – and responsible stewardship of – crop protection products and other inputs.

Stewardship
Advance the sustainable production of U.S. corn.

Risk Management & Transportation
Advocating on behalf of growers and the rural economy for effective market-oriented agriculture policies, infrastructure, and tax policy reform.

Ethanol
Ensuring corn growers continue to take a leadership role in the utilization, promotion, and advocacy of corn-based biofuels.

Member & Consumer Engagement
Communicating with consumers on matters important to growers while growing membership and grower participation; creating new leaders; and building diversity of thought.



In This Report

Arkansas Corn & Grain Sorghum Board | National Corn Growers Association

The National Corn Growers Association worked hard on behalf of corn growers in 2023, making strides in several key areas. NCGA's 2023 Impact Report proves the impact that's possible when our organizations work together. Contributions and leadership from state corn checkoffs, associations and individual growers made these and many other accomplishments possible.

- Protecting our largest export market by holding Mexico to its trade commitments, leading to an active dispute settlement.
- Tirelessly advocating for corn grower priorities for the next Farm Bill, including nearly 8,000 corn advocate messages to Capitol Hill.
- Garnering expanded support for the Next Generation Fuels Act, with pledges of support from more than 20 national groups.

Get the latest on these programs here.

CONSIDER CORN CHALLENGE | FARMERS for SOIL HEALTH | NOURISH the FUTURE

Grower Advocacy Snapshot

Arkansas Corn & Grain Sorghum Board | National Corn Growers Association

ADVOCACY

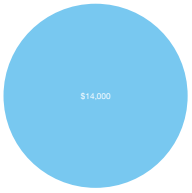
141 ACTIVE CORN ADVOCATES

43 ADVOCACY MESSAGES SENT

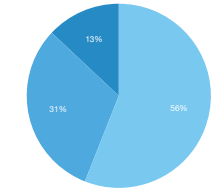
Investment Snapshot

Arkansas Corn & Grain Sorghum Board | National Corn Growers Association

2023 Action Team Investment
$14,000



2023 Base Funding Investment
$14,000



Base Funding Supports:

- Association Events: Corn Congress, Action Team Meetings, etc.
- Leadership Programs
- Membership Retention and Growth
- Program Staff
- Operating Expenses

Key Accomplishments

Arkansas Corn & Grain Sorghum Board | National Corn Growers Association

Holding Mexico Accountable on Trade

Arkansas Corn & Grain Sorghum Board | National Corn Growers Association

SITUATION:

Mexico's stance on biotech corn — specifically a ban on genetically modified corn for human consumption and plans to phase out GM corn in animal feed— jeopardized U.S. corn's number one export market. In 2022, U.S. exports of corn to Mexico were valued at $4.92 billion, accounting for more than one-third of U.S. corn exports.

ACTION:

NCGA sounded alarm bells, urging action to enforce the United States-Mexico-Canada Agreement. Persistent advocacy kept the issue top of mind. Support and investment from both farmers and state corn organizations were key to the effort's success. For example, the Production Technology Access Action Team funded studies to quantify pricing trends and their causes, which is critical for supporting corn's position with external officials and stakeholders.

Winter

Little progress has been made to prevent Mexico's proposed ban on biotech corn, slated to go into effect in 2024.

NCGA and 23 state groups urge President Biden to resolve dispute quickly or file a dispute under USMCA.

Spring

Mexico moves up timeline for ban, effective immediately. USTR initiates a technical consultation with Mexico.

NCGA, with 61 partner organizations, calls for consultations to begin promptly.

Summer

USTR initiates a dispute settlement under USMCA.

NCGA supports enforcing USMCA.

RESULTS TO DATE:

We've seen positive steps to enforce USMCA, including the U.S. Trade Ambassador's initiation of a dispute settlement in June, followed by a request to establish the panel in August with panel membership finalized in October.

UP NEXT:

Keep regulators focused on the issue until it is resolved, as more than 90% of U.S.-grown corn is biotech.

Amplifying Farm Bill Priorities

Arkansas Corn & Grain Sorghum Board | National Corn Growers Association

SITUATION:

The Farm Bill is up for reauthorization every five years, providing both opportunities for improvement and risks to programs U.S. corn farmers depend on, from crop insurance to conservation. The 2018 bill, which expired in 2023, presented a challenge for a divided Congress.

ACTION:

NCGA developed and rallied support for corn grower Farm Bill priorities, launching a diversified campaign to inform congressional delegations of the bill's importance. NCGA Action Teams researched, developed, and evaluated policy positions and provided resources to state, industry and legislative partners. State investment and leadership made it possible for NCGA to remain engaged with policymakers through strategic Capitol Hill outreach, direct lobbying, grassroots advocacy, targeted digital outreach and active participation in a number of coalitions and partnerships.

NCGA Farm Bill Priorities

1. Protect crop insurance.
2. Bolster U.S. international market development efforts.
3. Strengthen the producer safety net, including a mandatory update of base acres.
4. Support voluntary conservation programs.

RESULTS TO DATE:

Corn advocates sent nearly 8,000 messages to Capitol Hill, and grower leaders have testified in front of the House and Senate Agriculture Committees. Digital efforts have resulted in over 4 million impressions. Although the September 30 statutory deadline has passed, NCGA and state partners are in a strong position to deliver on corn grower priorities.

UP NEXT:

NCGA continues to urge Congress to pass a comprehensive, bipartisan Farm Bill that supports and protects corn growers as soon as possible. NCGA will maintain engagement with stakeholders on policy improvements, such as a mandatory base acre update, and prepare for the next steps in the legislative process.

Growing and Defending Ethanol Markets

Arkansas Corn & Grain Sorghum Board | National Corn Growers Association

SITUATION:

Harmful proposed regulations from the EPA and the National Highway Traffic Safety Administration threatened ethanol's impact in 2023, while consumers saw gas prices fluctuate widely. And a solution is on the table to expand choice and affordability in the transition to cleaner fuels.

ACTION:

NCGA and state partners worked to expand support for ethanol and the Next Generation Fuels Act through a coordinated stakeholder engagement campaign. More than 20 national groups have now pledged their support of the NGFA. Additionally, NCGA launched a fully integrated communications campaign to raise awareness of ethanol's positive impacts among policymakers, key government officials, energy influencers and the media. Solutions-oriented messages appeared in earned and paid radio, television, print and digital placements.

RESULTS TO DATE:

NCGA was successful in supporting re-introduction of the NGFA in both houses of Congress. The integrated campaign generated millions of touchpoints to build understanding among key audiences.

UP NEXT:

Continue to pursue growth for ethanol markets, prioritizing expanded congressional support and additional cosponsors for the Next Generation Fuels Act.

NATIONAL NEXT GENERATION FUELS ACT SUPPORTERS:

RFA, POET, growth energy, FB, National Farmers Union, Nutrien, John Deere, The Fertilizer Institute, AEM, Case IH, CFDC, UAW, New Holland Agriculture, ICM, Beck's, Bayer, CHS, ethanol, Corteva, syngenta

Accomplishment Roundup

Arkansas Corn & Grain Sorghum Board | National Corn Growers Association

Consider Corn Challenge 4

To date, NCGA has hosted four Consider Corn Challenges, an open innovation contest that seeks to find innovative technologies to develop new uses of corn. The first three challenges yielded 15 winners with a total investment of $450,000. This year, the MDAT increased funding to $250,000 to be split between the four winners selected. Prior winners have gone on to receive additional funding from private and federal sources, licensed or sold their technology for further development, and continue to work towards commercialization. At full commercialization, one estimate projects the 19 winners could drive nearly 3.7 billion bushels in total additional corn demand.

Farmers for Soil Health

In 2023, Farmers for Soil Health, a partnership among NCGA, the National Pork Board and the United Soybean Board, received a USDA Climate-Smart grant for $95 million to assist in the group's goal to double cover crop acres by 2030. The funds will expand grower access to technical service providers in 20 states and provide financial assistance and cost-share opportunities to farmers adopting sustainable practices. Farmer enrollment for the program launched this year. By supporting growers as they evaluate and adopt sustainable practices, NCGA is also making strides toward the association's nationwide sustainability goals. Find more information, including farmer enrollment, at FarmersforSoilHealth.com.

Nourish the Future — Tomorrow's science is looking for leaders

In FY23, NCGA's STEM education program, Nourish the Future, reached 145 teachers from states across the country. For the first time, NCGA studied impacts on students whose teachers participated in the program. Students experienced a 30% increase in knowledge in key areas, and over 30% of students were more interested in a career in biotechnology after their teacher's participation in the program. Through support of DonorsChoose, NCGA also provided funding to 89 teachers across 26 states. The funds helped teachers implement lessons on food production and sustainability in schools that have been historically underfunded due to economic and racial inequality.

Financial Reporting

Arkansas Corn & Grain Sorghum Board | National Corn Growers Association

FY23 Income Statement

	Actuals (Aug 2023)	YTD Actuals (Oct 2022 - Aug 2023)	Budget (Oct 2022 - Sep 2023)	Amount Over/ (Under) Budget	% of Budget
Income					
Checkoff Revenue	$904,195	$14,853,032	$15,886,173	($1,033,141)	93.50%
Industry Revenue	$40,994	$1,182,744	$1,195,500	($12,756)	98.93%
Membership	$61,499	$709,782	$650,000	$59,782	109.20%
Corn Yield Contest Revenue	$409,500	$827,394	$925,000	($97,606)	89.45%
NCGA Commodity Classic	$34,375	$339,147	$500,000	($160,853)	67.83%
Grant (SHP)	$1,917	$145,869	$0	$145,869	100.00%
Interest Income	$46,287	$404,803	$300,000	$104,803	134.93%
Other	$0	$322,127	$85,000	$237,127	378.97%
Total Income	$1,498,768	$18,784,898	$19,541,673	($756,775)	96.13%
Expenses					
Total Team Programs	$551,930	$5,823,186	$6,413,173	($589,987)	90.80%
Total Association Programs	$507,147	$3,535,308	$4,106,977	($571,669)	86.08%
Total Human Resources	$483,432	$5,637,726	$7,094,544	($1,456,818)	79.47%
Total Property & Equipment	$61,076	$736,569	$712,650	$23,919	103.36%
Total Operating Expenses	$55,699	$627,060	$885,790	($258,730)	70.79%
Total Expenses	**$1,659,284**	**$16,359,849**	**$19,213,134**	**($2,853,285)**	85.15%
Net Income	**($160,516)**	**$2,425,049**	**$328,539**	**$2,096,510**	738.13%

Income and expenses as of August 2023. A final FY23 report will be provided later this year after the conclusion of NCGA's financial audit.

FY23 Action Team Financials

Team	FY23 Revised Budget	Funding			Spend - YTD FY23	Restricted (Known Spend) Remaining - FY24	Unrestricted FY23 Carryover.
		Carryover from FY22	FY23 Commitments	Total FY23 Team Funding			
Ethanol	$2,778,046.00	$4,524,338.38	$3,070,090.00	$7,594,428.38	$(2,877,546.19)	$(4,415,930.00)	$300,952.19
Market Development	$800,549.00	$777,362.87	$906,549.21	$1,683,912.08	$(997,839.37)	$(300,000.00)	$386,072.71
Member & Consumer Engagement	$1,373,176.00	$1,183,237.83	$1,375,676.00	$2,558,913.83	$(1,467,780.74)	$(575,000.00)	$516,133.09
Production Technology Access	$221,217.00	$246,897.63	$221,217.00	$468,114.63	$(95,117.63)	$-	$372,997.00
Risk Management & Transportation	$175,000.00	$631,151.20	$175,000.00	$806,151.20	$(195,147.79)	$(160,000.00)	$451,003.41
Sustainable Ag Research	$660,000.00	$556,966.08	$844,273.30	$1,401,239.38	$(916,600.20)	$(250,000.00)	$234,639.18
Stewardship	$405,185.00	$426,558.07	$693,333.88	$1,119,891.95	$(646,011.55)	$(450,000.00)	$23,880.40
Total	$6,413,173.00	$8,346,512.06	$7,286,139.39	$15,632,651.45	$(7,196,043.47)	$(6,150,930.00)	$2,285,677.98

Projected FY23 Action Team expenses and FY24 carryover as of October 2023. A final FY23 report will be provided later this year after the conclusion of NCGA's financial audit.


NCGA UPDATE
MATT FROSTIC
CORN BOARD LIAISON
Arkansas Corn & Grain Sorghum Board
February 21, 2024

1


HIGHLIGHTS
& PRIORITIES

2


Arkansas
Corn & Grain Sorghum Board
NATIONAL
CORN GROWERS
ASSOCIATION

3


Trade

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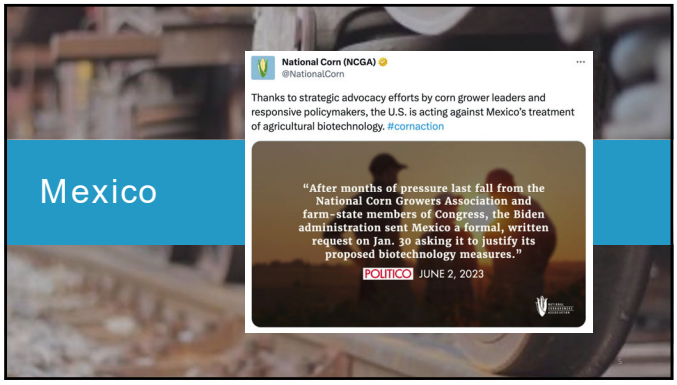
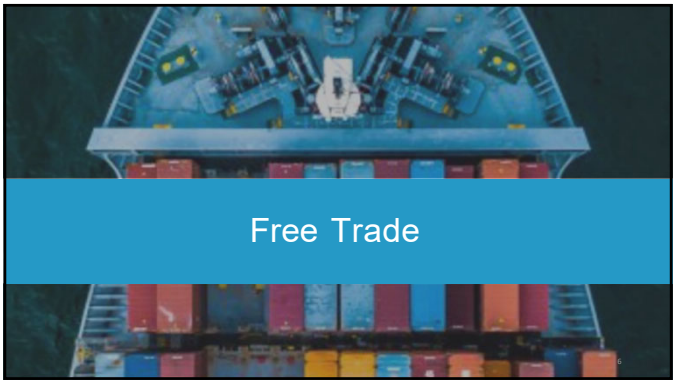

Mexico
National Corn (NCGA)
@NationalCorn
Thanks to strategic advocacy efforts by corn grower leaders and responsive policymakers, the U.S. is acting against Mexico's treatment of agricultural biotechnology. #cornaction
"After months of pressure last fall from the National Corn Growers Association and farm-state members of Congress, the Biden administration sent Mexico a formal, written request on Jan. 30 asking it to justify its proposed biotechnology measures."
POLITICO JUNE 2, 2023

5


Free Trade

6

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FY2024 Funding Request

BASE FUNDING

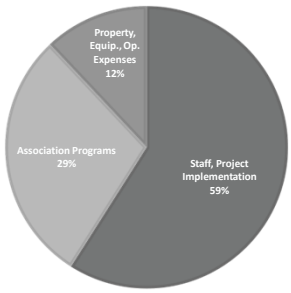
- Action Team Meetings
- Corn Staff Meetings
- Leadership Programs
- State Presidents Meeting
- Property and Equipment
- Corn Congress
- Corn Board Governance
- NCGA Communications
- Program Staff
- Operating Expenses

ACTION TEAM FUNDING

- Ethanol
- Market Development
- Stewardship
- Sustainable Ag Research
- Risk Management and Transportation
- Member and Consumer Engagement
- Production Technology Access

11

Base Funding Breakdown



12

FY2024 Total Funding Request

Base Funding	$14,000
Action Team Funding	$14,500
Total	**$28,500**

13

14

ATTACHMENT 3

Arkansas Corn & Grain Sorghum Board

USGC Funding Proposal Presentation

U.S. GRAINS COUNCIL

1

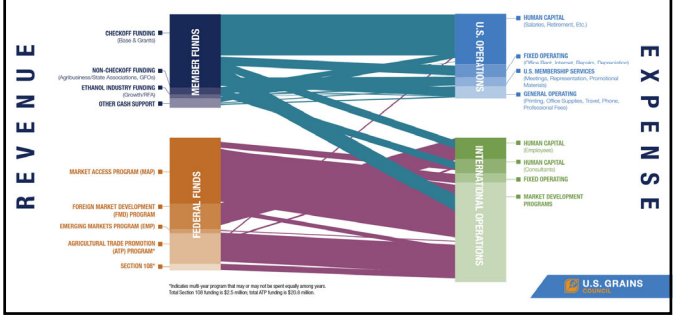
2

Growing the Future

3

4

USGC BUDGET BREAKDOWN



5

FY25 USGC Funding Request

To meet these goals, in FY2024, the USGC respectfully requests the Arkansas Corn & Grain Sorghum Board consider the following:

funding a total of $71,266. This is a 4% increase from last year's base contribution.

6

Key Market Overviews

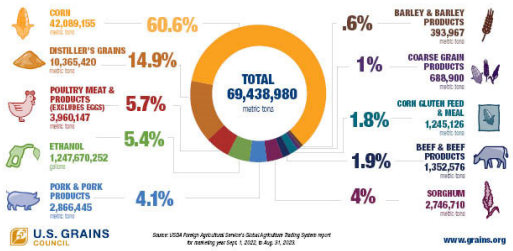
And Selection of Successes

U.S. GRAINS COUNCIL

7

HOW U.S. GRAIN WAS EXPORTED IN 2022/2023

The U.S. Grains Council's feed grains in all forms calculation offers a holistic view of feed grain sold to overseas customers in both unprocessed and value-added forms. This calculation includes corn-equivalent exports of U.S. corn, sorghum, barley, distiller's dried grains with solubles (DDGS), ethanol, corn gluten meal (CGM), meat and poultry.



U.S. GRAINS COUNCIL

Source: USDA Foreign Agricultural Service's Global Agriculture Trading System report for marketing year Sept. 1, 2022, to Aug. 31, 2023.

www.grains.org

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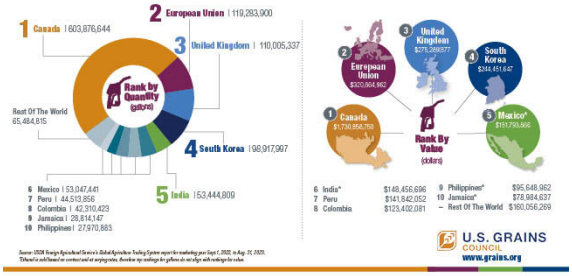
WHERE IS U.S. ETHANOL GOING?

TOP U.S. EXPORT CUSTOMERS IN MARKETING YEAR 2022/2023



U.S. GRAINS COUNCIL

www.grains.org

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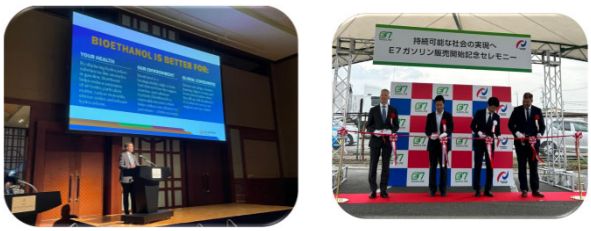
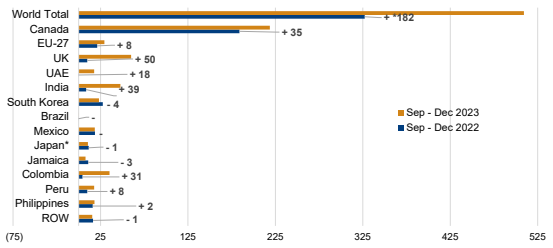
Making Progress in Japan



U.S. GRAINS COUNCIL

10

Exports of U.S. ethanol total over half a billion gallons in the first four months of MY 2023/24 …

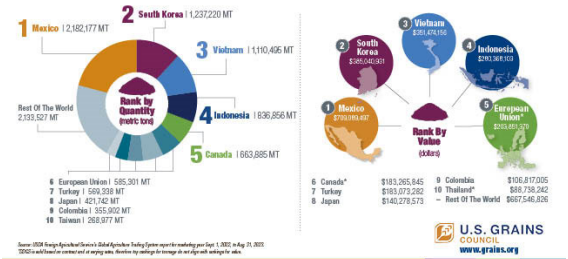


Source: USDA Global Agricultural Trade System & *USGC estimates for Japan

11

WHERE IS U.S. DDGS GOING?

TOP U.S. EXPORT CUSTOMERS IN MARKETING YEAR 2022/2023



U.S. GRAINS COUNCIL

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12

International Aquaculture Conference

U.S. GRAINS COUNCIL

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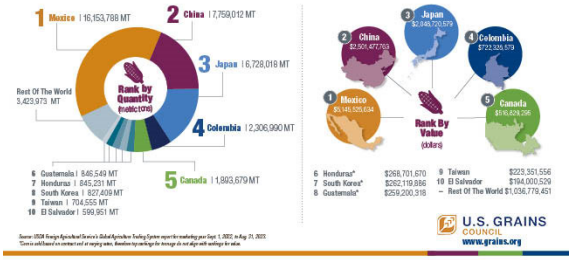
WHERE IS U.S. CORN GOING?

TOP U.S. EXPORT CUSTOMERS IN MARKETING YEAR 2022/2023



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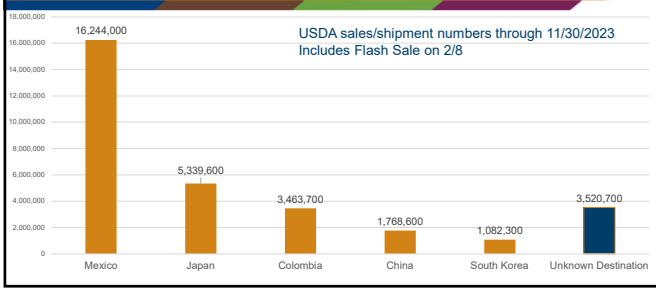
14

Marketing Superior Performance in India

U.S. GRAINS COUNCIL

15

Top Corn Markets 2023/24 (MT)



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U.S. Grains Council Launches CSAP

U.S. GRAINS COUNCIL

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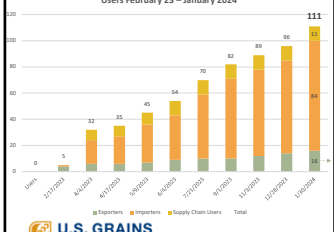
CSAP | SCE Roll-out

SCE: Exporters enabled to support clients

SCE Adoption:
Users February 23 – January 2024



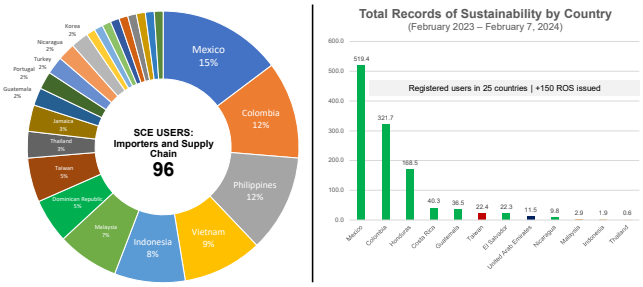
Registered exporters in SCE

U.S. GRAINS COUNCIL

18

CSAP | SCE Roll-out

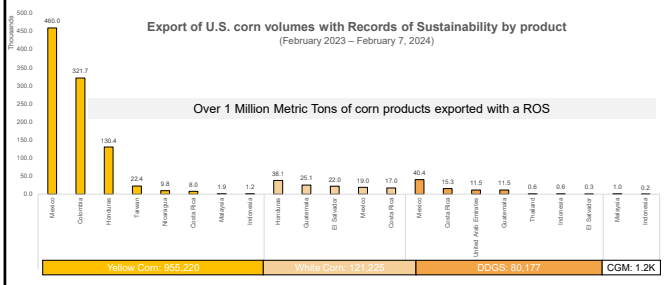
SCE: Growth in users across key geographies



19

CSAP | SCE Roll-out

SCE: Growth in users and volumes



20

Looking Ahead

And Future Opportunities

21

Regional Agricultural Promotion Program (RAPP)

- Notice of Funding Opportunity (NOFO) released on November 29, 2023
- Applications due to FAS on February 2, 2024
- First NOFO is for $300 million ($25 million allocated for Africa)
- Expect NOFO for additional $200-$300 million each year for 5 years.
- Regions excluded include China, Canada, Mexico and EU
- 10% match required

22

RAPP Member Impact

- This is an exciting new chapter for USGC and our partners!
- Opportunity to extend global impact and engagement
- Immediate 10:1 ROI

23

$728,700,000
Total value of grain trade to Arkansas' economy

$189,200,000
Contribution to gross state product

$170,900,000
Value of corn exported

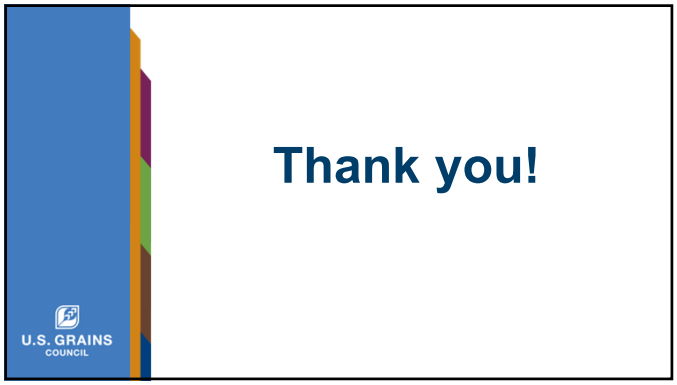
$2,000,000
Value of Sorghum exported

$180,500,000
Value of corn equivalent to meat exported

4,579
Number of jobs added to the state of Arkansas

Value of Exports of Grain in All Forms to Arkansas

24



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U.S. GRAINS COUNCIL

January 30, 2024

Dear Scott, Tyler and the Arkansas Corn and Grain Sorghum Board,

On behalf of the Board of Directors of the U.S. Grains Council, I am submitting the enclosed funding request for your consideration. Your previous investment in the U.S. Grains Council has helped increase demand for U.S. sorghum, corn, ethanol and co-products around the world – and increased profitability for farmers in Arkansas and around the country.

For fiscal year 2024, the U.S. Grains Council respectfully requests the Arkansas Corn and Grain Sorghum Board increase its base funding to $71,266 which is a 4 percent increase from last year's contribution.

The Council greatly appreciates your continued support of our programs through funding and via guidance provided through Advisory Team and participation.

If you have any questions about the proposal, please feel free to contact me.

Best,

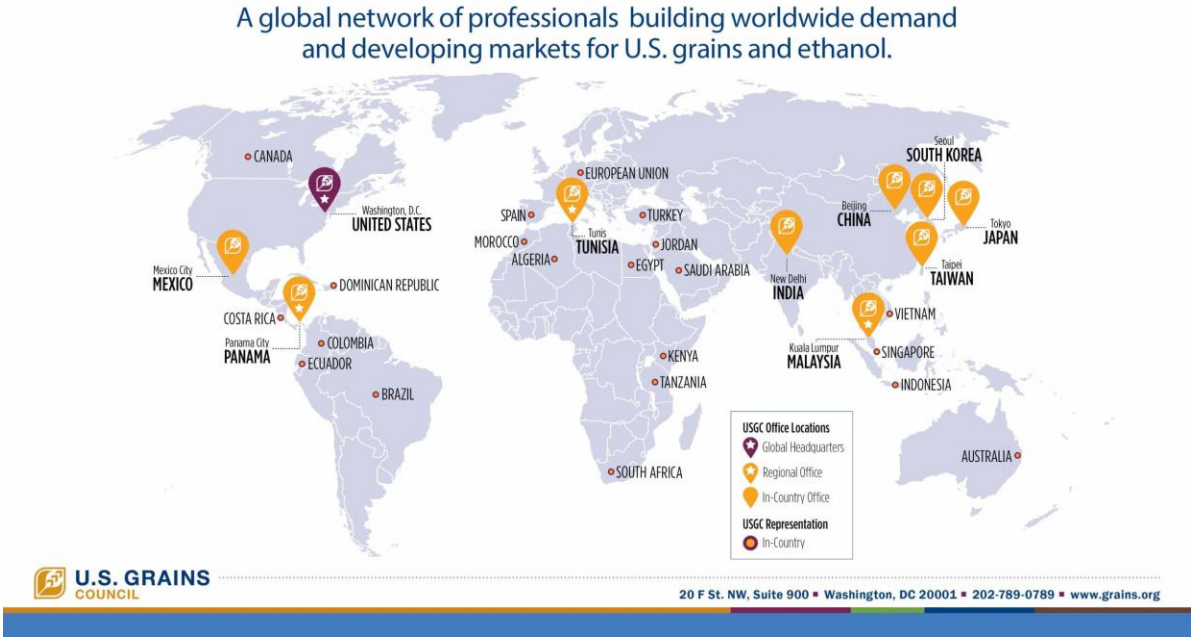
Ryan LeGrand
President and CEO

Growing the Future: FY2024 Request For Funding

As our world adapts to increasing inflation costs, supply chain disruptions and transportation issues, the U.S. Grains Council is continuing to work on behalf of U.S. farmers to educate and promote the use of U.S. grains in all forms. Future customers on six continents are being born today – which is why engagement to build and maintain market share is critical now. Our theme of *Growing the Future* reinforces our focus on programs that will move bushels of grain today and for generations to come. We are proud to work collaboratively with our partners in the corn industry like Arkansas Corn and Grain Sorghum and we look forward to working together in the future to *Develop Markets, Enable Trade and Improve Lives.*

A study conducted by the Council showed that in 2021 Arkansas' grain and grain product exports were valued at $189 million – creating a total of $728 million in economic output across the Arkansas economy and supporting more than 4,579 jobs in the state. The Council actively works to present U.S. farmers with opportunities for export growth, which benefits their bottom lines and agriculture as a whole. To continue and expand this progress in FY 2024, USGC respectfully requests the Arkansas Corn and Grain Sorghum Board increase its base funding to $71,266 which is a 4.0 percent increase from last year's request.

The successes USGC can win for Arkansas farmers stem directly from our global network of dedicated professionals working daily with our members and customers to promote corn, ethanol, DDGS and more. Through a full-time presence in more than 28 locations and programs in more than 50 countries and the EU, we are carrying out this work on your behalf.



Demand Growth Lives Overseas

Consider this: more than 95 percent of the world's population lives outside the United States. More than 97 percent of the anticipated population growth over the next 35 years will take place outside of U.S. borders, much of it in Asia and Africa, where the Council has a strong presence. Future customers on six continents are being born today – which is why engagement to build market share is critical now.

Council's Southeast Asia Office Hosts Agricultural Co-operators Conference

For the first time since the onset of the COVID-19 pandemic, the U.S. Grains Council (USGC), together with the U.S. Soybean Export Council (USSEC), held their annual Southeast Asia U.S. Agricultural Co-operators Conference (ACC) in person, in Bangkok, Sept. 20-22. This premier regional event brought together key industry representatives, trade and agricultural association leaders, regional government officials, U.S. agricultural co-operators and related U.S. government agencies, U.S. corn and soybean grower leaders, U.S. corn and soybean members and stakeholders to receive critical market updates, learn about new product offerings and regional policy changes; in addition to reconnecting with trading partners not seen for two years.

With more than 300 in-person attendees, ACC exceeded participation expectations. Customers were very eager to meet in person again considering over the last two years there have been major market developments, including the influx of higher protein meals derived from corn, phytosanitary resolutions in Thailand and corn tariff reductions in the Philippines. U.S. Corn and soybean growers were also provided the opportunity to share their on-the-ground perspective of the 2022 crop. Southeast Asia is a growing and dynamic region for corn, corn co-products and grains in all forms. There are similarities among the countries and markets in the Southeast Asia region, but each market also has its own needs and requirements. Following the program, the Council distributed a market survey to gather information about perception of this event. Exit surveys are critical to ensure the Council remains relevant to its stakeholders. These surveys also allow the Council to quantify the high volume of trades that occur during this cornerstone conference.

Continuing to Engage with Mexico

Mexico continues to be one of the top markets for U.S. corn, sorghum, barley and related co-products. In 2021/2022, Mexico imported nearly 27.7 million metric tons of grains in all forms. Given the many policy related challenges in this important market, the Council's work to defend this market is critical. Here a few highlights of the most recent programs from fall 2022.

Educational Programming to Strengthen Relationships – In the last four years the Council has been building its relationship with SuKarne, Mexico's largest cattle producer, as the company looks to improve its processes, gain greater confidence in the quality of U.S. Corn, and overall support the U.S. corn industry further through feed utilization. In October of 2022, the Council staff in Mexico set up a training to help the group's quality control team learn to identify and classify the type of corn damage and it's usability. The Council and SuKarne began working together following a Corn Export Cargo Quality Report presentation when the company requested additional assistance and training from the Council following difficulties with broken corn and foreign materials (BCFM) in its imports. As the Council works to build upon SuKarne's knowledge of the quality of U.S. corn, it would also like to introduce the use of DDGS to the company. The Council looks forward to continuing its partnership with SuKarne and other emerging Mexican markets.

Export Exchange 2022 Leads To $225 Million In Grain And Co-Product Sales

The Export Exchange conference hosted this fall by the U.S. Grains Council (USGC), Growth Energy and the Renewable Fuels Association (RFA) is already paying dividends, according to new surveys of overseas grain buyers who attended to the tune of $225 million worth of grain and ethanol co-product sales. Buyers and end-users were surveyed after the conference if they made purchase agreements with sellers and how much volume was purchased. In total, attendees reported sales of just over $225 million with another $128 million under negotiation. That equates to 514,850 metric tons of grains and co-products traded either at the conference or immediately before or after.

The top grain traded during the two-day conference was corn, with 208,800 metric tons

collectively exchanged, followed by distiller's dried grains with solubles (DDGS), with 156,400 metric tons exchanged. Export Exchange 2022 offered attendees a unique opportunity to meet and build relationships with domestic suppliers of corn, DDGS, sorghum, barley and other commodities. More than 200 international buyers and end-users of coarse grains and co-products from more than 35 countries were in Minneapolis for the conference, held Oct. 12 to 14, and for related tours of U.S. farms, ethanol plans and export infrastructure as part of Council trade teams.

Trade is absolutely critical to U.S. farmers right now, and these sales show that buyers attending Export Exchange 2022 took the buying opportunities very seriously. Putting buyers and sellers together, building and sustaining relationships with our top global grain buyers have been hallmarks of Council activities worldwide. We are thrilled to see how much actual trade was done at the show and in association with it. Other grains traded at Export Exchange included:

- Corn Gluten Meal—24,250 metric tons;
- Sorghum—20,800 metric tons; and
- Soybean Meal – 77,000 metric tons.

The Export Exchange conference provides an ideal forum for continued relationship building among trading partners.

Benefits of U.S. Sorghum Studied in Spanish Swine Diets

To encourage end users to incorporate sorghum into their feed rations, the U.S. Grains Council partnered with a renowned commercial research institution, Animal Data Analytics (ADA), to conduct a trial showcasing the performance of sorghum in swine diets. Jace Hefner, USGC manager of global trade, travelled to Segovia, Spain to observe the trial's commencement.

Feeding trials are one of the most effective ways to market raw materials as feedstocks, since feed millers need to see the impact on their bottom line before buying a premium product. Without a thorough understanding of the return on investment, producers remain hesitant to consider alternatives to their locally available feedstocks.

"The Council is excited to partner with ADA to facilitate this trial," Hefner said. "This measurement of sorghum's efficacy in swine diets will not only serve to bolster its feed grain use in the Iberian Peninsula, but in markets around the world with elevated quality standards for pork products."

The trial consists of 288 pigs that will receive three separate diets: a traditional Spanish control diet of wheat and barley, a corn-based diet, and a sorghum-centric diet. The animals will be fed over the course of 77 days, including 28 days in the growing phase

and 49 in the finishing phase. Upon the trial's completion in February 2024, diet effects on health, performance, fat firmness, meat quality and color and environmental impact will be measured and aggregated.
Integrating sorghum into Iberian pig feeds has historically shown superior performance to competing feedstocks in global markets, particularly when compared to those native to Spain and its nearby trade partners.

"There is no doubt about the quality of U.S.-grown sorghum, and the Council's tireless support of agricultural research and testing continues to show its value to importers and international producers," Hefner said.

Thank you!
As the Council looks to seize these challenges and aggressively pursue these opportunities, we need the robust engagement of our members. We are grateful for our longstanding partnership with the Arkansas Corn and Grain Sorghum Board in these efforts and look forward to continuing and enhancing these efforts in FY2024 and beyond.

ATTACHMENT 4

To: Tommy Young, Chairman, Arkansas Corn and Grain Sorghum Promotion Board

From: Spencer Parkinson, Decision Innovation Solutions

Date: October 31, 2023

Re: Introduction to Decision Innovation Solutions (DIS)

Greetings Tommy:

To my knowledge we've not met but hope to have the pleasure of doing so soon. DIS is an economic analytics firm based in Des Moines, Iowa that, in part, delivers unique insights and analyses to agricultural organizations to advance the interests of their members. DIS delivers top shelf studies and targeted presentations by combining decades of industry insight with proprietary models and methodology honed over the past 16 years. Since our founding in 2007, DIS has earned an excellent reputation for flexibility, integrity, and responsiveness with organizations throughout the United States.

A few of us on the DIS team recently visited with Scott Bray at the Arkansas Department of Agriculture. During our conversation, we learned more of his new role with your board and were given a chance to describe some of the exciting work we're currently engaged in and many of the projects we've completed (either directly with or in conjunction with other state commodity organizations) for other state corn boards (i.e., Iowa, South Dakota, Minnesota, Missouri, Kansas and Illinois).

On the national level, we've completed projects for the National Corn Growers Association, the Iowa Renewable Fuels Association, the American Feed Industry Association, National Grain and Feed Association, the Pet Food Institute, United Soybean Board (often several projects per year since 2014), North American Renderers Association and the National Biodiesel Board (now the Clean Fuels Alliance). Additionally, we've had the pleasure of working with several export organizations such as the U.S. Soybean Export Council, USA Poultry and Egg Export Council, and through a partnership with NCGA, the U.S. Grains Council.

Following my signature, I have included several examples of work we've recently completed or are completing. We invite you and your board to review them and consider giving us the opportunity to visit about how our work would benefit Arkansas soybean farmers.

We thank you for your time and very much look forward to an opportunity to talk with you and the rest of the Arkansas Corn and Grain Sorghum Promotion Board about your specific research needs. Please don't hesitate to reach out with any initial questions or comments.

Spence

Spencer Parkinson
President, CEO and Founding Member
Decision Innovation Solutions, LLC
11107 Aurora Ave
Urbandale, IA 50322
O: 515.639.2900 / M: 515.639.2901
Email | Website | DIS Insights Blog

Decision Innovation Solutions Selected Work Samples

Below is a sample of projects recently completed for our clients. These projects typically utilize at least one of our core competencies: **Economic Impact and Contribution Analysis, Feasibility and Due Diligence, Market Analytics, Policy Analysis and Spatial and Time Series Analysis**. As we work with our clients, our ultimate goal is to provide them with all data, analytics, and in many cases, custom-built tools, to make sound business decisions.

Policy Analysis

Global Macroeconomic Indicators for the Poultry Meat Industry (2022) | *International Poultry Council.* The International Poultry Council represents the poultry meat sector on a wide range of subjects from policy to communications on the economic impact and contribution of the sector. The goal of this study was to provide an overview of the global poultry meat industry (chickens, ducks and turkeys) with an emphasis on the contributions of the poultry meat output of IPC members to regional and global economies. The report focused on three major areas: demographics, economics and market analytics.
Foreign Animal Disease Response Infrastructure and Needs Assessment (2022) | *Iowa Pork Producers Association.* The purpose of this project was to begin a comprehensive assessment of what is available and what is needed to respond to and deal with a foreign animal disease outbreak in Iowa, including, potentially, a total depopulation of hogs. This evaluation of current assets in Iowa for response will help Iowa hog producers, IPPA and other stakeholders determine what gaps there would be in successfully responding to and implementing a full depopulation of Iowa's hog inventory. The report generated from the assessment and case study outcomes is designed to be usable by the stakeholders to begin identifying needs and addressing gaps in research, data, and/or infrastructure.
Impact of Idling Productive Cropland on Rural Communities (2021) | *National Grain and Feed Association*. This study sought to provide an estimate of the economic contribution of grain and feed production at the U.S. and state levels. We also studied the reduction in cropland acreage since 1982 because of urban encroachment and other factors. A final component addressed the economic impact and ripple effects on rural communities from idling productive cropland. A "model rural community" was studied in-depth to better understand the impact at the community level.
Local Meat Processor Expansion – Hogs, Fed Cattle, and Slaughter Cow Draw Summary (2020) | *Illinois Farm Bureau.* This project estimated the economic impact of expansion of existing or location of new meat processing facilities. A second part of the project used the DIS commodity flow methodology to model the draw of Hogs, Fed Cattle and Slaughter Cows in and through the state of Illinois and twelve neighboring states.
Increased Biodiesel Production and Usage in Missouri (2020) | *Biodiesel Coalition of Missouri*. Analyzed the impact of additional production and usage of biodiesel in Missouri. Impact on soybean oil requirements, soybean and biodiesel movement (using an adapted form of our "commodity flow" methodology used for modeling movement of agricultural commodities), soybean processors, biodiesel producers was determined. Once an estimate of the volumetric change in biodiesel was determined, an economic impact study was conducted to estimate the economic impact of a larger biodiesel industry in Missouri.

Environmental and Economic Impacts of Global, Non-Science Based Maximum Residue Limit (MRL) Policies on the U.S. Corn Industry (2020) | *National Corn Growers Association.* This project assessed which countries/regions are the most likely to adopt non-science based MRL policies and how U.S. corn exports would be impacted by those policies. Second, determined the potential economic impact to the U.S. corn industry if farmers must cease use of a product and choose an alternative product or change management practices to deal with pest pressures. Third, estimated the potential environmental impact(s) if farmers ceased use of a product and chose an alternative product(s) or management practices. Finally estimating the potential economic impact to the U.S. corn industry if an export market is no longer accessible due to asynchronous or unattainable MRL policies.
Return on Investment (ROI) of Checkoff Funds and Membership Dues (2016-Current) | *Multiple Commodity Organizations.* Entities who collect checkoff funds or membership dues are often tasked with demonstrating the value that accrues to contributors. Using expenditure data and defining what initiatives were undertaken with the funds, DIS has developed methodology that is used to objectively quantify the financial impact an organization is able to have in many areas, including domestic promotion, trade, demand enhancement and policy development and implementation.

Economic Impact and Contribution

Economic Contributions of Iowa Agriculture (2009, 2014, 2019 and Forthcoming) | *Multiple Iowa Organizations.* In 2009, DIS updated a project originally conducted by Iowa State University in 2005. This project dealt with quantifying the importance of agriculture at the county, federal congressional district, and state levels.
Animal Agriculture Economic Impact and Soybean Meal Demand Analysis (annually from 2014-Forthcoming) | *United Soybean Board (USB).* This multi-year project annually estimates the economic impact of animal agriculture at the state and national levels. It also annually quantifies the volume of soy-related ingredients fed to major livestock and poultry by species, by stage of life, by state and region.
Economic Contribution of Animal Feed/Pet Food Production (2017 and 2023) | *American Feed Industry Association (https://www.afia.org/)* . This report estimated the economic contribution of animal feed/pet food production for the U.S., every U.S. federal congressional district and every U.S. state. This analysis was used to educate federal lawmakers on the local impact of a key component of agriculture. We are currently in the midst of an update to the original work completed in 2017.
Economic Contribution & Economic Impact Analysis of the Pork Industry in Key States (2021) | *National Pork Board*. This analysis studied the economic contribution of the pork industry at the state level for seven key pork-producing states (CO, IN, KS, NE, OK, SD and WI). Historical and current context/trends of the pork industry were presented. Economic impact studies for new sow and finishing farms were also provided for the study areas. Another key component of this analysis was a statistical analysis of what impact location of livestock farms has on home and land values. A similar effort was completed for nine additional U.S. states in 2022. Separate analyses have been conducted for IA for the Iowa Pork Producers Association and for IL for a multi-species group.
Economic Contributions of South Dakota Agriculture (2014, 2019 and 2021) | *Multiple South Dakota Organizations.* DIS completed the South Dakota Agriculture Economic Contribution Study at the state, federal congressional district (same as state) and county levels in 2014. The state level analysis was updated in 2019. The state and county levels were updated in July of 2021 in project co-sponsored by the South Dakota Corn Growers Association, Ag United for South Dakota and the Department of Agriculture and Natural Resources. Enterprise (dairy, hog and ethanol plant) economic impact studies were also provided.

Economic Contributions of Missouri Agriculture and Forestry (2016 and 2021) | *Missouri Department of Agriculture, Missouri Farm Bureau and the Missouri Agricultural & Small Business Development Authority.* This study was done at the state, federal congressional district and county levels.
Economic Impact of Moving the South Dakota Fairgrounds (2020) | DIS worked with a local business entity to estimate the impact of moving the state fair from its current location to a newer location.
Economic Contributions of Minnesota Agriculture and Forestry (2020) | *Twenty-four Minnesota agriculture and forestry organizations led by the Minnesota Agri-Growth Council*. This study was done at the state, federal congressional district and county levels and quantified the economic contribution of Minnesota agriculture and forestry.
Economic Impact Studies (2020) | *National Pork Producers Council*. Three geographic regions with significant pork production were identified. An economic impact study for sow production and hog finishing farms was then conducted for each of these three regions.
Economic Impact of COVID on Pork Processing in Key Pork Producing States (2020) | *National Pork Board*. When COVID caused pork processing in Minnesota, Iowa, South Dakota and Indiana to curtail their slaughtering and processing of hogs, significantly negative economic effects were felt throughout the pork production and processing industries. We estimated the economic impact of this at five major processors: Delphi, IN, Logansport, IN, Sioux Falls, SD, Waterloo, IA and Worthington, MN. A similar study was conducted for pork processing in the State of Illinois at approximately the same time.
Economic Contribution and Economic Impact Analysis of the Pork Industry in Iowa (2020) | *Iowa Pork Producers Association.* This analysis studied the economic contribution of the pork industry at the state level and 35 counties. IA was completed because of its large production of market hogs. Historical and current context/trends of the pork industry were presented. Economic impact studies for new sow and finishing farms were also provided at the state level.
Economic Contributions of Illinois Agriculture (2015 and 2019) | *Multiple Illinois Organizations*. DIS completed the Illinois Agricultural Economic Contribution Study at the state, county and congressional district level. This study also included detailed "breakout" studies for some of the state commodity associations. An update was completed in late 2019.
Economic Contribution of Animal Feed/Food Production (2017) | *American Feed Industry Association.* This report estimated the economic contribution of animal feed/food production for the U.S., every U.S. federal congressional district and every U.S. state. This was analysis used to educate federal lawmakers on the local impact of a key component of agriculture.
Economic Contributions of Alabama Agriculture and Forestry (2016) | *Auburn University.* DIS completed the Economic Contributions of Alabama Agriculture and Forestry Study by working with Auburn University to update and enhance a study previously conducted by the University of Florida. The study was completed at the state, federal congressional district and county levels.

Spatial and Time Series Analysis

Analysis of Projected Growth in Soybean Meal Production and the Animal Ag Industry (2023) | *Nebraska Soybean Association.* Domestic soybean crush capacity is expanding in response to increased demand for soybean oil for renewable fuels (biodiesel, renewable diesel and sustainable aviation fuel). New plants have been announced in Norfolk and David City, Nebraska that would add more than 90 million bushels of new crush capacity to that already existing in Nebraska. Other plants have been proposed in neighboring states. Considering the potential for significant expansion of soybean crush for soybean oil use in renewable fuels, we are working to understand how relative price changes for SBM in NE and U.S. markets may impact soybean meal inclusion rates, projected overall consumption of soybean meal in NE and U.S. livestock and poultry feed, and the resulting SBM that may be channeled into export markets

Analysis of Regional Soy Processing in Rural Areas (2023) | *Kansas Soybean Commission.* Over time, soybean growing areas, as well as regional soybean meal consumption, experience change. These shifts in both production and consumption patterns can result in inefficient processing gaps and leave producers with reduced marketing choices and/or excessive transportation costs for soybeans-to-processing and soybean meal-to-consumption. Regional processors may provide a sustainable approach to meeting those interests. This research helps leverage a business model that includes data, variables and relationships, business simulation and risk analysis will assist potential investors and other stakeholders in determining the feasibility and sustainability of building and operating a regional soybean processing facility.

Kansas Agribusiness Commodity Flow Study (2022) | *Kansas Department of Agriculture*. Using Kansas and neighboring states as the primary study area, we determined the flow of seventeen primary farm commodities, feed ingredients and renewable fuel commodities from farm to feeding, processing and international trade. This was enabled by our creation of our "Dynamic Flow Analysis" methodology, initially developed for a project in Missouri. We also analyzed the change in commodity flows from the construction of a new soybean crush facility in southeast Kansas.

Impact of CP-KCS Merger on U.S. Wheat Movement (2021) | *U.S. Wheat Associates*. Recent action taken at both railroads have cleared the way for a merger between the Canadian Pacific (CP) and Kansas City Southern (KCS) railroads. With significant domestic usage and large volumes destined for international locations, U.S. wheat growers are one set of stakeholders who will be impacted by the merger. Additionally, Canadian wheat growers in the prairie provinces are expected to be impacted by the merger. How wheat growers in the U.S. and Canada will be impacted by the merger was the subject of this analysis.

Commodity Flow and Infrastructure Analysis (2019) | *Missouri Soybean Merchandising Council*. Using Missouri and peripheral crop reporting districts as the primary study area, we determined the flow of four primary farm commodities (corn, soybeans, grain sorghum and wheat) from farm to feeding, processing and international trade. This was enabled by our creation of our "Dynamic Flow Analysis" methodology. We also analyzed the cost-benefit of improving infrastructure (deficient bridges) key to delivery of farm commodities and what the economic impact of deficiencies in bridges would be if not remedied.

Market Analytics

Global Macroeconomic Indicators for the Poultry Meat Industry (2022) | *International Poultry Council.* The International Poultry Council represents the poultry meat sector on a wide range of subjects from policy to communications on the economic impact and contribution of the sector. The goal of this study was to provide an overview of the global poultry meat industry (chickens, ducks and turkeys) with an emphasis on the contributions of the poultry meat output of IPC members to regional and global economies. The report focused on three major areas: demographics, economics and market analytics.

Animal Feed Consumption Report (2017 and 2021) | *American Feed Industry Association (AFIA) and the Institute for Feed Education and Research (IFEEDER)*. The first report of its kind in the U.S., the objective of this project was to estimate manufactured animal feed/pet food usage by animal species by life stage by state and region.
Missouri River Utilization Study (2021) | *Soybean Transportation Coalition* DIS and Bujanda & Allen were engaged to conduct a study on utilization of the Missouri River entitled "Missouri River -An Underutilized Link in the Soybean Supply Chain". The study included a historical analysis of the river's performance and the potential for improvements to improve its stability and duration of navigation periods.
Animal Agriculture Economic Impact and Soybean Meal Demand Analysis (annually from 2014-Forthcoming) | *United Soybean Board (USB).* This multi-year project annually estimates the economic impact of animal agriculture at the state and national levels. It also annually quantifies the volume of soy-related ingredients fed to major livestock and poultry by species, by stage of life by state and region.
Pet Food Production and Ingredient Analysis (2020) | In a report published in 2020 by our three-party-client (American Feed Industry Association, Pet Food Institute and North American Renderers Association), we studied the quantities and values of ingredients used in production of the nation's dog and cat foods.
Market Research for USA Poultry & Eggs in Sub-Saharan Africa (2020) | *USA Poultry & Egg Export Council*. The goal of this project was to identify the market potential for USA poultry & egg products in the Sub-Saharan African countries with particular emphasis on Nigeria, Senegal, Tanzania and Kenya. The DIS team collaborated with USAPEEC representatives in conducting the research.

Feasibility and Due Diligence

Clark County Port Strategic Plan/Market Study (2022) | *Northeast Missouri Regional Planning Commission.* The subject of this project was to .
Comprehensive Market Study – Multi-Modal Port (2020) | *Heartland Port Authority.* The subject of this project was to estimate the draw area and draw volumes of various types of cargoes that could realistically be exported from a new port on the Missouri River in central Missouri. Feasibility of the business plan was conducted, along with forecasts of likely tonnage estimates utilizing the inland port.
Comprehensive Market Study – Container on Barge Facility in Brunswick, MO (2020) | *AGRIServices of Brunswick.* This study was completed for the client to support a request a project designation for a container on barge (COB) facility at the client's existing port facility. The study included market, economic, and feasibility analysis. Dynamic Flow Analysis and Freight Rate Analysis were used to complete the study.

ATTACHMENT 5

Arkansas
Corn & Grain Sorghum Board

WEBSITE REPORT

FEBRUARY 2024

COMMUNICATIONS GROUP
POWERING INSIGHT

 1

1

OVERVIEW

- 2023 Recap
- Deliverables Review
- Summary of Updates
- Performance Insights
- Recommendations

2

SITUATION ANALYSIS

An audit of the Arkansas Corn & Sorghum Board's website was conducted in 2023. The results of the audit indicated the board's website was performing below acceptable industry standards at a "C" level. Contributing to this score is:

- A lack of social media integration,
- Overall low technical performance and usability,
- A deficiency in backlinking credibility.

While the site's search engine optimization (SEO) does stand out as the top performing component, it could be better.

Additionally, regular maintenance, including keeping the site's basic information and content current, has been neglected which is detrimental to the credibility and overall functionality of the site, therefore affected by the frequency in which the site is updated.

It is also important to consider that since the site was developed, changes in technology have rapidly changed. The older a site grows without regular maintenance, the more obsolete it becomes. Best industry practices dictate that an effective website should be updated at least every 2-4 years.

Given the lack of strategic direction and utilization, the website attracts little to no traffic, essentially defeating its own purpose.

It appears the website has no structured maintenance, management plan, or point-person to manage and maintain the site.

3

CHALLENGES

- Outdated Content
- Aging Technical Compatibility
- No Regular Maintenance Schedule
- No Dedicated Site Manager
- No Proactive Communications to Drive Traffic / Lack of Social Media (Integration)
- Backlinking Deficiency

4

DELIVERABLES REVIEW

TIER	SERVICE	DETAIL	SOLUTION
1	Content Refresh	• ComGroup will update the content of the website to replace existing content with current accurate information	• Outdated Content
2	Essential Updates	• ComGroup will implement any available tech upgrades to modernize the website for highest potential performance and expand the lifespan of the site	• Outdated Content • Aging Technology
3	Routine Website Maintenance & Management	• ComGroup will assume the management of the website; perform monthly maintenance; monitor, measure and report to the board on the website's functionality and performance; make unscheduled content updates to the site as requested	• Outdated Content • Aging Technology • No Regular Maintenance Schedule • No Dedicated Site Manager

5

SUMMARY OF UPDATES (1/4)

1. Updated footer information to Tyler Oxner
2. Added Matt Jackson's contact info to Ag in Classroom page
3. Added link to farm bureau offices on Ag in Classroom page
4. Set up and connected Google Analytics 4 to properly track website traffic since Google's Universal Analytics will no longer track after June. Excluded CG IP addresses from tracking and skewing analytics.
5. Changed address in Footer
6. Added sitemap to footer
7. Changed address on homepage map
8. Added Tyler's contact info to contact page
9. Added corrected address to map on contact page
10. Added header to contact page form

6

SUMMARY OF UPDATES (2/4)

11. Removed media page and added Contact Page to main nav bar
12. Added section about board members to about page with link to board members page
13. Added checkoff fund info to about page
14. Updated copy to make evergreen on Verification Program and Drying, Storage and Safety pages
15. Updated board members page to include some info about the board and updated titles
16. Created and implemented SEO-friendly page titles and descriptions
17. Unpublished pages that weren't being displayed
18. Added new plugin to display board members' photo on homepage. Added captions so names/titles could be displayed. And added button to link to board members page
19. Added button on homepage that links to more facts and FAQs
20. Updated facts on homepage and some copy

7

SUMMARY OF UPDATES (3/4)

21. Created AR Ag Leaders Page
22. Created AR Irrigation Contest Page
23. Created NCGA Page
24. Updated facts on about page
25. Add new pages to menu and removed UA Poultry Short Course page
26. Created new charts and updated allocations page
27. Added link to Crop Budgeting Tools page and updated copy
28. Optimized board member photos
29. Fixed issue where header images didn't display on mobile
30. Updated year in footer

8

SUMMARY OF UPDATES (4/4)

31. Added more spacing on each page before footer
32. Created new research studies page and added to mobile/desktop menus
33. Updated board members pages to add more space before footer
34. Matt Smith name change
35. Update performance testing flipbook
36. Update verification program flipbook
37. Update crop budgeting flipbook
38. Update flipbook for drying, store and safety page
39. Update corn and grain sorghum production handbooks

9

PENDING UPDATES

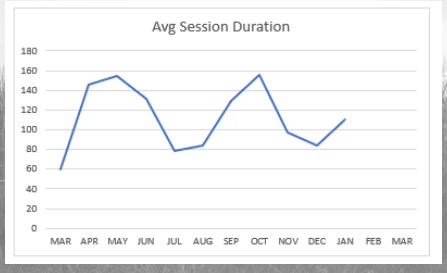
1. Add missing info to Tommy Young's board member page
2. Add missing info and photo for Matt Gammill's board member page
3. Add info and photo for Matt Smith's board member page

10

PERFORMANCE INSIGHTS

11

PERFORMANCE INSIGHTS



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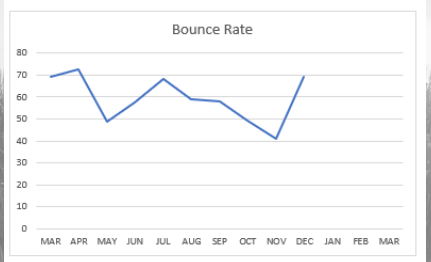
PERFORMANCE INSIGHTS



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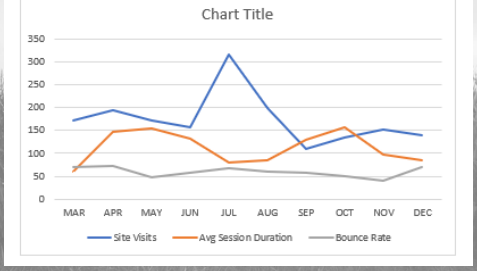
PERFORMANCE INSIGHTS



14

PERFORMANCE INSIGHTS

- **Stable Quarterly Traffic**: Observed consistent site traffic across each quarter, as detailed in the lower right quadrant.
- **Bounce Rate Insights**: Notable high bounce rate in Q1, which significantly decreased in subsequent quarters, likely due to website updates making information more current and relevant, addressing initial perceptions of outdated content or inactivity.
- **Lack of Marketing Initiatives**: Without targeted marketing efforts, the website's performance has been guided by organic market and consumer behaviors.
- **Organic Performance Insight**: This approach provided insights into the website's natural demand and utility from a user perspective.

15

RECOMMENDATIONS

- **Continue to Monitor and Track Website Performance**
- **Continue to Perform Monthly Health Checks and Regular Maintenance to Keep Site Current**
- **Develop and Implement Digital & Social Marketing Strategy**

16

QUESTIONS?

17

Carson Horn, APR
Public Relations Director
The Communications Group
chorn@comgroup.com
501-515-0849

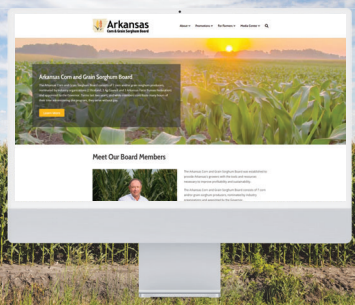
Thanks!
-CH

18

COMMUNICATIONS GROUP
POWERING INSIGHT

Corn & Sorghum Board Social Media

DATE
2.21.2024

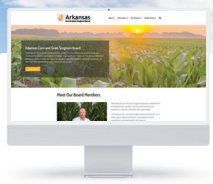


SOCIAL MEDIA

Goals

Increase Visibility & Awareness

Elevate the profile of Arkansas' corn and sorghum sectors, highlighting their growing importance in the state's economy and the agriculture industry at large.



Drive Website Traffic

Use social media as a tool to direct users to thewebsite for more in-depth information, resources, and engagement opportunities, thereby increasing the site's utility and relevance.

Community Engagement and Building

Foster a strong, interactive community of farmers, industry stakeholders, consumers, and students.

SOCIAL MEDIA

Target Audiences

Corn and Sorghum Farmers in Arkansas

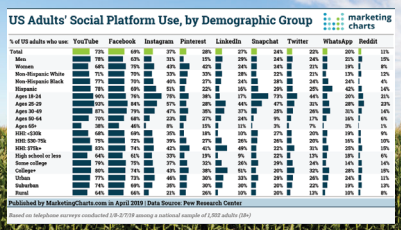
Seeking updates on agricultural practices, market trends, new technologies, and opportunities for networking and collaboration.

Consumers and Industry Stakeholders

Interested in the benefits and sustainability of corn and sorghum, market opportunities, and innovations in product development and biofuel production.

Students and Future Industry Leaders

Eager for educational content, career opportunities in agriculture, advancements in sustainable farming, and insights into the future of the industry.



RECOMMENDED PLATFORM

Facebook

Facebook remains the largest social media platform with a broad demographic reach, especially among adults who are key decision-makers in the agricultural and consumer sectors. It excels in community building, information sharing, and driving engagement.

SOCIAL MEDIA

Content Pillars

Community Roots

Spotlights the personal stories and successes of local farmers and communities, celebrating the human side of agriculture.

Grower Updates

Shares updates on market trends, crop health, funded research, and weather impacts, keeping the community informed with straightforward, relevant news.

Fields Beyond

Connects with students and industry stakeholders through educational content, career opportunities, research resources, and advancements in sustainable farming.

SOCIAL MEDIA

Content Ideas

- Field Updates: Share photos and videos of fields in progress, showcasing different stages of corn and sorghum growth, from planting to harvest.
- Board Member Spotlights: Highlight farmers serving on the board periodically.
- News/Announcements: Post updates on relevant agricultural news, policy changes, and announcements from the Arkansas Corn & Sorghum Board.
- Market Updates: Provide regular updates on corn and sorghum market trends, prices, and demand forecasts to keep farmers informed.
- Sustainability Tips: Share tips and best practices for sustainable farming, including water conservation, soil health, and eco-friendly pest management.
- Event Highlights: Cover agricultural events, webinars, and community gatherings, offering recaps and highlights for those who couldn't attend.
- Research Highlights: Share the latest insights from university researchers working on board-funded projects.
- Educational Resources: Post infographics, articles, and videos that educate on corn and sorghum farming techniques, technology, and research findings.
- Seasonal Advice: Offer timely advice and reminders about seasonal farming activities, pest management, and crop rotation strategies.
- Q&A Sessions: Host regular Q&A sessions with experts in agriculture, giving followers the chance to ask questions and get advice.
- Student Engagement: Share opportunities for students interested in agriculture, including scholarships, internships, and educational programs.

RECOMMENDATION ONE

Organic Social

- Account Setup and Optimization
  - Creation and optimization of the Facebook Page, including profile setup, bio, and initial strategy to encourage early followers.
  - Integration of Facebook with the website for seamless content sharing and traffic redirection.
- Content Strategy & Creation (2-3 Posts Weekly)
- Engagement and Community Management
  - Daily monitoring and management of the Facebook Page and Group to foster a vibrant community.
  - Prompt response to comments, messages, and inquiries to build relationships and encourage active participation.
- Analytics and Monthly Reporting

One-time Setup Investment: $1,000
Monthly Investment: $1,800

Optional: $1,000 monthly ad budget for limited time specifically targeting Arkansas corn and sorghum growers to encourage them to follow the page.

RECOMMENDATION TWO

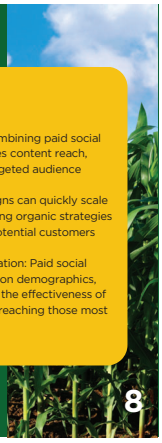
Paid Social

- Ad Campaign Strategy
- Creative Development
- Campaign Setup and Management
- Continuous Optimization & Monitoring
- Monthly Analytics and Reporting

Benefits

- Enhanced Reach and Visibility: Combining paid social media with organic efforts amplifies content reach, ensuring visibility to a broader, targeted audience beyond organic limitations.
- Accelerated Growth: Paid campaigns can quickly scale up audience growth, complementing organic strategies by attracting new followers and potential customers more rapidly.
- Improved Targeting and Segmentation: Paid social allows for precise targeting based on demographics, interests, and behavior, enhancing the effectiveness of both organic and paid content by reaching those most likely to engage.

Monthly Recommended Ad Spend: $1,000 - $1,500
Monthly Management Investment: $1,000



RECOMMENDATION THREE

Website

- Annual Hosting Fees - $2,000 per year
- Website Management, Optimizations & Analytics - $500 per month

Benefits

- Continuous Improvement: Monthly management ensures your website remains up-to-date, secure, and aligned with the latest web standards and technologies.
- Data-Driven Decisions: Regular analytics review can help inform strategic adjustments for improved outcomes.

Discussion

ATTACHMENT 6

DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

Proposals For Funding Corn and Grain Sorghum Research 2024-2025

February 22, 2024

Submitted to the

Arkansas Corn & Grain Sorghum Board

Arkansas Corn and Grain Sorghum Promotion Board

Table of Contents

2024-2025 Proposals for Funding – February 22, 2024

	J. Kelley and T. Roberts		
57	**Cover Crops in Corn Rotations- What Works and What Doesn't? (Year 2 of 3).** *T. Roberts, J. Kelley and G. Drescher*	$46,599	$39,729
Diseases			
61	**Towards a comprehensive aflatoxin solution: Creating and integrating novel aflatoxin control resources for an effective, sustainable management strategy (Year 2 of 3).** *B. Bluhm and G. Johal*	$45,000	$45,000
65	**Assess Management Options for Corn Nematodes in Arkansas (Year 3 of 3).** *T. Faske, D. Rivera, A. Greer and M. Emerson*	$53,713	$55,401
Economics			
69	**Corn and grain sorghum enterprise budgets and production economic analysis (Ongoing).** *V. Ford and B. Watkins*	$10,000	$10,000
Fertility			
74	**Fine-tuning Potassium Recommendations and Investigating Intensive Tissue Analysis for Sustainable Corn Production (Year 3 of 3).** *T. Roberts, J. Kelley and G. Drescher*	$55,934	$56,395
Insects			
78	**Assessing Susceptibility of Insect Pests of Corn in Storage to Selected Insecticides (Year 3 of 3).** *G. Studebaker, N. Bateman, B. Thrash and N. Joshi*	$40,563	$41,305
Irrigation			
83	**The Arkansas Irrigation Yield Contest (Year 7).** *C. Henry*	$10,000	$10,000
84	**Improving Irrigation Technology for Corn Production in Arkansas (Year 2 of 3).** *C. Henry, J. Kelley, T. Spurlock and C. Capps*	$185,281	$185,280
Misc.			
88	**Arkansas Discovery Farms (Year 3 of 3).** *M. Daniels*	$5,000	$5,000
91	**Arkansas Corn & Grain Sorghum Research Studies Series, an annual report and archival system for all Board-funded research (Year 3 of 3).** *J. Kelley, V. Ford and N. McKinney*	$4,498	$4,667
95	**Use of gossypol to inhibit reproduction in domestic hogs as a model for feral hog control (Year 2 of 3).** *B. Littlejohn, C. Maxwell, T. Tsai and M. Snider*	$30,000	$60,016
99	**Arkansas Future Ag Leaders Tour (Year 3 of 3).** *J. Robinson*	$5,000	$5,000
103	**Performance Crop Insurance as a risk management tool for corn and grain sorghum producers in Arkansas (Year 3 of 3).** *L. Connor*	$29,810	$29,987
Verification			

107	**Corn and Grain Sorghum Research Verification Program (Year 1 of 3).** *J. Kelley, T. Faske, T. Spurlock, T. Roberts, T. Barber, G. Studebaker, Breana Watkins, C. Henry and C. Capps*	$126,000	$130,000
Weed Control			
111	**Evaluation of new herbicides, premixes, programs, and application methods for improved control of problematic weeds in corn (Year 2 of 3).** *T. Barber and J. Norsworthy*	$80,616	$87,293
Projects Completed			
	Comparing the effects of Nitrogen sources and application strategies on corn performance (Year 3 of 3). *T. Roberts, J. Kelley and G. Drescher*	$75,188	$0
	Developing a green integrated approach to enhance the utilization of grain sorghum in foods (Year 3 of 3). *A. Ubeyitogullari*	$42,205	$0
	Economic Analysis of Corn and Grain Sorghum Production and Marketing Practices (New, Year 1 of 1). *B. Deaton*	$5,713	$0
	Determining the value added of starter fertilizer with in-furrow fungicide on corn (Year 3 of 3). *T. Spurlock, J. Kelley and J. Davis*	$26,000	$0
	A web tool to assess mid-season nitrogen fertilizer needs from aerial imagery (Year 3 of 3). *A. Poncet, L. Purcell, T. Roberts and J. Kelley*	$54,000	$0
	Total	**$962,120**	**$1,255,007**

Arkansas Corn and Grain Sorghum Board – Proposal 2024-2025

Title: Exploring Plasma-Activated Water for Enhanced Biocontrol of Aflatoxins and Diseases in Corn Plants

Lead Investigator: Griffiths Atungulu

Co-Investigators: Mahfuzur Rahman, Burt Bluhm

Status: New

Research Area: Diseases

Stated Objective: A wide range of diseases can affect corn production in Arkansas, including foliar diseases, stalk rots, and ear rots. Pathogens present unique challenges for management, with issues such as fungicide resistance, evolution to overcome genetic resistance, the ability to evade management (such as Aspergillus ear rot/aflatoxin) and newly emerging diseases (such as tar spot). Thus, new disease management tools would help mitigate risks associated with the unpredictable nature of corn diseases.

Traditional biocontrol methods show promise in managing aflatoxin contamination in field conditions, but face limitations influenced by environmental factors. Integrating biocontrol with innovative approaches could enhance efficacy and sustainability in disease management, impacting grain yield and quality positively.

This research aims to evaluate the efficacy of plasma-activated water on corn plants as a novel biocontrol method for aflatoxins and other plant diseases affecting grain yield and quality. Plasma, the fourth state of matter, generates charged particles, altering atmospheric gases to create biologically active plasma-activated water. This project exploits plasma properties to combat pathogenic fungi and microbes affecting corn.

Specific Objectives:

1. Generate various plasma-activated water types using a recently acquired plasma generator and assess their efficacy against fungal pathogens of corn.
2. Evaluate plasma-activated water's ability to suppress pathogenic activity and prevent toxin accumulation when applied to corn plants.
3. Analyze traits of harvested corn treated with plasma-activated water versus untreated samples.

Methods:

Phase 1: Generate four plasma-activated water types, testing effectiveness and dosages against a wide range of corn pathogens, with emphasis on aflatoxigenic strains of *A. flavus*. For this work, the Bluhm lab has an extensive collection of pathogens causing corn diseases, including stalk rots (Fusarium stalk rot, Gibberella stalk rot, Anthracnose stalk rot, Diplodia stalk rot, Charcoal rot), foliar diseases (Gray leaf spot, Anthracnose, Northern and Southern corn leaf blight, Southern and Common rust), and ear rots/mycotoxins (Aspergillus ear rot/aflatoxin, Fusarium ear rot/fumonisins, Gibberella ear rot/vomitoxin, Diplodia ear rot/diplodiatoxins, Penicillium ear rot/ochratoxin, and Trichoderma ear rot). Multiple strains of each pathogen will be evaluated for inhibition of growth and mycotoxin production (where applicable). Experiments will be performed initially in pure culture in laboratory conditions to obtain a baseline of sensitivity to plasma-activated water. The primary variables to be explored are time and intensity of

dosage for each of the four plasma-activated water types. For *A. flavus*, a large collection (>200) isolates will be evaluated for inhibition of growth and aflatoxin production.

To generate the four different types of plasma-activated water, a plasma generator coupled with bubble and frit reactors will be used to generate cold plasma at voltages ranging from 80 to 325V, with discharge frequencies between 1-2 kHz and duty cycle range as 50-150 s. Two different gas sources, nitrogen and air at two different discharge frequencies (1000 vs 2000 Hz) will be utilized to regulate the reactive species (nitrogenous or oxygenous) and their reactivity.

Phase 2: Inoculate healthy corn plants with different pathogens, assessing treatment efficacy based on dosage and application timing. Depending on the sensitivity of pathogens to plasma-activated water (as determined in Phase 1 of the project), a subset of pathogens will be selected for further evaluation. Emphasis will be placed on pathogens of greatest concern/economic importance. Pathogens will first be inoculated on susceptible hybrids in greenhouse conditions to ensure disease development. Plasma-activated water treatments will be applied with information from Phase 1 as a guide to dosage and timing. Suppression of disease will be quantified by assessing symptoms such as lesion number and size, yield, and kernel colonization/production of mycotoxins (the details of the approach to induce and assess pathogenesis will vary depending on the specific pathogen). We will also evaluate potential negative effects on host plants, particularly with respect to kernel set/development, yield, and vigor.

Phase 3: Study treatment implications on corn traits post-treatment. Non-treated samples will serve as controls in each phase. The degradation kinetics will be evaluated with respect to different factors like kernel size, shape, composition, level of pathogen infestation and accumulation of toxins in the grain and other changes that determine suitability for food and feed applications. In future, the aim is to develop a novel and cost-effective protocol using plasma-activated water at a field scale for biocontrol of aflatoxins and diseases in corn plants.

Planned Milestones:

2024: Complete Phase 1

2025: Complete Phase 2

2026: Complete Phase 3

Projected Value:

Plasma technology offers scalability and cost-effectiveness. Leveraging existing infrastructure, like irrigation, and potential aerial application via planes or drones, could significantly reduce aflatoxin loads and combat a wide range of corn diseases. The technology also could potentially be used in sanitation (e.g., trucks, bins) to reduce post-harvest infection with *A. flavus* and other storage fungi.

Budget Justification: The budget will be allocated to three faculty members: Dr. Burt Bluhm (plant pathologist collaborator), Dr. Atungulu (grain processing systems engineer), and Dr. Rahman (plasma degeneration expert). Salaries for a research associate, a full-time graduate student, and hourly personnel are requested. The research associate will train the graduate student, oversee experiments, and troubleshoot. Out-of-state travel costs for professional conferences and expenses for laboratory supplies, chemicals, and grain quality analysis are also included.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Atungulu, Griffiths — *Exploring Plasma-Activated Water for Enhanced Biocontrol of Aflatoxins and Diseases in Corn Plants*

Year	2024/2025	**Project Year**	New
Lead Investigator	Atungulu, Griffiths	**Co-PI #1**	Rahman Mahfuzur
Co-PI #2	Bluhm, Burt	**Co-PI #3**	
Department	FDSC Food Science		
Commodity Board	Corn and Grain Sorghum Board		
Project Title	Exploring Plasma-Activated Water for Enhanced Biocontrol of Aflatoxins and Diseases in Corn Plants		

Version: 6.0 (11/01/2023)

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

		Atungulu, Griffiths	Rahman Mahfuzur	Bluhm, Burt		Total Board Funding Requested	AES Portion	CES Portion
Select "AES" or "CES" for each PI		AES	AES	AES				
Fulltime Personnel								
Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
Research Associate	Nikitha Modupolli	20%		$8,333			$8,333	$8,333	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Subtotal: Salaries		$0	$8,333	$0	$0	$8,333	$8,333	$0
	Graduate Student								
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
	Roshanak Zolqadri	25%		$10,000			$10,000	$10,000	$0
	Graduate Student (TB	25%	$10,000				$10,000	$10,000	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Tuition		$3,398	$3,398			$6,796	$6,796	$0
	Subtotal: Graduate Student		$13,398	$13,398	$0	$0	$26,796	$26,796	$0
	Hourly								
			Wages				**Total**	**AES Portion**	**CES Portion**
	Hourly-Personnel		$2,500	$1,500	$3,500		$7,500	$7,500	$0
	Hourly-Students						$0	$0	$0
	Subtotal: Hourly		$2,500	$1,500	$3,500	$0	$7,500	$7,500	$0
	Fringe Benefits								
Fringe benefits are calculated when salary and wage amounts are entered above.			**Benefits**				**Total**	**AES Portion**	**CES Portion**
	Fulltime Personnel		$0	$2,633	$0	$0	$2,633	$2,633	$0
	Graduate Students		$420	$420	$0	$0	$840	$840	$0
	Hourly Personnel		$198	$119	$277	$0	$593	$593	$0
	Hourly-Students		$0	$0	$0	$0	$0	$0	$0
	Subtotal: Fringe Benefits		$618	$3,172	$277	$0	$4,066	$4,066	$0
	Personnel Total		$16,516	$26,403	$3,777	$0	$46,695	$46,695	$0
	Travel								
Justify out-of-state travel in proposal.			**Travel**				**Total**	**AES Portion**	**CES Portion**
	In-State		$1,000	$1,000	$1,000		$3,000	$3,000	$0
	Out-of-State			$1,000			$1,000	$1,000	$0
	Travel Total		$1,000	$2,000	$1,000	$0	$4,000	$4,000	$0

University of Arkansas System Division of Agriculture
Promotion Board Budget

Atungulu, Griffiths — *Exploring Plasma-Activated Water for Enhanced Biocontrol of Aflatoxins and Diseases in Corn Plants*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$2,500	$2,000	$8,000		$12,500	$12,500	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$2,500	$2,000	$8,000	$0	$12,500	$12,500	$0
	Total for Proposal	$20,016	$30,403	$12,777	$0	$63,195	$63,195	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Atungulu, Griffiths	Rahman Mahfuzur	Bluhm, Burt		Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

ARKANSAS CORN AND GRAIN SORGHUM BOARD
2024-2025 PROPOSAL

Title: Economic Analysis of Corn and Grain Sorghum Production and Marketing Practices

Lead Investigator: Dr. Brian Deaton, Associate Professor

Status: New

Research Area: Verification Program

Stated Goal: The project will assist producers as they continue to seek opportunities for increasing incomes, decreasing costs, and reducing risks.

Specific Objectives: The overall objective of this study is to provide an economic analysis for the following proposed projects and other Corn and Grain Sorghum Promotion Board funded projects that would benefit from economic analysis. Specific objectives are:

(1) Conduct an economic analysis of production practices used in the Arkansas Corn and Grain Sorghum Research Verification Program that impact profitability and verify Extension recommendations. (J. Kelley and C. Capps)

(2) Standardize the economic analysis by integrating the 2023 corn verification program data with data from previous years. This will continue to document the long-term benefits of the Arkansas Corn and Grain Sorghum Research Verification Program. (J. Kelley and C. Capps)

(3) Provide economic assistance and interpretation of agronomic results for projects previously funded or proposed for funding by CGSPB.

Methods: The economic feasibility of various production management decisions suggested in the Corn and Grain Sorghum Research Verification Program will continue to be analyzed using enterprise budgets. Production economics will be applied to multiple agronomic CGSPB projects currently funded or proposed. Specific information related to field operations, inputs, irrigation, and yield will be entered into a computerized budget generator to estimate production costs. Breakeven prices and/or yields will be used to determine production practices that offer producers highest expected net returns for their corn and grain sorghum enterprises. Data will be gathered in visits to cooperating producers across Arkansas with results presented at county/state/regional/national meetings.

Planned Milestones: [Objectives 1 & 2 – Kelley and Capps]

April 10 - Integrate the 2023 corn verification program data into the historical database that contains data from previous years.

July 15 - Begin electronic coordinator data submission through planting for all cooperators in the Arkansas Corn and Grain Sorghum Research Verification Program from each respective field.

November 1 - Receive final CGSPB production input data reports and begin computer entry. CGSPB Coordinator will check items for accuracy after initial entry.

November 15 - Receive final CGSPB harvest data reports and begin computer entry. CGSPB Coordinator will check added items after initial entry.

December 22 - Complete first draft of CGSPB economic analysis tables. CGSPB Coordinator will check items after completion.

January 15 - Finish economic analysis for CGSPB Report publication and distribution.

[Objective 2 – Various Project Leaders]

Weekly - Provide continued Arkansas corn cash market summaries for publication through "Row Crops Blog" online newsletter outlet in cooperation with the Arkansas State Corn and Grain Sorghum Agronomist. Work with Communication Group along with other media outlets to provide additional national exposure for the Arkansas corn and grain sorghum industry.

Monthly - Provide corn and grain sorghum economic presentations to county/regional meetings, state research verification tour, and research center field days in-state and otherwise as requested.

Statement of Projected Value: This project extends previous CGSPB work to address agronomic issues. Benefits from economic analysis of alternative corn and grain sorghum production strategies assist producers in identifying opportunities to adjust individual costs and incomes while providing a significant reduction in the risk levels that producers face. Maintenance of a historical database of annual CGSPB data provides valuable time series corn data for extended research. Economic analysis of Board-funded production projects adds value to the projects and increases the return for check-off dollars invested. Results enable producers to make management decisions based on profit maximization rather than just maximizing yield.

Budget Justifications/Explanation of Travel and Direct Costs: Activities with state specialists, county agents, and corn producers within the Mid-South states require the requested funding for travel.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Brian Deaton — *Economic Analysis of Corn and Grain Sorghum Production and Marketing Practices*

Year	2024/2025	**Project Year**	New	**Version: 6.0 (11/01/2023)**
Lead Investigator	Brian Deaton	**Co-PI #1**		
Co-PI #2		**Co-PI #3**		
Department	AFRC			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Economic Analysis of Corn and Grain Sorghum Production and Marketing Practices			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Brian Deaton				**Total Board Funding Requested**	**AES Portion**	**CES Portion**
Select "AES" or "CES" for each PI	AES						
Fulltime Personnel							
Position Title / **Name** *(if position is filled)* / **% Time**	**Salaries**				**Total**	**AES**	**CES**
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Subtotal: Salaries	$0	$0	$0	$0	$0	$0	$0
Graduate Student							
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.							
Name *(if position is filled)* / **% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Tuition					$0	$0	$0
Subtotal: Graduate Student	$0	$0	$0	$0	$0	$0	$0
Hourly							
	Wages				**Total**	**AES Portion**	**CES Portion**
Hourly-Personnel	$3,500				$3,500	$3,500	$0
Hourly-Students					$0	$0	$0
Subtotal: Hourly	$3,500	$0	$0	$0	$3,500	$3,500	$0
Fringe Benefits							
Fringe benefits are calculated when salary and wage amounts are entered above.							
	Benefits				**Total**	**AES Portion**	**CES Portion**
Fulltime Personnel	$0	$0	$0	$0	$0	$0	$0
Graduate Students	$0	$0	$0	$0	$0	$0	$0
Hourly Personnel	$277	$0	$0	$0	$277	$277	$0
Hourly-Students	$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits	$277	$0	$0	$0	$277	$277	$0
Personnel Total	$3,777	$0	$0	$0	$3,777	$3,777	$0
Travel							
Justify out-of-state travel in proposal.							
	Travel				**Total**	**AES Portion**	**CES Portion**
In-State	$500				$500	$500	$0
Out-of-State	$500				$500	$500	$0
Travel Total	$1,000	$0	$0	$0	$1,000	$1,000	$0

University of Arkansas System Division of Agriculture
Promotion Board Budget

Brian Deaton — *Economic Analysis of Corn and Grain Sorghum Production and Marketing Practices*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$1,000				$1,000	$1,000	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$1,000	$0	$0	$0	$1,000	$1,000	$0
	Total for Proposal	$5,777	$0	$0	$0	$5,777	$5,777	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

Ecosystems (Rice Only)		%	Brian Deaton				Total	
	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Corn Yield Forecast System for the US Mid-South

Lead Investigators: Elvis F. Elli

Co-Investigators: Jason P. Kelley, Gerson L. Drescher

Status (i.e., New, Year 2 of 3, Year 2 of 2, etc.): New (Year 1 of 3)

Research Areas (Verification Program, General Agronomics, Diseases, Insects, Fertility, Irrigation, Weed Control, Misc. Projects): Misc. Projects (crop physiology and modeling)

Stated Goal: Reliable seasonal forecasts of crop yields are among the most valuable pieces of information that different stakeholders can have to make strategic decisions. Corn acreage has considerably increased over the last decade in Arkansas, but interannual yield variability is large and its uncertainties need to be quantified and better understood. Designing yield forecast frameworks has the potential to provide scientific and practical value to assist in decision-making for different stakeholders, ranging from farmers to policymakers and governments to commodity traders. Different approaches have been used to develop seasonal yield forecast systems, such as remote sensing, machine learning/statistical models, field surveys, and process-based models (e.g., the APSIM framework). Trade-offs exist among methods in terms of simplicity, accuracy, timing, scale, and explanatory power. Process-based crop models use weather, soil, variety physiology, and management information as input to simulate crop growth and development. One of the challenges in using process-based models is the large number of input data and parameters required for model calibration, which can be overcome by conducting high-resolution field experiments. An additional challenge is the uncertainty related to unknown weather from the forecast date (e.g., middle of the growing season) to physiological maturity. One potential approach to address this issue is using real-time weather data until the forecasting date and then using historical weather scenarios from the forecasting date to maturity. Crop models have shown great potential for use in yield forecast systems in the US, but we lack a robust system focused on the US Mid-South. The overarching objective of this proposal is to develop a comprehensive seasonal yield forecast system for corn using a process-based modeling approach combined with historical daily weather information for the US Mid-South region.

Specific Objectives: (1) Conduct field experiments across contrasting environments to collect relevant crop measurements necessary for model testing and development of cultivar parameters; **(2)** Test the ability of a crop simulation model (APSIM) to simulate soil-plant processes. **(3)** Develop a forecast system protocol for the US Mid-South using the APSIM and historical weather information.

Methods:

Objective 1: In the first year, three corn hybrids will be planted in three contrasting locations within the University of Arkansas System Division of Agriculture's properties, under two planting dates (early and normal). Experiments will be conducted with a randomized complete block design and four replications. Crop measurements will be taken approximately every two weeks and include total biomass and its partitioning to different organs, tissue nitrogen (N) concentration, leaf area index, and phenology. Crop yields will be collected at physiological maturity. Soil moisture and temperature sensors will be installed. At the end of year one, we will have yield data of 72 plots and approximately 700 in-season samples of biomass/partitioning, as well as tissue N concentration of different organs. Field experiments will be redesigned and expanded in the following years as needed to capture more variability and address specific needs for crop model improvement. All crop management practices (e.g., nutrient management, pest and

weed control, and irrigation) will follow the University of Arkansas Cooperative Extension Service recommendations.

Objective 2: Experimental data from *Objective 1* and literature information will be used to develop cultivar parameters and test the ability of a crop simulation model (APSIM) to simulate plant and soil processes. Soil parameters will be derived from a combination of SSURGO (Soil Survey Geographic Database) and measured data. Daily weather information required to run the model (maximum and minimum temperature, solar radiation, and rainfall) will be retrieved from local weather stations when available or satellite-based data.

Objective 3: We will create a synthetic daily weather file that accounts for actual data up to the forecast date, and then historical weather scenarios of at least 30 past years from that forecast date to physiological maturity. We will start running the model at the planting date and will rerun it every week as actual weather information becomes available to update forecasted yields. At the end of the growing season, we will use all field measurements and final observed crop yields to evaluate the accuracy of the forecast system. As more measurements become available, we will perform additional model calibrations and adjustments to improve the forecast system.

Planned Milestones:

Work Plan and Timeline	Year 1				Year 2				Year 3			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Objective 1: Conduct field experiments for model testing and development of cultivar parameters												
Field experiments and in-season sampling												
Data analysis and quality control												
Objective 2: Evaluate the ability of a crop model (APSIM) to simulate soil-plant processes across US Midsouth												
Set up APSIM model for all sites												
Develop cultivar coefficients												
Model testing and evaluation												
Objective 3: Develop a forecast system protocol using APSIM framework for the different experimental sites												
Creating synthetic weather files												
Additional model calibration												
Forecast system implementation												

Statement of Projected Value: Predicting exact crop yields before harvest has been historically a wish puzzling. Year-to-year weather variability and the occurrence of extreme weather events such as drought and flooding challenge our capacity to appropriately predict crop growth and raise uncertainties that limit decision-making. We hypothesize that using a process-based modeling approach coupled with 30-year historical weather information can provide reasonable predictions of crop yields because this approach can dynamically represent soil and plant processes. Quantifying weather uncertainty over the growing season and its interaction with soil and management factors would improve our understanding of the cropping systems and facilitate the conceptualization of solutions to enhance productivity. The ultimate goal of the project is to develop a corn yield forecast system for the US Mid-South that will assist agricultural practitioners in decision-making, mitigating risks, and potentially increasing profits.

Budget Justifications/Explanation of Travel and Direct Costs: Funds are requested for 50% support of an MS student who will be assigned to this project, and 30% support of a program associate who will assist the student with data collection. In-state travel funds are requested for in-season data collection across the experimental sites. Out-of-state travel funds are requested to present preliminary research findings at the 2024 ASA-CSSA-SSSA conference in San Antonio, TX. Supplies and other direct expenses are requested for lab and field supplies, including bags, tags, stakes, and soil and plant analysis.

University of Arkansas System Division of Agriculture

Promotion Board Budget

Elli, Elvis — *Corn Yield Forecast System for the US Mid-South*

Year	2024/2025	**Project Year**	New	**Version: 6.0 (11/01/2023)**
Lead Investigator	Elli, Elvis	**Co-PI #1**	Kelley, Jason	
Co-PI #2	Drescher, Gerson	**Co-PI #3**		
Department	CSES Crop, Soil, Environmental Science			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Corn Yield Forecast System for the US Mid-South			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

		Elli, Elvis	Kelley, Jason	Drescher, Gerson		Total Board Funding Requested	AES Portion	CES Portion
	Select "AES" or "CES" for each PI	AES	CES	AES				
Fulltime Personnel								
Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
Program Associate		30%	$15,000				$15,000	$15,000	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Subtotal: Salaries		$15,000	$0	$0	$0	$15,000	$15,000	$0
	Graduate Student								
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
		50%	$11,000				$11,000	$11,000	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Tuition		$3,800				$3,800	$3,800	$0
	Subtotal: Graduate Student		$14,800	$0	$0	$0	$14,800	$14,800	$0
	Hourly								
			Wages				**Total**	**AES Portion**	**CES Portion**
	Hourly-Personnel						$0	$0	$0
	Hourly-Students						$0	$0	$0
	Subtotal: Hourly		$0	$0	$0	$0	$0	$0	$0
	Fringe Benefits								
Fringe benefits are calculated when salary and wage amounts are entered above.			**Benefits**				**Total**	**AES Portion**	**CES Portion**
	Fulltime Personnel		$4,740	$0	$0	$0	$4,740	$4,740	$0
	Graduate Students		$462	$0	$0	$0	$462	$462	$0
	Hourly Personnel		$0	$0	$0	$0	$0	$0	$0
	Hourly-Students		$0	$0	$0	$0	$0	$0	$0
	Subtotal: Fringe Benefits		$5,202	$0	$0	$0	$5,202	$5,202	$0
	Personnel Total		$35,002	$0	$0	$0	$35,002	$35,002	$0
	Travel								
Justify out-of-state travel in proposal.			**Travel**				**Total**	**AES Portion**	**CES Portion**
	In-State		$5,000				$5,000	$5,000	$0
	Out-of-State		$3,000				$3,000	$3,000	$0
	Travel Total		$8,000	$0	$0	$0	$8,000	$8,000	$0

University of Arkansas System Division of Agriculture
Promotion Board Budget

Elli, Elvis — *Corn Yield Forecast System for the US Mid-South*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$3,000				$3,000	$3,000	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs	Tissue Nitrogen Analysis	$7,000				$7,000	$7,000	$0
Station Maintenance	SAREC, Fayetteville	$1,250	$0	$0	$0	$1,250	$1,250	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$1,200	$0	$0	$0	$1,200	$1,200	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$1,200	$0	$0	$0	$1,200	$1,200	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$13,650	$0	$0	$0	$13,650	$13,650	$0
	Total for Proposal	$56,652	$0	$0	$0	$56,652	$56,652	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Elli, Elvis	Kelley, Jason	Drescher, Gerson		Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: University of Arkansas System Division of Agriculture Feed Kits

Lead Investigators: Allison Harman

Status (i.e., New, Year 2 of 3, Year 2 of 2, etc.): New

Research Areas: Misc. Project

Stated Goal:
To provide each of the 75 Arkansas county Extension offices with a UADA Feed Kit as an educational resource and training tool for youth and adult animal science programs. Arkansas agriculture is more than a $20 billion industry producing significant amounts of U.S. livestock and crop production. The goal of this resource is to increase the quality of educational efforts by UADA county agents at no expense to the county budget. This project was previously completed in 2015 but was not accessible to all counties due to cost and limited scale. Feedback from county agents indicates that the counties that still have access to the kits are missing feed or have missing answer keys. Use of an educational feed kit will increase awareness of feeding options for livestock, focus on Arkansas grown feed grains, and emphasize the importance of our agricultural industries in Arkansas.

Specific Objectives:
- Provide each Arkansas county with a resource for youth and adult education.
- Source as much feed as possible from Arkansas farms and businesses.
- Increase awareness of the different commodities used as livestock feeds.
- Increase a county's ability to train 4-H Animal Science contest teams.

Methods:
Each kit will contain 3 or 4-ounce samples of 36 feedstuffs commonly utilized in livestock rations. These feeds will be sourced as locally as possible with emphasis on utilizing Arkansas farms and businesses. Each county will be provided with a plastic bin to hold the plastic jars containing the feed. Each feed jar will be filled and labeled with a number that corresponds to the name of the feed on an answer key. The answer key will be a two-sided laminated paper with the list of feeds, logos of the supporting organizations, and brief nutritional information about the feed. Each county will receive a complete UADA Feed Kit by December 2024.

Planned Milestones:
1. Formalization of a detailed project management plan: February
2. Sourcing and accumulating feeds: March
3. Order plastic bins and jars: March
4. Assembly of feed kits and creation of answer key: June
5. Distribution of feed kits to each county office: September
6. Have all UADA Feed Kits to each county office: December

Statement of Projected Value:

Counties with the previous UADA Feed Kits have emphasized the broad array of educational programs utilizing this resource. The 4-H Livestock Skill-a-thon and Hippology contests have feed identification portions of the contest. Training of these skills is improved by access to tangible feedstuffs. Producer groups can also be educated on the value of adding commodity feeds to supplement livestock rations at reduced costs while being informed about the variety of options and physical characteristics of those feeds. County agents have also indicated the popularity of including livestock feeds as an educational display at county fairs. Arkansas Agriculture consistently ranks in the top one-third of the nation for agricultural cash farm receipts. In 2023, agricultural cash receipts from animals and animal products in Arkansas ranked 10th nationally. Additionally, Arkansas ranked 15th nationally for corn for grain production in 2022. Given the significant contribution of agriculture to the Arkansas economy and the platform for county agents to educate within their own community, this resource will start conversations and raise awareness on the broad scope of Arkansas agriculture.

Budget Justifications/Explanation of Travel and Direct Costs:
Coordination will be provided by the University of Arkansas System Division of Agriculture Cooperative Extension Service Animal Science team. Estimated cost for the project totals in the amount of $7,500. Program coordinators are requesting $2,500 from the Corn and Grain Sorghum Board and seeking additional contributions from other commodity and industry groups to fund the total. The greatest expenses for this project are the plastic jars for each feed sample and the bins to contain the kits. Utilizing county agent relationships, we plan to secure donation of most of the feedstuffs included in the kits and source as much of it from Arkansas farms and co-ops as possible.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Harman, Allison *UADA Feed Kits*

Year	2024/2025	**Project Year**	New	**Version: 6.0 (11/01/2023)**
Lead Investigator	Harman, Allison	**Co-PI #1**	Russell, Mark	
Co-PI #2		**Co-PI #3**		
Department	ANSC Animal Sciences			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	UADA Feed Kits			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

		Harman, Allison	Russell, Mark			Total Board Funding Requested	AES Portion	CES Portion
	Select "AES" or "CES" for each PI	CES	CES					
Fulltime Personnel								
Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Subtotal: Salaries		$0	$0	$0	$0	$0	$0	$0
Graduate Student								
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Tuition						$0	$0	$0
	Subtotal: Graduate Student		$0	$0	$0	$0	$0	$0	$0
Hourly								
			Wages				**Total**	**AES Portion**	**CES Portion**
	Hourly-Personnel						$0	$0	$0
	Hourly-Students						$0	$0	$0
	Subtotal: Hourly		$0	$0	$0	$0	$0	$0	$0
Fringe Benefits								
Fringe benefits are calculated when salary and wage amounts are entered above.			**Benefits**				**Total**	**AES Portion**	**CES Portion**
	Fulltime Personnel		$0	$0	$0	$0	$0	$0	$0
	Graduate Students		$0	$0	$0	$0	$0	$0	$0
	Hourly Personnel		$0	$0	$0	$0	$0	$0	$0
	Hourly-Students		$0	$0	$0	$0	$0	$0	$0
	Subtotal: Fringe Benefits		$0	$0	$0	$0	$0	$0	$0
	Personnel Total		$0	$0	$0	$0	$0	$0	$0
Travel								
Justify out-of-state travel in proposal.			**Travel**				**Total**	**AES Portion**	**CES Portion**
	In-State						$0	$0	$0
	Out-of-State						$0	$0	$0
	Travel Total		$0	$0	$0	$0	$0	$0	$0

University of Arkansas System Division of Agriculture
Promotion Board Budget

Harman, Allison *UADA Feed Kits*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$2,500				$2,500	$0	$2,500
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$2,500	$0	$0	$0	$2,500	$0	$2,500
	Total for Proposal	$2,500	$0	$0	$0	$2,500	$0	$2,500

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Harman, Allison	Russell, Mark			Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Title: Use of Corn Protein Concentrate in Plant-Based Diets for Largemouth Bass to Optimize Production Sustainability and Profitability

Investigator: Rebecca Lochmann, University of Arkansas at Pine Bluff (UAPB), Dept. of Aquaculture and Fisheries, Mail Slot 4912, Pine Bluff, AR 71601 phone: (870) 575-8124; fax: (870) 575-8125

Status: New 1-year project; **Research Area:** Miscellaneous projects

Stated Goal: To determine the effects of dietary corn protein concentrate (CPC) on production performance, non-specific immune response, and cost effectiveness of largemouth bass production.

Specific Objectives:

1) Determine growth, survival, feed conversion, native immune function, and whole-body proximate composition of largemouth bass fed diets with increasing CPC in place of fish meal.

2) Conduct a partial budget analysis to determine the relative profitability of using the different diets.

Background and rationale:

Arkansas is a major producer of largemouth bass (LMB), which are popular worldwide for food and sportfishing. Current production feeds for largemouth bass include marine fish meal and fish oil, which are expensive and considered environmentally unsustainable in fish feeds. The aquaculture industry is rapidly migrating toward plant-based feeds that generate a smaller carbon footprint and cost less than animal-based feeds. However, it is especially challenging to create palatable plant-based feeds that support growth and overall performance of carnivorous fish (such as LMB). Most plant ingredients have incomplete amino acid profiles compared to animal proteins. Plants also contain anti-nutritional factors (ANFs) that limit fish performance. However, concentrates produced from corn have been processed so that many of the ANFs are removed. Concentrates also contain much higher total protein levels (50-60%) – comparable to fish meal. Corn protein concentrate has the potential to be a primary protein source in LMB feeds, and CPC costs considerably less than fish meal. Fish Performance/cost data is needed to drive changes in commercial feed formulation Increased use of US corn concentrate as a major protein source in largemouth bass feeds will benefit the corn, aquaculture, and animal feed industries. Recent LMB sales totaled $27,500,000. Approximately 3,778,000 lbs of foodsize fish were produced, requiring 5,667,000 lbs of feed (conversion of 1.5). Potential application to other carnivorous species could increase demand further. Environmental impacts of higher soy and corn in aquafeeds will be positive (versus feeds high in marine animal products). Demonstrated benefits of using more corn (as a concentrate) in LMB feeds will increase use of plant-based feeds in high-value carnivorous fish, increasing demand for domestic corn.

Methods: We will conduct a feeding trial in tanks to evaluate the use of corn protein concentrate in LMB feeds. Five experimental diets will be prepared in the UAPB fish nutrition lab. The control diet will contain 15% fish meal. The other diets will successively replace fish meal with CPC in combination with complementary ingredients (such as blood meal) to ensure that all essential amino acid requirements are met by all diets. All diets will be formulated to contain similar amounts of total protein and available energy, and meet the known nutrient requirements of LMB. Juvenile LMB (feed-trained) will be obtained from a local producer (Dunn's Fish Farm, Brinkley, AR) and reared to an appropriate size for stocking (5 grams). Fish will be hand-graded to achieve uniform initial sizes, then will be weighed and stocked at 20 fish per tank in each of 4 replicate tanks per diet. Fish will be fed twice daily to satiation for 12 weeks, and weighed every 3 weeks to track growth and adjust feed rations. At the end of the trial, all fish will be counted and weighed by tank. Mucous and blood from five anaesthetized fish per tank will be obtained to perform health assays. The same fish will be reserved for proximate analysis (protein, lipid, dry matter, ash). A partial budget analysis will be conducted to compare the economics of the different diets.

Planned Milestones (with target times):

1) Prepare diets and begin the feeding trial (March-April)
2) Subsample fish for growth (monthly after stocking)
3) Determine final growth, survival, feed conversion, native immune function and proximate composition of whole body (Oct.-Dec.)
4) Conduct statistical and economic analyses of data (Nov.-Dec.)
5) Prepare final report, presentations, and manuscript for publication (Dec.-Feb.)

Statement of Projected Value:

Fish Performance/cost data is needed to drive changes in commercial feed formulation. Increased use of US corn protein concentrate as a major protein source in largemouth bass feeds has the potential to benefit multiple industries (corn, aquaculture, and the feed industry). Recent LMB sales totaled $27,500,000. Approximately 3,778,000 lbs of foodsize fish were produced, requiring 5,667,000 lbs of feed (conversion of 1.5). Potential application to other carnivorous species could increase demand further, and increasing the economic efficiency of domestic fish production is more critical than ever.

Budget Justification: This project will require a ½ time MS level Research Specialist (annual salary of $37,600 x 0.5 = $18,800) to conduct the feeding trial and collect and analyze nutrition, water quality, and immune function. The Research Specialist will also supervise an undergraduate student (separately funded) who will assist with this trial. Supplies include reagents for nutritional and water quality analysis, ($5200), immune reagents, and diet ingredients ($800) and out-of-state travel ($2000). Travel expenses will partly cover the costs of the PI and the Research Specialist to attend the Aquaculture America meeting in 2025 in New Orleans to present the research results. The total amount of this request is $32,741.

University of Arkansas System Division of Agriculture

Promotion Board Budget

Lochmann, Rebecca *Use of Corn Protein Concentrate in Plant-Based Diets for Largemouth Bass to Optimize Production Sustainability*

Year	2024/2025	**Project Year**	New	**Version: 6.0 (11/01/2023)**
Lead Investigator	Lochmann, Rebecca	**Co-PI #1**		
Co-PI #2		**Co-PI #3**		
Department	UAPB Aquaculture and Fisheries			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Use of Corn Protein Concentrate in Plant-Based Diets for Largemouth Bass to Optimize Production Sustainability and Profitability			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Lochmann, Rebecca				**Total Board Funding Requested**	**AES Portion**	**CES Portion**
Select "AES" or "CES" for each PI	AES						
Fulltime Personnel							
Position Title / **Name** *(if position is filled)* / **% Time**	**Salaries**				**Total**	**AES**	**CES**
Research Specialist / TBA / 50%	$18,800				$18,800	$18,800	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Subtotal: Salaries	$18,800	$0	$0	$0	$18,800	$18,800	$0
Graduate Student							
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.							
Name *(if position is filled)* / **% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Tuition					$0	$0	$0
Subtotal: Graduate Student	$0	$0	$0	$0	$0	$0	$0
Hourly							
	Wages				**Total**	**AES Portion**	**CES Portion**
Hourly-Personnel					$0	$0	$0
Hourly-Students					$0	$0	$0
Subtotal: Hourly	$0	$0	$0	$0	$0	$0	$0
Fringe Benefits							
Fringe benefits are calculated when salary and wage amounts are entered above.	**Benefits**				**Total**	**AES Portion**	**CES Portion**
Fulltime Personnel	$5,941	$0	$0	$0	$5,941	$5,941	$0
Graduate Students	$0	$0	$0	$0	$0	$0	$0
Hourly Personnel	$0	$0	$0	$0	$0	$0	$0
Hourly-Students	$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits	$5,941	$0	$0	$0	$5,941	$5,941	$0
Personnel Total	$24,741	$0	$0	$0	$24,741	$24,741	$0
Travel							
Justify out-of-state travel in proposal.	**Travel**				**Total**	**AES Portion**	**CES Portion**
In-State					$0	$0	$0
Out-of-State	$2,000				$2,000	$2,000	$0
Travel Total	$2,000	$0	$0	$0	$2,000	$2,000	$0

University of Arkansas System Division of Agriculture

Promotion Board Budget

Lochmann, Rebecca — *Use of Corn Protein Concentrate in Plant-Based Diets for Largemouth Bass to Optimize Production Sustainability*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$6,000				$6,000	$6,000	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$6,000	$0	$0	$0	$6,000	$6,000	$0
	Total for Proposal	$32,741	$0	$0	$0	$32,741	$32,741	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Lochmann, Rebecca				Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Remote sensing-based mid-season corn nitrogen fertilizer rate recommendations and web-tool extension.

Lead Investigators: Aurelie Poncet

Co-Investigators: Trenton Roberts, Jason Kelley

Status: NEW Year 1 of 3

Research Areas: General Agronomics, Fertility

Stated Goal: The current corn nitrogen (N) fertilizer recommendations account for soil texture and yield goal, and the recommended amounts are applied in two or three-split applications. Three-split applications are preferable when unexpected environmental conditions increase early-season N loss because they provide a better match of fertilizer delivery to crop needs. However, the need for a third application and the optimum mid-season N fertilizer rate are difficult to predict without additional information about site-specific crop health. Ongoing research emphasizes the use of tissue sampling and remote sensing to collect the needed information and fine-tune mid-season corn N fertilizer recommendations. Research conducted by the NSTaR program demonstrated that yield-limiting N deficiency is expected if the corn leaf N concentration before tasseling (VT) is smaller than 3%. In that case, additional N fertilizer should be applied to minimize losses, and calibration equations were developed to identify the optimum agronomic mid-season N fertilizer rate from leaf N concentration. However, these equations should only be used if the collected samples are representative of field conditions, and remote sensing can help inform tissue sampling. Previous research demonstrated that mid-season corn N status can be assessed from canopy greenness using inexpensive small unmanned aerial systems (sUAS, or drones). Canopy greenness is quantified using the dark green color index (DGCI). Calibration curves were established to relate pre-tassel field and high-N reference DGCI values to mid-season corn N status. The image processing steps were automated and integrated into a web-tool prototype that uses raw drone images (no stitching required) to determine whether a crop would be responsive to a third N fertilizer application, and where tissue samples may be collected to determine the optimized N fertilizer rate(s). However, no mid-season N fertilizer rate is provided directly from the images. The proposed research goal is to develop remote sensing-based mid-season N fertilizer recommendations and integrate them into the created web-tool to further inform ground-truthing using tissue sampling and optimize Arkansas corn production.

Specific Objectives:

1. To create calibration curves that determine the amount of N fertilizer required to recover 90% to 95% yield potential from field and high-N reference DGCI values when mid-season yield-limiting N deficiencies are identified.
2. To develop a new web-tool functionality that predicts the agronomically and economically optimum mid-season corn N fertilizer rate recommendation from raw drone images.
3. To verify that the new remote sensing-based mid-season corn N fertilizer rate recommendations can accurately predict how much N fertilizer is needed to maintain or increase yields.

Methods:

Objective 1: In the past four years, drone images and tissue samples were collected at V8, V10, and V13 in five NSTaR's N response trials established between 2020 and 2023 at the Milo J. Shult Agricultural

Research and Extension Center (Fayetteville, AR) and Pine Tree Research Station (Colt, AR). Treatments with different pre-planting, sidedress, and mid-season N fertilizer rates were applied to create a gradient of mid-season corn N status and evaluate crop response to different mid-season N fertilizer rates across the established gradient. Leaf samples were collected immediately before the mid-season N fertilizer application and analyzed for total N. Flight height was 200 ft. The treatment with the maximum total amount of N fertilizer applied will be used as high-N reference. The DGCI values for the high-N reference and other treatments will be determined from the collected drone images. At maturity, grain yield was harvested from a bordered section of each plot. Relative grain yield (treatment yield compared to the yield of the high-N reference) for each site-year will be regressed against the field and high-N reference DGCI values. Results will then be summarized across all site-years to determine the amount of N required to recover 90% and 95% yield potential based on the measured field and high-N reference DGCI values.

Objective 2: The calibration curves created to meet objective 1 will be integrated into the web-tool prototype developed during previous research. This process will include additional automation and user interface development. The outcome will be the addition of a new functionality that will provide Arkansas corn producers with a remote sensing-based mid-season N fertilizer recommendation.

Objective 3: During project years 1 to 3, drone images, tissue samples, and yield data will be collected in the NSTaR's variety x plant population x N fertilizer rate trials established in at least three locations every year. The data will be collected and processed as described under objective 1. For each variety and plant population, the treatment with the higher N fertilizer rate will be used as the high-N reference. The created tool will then be used to determine the predicted optimum mid-season N fertilizer rate. Statistical analysis of the leaf N and yield data will be conducted to identify the true optimum mid-season N fertilizer rate. The predicted and true results will be compared to validate the created remote sensing-based mid-season corn N fertilizer recommendation.

Planned Milestones: We anticipate that objectives 1, 2, and 3 will be completed during project years 1, 2, and 3, respectively.

Statement of Projected Value: Corn uses more N than any other crop cultivated in Arkansas and optimal N fertilizer use in corn is a critical component of farm profitability. Optimal N fertilizer use matches the crop needs, but the current recommendations do not account for the potential of early season N losses due to leaching and denitrification caused by unpredictable weather patterns. Previous research demonstrated that mid-season corn N status can be assessed using inexpensive drones and the DGCI index, providing that a high-N reference is established in a small portion of the field. A web-tool prototype was also created to automate image processing and make research findings accessible to Arkansas producers. However, further research is needed to predict the optimum mid-season N fertilizer rate from drone images when yield-limiting N deficiencies are identified in the field. The proposed research will address this gap and help increase corn N fertilizer use efficiency using inexpensive drone technology.

Budget Justifications/Explanation of Travel and Direct Costs: Personnel fund were requested for 30% support of a program associate and 50% support of a graduate student. Graduate student support includes stipend and tuition. Personnel funds were also requested for support of hourlies. All personnel will help with data analysis and web tool development. Travel funds were requested for data collection and participation in relevant conferences including the 2024 ASA-CSSA-SSSA Annual International Meeting. Supply funds and other direct costs were requested to participate with remote sensing equipment maintenance, leaf sample analysis, and manuscript publication fees.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Poncet, Aurelie — *Remote sensing-based mid-season corn nitrogen fertilizer rate recommendations and web-tool extension.*

Year	2024/2025	**Project Year**	New
Lead Investigator	Poncet, Aurelie	**Co-PI #1**	
Co-PI #2		**Co-PI #3**	
Department	CSES Crop, Soil, Environmental Science		
Commodity Board	Corn and Grain Sorghum Board		
Project Title	Remote sensing-based mid-season corn nitrogen fertilizer rate recommendations and web-tool extension.		

Version: 6.0 (11/01/2023)

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Poncet, Aurelie				**Total Board Funding Requested**	**AES Portion**	**CES Portion**
Select "AES" or "CES" for each PI	AES						

Fulltime Personnel

Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
Program Associate	Wesley France	30%	$15,000				$15,000	$15,000	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
		Subtotal: Salaries	$15,000	$0	$0	$0	$15,000	$15,000	$0

Graduate Student

Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
	MS Student	50%	$11,500				$11,500	$11,500	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
		Tuition	$2,700				$2,700	$2,700	$0
		Subtotal: Graduate Student	$14,200	$0	$0	$0	$14,200	$14,200	$0

Hourly

	Wages				**Total**	**AES Portion**	**CES Portion**
Hourly-Personnel	$1,800				$1,800	$1,800	$0
Hourly-Students	$2,500				$2,500	$2,500	$0
Subtotal: Hourly	$4,300	$0	$0	$0	$4,300	$4,300	$0

Fringe Benefits

Fringe benefits are calculated when salary and wage amounts are entered above.

	Benefits				**Total**	**AES Portion**	**CES Portion**
Fulltime Personnel	$4,740	$0	$0	$0	$4,740	$4,740	$0
Graduate Students	$483	$0	$0	$0	$483	$483	$0
Hourly Personnel	$142	$0	$0	$0	$142	$142	$0
Hourly-Students	$18	$0	$0	$0	$18	$18	$0
Subtotal: Fringe Benefits	$5,383	$0	$0	$0	$5,383	$5,383	$0
Personnel Total	$38,883	$0	$0	$0	$38,883	$38,883	$0

Travel

Justify out-of-state travel in proposal.

	Travel				**Total**	**AES Portion**	**CES Portion**
In-State	$4,500				$4,500	$4,500	$0
Out-of-State	$3,500				$3,500	$3,500	$0
Travel Total	$8,000	$0	$0	$0	$8,000	$8,000	$0

University of Arkansas System Division of Agriculture

Promotion Board Budget

Poncet, Aurelie *Remote sensing-based mid-season corn nitrogen fertilizer rate recommendations and web-tool extension.*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$1,617				$1,617	$1,617	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication	$3,000				$3,000	$3,000	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs		$4,500				$4,500	$4,500	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$9,117	$0	$0	$0	$9,117	$9,117	$0
	Total for Proposal	$56,000	$0	$0	$0	$56,000	$56,000	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Poncet, Aurelie				Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Utilizing Plasma Technology to Inhibit Tannin Effects in Grain Sorghum for Enhanced digestibility and Protein Quality

Lead Investigators: Mahfuzur Rahman

Co-Investigators: Griffiths Atungulu

Status: New

Research Areas: Misc. Projects

Stated Goal:

The goal of the project is to increase the value of sorghum in the food and feed industry by inactivating tannin activity. Tannins, found in sorghum, present challenges such as a bitter taste, reduced digestibility, antinutritional effects, and complications in livestock feed and food processing. Their high levels diminish sorghum's palatability for humans and animals, impacting market appeal. Tannins interfere with nutrient digestion, particularly proteins, lowering nutritional value. In livestock feed, elevated tannin levels decrease intake and nutrient absorption. In addition, sorghum-based food product manufacturing is hindered by high tannin content, requiring removal or reduction for improved taste and functionality. The goal of this proposed project is to utilize non-thermal technology to inactivate tannin, unleash grain-sorghum protein functionality and digestibility, while preserving grain quality.

The goal will be achieved by applying non-thermal plasma technology to inactivate tannin and fractionate high-quality sorghum protein. Plasma is considered the fourth state of matter, distinct from solid, liquid, and gas. It is characterized by a collection of charged particles, including ions and free electrons, in an energized and ionized state. When plasma interacts with atmospheric gases like oxygen and nitrogen, it can influence the chemical composition of these gases and create oxygen and nitrogen radicals as well as ozone.

Plasma treatment technology can easily be retrofitted in processing for enhancing grain-sorghum digestibility and protein quality. Dry grain could be treated with plasma while moving on conveyors belts. Alternatively, the technology could be applied to generate plasma-activated water to soak and clean contaminated grain. These approaches have the potential to unleash sorghum protein and enhance its digestibility and utilization in the manufacture of plant-protein based products.

Specific Objectives:

- Optimize the cold plasma system based on inactivated tannin activity in grain sorghum.
- Determine the impact of plasma treatment on the quality of grain.
- Fractionate protein from grains and analyze the quality of protein to develop alternative protein-based food products.

Methods:

A plasma reactor with a series of discharge methods, such as activating air (jet or pin-to-plate), and activating water (frit and bubble), will be utilized to achieve tannin degradation in grain sorghum. This reactor can also use nitrogen gas instead of atmospheric air if needed. The tannins are tightly bound to the cell membrane and require a certain amount of energy to be liberated and made available for removal from any substrate. The high-energy transfer during cold plasma generation will aid in breaking covalent bonds, hydrolyzing, and depolymerizing phytochemicals like tannins. The free and depolymerized tannin compounds will undergo substantial degradation by the reactive species generated during cold plasma treatment.

A protocol will be developed, optimized, and evaluated for the degradation of tannin content in sorghum using non-thermal plasma generated through different modes. Parameters such as exposure time, voltage, discharge frequency, moisture content, and source gas will be analyzed to enhance the protocol, aiming for maximum degradation efficiency. After degrading the tannins, the impact of plasma on the grain will be analyzed to ensure that plasma treatment does not affect the quality. Grain quality factors, such as protein content, protein digestibility, kernel hardness, kernel weight and diameter, and phenolic content, will be assessed.

Tannin-degraded sorghum samples will undergo protein extraction using plasma-activated water, a process hindered by tannin content. Analyzing the quality and functional properties of extracted sorghum protein is very important to identify its food applications. Based on the quality and functional data, protein will be selected to develop plant (sorghum)-based cheese and meat containing 20-25% sorghum protein. Textural properties of the cheese and meat analogs will be compared with commercially available plant-based cheese and meat.

Planned Milestones:

2024: Find a suitable and optimized method of cold plasma treatment (whether wet or dry, considering the mode of generation and treatment parameters) for the degradation of tannins in sorghum grain.

2025: Determine the impact of plasma treatment on the quality of grain such as protein content, protein digestibility, kernel hardness, kernel weight and diameter, and phenolics content. Publish the results in the Arkansas Corn and Grain Sorghum Research Studies series & a journal, and present data at the national scientific meeting.

2026: Optimize protein extraction, assess extracted protein properties, and create protein-rich food and feed products. Evaluate the quality of cold-plasma-treated sorghum grains, proteins, and products for a comprehensive understanding. Publish the results in the Arkansas Corn and Grain Sorghum Research Studies series & a journal, and present data at the national scientific meeting.

Statement of Projected Value:

Tannins in train-sorghum sorghum can adversely impact their quality and utility. The bitter taste associated with tannins reduces the palatability of products from the grain-sorghum for both humans and animals. Additionally, high tannin levels hinder nutrient absorption, particularly affecting proteins, thereby lowering the overall nutritional value of the grain. These factors, combined with potential antinutritional effects, make tannins a significant concern for the grain-sorghum industry, affecting its market appeal and suitability for various uses, including livestock feed and food processing.

In 2022, the plant-based protein market was valued at $8 billion in the U.S., experiencing a 7% increase in dollar sales compared to 2021. The major plant-based categories are plant-based meat and dairy alternatives. Soybean, pea, corn, and wheat proteins dominate the plant protein market. Although sorghum has a great protein to make alternative dairy products, tannin is the only hindrance to getting into the market. Successful results from this project would create a new market for sorghum protein in the alternative protein market.

Budget Justifications/Explanation of Travel and Direct Costs:

Salaries of a research associate (20% FTE) and a graduate student are requested to complete the project. The research associate will train the graduate student in cold plasma systems and analysis of grain, as well as troubleshoot the method when needed. The graduate student will be responsible for running experiments, analyzing data, and preparing reports. Out-of-state travel to present at professional conferences (PI and Grad Student): transportation, lodging, and registration costs. Expenses for laboratory supplies and chemicals for plasma and grain quality analysis are also requested.

University of Arkansas System Division of Agriculture

Promotion Board Budget

Rahman, Mahfuzur — *Utilizing Plasma Technology to Inhibit Tannin Effects in Grain Sorghum for Enhanced digestibility and Protein*

Year	2024/2025	**Project Year**	New	**Version: 6.0 (11/01/2023)**
Lead Investigator	Rahman, Mahfuzur	**Co-PI #1**	Atungulu, Griffiths	
Co-PI #2		**Co-PI #3**		
Department	FDSC Food Science			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Utilizing Plasma Technology to Inhibit Tannin Effects in Grain Sorghum for Enhanced digestibility and Protein Quality			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

			Rahman, Mahfuzur	Atungulu, Griffiths			Total Board Funding Requested	AES Portion	CES Portion
		Select "AES" or "CES" for each PI	AES	AES					
Fulltime Personnel									
Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
Research Associate	Nikitha Modupolli	20%	$8,333				$8,333	$8,333	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Subtotal: Salaries		$8,333	$0	$0	$0	$8,333	$8,333	$0
	Graduate Student								
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
	Roshanak Zolqadri	50%	$20,000				$20,000	$20,000	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Tuition		$6,795				$6,795	$6,795	$0
	Subtotal: Graduate Student		$26,795	$0	$0	$0	$26,795	$26,795	$0
			Hourly						
			Wages				**Total**	**AES Portion**	**CES Portion**
	Hourly-Personnel						$0	$0	$0
	Hourly-Students						$0	$0	$0
	Subtotal: Hourly		$0	$0	$0	$0	$0	$0	$0
			Fringe Benefits						
Fringe benefits are calculated when salary and wage amounts are entered above.			**Benefits**				**Total**	**AES Portion**	**CES Portion**
	Fulltime Personnel		$2,633	$0	$0	$0	$2,633	$2,633	$0
	Graduate Students		$840	$0	$0	$0	$840	$840	$0
	Hourly Personnel		$0	$0	$0	$0	$0	$0	$0
	Hourly-Students		$0	$0	$0	$0	$0	$0	$0
	Subtotal: Fringe Benefits		$3,473	$0	$0	$0	$3,473	$3,473	$0
	Personnel Total		$38,601	$0	$0	$0	$38,601	$38,601	$0
			Travel						
Justify out-of-state travel in proposal.			**Travel**				**Total**	**AES Portion**	**CES Portion**
	In-State						$0	$0	$0
	Out-of-State		$2,500				$2,500	$2,500	$0
	Travel Total		$2,500	$0	$0	$0	$2,500	$2,500	$0

University of Arkansas System Division of Agriculture

Promotion Board Budget

Rahman, Mahfuzur — *Utilizing Plasma Technology to Inhibit Tannin Effects in Grain Sorghum for Enhanced digestibility and Protein*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$2,000				$2,000	$2,000	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$2,000	$0	$0	$0	$2,000	$2,000	$0
	Total for Proposal	$43,101	$0	$0	$0	$43,101	$43,101	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Rahman, Mahfuzur	Atungulu, Griffiths			Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Improving Nitrogen Management for Arkansas Corn Production

Lead Investigators: Trenton Roberts

Co-Investigators: Jason Kelley and Gerson Drescher

Status: New

Research Areas: Fertility and General Agronomics

Stated Goal: Investigate proper nitrogen management in irrigated corn production systems and provide producers with effective management strategies.

Specific Objectives:

1. Validate the current nitrogen management strategies for irrigated Arkansas corn production in small plot and large block field trials. The nitrogen management tools that will be investigated in the systems approach include:
   a. Preplant and in-season soil tests
   b. In-season tissue analysis
   c. Aerial imagery
   d. Post-season cornstalk nitrate test
2. Quantify the potential nitrogen losses, primarily ammonia volatilization loss, from treatments that include surface broadcast and banded applications of urea and urea ammonium nitrate.
3. Evaluate the impacts of nitrogen rate and timing on corn yield components including rows per ear, kernels per row and 1000 count seed weight.

Methods:

1. Trials will be established on experiment stations in a range of sizes from standard small plots all the way to large scale block trials. Preplant soils samples and soil samples collected at V4-V6 will be used to refine sidedress nitrogen application rates. Following sidedress nitrogen applications leaf samples will be collected weekly to identify whether additional top dress or pretassel nitrogen applications are warranted. From the V6-VT growth stages, aerial imagery will be collected to assess the need for in-season nitrogen applications. The aerial images will be compared to the tissue concentration data, but treatments will be made based on each assessment to compare if one is more feasible or accurate than the other. At the conclusion of the season cornstalk nitrate samples will be taken to assess the season long nitrogen management approach and provide an report for each of the strategies that were implemented.
2. Within the trials listed above and independent trials ammonia volatilization will be quantified using semi-static chambers that will capture the ammonia loss over a series of days to identify the daily and cumulative nitrogen loss from each of the treatments. The semi-static chambers will contain foam sorbers saturated in a phosphoric acid/glycol mixture that will effectively capture the ammonia gas before it escapes to the atmosphere. The foam sorbers will be changed periodically and the phosphoric acid mixture extracted and the ammonium nitrogen it contains quantified. Once the potential loss from each treatment combination is identified subsequent years of the study will use the same methodology to quantify the effectiveness of urease inhibitors on reducing nitrogen losses via ammonia volatilization using these treatment strategies.
3. Nitrogen rate trials will be implemented that include a single application of 220-280 lb nitrogen per acre applied at one of the following growth stages: preplant, V2, V6, V8, V10,

V12, V14, VT and R2. A standard nitrogen management plan of 30 lb nitrogen preplant followed by 190 lb nitrogen per acre applied sidedress will be included for comparison. At R6 or physiological maturity a minimum of five ears will be collected from each plot. The number of rows per ear, kernels per row and 1000 count seed weight will be collected.

Planned Milestones:

1. Data will be collected annually and compiled over time to compare how the various nitrogen management tools can be optimized to produce not only maximal yield but in the most profitable way possible. These trials will be conducted at multiple locations with varying soils and potential nitrogen needs locations may be altered each year to fill in knowledge gaps. At the end of three growing seasons the dataset should be robust enough to identify any potential differences in the nitrogen assessment tools and inform producers on the best management practices moving forward.
2. Initial trials will be established to identify the ammonia volatilization loss potential of the various source and application strategy combinations identified in objective one. Once the principal investigators are able to identify the ammonia volatilization loss potential the will test mitigation strategies in year 2 and 3 to identify what potential fertilizer additives might be used to protect nitrogen from ammonia volatilization using the various application strategies. By year 3 we hope to have clearly identified best management practices to prevent ammonia volatilization losses.
3. Initial plans are to implement nitrogen response trials at three locations and assess how variety, environment, and response to nitrogen impact corn yield components. Based on the first year of data the nitrogen rates and timings may be adjusted to ensure that we are able to generate a robust dataset.

Statement of Projected Value: Nitrogen fertilizer and its application represent the largest single item expenditure for most corn producers and accounts for as much as 20% of the total operating cost. Nitrogen is the most yield limiting factor in Arkansas corn production and offers the largest yield gains when used at the correct rates and timings. There are a variety of rates, sources and timings that can be used to maximize corn yield and a better understanding of how to best make these decisions is needed. Nitrogen use efficiency in Arkansas irrigated corn production can be very high when the proper combination of rates, sources and timings is implemented and can provide a very high rate of return on the nitrogen fertilizer investment. Development of a web-based decision support tool that allows producers to input their production parameters and economic factors to determine the best course of action is needed. The results of this research project will help provide the basis for the development and implementation of this tool.

Budget Justifications/Explanation of Travel and Direct Costs: The out of state travel included in this proposal is to cover a portion of the cost for graduate students to attend professional scientific meetings which in this calendar year will include the international annual agronomy meetings in San Antonio, TX. The attendance at these meetings allows presentations to be made concerning the research work conducted and also for increased education by attending other scientific presentations and workshops. In-state travel and salary are budgeted for field data collections.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Roberts, Trenton *Improving Nitrogen Management for Arkansas Corn Production*

Year	2024/2025	**Project Year**	New	**Version: 6.0 (11/01/2023)**
Lead Investigator	Roberts, Trenton	**Co-PI #1**		
Co-PI #2		**Co-PI #3**		
Department	CSES Crop, Soil, Environmental Science			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Improving Nitrogen Management for Arkansas Corn Production			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

		Roberts, Trenton				Total Board Funding Requested	AES Portion	CES Portion
	Select "AES" or "CES" for each PI	AES						
Fulltime Personnel								
Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
Program Associate	Joe Shafer		$14,000				$14,000	$14,000	$0
Program Associate	Dave Smith		$14,000				$14,000	$14,000	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Subtotal: Salaries		$28,000	$0	$0	$0	$28,000	$28,000	$0
Graduate Student								
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
	Kyle Hoegenauer	50%	$12,500				$12,500	$12,500	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Tuition		$3,300				$3,300	$3,300	$0
	Subtotal: Graduate Student		$15,800	$0	$0	$0	$15,800	$15,800	$0
Hourly								
			Wages				**Total**	**AES Portion**	**CES Portion**
	Hourly-Personnel						$0	$0	$0
	Hourly-Students		$2,000				$2,000	$2,000	$0
	Subtotal: Hourly		$2,000	$0	$0	$0	$2,000	$2,000	$0
Fringe Benefits								
Fringe benefits are calculated when salary and wage amounts are entered above.			**Benefits**				**Total**	**AES Portion**	**CES Portion**
	Fulltime Personnel		$8,848	$0	$0	$0	$8,848	$8,848	$0
	Graduate Students		$525	$0	$0	$0	$525	$525	$0
	Hourly Personnel		$0	$0	$0	$0	$0	$0	$0
	Hourly-Students		$14	$0	$0	$0	$14	$14	$0
	Subtotal: Fringe Benefits		$9,387	$0	$0	$0	$9,387	$9,387	$0
	Personnel Total		$55,187	$0	$0	$0	$55,187	$55,187	$0
Travel								
Justify out-of-state travel in proposal.			**Travel**				**Total**	**AES Portion**	**CES Portion**
	In-State		$5,500				$5,500	$5,500	$0
	Out-of-State		$1,500				$1,500	$1,500	$0
	Travel Total		$7,000	$0	$0	$0	$7,000	$7,000	$0

University of Arkansas System Division of Agriculture
Promotion Board Budget

Roberts, Trenton *Improving Nitrogen Management for Arkansas Corn Production*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$2,000				$2,000	$2,000	$0
	Fertilizer/Chemicals	$1,000				$1,000	$1,000	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs	Analysis	$5,000				$5,000	$5,000	$0
Station Maintenance	SAREC, Fayetteville	$2,480	$0	$0	$0	$2,480	$2,480	$0
	CTST, Marianna	$1,680	$0	$0	$0	$1,680	$1,680	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$4,200	$0	$0	$0	$4,200	$4,200	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$16,360	$0	$0	$0	$16,360	$16,360	$0
	Total for Proposal	$78,547	$0	$0	$0	$78,547	$78,547	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

Ecosystems (Rice Only)		%	Roberts, Trenton				Total	
	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Determining disease resistance and susceptibility of corn and grain sorghum hybrids

Lead Investigators: Dr. Terry Spurlock**,** Dr. Jason Kelley, Dr. Camila Nicolli, and John Carlin

Status: New

Research Areas: Diseases

Stated Goal: To extend disease resistance and susceptibility data of commercial corn and grain sorghum hybrids to growers annually

Specific Objectives:

1. Establish a 'late-planted' version of the official corn hybrid variety trial at Rohwer Research Station (Spurlock), Lon Mann Cotton Research Station (Kelley), and Pine Tree Research Station (Nicolli).
2. Evaluate each grain sorghum official variety trial and determine the two (of the five normally planted) that have the highest disease pressure and determine the amount of disease on each hybrid. (Spurlock and Nicolli)
3. Extend the results to growers and consultants at county and regional row crop production meetings and post the results on the Arkansas Variety Testing web site annually. (Spurlock, Kelley, Nicolli, Carlin).

Methods: Seed from each entry of the official corn hybrid variety trial will be planted at each of three locations: Rohwer Research Station, Lon Mann Cotton Research Station in Marianna, and Pine Tree Research Station. Trials will be planted to 2-row plots on 30- or 38-inch row spacings (depending on station) with each hybrid replicated three times and plot lengths 20 ft long. **Each trial will be planted late to help increase foliar disease pressure, particularly southern rust pressure.** Disease incidence and severity will be determined for each location at growth stage R5.5 – R6 with each disease present rated on a 0-9 scale where a rating of '9' would indicate the disease was severe. Diseases that will be rated should include southern rust, northern corn leaf blight, southern corn leaf blight, gray leaf spot, stalk rot, and others if they are present and at high enough levels to be rated. Drone images will also be collected of each plot at each location for extension outreach and training purposes. At maturity, plots in all tests will be harvested with a plot combine and the results subjected to appropriate statistical analyses (ANOVA and means separation of fixed effects using Tukey's honest significant difference test).

Grain sorghum variety trials are planted each year as part of the variety testing program. Here, we propose to scout each trial and choose at least one, or possibly two trials, with significant disease pressure and rate the trials for incidence and severity of foliar and head diseases just prior to maturity. Drone images will be collected of all plots in the trials that are rated for disease and be used for extension outreach and training purposes.

Planned Milestones: Trials will be planted at each location by mid-May. Summer and annual reports will be provided as requested to the Corn and Grain sorghum Promotion Board. The results of each test location will be summarized and submitted to Arkansas Variety Testing by December 1.

Statement of Projected Value: At present, Arkansas Variety Testing does not generate foliar disease data for corn or grain sorghum for the official variety trial locations. These data would be valuable for producers to select high yielding corn and grain sorghum hybrids that are also resistant to the diseases that impact yield and grain quality in Arkansas. By selecting resistant hybrids, producers can save thousands of dollars on input costs for their own farms by not having to apply fungicides for foliar disease control.

Budget Justifications/Explanation of Travel and Direct Costs: The budget includes personnel costs for time spent planting and maintaining the trials and assisting in collection of disease data. There are also costs included for plot supplies, fertilizer, and herbicide to be used for plot maintenance. Travel costs are included for investigators and staff to travel to trial locations.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Spurlock, Terry — *Determining disease resitance and susceptibility of corn and grain sorghum hybrids*

Version: 6.0 (11/01/2023)

Year	2024/2025	**Project Year**	New
Lead Investigator	Spurlock, Terry	**Co-PI #1**	Kelley, Jason
Co-PI #2	Nicolli, Camila	**Co-PI #3**	
Department	ENPL Entomology and Plant Pathology		
Commodity Board	Corn and Grain Sorghum Board		
Project Title	Determining disease resitance and susceptibility of corn and grain sorghum hybrids		

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Spurlock, Terry	Kelley, Jason	Nicolli, Camila		Total Board Funding Requested	AES Portion	CES Portion
Select "AES" or "CES" for each PI	CES	CES	CES				

Fulltime Personnel

Position Title	Name *(if position is filled)*	% Time	Salaries				Total	AES	CES
Program Technician	Robert Hoyle	20%	$8,500				$8,500	$0	$8,500
Program Technician		20%			$8,000		$8,000	$0	$8,000
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Subtotal: Salaries		$8,500	$0	$8,000	$0	$16,500	$0	$16,500

Graduate Student

Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.

Name *(if position is filled)*	% Time	Wages				Total	AES Portion	CES Portion
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
Tuition						$0	$0	$0
Subtotal: Graduate Student		$0	$0	$0	$0	$0	$0	$0

Hourly

	Wages				Total	AES Portion	CES Portion
Hourly-Personnel		$3,500			$3,500	$0	$3,500
Hourly-Students					$0	$0	$0
Subtotal: Hourly	$0	$3,500	$0	$0	$3,500	$0	$3,500

Fringe Benefits

Fringe benefits are calculated when salary and wage amounts are entered above.

	Benefits				Total	AES Portion	CES Portion
Fulltime Personnel	$2,686	$0	$2,528	$0	$5,214	$0	$5,214
Graduate Students	$0	$0	$0	$0	$0	$0	$0
Hourly Personnel	$0	$277	$0	$0	$277	$0	$277
Hourly-Students	$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits	$2,686	$277	$2,528	$0	$5,491	$0	$5,491
Personnel Total	$11,186	$3,777	$10,528	$0	$25,491	$0	$25,491

Travel

Justify out-of-state travel in proposal.

	Travel				Total	AES Portion	CES Portion
In-State	$1,000	$2,500	$1,000		$4,500	$0	$4,500
Out-of-State					$0	$0	$0
Travel Total	$1,000	$2,500	$1,000	$0	$4,500	$0	$4,500

University of Arkansas System Division of Agriculture
Promotion Board Budget

Spurlock, Terry — *Determining disease resitance and susceptibility of corn and grain sorghum hybrids*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$799	$1,500	$1,000		$3,299	$0	$3,299
	Fertilizer/Chemicals	$1,500	$500	$500		$2,500	$0	$2,500
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$2,010	$0	$0	$2,010	$0	$2,010
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$1,680	$0	$1,680	$0	$1,680
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$520	$0	$0	$0	$520	$0	$520
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$2,819	$4,010	$3,180	$0	$10,009	$0	$10,009
	Total for Proposal	$15,005	$10,287	$14,708	$0	$40,000	$0	$40,000

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Spurlock, Terry	Kelley, Jason	Nicolli, Camila		Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Developing a satellite-based field scouting tool for corn

Lead Investigators: Dr. Terry Spurlock

Co-Investigators: Dr. Jason Kelley

Status: New

Research Areas: Precision Ag, General Agronomics, and Diseases

Stated Goal: To develop a tool that uses publicly available satellite imagery to increase scouting efficiency by locating areas in fields that should be scouted

Specific Objectives:

1. Run the tool weekly on each corn verification field and scout areas of field the tool locates at least once prior to VT, once at R3/R4 and once at R6.

2. Collect relevant data relating to corn health and productivity (stand, weed populations, diseases present, etc.) at each area the tool locates as well as soil samples from areas the tool frequently locates.

3. Test different vegetation indexes and mathematical models to determine the best single model or combination of models for field scouting.

4. Year 3 – deploy the beta version of the tool to be used by county agents, consultants, scouts, and/or farmers.

Methods: For each verification field, a polygon shapefile will be drawn to represent the field boundary. All fields will be joined as a single file and these data entered into the tool. The tool will be run weekly on all fields through maturity. As fields reach maturity, they will be removed from the model. The model will use multiple vegetation indexes, normalized difference vegetation index (NDVI), simple ratio (SR), optimized vegetation index (OSAVI), difference vegetation index (DVI), and others, calculated from satellite data that is downloaded weekly. From these indices, three mathematical models will be calculated, 10 points in 4 categories: high, medium high, medium low, and low, a global Moran's I, and high and low outliers calculated using the interquartile range method, to locate field areas to be scouted. After each run of the tool, a file with point data representing areas of the fields to be scouted will be created for each field. These files will then be opened, visualized, and located using a GPS enabled smart phone. For each area scouted, data will be collected within a 5-meter area. Data to be collected will be stand, percent weed coverage, diseases present, and other relevant data describing the field condition. For areas the tool repeatedly locates, a soil sample will be collected prior to harvest. Soil samples will be stored in a -80 celsius freezer for future analysis. At the time of scouting, each point will be designated as 'healthy' or 'unhealthy' to confirm that visual observation agrees or disagrees with the category designated by the model run. Data will be analyzed using a t-test to determine differences between what each model run located.

Planned Milestones: Each year, a summary of findings will be provided to the Arkansas Corn and Grain Sorghum Promotion Board as required. Required progress reports will also be provided. At the conclusion of year 3, a 'beta' version of the tool will be made available to select county offices for use and further testing.

Statement of Projected Value: A working satellite-based scouting tool has been developed to address inefficiency in our current field scouting procedures. This project seeks to validate the tool and provide a more efficient way to learn as much as possible as quickly as possible about corn fields during scouting. As farm sizes increase and the amount of acreage consultants are required to scout increases, an updated scouting procedure is needed that will direct scouts to the most important areas of fields and allow more informed decisions to be made and decrease the likelihood of missed pest pressure and unnecessary product applications.

Budget Justifications/Explanation of Travel and Direct Costs: The budget accounts for travel to and from field locations using Monticello as a home base. We expect to scout verification field locations in southern or central Arkansas. The Spurlock laboratory has hired a specific person to complete data collection with experience in weed science, entomology, and plant pathology. Her hourly wage is accounted for in the budget at an estimated 20 hours per week.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Spurlock, Terry *Developing a satellite-based field scouting tool for corn*

Year	2024/2025	**Project Year**	New	**Version: 6.0 (11/01/2023)**
Lead Investigator	Spurlock, Terry	**Co-PI #1**	Kelley, Jason	
Co-PI #2		**Co-PI #3**		
Department	ENPL Entomology and Plant Pathology			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Developing a satellite-based field scouting tool for corn			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

		Spurlock, Terry	Kelley, Jason			Total Board Funding Requested	AES Portion	CES Portion
	Select "AES" or "CES" for each PI	CES	CES					
Fulltime Personnel								
Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Subtotal: Salaries		$0	$0	$0	$0	$0	$0	$0
	Graduate Student								
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Tuition						$0	$0	$0
	Subtotal: Graduate Student		$0	$0	$0	$0	$0	$0	$0
	Hourly								
			Wages				**Total**	**AES Portion**	**CES Portion**
	Hourly-Personnel		$12,000				$12,000	$0	$12,000
	Hourly-Students						$0	$0	$0
	Subtotal: Hourly		$12,000	$0	$0	$0	$12,000	$0	$12,000
	Fringe Benefits								
Fringe benefits are calculated when salary and wage amounts are entered above.			**Benefits**				**Total**	**AES Portion**	**CES Portion**
	Fulltime Personnel		$0	$0	$0	$0	$0	$0	$0
	Graduate Students		$0	$0	$0	$0	$0	$0	$0
	Hourly Personnel		$948	$0	$0	$0	$948	$0	$948
	Hourly-Students		$0	$0	$0	$0	$0	$0	$0
	Subtotal: Fringe Benefits		$948	$0	$0	$0	$948	$0	$948
	Personnel Total		$12,948	$0	$0	$0	$12,948	$0	$12,948
	Travel								
Justify out-of-state travel in proposal.			**Travel**				**Total**	**AES Portion**	**CES Portion**
	In-State		$2,052				$2,052	$0	$2,052
	Out-of-State						$0	$0	$0
	Travel Total		$2,052	$0	$0	$0	$2,052	$0	$2,052

University of Arkansas System Division of Agriculture
Promotion Board Budget

Spurlock, Terry *Developing a satellite-based field scouting tool for corn*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$0				$0	$0	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$0	$0	$0	$0	$0	$0	$0
	Total for Proposal	$15,000	$0	$0	$0	$15,000	$0	$15,000

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Spurlock, Terry	Kelley, Jason			Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Generating a high-value wax material from sorghum bran using an innovative green approach
Lead Investigator: Ali Ubeyitogullari
Status: New
Research Areas: Misc. Projects

Stated Goal:
Grain sorghum is a drought-resistant cereal, making it a valuable crop to cope with the changing climate. However, the potential of grain sorghum is underestimated as its use in food and bioethanol production is still minimal. Another distinguishing feature of grain sorghum, setting it apart from other grains, is its notable high wax content found in the bran. Sorghum bran waxes have a high melting point, which makes them a potential alternative to commercial carnauba wax, which has sustainability issues. Carnauba wax production is confined to Brazil, with notable concerns surrounding deforestation. Therefore, there is a great opportunity for grain sorghum for the generation of wax material as an alternative to commercial carnauba wax. Thus, our overall objective for this application is to extract and fractionate grain sorghum waxes using a green approach based on supercritical carbon dioxide (SC-CO_2) for both food and non-food industrial applications.

SC-CO_2 is a green solvent for the extraction of various nonpolar compounds since CO_2 is non-toxic, environmentally friendly, inexpensive, abundant, and has a mild critical temperature (31 °C) and pressure (7.4 MPa). In addition, the use of grain sorghum in bioethanol production results in a lipid slurry that is rich in waxes. Nevertheless, this side stream is currently underutilized due to the limitation of hexane fractionation. Therefore, the proposed project will add value to grain sorghum by increasing its use both in food and ethanol production due to its high wax content. In addition, bioethanol manufacturers will increase the use/ratio of sorghum in their fermenters due to high-value wax in their byproducts. Overall, this study will enable the extraction and fractionation of waxes from other lipids using SC-CO_2 owing to its tunable solubility, density, and diffusivity properties.

Specific Objectives:
1. Extract high-value waxes from sorghum bran using SC-CO_2, optimize the extraction conditions, and create a model to describe the extraction process.
2. Separate and fractionate waxes from a recovered oil process stream of a bioethanol facility that uses grain sorghum in their fermenter.
3. Coat fresh blackberries with the generated wax fractions to enhance their shelf life.

Methods:
Objective 1: Grain sorghum (white, yellow, red, brown, and black) will be decorticated by a dehuller to obtain sorghum bran. The wax-rich oils will be extracted from different sorghum brans using a lab-scale SC-CO_2 extractor (SFT-120, Supercritical Fluid Technologies, Inc., DE, USA). First, the cylindrical stainless-steel vessel (100 mL) will be filled with 18 g of sorghum bran. The vessel will be sealed with glass wool from both ends to prevent the stainless-steel frits from clogging. Then, the system will be flushed with CO_2 to eliminate any air in the vessel to prevent oxidation. Subsequently, the temperatures of the needle and micrometering valves will be set to 80 °C to prevent freezing owing to the Joule-Thompson effect during the continuous flow of CO_2. Next, the vessel will be heated to the set temperature (30-80 °C) and pressurized to the set pressure (5-40 MPa). After a static extraction time of 20 min, the flow rate of CO_2 will be adjusted to 2 L/min (at ambient conditions). The extracted fractions will be continuously collected in 40 mL brown glass vials kept in an ice bath. The extraction time will vary between 1-5 h. The extraction yield will be determined gravimetrically. The wax content of the collected lipids will be determined using ethanol fractionation. The composition of the extracted lipids will be

determined using a gas chromatography-mass spectrometry (GC-MS) method. The SC-CO_2 extraction conditions will be modeled and optimized using machine learning algorithms.

Objective 2: The bioethanol production side streams (i.e., lipid slurries) will be obtained from Western Plains Energy. The bioethanol facility uses different ratios of corn/sorghum in their fermenter, where, depending on the availability, they could use over 90% grain sorghum. Lipid slurries obtained from 30, 50, and 70% grain sorghum used during fermentation will be used for the separation and fractionation of waxes using the same SC-CO_2 extractor (SFT-120, Supercritical Fluid Technologies, Inc., DE, USA). Differential scanning calorimetry (DSC, Model Diamond, Perkin-Elmer, Norwalk, CT, USA) will be performed to measure the melting points of the extracts/fractions collected. The composition of the waxes will be characterized using a GC-MS method. The melting profiles will be compared with commercially available waxes such as carnauba, shellac, beeswax, and candelilla. The DSC data will be fed into machine learning algorithms to optimize the SC-CO_2 extraction conditions to generate waxes with properties similar to the commercially available ones.

Objective 3: The purified waxes will be used to generate nanoemulsions, which will be applied to the fresh blackberries to increase their shelf life. The wax nanoemulsions will be characterized for their droplet size, zeta potential, stability, and viscosity. The coating will be achieved by spraying onto the fruit or dipping them into the emulsion solutions. The thickness of the coating materials will be analyzed using scanning electron microscopy. Based on the modeling data, wax fractions with similar properties to carnauba and candelilla wax will be applied, and they will be compared with the commercially available waxes. The texture, color, weight, total phenolic content, and decay of the blackberries will be determined over a storage period of 21 days.

Planned Milestones:

The extraction and modeling of waxes from sorghum bran will be completed in the first year. Separation, fractionation, and predictive modeling of waxes from bioethanol side streams will be completed in the second year. In the third year, the collected wax fraction will be used to produce coating materials, and they will be tested on fresh blackberries to increase their shelf life.

Statement of Projected Value:

The utilization of grain sorghum in bioethanol and food applications is limited; thus, the full value of grain sorghum is underestimated. The proposed research will highlight the advantages of grain sorghum by creating high-value wax materials from sorghum bran and byproducts of bioethanol production using a green process based on SC-CO_2 technology. This process will maximize the value of grain sorghum, add value to the lipid side stream in bioethanol production, and minimize waste generation. Considering the grain sorghum production in Arkansas, this research will contribute to Arkansas's economy by generating premium waxes from grain sorghum and, in turn, increase the acreage of grain sorghum in Arkansas. Finally, the proposed project has great potential for patent application and licensing, which can increase the demand for grain sorghum and its profitability.

Budget Justifications/Explanation of Travel and Direct Costs:

Funds are requested to support a graduate student and cover tuition for the graduate student. Out-of-state travel is requested to present findings at professional conferences (e.g., IFT, AOCS) in the U.S., to increase the visibility of the University and attract high-quality people to the state. Also, funds are requested for direct expenses like materials and supplies (i.e., high-pressure tubing and valves, glassware, chemicals, digestive enzymes) in the lab, and service lab usage fees (GC, FTIR, SEM, XRD service fees).

University of Arkansas System Division of Agriculture

Promotion Board Budget

Ubeyitogullari, Ali — *Generating a high-value wax material from sorghum bran using an innovative green approach*

Year	2024/2025	**Project Year**	New	**Version: 6.0 (11/01/2023)**
Lead Investigator	Ubeyitogullari, Ali	**Co-PI #1**		
Co-PI #2		**Co-PI #3**		
Department	FDSC Food Science			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Generating a high-value wax material from sorghum bran using an innovative green approach			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Ubeyitogullari, Ali				**Total Board Funding Requested**	**AES Portion**	**CES Portion**
Select "AES" or "CES" for each PI	AES						
Fulltime Personnel							
Position Title / **Name** *(if position is filled)* / **% Time**	**Salaries**				**Total**	**AES**	**CES**
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Subtotal: Salaries	$0	$0	$0	$0	$0	$0	$0
Graduate Student							
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.							
Name *(if position is filled)* / **% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
100%	$23,000				$23,000	$23,000	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Tuition	$6,795				$6,795	$6,795	$0
Subtotal: Graduate Student	$29,795	$0	$0	$0	$29,795	$29,795	$0
Hourly							
	Wages				**Total**	**AES Portion**	**CES Portion**
Hourly-Personnel					$0	$0	$0
Hourly-Students					$0	$0	$0
Subtotal: Hourly	$0	$0	$0	$0	$0	$0	$0
Fringe Benefits							
Fringe benefits are calculated when salary and wage amounts are entered above.							
	Benefits				**Total**	**AES Portion**	**CES Portion**
Fulltime Personnel	$0	$0	$0	$0	$0	$0	$0
Graduate Students	$966	$0	$0	$0	$966	$966	$0
Hourly Personnel	$0	$0	$0	$0	$0	$0	$0
Hourly-Students	$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits	$966	$0	$0	$0	$966	$966	$0
Personnel Total	$30,761	$0	$0	$0	$30,761	$30,761	$0
Travel							
Justify out-of-state travel in proposal.							
	Travel				**Total**	**AES Portion**	**CES Portion**
In-State					$0	$0	$0
Out-of-State	$2,000				$2,000	$2,000	$0
Travel Total	$2,000	$0	$0	$0	$2,000	$2,000	$0

University of Arkansas System Division of Agriculture

Promotion Board Budget

Ubeyitogullari, Ali — *Generating a high-value wax material from sorghum bran using an innovative green approach*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$10,000				$10,000	$10,000	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$10,000	$0	$0	$0	$10,000	$10,000	$0
	Total for Proposal	$42,761	$0	$0	$0	$42,761	$42,761	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Ubeyitogullari, Ali				Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Development and verification of a stand counting application using drone imagery for research and production decision support.

Lead Investigators: Jason Davis, Extension Specialist in Remote Sensing and Pesticide Application

Co-Investigators: Jason Kelley, Extension Agronomist

Status: New, Year 1 of 3

Research Areas: Misc. Project (Precision Agriculture)

Stated Goal: Produce and validate a user-friendly stand counting program or web-tool that can be used in conjunction with drone imagery to inform research and production replant decisions.

Specific Objectives:

(1) Collect drone imagery of plant population studies (small plots) and use it to train a custom corn plant counting object detection model.

(2) Validate detection accuracy of model with considerations for research and production applications.

(3) Develop and release a user-friendly software package that leverages the validated customized model.

Methods:

1. Drone imagery will be collected on multiple dates of Dr. Jason Kelly's small and large plot Nitrogen population evaluation study at the Jackson County Extension Center and the Pine Tree Research Station. Established treatments in large and small plots will be imaged using an automated mission flying at low altitude (2 – 3 m) and at two relative view angles to corn emergence (directly overhead and approximately 35^{o} off nadir). Imagery will be collected within a week of corn emergence and in conjunction with counting events by Dr. Kelly's team to be used as part of model validation.

2. Imagery will be converted into training data by annotating individual corn plants. Training data will be used to train a custom object detection model. Model accuracy will be validated using a combination of ground referenced results collected from Dr. Kelly's team and manual counting in raw imagery.

3. A user-friendly software package (downloadable executable program) or web-tool (hosted on UAEX website) will be developed that uses the custom trained corn counting model to produce field maps and reports with raw counts and acre population estimates.

Planned Milestones:

Year 1 – Plots established, imagery collected, annotated, and initial model trained. Model accuracy will be evaluated, and results will be presented at crop production meetings, blog postings, and other avenues of information. Initial software framework to be established using Year 1 model.

Year 2 – Plots established, additional imagery will be collected, annotated and model updated as needed to reach desirable accuracy. The updated model will be embedded in a further developed software framework. If software tool and model perform to a desirable level of accuracy, they will be released. If further development is needed, Year 3 funding may be requested.

Year 3 – Model and software framework will be finalized, and tool will be made available.

Statement of Projected Value:

Optimal plant populations heavily influence yield and profitability; however, establishing robust plant population estimates at scale to inform replant or other production decisions is cumbersome and time consuming. A user-friendly and robust counting tool that leverages the automated data collection capabilities of drones could significantly facilitate these estimates. Furthermore, if population data is incorporated into machine readable maps, population estimates could inform site-specific applications of nutrients with Variable Rate Technology (VRT). A prerequisite of this, however, would be the automation of population estimates across whole fields. This project will have the initial value of building a stand counting tool for traditional production decisions and potentially be used as the foundation for a variable rate map generator for site-specific nutrient applications.

Budget Justifications/Explanation of Travel and Direct Costs:

The budget reflects personnel, travel, and some miscellaneous supplies for fieldwork and data analysis. Specifically, partial support for a program technician to assist with field work, data collection and training imagery annotation is requested. Additionally, funding for travel to and from plot locations to collect imagery and ground reference data. Miscellaneous supplies related to plot work, drone maintenance, and data storage and analysis.

University of Arkansas System Division of Agriculture

Promotion Board Budget

Davis, Jason — *Development and verification of a stand counting application using drone imagery for research and production*

Year	2024/2025	**Project Year**	New
Lead Investigator	Davis, Jason	**Co-PI #1**	Kelley, Jason
Co-PI #2		**Co-PI #3**	
Department	CSES Crop, Soil, Environmental Science		
Commodity Board	Corn and Grain Sorghum Board		
Project Title	Development and verification of a stand counting application using drone imagery for research and production decision support.		

Version: 6.0 (11/01/2023)

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

		Davis, Jason	Kelley, Jason			Total Board Funding Requested	AES Portion	CES Portion
Select "AES" or "CES" for each PI		CES	CES					
Fulltime Personnel								
Position Title	**Name** *(if position is filled)* / **% Time**	**Salaries**				**Total**	**AES**	**CES**
Technician	25%	$10,000				$10,000	$0	$10,000
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
Subtotal: Salaries		$10,000	$0	$0	$0	$10,000	$0	$10,000
Graduate Student								
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)* / **% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
	Tuition					$0	$0	$0
Subtotal: Graduate Student		$0	$0	$0	$0	$0	$0	$0
Hourly								
		Wages				**Total**	**AES Portion**	**CES Portion**
Hourly-Personnel						$0	$0	$0
Hourly-Students						$0	$0	$0
Subtotal: Hourly		$0	$0	$0	$0	$0	$0	$0
Fringe Benefits								
Fringe benefits are calculated when salary and wage amounts are entered above.		**Benefits**				**Total**	**AES Portion**	**CES Portion**
Fulltime Personnel		$3,160	$0	$0	$0	$3,160	$0	$3,160
Graduate Students		$0	$0	$0	$0	$0	$0	$0
Hourly Personnel		$0	$0	$0	$0	$0	$0	$0
Hourly-Students		$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits		$3,160	$0	$0	$0	$3,160	$0	$3,160
Personnel Total		$13,160	$0	$0	$0	$13,160	$0	$13,160
Travel								
Justify out-of-state travel in proposal.		**Travel**				**Total**	**AES Portion**	**CES Portion**
In-State		$3,500				$3,500	$0	$3,500
Out-of-State						$0	$0	$0
Travel Total		$3,500	$0	$0	$0	$3,500	$0	$3,500

University of Arkansas System Division of Agriculture

Promotion Board Budget

Davis, Jason — *Development and verification of a stand counting application using drone imagery for research and production*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$3,000				$3,000	$0	$3,000
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$3,000	$0	$0	$0	$3,000	$0	$3,000
	Total for Proposal	$19,660	$0	$0	$0	$19,660	$0	$19,660

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

Ecosystems (Rice Only)		%	Davis, Jason	Kelley, Jason			Total	
	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Promotion Board - 2024-2025 Proposal

Title: Optimizing Plant Population and Nitrogen Rate in Corn

Lead Investigator: Jason Kelley, Extension Agronomist

Co-Investigators: Trent Roberts, Soil Fertility, Hunter Biram, Extension Economist

Status: Year 2 of 3

Research Areas: Agronomics, Fertility, Economics

Stated Goal: Evaluate corn yield response and resulting economic returns to varying plant populations and plant population x nitrogen rate combinations.

Specific Proposed Objectives:

(1) Evaluate the impact of corn plant populations (populations of approximately 20k-45k plants/acre) on producer fields to compare yields, lodging potential, and economic return across diverse sites with varying yield potential and various commonly planted hybrids. (Large plots)

(2) Evaluate yield response to varying plant populations of new and commonly grown corn hybrids in combination with varying nitrogen rates (Small Plots)

(3) Evaluate resulting economic returns from trials

Methods and Procedures:

1. Large plot trials will be established on cooperating producer fields with the assistance of county agents. An approximate range of plant populations will be 20k-45k plants/acre but will vary depending on the producer. The hybrid (s) evaluated will be based on what the producer is planting. Grain yield, lodging, and economic returns will be evaluated.

2. Replicated small plots evaluating corn plant population X nitrogen rate of 2 or more hybrids will be conducted at five locations including the Southeast Research and Extension Center at Rohwer, the Lon Mann Cotton Research Station near Marianna, the Pinetree Research Station, the Jackson County Extension Center, near Newport, and the Milo Shult Agriculture Research and Extension Center at Fayetteville. Anticipated plant populations to be evaluated include 22k, 27k, 32k, 37k, and 42k plants/acre. Nitrogen rates anticipated include 0, 150, 200, 250, and 300 lbs N/ac. Tissue sampling will be conducted to evaluate potential differences in nutrient concentrations among varying plant populations. Yield, lodging, and economic returns will be evaluated.

3. Economic returns will be determined from Objectives 1 and 2 using resulting corn yields from treatments and actual input prices to determine the most economical production practices.

Planned Milestones: Results will be published in the Arkansas Corn and Grain Sorghum Research Studies publication. Relevant information obtained from these trials will be presented at crop production meetings, in newsletters, blog postings, and other avenues of information dissemination to assist Arkansas corn growers in making sound production decisions to increase the profitability of their farms.

Statement of Project Value: These trials will provide Arkansas corn growers with unbiased, local, and up-to-date information on how plant populations and nitrogen fertilizer rate combinations may impact corn yield and economic returns on their farms. Arkansas corn yields have increased dramatically over the last 30 years with an approximate 70+ bu/acre increase in the state average yield from 1992-2023 (110 to 180 bu/acre). Management practices such as increasing plant populations and more efficient nitrogen management has played a large role in increasing yields and will continue to be important in future years.

Many Arkansas corn growers can grow 200-240 bu/acre corn when proper management practices are implemented timely, followed by weather that is conducive for high yields. Although the state average yield has never been over 187 bu/acre, there is still room for improvement for much of our corn acreage. The National Corn Growers Yield Contest winner from Arkansas in 2022 had a yield of 308 bu/acre indicating extremely high yields are possible, but economic return is not a factor in achieving yield contest yields. Economic returns for inputs to "normal" corn fields are critical and will be highlighted in this research.

In past research, plant population and nitrogen fertilizer are two inputs that typically have large impacts on overall yield, and with seed and fertilizer being the two greatest input costs to grow corn, obtaining the optimum plant population and nitrogen rate combination is critical for profitability. As new higher-yielding hybrids become commercially available, determining the economic optimum plant population and nitrogen fertilizer rate of newer hybrids is needed to keep our producers up to date on management.

Out-of-State Travel Justification: $1500 to partially cover travel costs to attend the American Society of Agronomy National meeting (Nov. 2024, San Antonio, TX) to present results from this project and gain new ideas from colleagues across the country.

University of Arkansas System Division of Agriculture

Promotion Board Budget

Kelley, Jason *Optimizing Plant Population and Nitrogen Rate in Corn*

Year	2024/2025	**Project Year**	Year 2 of 3	**Version: 6.0 (11/01/2023)**
Lead Investigator	Kelley, Jason	**Co-PI #1**	Roberts, Trenton	
Co-PI #2	Biram, Hunter	**Co-PI #3**		
Department	CSES Crop, Soil, Environmental Science			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Optimizing Plant Population and Nitrogen Rate in Corn			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

			Kelley, Jason	Roberts, Trenton	Biram, Hunter		Total Board Funding Requested	AES Portion	CES Portion
		Select "AES" or "CES" for each PI	CES	AES	CES				
Fulltime Personnel									
Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
Progam Tech		15%		$5,250			$5,250	$5,250	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Subtotal: Salaries		$0	$5,250	$0	$0	$5,250	$5,250	$0
	Graduate Student								
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Tuition						$0	$0	$0
	Subtotal: Graduate Student		$0	$0	$0	$0	$0	$0	$0
			Hourly						
			Wages				**Total**	**AES Portion**	**CES Portion**
	Hourly-Personnel		$3,476				$3,476	$0	$3,476
	Hourly-Students						$0	$0	$0
	Subtotal: Hourly		$3,476	$0	$0	$0	$3,476	$0	$3,476
			Fringe Benefits						
Fringe benefits are calculated when salary and wage amounts are entered above.			**Benefits**				**Total**	**AES Portion**	**CES Portion**
	Fulltime Personnel		$0	$1,659	$0	$0	$1,659	$1,659	$0
	Graduate Students		$0	$0	$0	$0	$0	$0	$0
	Hourly Personnel		$275	$0	$0	$0	$275	$0	$275
	Hourly-Students		$0	$0	$0	$0	$0	$0	$0
	Subtotal: Fringe Benefits		$275	$1,659	$0	$0	$1,934	$1,659	$275
	Personnel Total		$3,751	$6,909	$0	$0	$10,660	$6,909	$3,751
			Travel						
Justify out-of-state travel in proposal.			**Travel**				**Total**	**AES Portion**	**CES Portion**
	In-State		$5,000	$1,500			$6,500	$1,500	$5,000
	Out-of-State		$1,500				$1,500	$0	$1,500
	Travel Total		$6,500	$1,500	$0	$0	$8,000	$1,500	$6,500

University of Arkansas System Division of Agriculture

Promotion Board Budget

Kelley, Jason *Optimizing Plant Population and Nitrogen Rate in Corn*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$1,000				$1,000	$0	$1,000
	Fertilizer/Chemicals	$2,500	$965			$3,465	$965	$2,500
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs	tissue sampling	$800	$400			$1,200	$400	$800
Station Maintenance	SAREC, Fayetteville	$0	$1,935	$0	$0	$1,935	$1,935	$0
	CTST, Marianna	$1,935	$0	$0	$0	$1,935	$0	$1,935
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$1,935	$0	$0	$0	$1,935	$0	$1,935
	PTST, Colt	$0	$1,935	$0	$0	$1,935	$1,935	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$1,935	$0	$0	$0	$1,935	$0	$1,935
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$10,105	$5,235	$0	$0	$15,340	$5,235	$10,105
	Total for Proposal	$20,356	$13,644	$0	$0	$34,000	$13,644	$20,356

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Kelley, Jason	Roberts, Trenton	Biram, Hunter		Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Cover Crops in Corn Rotations- What Works and What Doesn't?

Lead Investigators: Trenton Roberts

Co-Investigators: Jason Kelley, Gerson Drescher, and New Soil Borne Plant Pathologist

Status: Year 2

Research Areas: General Agronomics

Stated Goal: To investigate the short-term and long-term benefits of cover crop implementation on corn yield, disease pressure, and soil health.

Specific Objectives:

1. Determine the best management practices for growing corn following common cover crops such as cereal rye and Austrian winter pea.
2. Determine how implementing winter cover crops into a corn-soybean rotation influences nutrient cycling, soil physical properties, soil chemical properties and soil health.
3. Determine how implementing winter cover crops into a corn-soybean rotation influence incidence and severity of soil-borne and foliar diseases.
4. Determine the changes of soil microbial seedbank and the microbes associated with roots of corn in response to the use cover crops as indicators of soil health.

Methods:

1. Field-scale strip trials will be developed to compare corn germination, establishment and yield following fallow and various cover crops including cereal rye and Austrian winter pea. To increase corn germination and establishment following cereal rye cover crops we will implement several strategies to look at the method and timing of cereal rye termination to determine how to best grow corn following cover crops. In addition to termination method and timing we will look at early season fertilization broadcast or in-furrow to boost early season corn growth Various rates of nitrogen (N) and phosphorus (P) fertilizer will be applied to determine if these early season applications can help overcome the early season vigor and grain yield lag of corn following cereal rye.
2. Field-scale, large-block trials will be implemented to look at the influence of cover crop species on soil health, soil physical and chemical characteristics specifically related to soil water holding capacity and irrigation. Implementation of cover crops and no-till production practices will influence the amount of soil organic matter and ultimately the crop performance and water use efficiency. Soil samples will be taken annually within the trial to gain baseline information of characteristics such as soil texture, organic C, organic N, soil organic matter via weight loss on ignition and basic soil fertility levels. During the initiation of the trial samples will be taken prior to cash crop planting each season to monitor the effects of the cover crop treatments within the corn and soybean rotations.
3. Within large blocks, transects will be established to determine plant stand and incidence and severity of economically important diseases. The number of points will be adjusted by field trial and based on block size. A subset of points will be chosen to collect soil samples at cover stage and corn seedling stage (V2-V6) for nematode counting and pathogen incidence. From these samples, populations of free-living and plant parasitic nematodes will be quantified by treatment. Free-living nematode populations offer an indication of soil health.

As describe in section 3 of methods, within the blocks, a subset of points will be selected to obtain soil subsamples for bioassays to establish pathogen incidence and DNA extraction from the soil samples and examining soil microbe populations, mainly bacteria and fungi. The characterization of the taxa will be used to determine the ratio of potential pathogenic organisms versus beneficial or saprophytic organisms present in the soil and how cover crops affect those shifts and ratios. Plants seedlings (V2-V6) will be sample to determine associated microbes with roots and potential presence of pathogens or beneficial microbes.

Planned Milestones:

Data will be collected annually and compiled over time to compare the short-term and long-term effects of winter cover crop species selection. It may take several years for these systems to reach equilibrium due to the changes of both cover cropping and no-till management practices. Our goal is to monitor these changes to help aid producers in N management for corn through the implementation of cover crops into a corn soybean rotation and explain performance of the overall field system by describing diseases and indicators of soil health such as free-living nematodes and soil microbial communities. Results will be reported each year at county and regional meetings and in the refereed scientific literature at the completion of the study.

Statement of Projected Value: Winter cover crops have been promoted based on the environmental benefits of reduced erosion and nutrient loss. Limited work has been done to date on species selection and cultural management practices for effective use of winter cover crops in Arkansas corn and soybean rotational systems. Identifying the correct species, planting date and fertilization needs are essential for effective cover crop use and continued profitability of our corn production systems. Costs and challenges of winter cover crops will be easily offset by: 1) the potential decrease in fertilizer needs 2) improved soil conditions that lead to better growth or reduced irrigation needs and 3) reduction in environmental impacts that threaten the long-term sustainability of Arkansas corn production. Inclusion of winter cover crops can have both short-term and long-term impacts on corn and soybean production. Understanding how cover crop species selection and cultural management practices influence corn grain yield and influence soil health, is one of the most important steps in realizing the benefits of their effective use.

Budget Justifications/Explanation of Travel and Direct Costs: The out of state travel included in this proposal is to cover a portion of the cost for graduate students to attend professional scientific meetings which in this calendar year will include the international annual agronomy meetings in San Antonio, TX. The attendance at these meetings allows presentations to be made concerning the research work conducted and also for increased education by attending other scientific presentations and workshops. In-state travel and salary are budgeted for field data collections.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Roberts, Trenton *Cover Crops in Corn Rotations- What Works and What Doesn't?*

Year	2024/2025	**Project Year**	Year 2 of 3	**Version: 6.0 (11/01/2023)**
Lead Investigator	Roberts, Trenton	**Co-PI #1**		
Co-PI #2		**Co-PI #3**		
Department	CSES Crop, Soil, Environmental Science			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Cover Crops in Corn Rotations- What Works and What Doesn't?			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Roberts, Trenton				**Total Board Funding Requested**	**AES Portion**	**CES Portion**
Select "AES" or "CES" for each PI	AES						
Fulltime Personnel							
Position Title / **Name** *(if position is filled)* / **% Time**	**Salaries**				**Total**	**AES**	**CES**
Program Associate / Joe Shafer / 25%	$15,000				$15,000	$15,000	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Subtotal: Salaries	$15,000	$0	$0	$0	$15,000	$15,000	$0
Graduate Student							
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition. / **Name** *(if position is filled)* / **% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Tuition					$0	$0	$0
Subtotal: Graduate Student	$0	$0	$0	$0	$0	$0	$0
Hourly							
	Wages				**Total**	**AES Portion**	**CES Portion**
Hourly-Personnel					$0	$0	$0
Hourly-Students	$2,000				$2,000	$2,000	$0
Subtotal: Hourly	$2,000	$0	$0	$0	$2,000	$2,000	$0
Fringe Benefits							
Fringe benefits are calculated when salary and wage amounts are entered above.	**Benefits**				**Total**	**AES Portion**	**CES Portion**
Fulltime Personnel	$4,740	$0	$0	$0	$4,740	$4,740	$0
Graduate Students	$0	$0	$0	$0	$0	$0	$0
Hourly Personnel	$0	$0	$0	$0	$0	$0	$0
Hourly-Students	$14	$0	$0	$0	$14	$14	$0
Subtotal: Fringe Benefits	$4,754	$0	$0	$0	$4,754	$4,754	$0
Personnel Total	$21,754	$0	$0	$0	$21,754	$21,754	$0
Travel							
Justify out-of-state travel in proposal.	**Travel**				**Total**	**AES Portion**	**CES Portion**
In-State	$3,500				$3,500	$3,500	$0
Out-of-State	$1,500				$1,500	$1,500	$0
Travel Total	$5,000	$0	$0	$0	$5,000	$5,000	$0

University of Arkansas System Division of Agriculture

Promotion Board Budget

Roberts, Trenton *Cover Crops in Corn Rotations- What Works and What Doesn't?*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$1,500				$1,500	$1,500	$0
	Fertilizer/Chemicals	$1,000				$1,000	$1,000	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs	Analysis	$4,000				$4,000	$4,000	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$6,475	$0	$0	$0	$6,475	$6,475	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$12,975	$0	$0	$0	$12,975	$12,975	$0
	Total for Proposal	$39,729	$0	$0	$0	$39,729	$39,729	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Roberts, Trenton				Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Towards a comprehensive aflatoxin solution: Creating and integrating novel aflatoxin control resources for an effective, sustainable management strategy

Lead Investigator: Dr. Burt Bluhm

Co-Investigators: Dr. Guri Johal, Purdue Univ.

Status (i.e., New, Year 2 of 3, Year 2 of 2, etc.): Year 2 of 3

Research Areas (Verification Program, General Agronomics, Diseases, Insects, Fertility, Irrigation, Weed Control, Misc. Projects): Disease, General Agronomics

Stated Goal: To provide a practical solution to aflatoxin in corn as quickly as possible (years, not decades). To this end, we are creating new genetic resources to control aflatoxin in corn, ensuring that next-generation semi-dwarf corn hybrids incorporate aflatoxin resistance, and integrating all Arkansas aflatoxin research efforts into a 'moon shot' initiative to eliminate the threat of aflatoxin in corn

Specific Objectives:

1. Identify genes in corn associated with protein misfolding during heat and drought stress
2. Create novel aflatoxin-resistance genes through transgenic approaches and genome editing
3. Incorporate aflatoxin resistance into new semi-dwarf maize hybrids
4. Acquire and organize resources to launch a comprehensive 'moon shot' among multiple institutions to control aflatoxin in corn

Methods:

Objective 1. With prior support from the Arkansas Corn and Grain Sorghum Promotion Board, we identified heat-shock response/repair pathways in modern corn hybrids as some of the most likely drivers of aflatoxin susceptibility. In the course of this project, we are identifing specific alleles of genes in this pathway that are associated with aflatoxin resistance. We will identify these alleles from tropical hybrids with known aflatoxin resistance, as well as the aflatoxin-resistant ancestor of modern maize (teosinte). It is very likely that resistance alleles are negatively associated (due to genetic linkage) with important production traits, such as yield. Thus, we will use novel approaches to introgress these alleles into modern hybrids and/or design novel transgenes based on these alleles to convey aflatoxin resistance.

Objective 2. We will utilize the information derived from Objective 1, in conjunction with information obtained in the previous project, to augment corn's response to heat stress, and thus aflatoxin resistance. We will utilize three approaches to create resistance-associated alleles. First, some alleles from tropical or ancestral germplasm are likely to be effective and can be introgressed transgenically into modern corn hybrid parental lines. Second, we anticipate that some polymorphisms will be well-suited for editing in modern hybrid parental lines, and can be directly converted into resistance alleles. Third, for some alleles, we may need to utilize a combination of genome editing and transgenic approaches to create 'custom' resistance alleles. With prior support from the Arkansas Corn and Grain Sorghum Promotion Board, we created a pipeline for genome editing in corn, and have extensive prior experience creating transgenes and transgenic corn; thus our program is well-equipped to perform the proposed work.

Objective 3. Dr. Guri Johal (Purdue University), an internationally recognized corn geneticist and long-time collaborator with our program, is pioneering the development of novel semi-dwarf corn hybrids. For decades, semi-dwarf hybrids have been pursued by corn breeding programs worldwide, due to their

improved input-to-yield ratios, increased water use efficiency, and other important traits. Dr. Norman Borlaug developed dwarf wheat in the 1960s, launching the Green Revolution in agriculture; for this, he received the Nobel Peace Prize. Dr. Johal has identified a dominant, single-gene mutation in corn that conveys dwarfing without impairing production or yield. This trait will fundamentally change corn hybrids in the U.S. and beyond. At this early stage of hybrid, semi-dwarf lines, we are collaborating with Dr. Johal to screen hybrids and parental lines for aflatoxin susceptibility, identify lines with aflatoxin/stress tolerance as parental lines, and incorporate our aflatoxin resistance transgenes into dwarf hybrids. This will ensure that aflatoxin resistance is part of the genetic foundation of semi-dwarf corn hybrids, rather than trying to catch up years after semi-dwarf hybrids have overtaken the market.

Objective 4. In the past two years, a comprehensive strategy to mitigate aflatoxin in corn has come into sharper focus. I firmly believe a 'cure' for aflatoxin in corn is achievable in years rather than decades. Achieving a cure will come in stages. First, resources have recently been created that must be deployed efficiently and effectively. For example, our program recently created transgenes that strongly suppress aflatoxin production in corn and identified novel atoxigenic *A. flavus* strains from Arkansas that 'push' native pathogen populations towards atoxigenicity. Emerging technologies such as these must be commercialized as quickly as possible and integrated into existing aflatoxin mitigation strategies. Secondly, emerging technologies need to be accelerated through federal funding and/or industry partnerships. For example, our program is actively mapping the genetic regulation of aflatoxin biosynthesis in *A. flavus* to provide new targets for transgenes in corn, and we are racing to identify the molecular signal that atoxigenic strains use to suppress aflatoxin biosynthesis in other strains; we will develop this molecule into a novel fungicide/fumigant to suppress aflatoxin production. Dr. Griffiths Atungulu has promising results with novel grain storage/drying technologies that minimize post-harvest aflatoxin production.

To organize all of these resources into a 'moon shot' initiative, we are establishing a multi-state network of aflatoxin researchers to coordinate research efforts, share results, and cooperatively secure federal and industry support for aflatoxin mitigation research. We envision that this individually funded group will essentially serve the function originally intended for the Aflatoxin Mitigation Center of Excellence.

Planned Milestones: In Year 1, we made progress on Objective 1 and initiated the other Objectives by creating novel transgenes, screening dwarf hybrids and parentals in Arkansas production conditions and meeting with other aflatoxin researchers. In Year 2, we will develop 2 – 5 transgenes, work to introgress existing transgenes into parental lines for dwarf hybrids, continue evaluating dwarf hybrids for aflatoxin responses, and submit at least one proposal for multi-state aflatoxin funding. In Year 3, we will continue creating/evaluating transgenes and genome edited lines, as well as dwarf hybrids; we will establish a formal entity to coordinate aflatoxin research (ideally, an Arkansas-based entity to lead aflatoxin research, e.g., the Arkansas Center for Mycotoxin Research).

Statement of Projected Value: Aflatoxin is one of the most devastating disease issues facing corn producers in Arkansas. Aflatoxin reduces profits, and in extreme events, can make a given season a total loss. A cure for aflatoxin that relies heavily on genetic resistance will increase producers' profits by protecting yields and reducing management costs; it will also greatly reduce the risk of catastrophic losses associated with outbreak events.

Budget Justifications/Explanation of Travel and Direct Costs: Funds are requested for research personnel, laboratory consumables associated with transgene development, and for field trials of semi-dwarf hybrids. Funding for out-of-state travel will support collaborations with researchers at other Universities, and for personnel to present research results at international conferences within the US.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Bluhm, Burt — *Towards a comprehensive aflatoxin solution: Creating and integrating novel aflatoxin control resources*

Year	2024/2025	**Project Year**	Year 2 of 3
Lead Investigator	Bluhm, Burt	**Co-PI #1**	
Co-PI #2		**Co-PI #3**	
Department	ENPL Entomology and Plant Pathology		
Commodity Board	Corn and Grain Sorghum Board		
Project Title	Towards a comprehensive aflatoxin solution: Creating and integrating novel aflatoxin control resources		

Version: 6.0 (11/01/2023)

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

		Bluhm, Burt				**Total Board Funding Requested**	**AES Portion**	**CES Portion**
Select "AES" or "CES" for each PI		AES						
Fulltime Personnel								
Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
Postdoctoral associate		% Time	$25,000				$25,000	$25,000	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Subtotal: Salaries		$25,000	$0	$0	$0	$25,000	$25,000	$0
	Graduate Student								
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Tuition						$0	$0	$0
	Subtotal: Graduate Student		$0	$0	$0	$0	$0	$0	$0
			Hourly						
			Wages				**Total**	**AES Portion**	**CES Portion**
	Hourly-Personnel		$1,681				$1,681	$1,681	$0
	Hourly-Students						$0	$0	$0
	Subtotal: Hourly		$1,681	$0	$0	$0	$1,681	$1,681	$0
			Fringe Benefits						
Fringe benefits are calculated when salary and wage amounts are entered above.			**Benefits**				**Total**	**AES Portion**	**CES Portion**
	Fulltime Personnel		$7,900	$0	$0	$0	$7,900	$7,900	$0
	Graduate Students		$0	$0	$0	$0	$0	$0	$0
	Hourly Personnel		$133	$0	$0	$0	$133	$133	$0
	Hourly-Students		$0	$0	$0	$0	$0	$0	$0
	Subtotal: Fringe Benefits		$8,033	$0	$0	$0	$8,033	$8,033	$0
	Personnel Total		$34,714	$0	$0	$0	$34,714	$34,714	$0
			Travel						
Justify out-of-state travel in proposal.			**Travel**				**Total**	**AES Portion**	**CES Portion**
	In-State		$500				$500	$500	$0
	Out-of-State		$3,000				$3,000	$3,000	$0
	Travel Total		$3,500	$0	$0	$0	$3,500	$3,500	$0

University of Arkansas System Division of Agriculture
Promotion Board Budget

Bluhm, Burt — *Towards a comprehensive aflatoxin solution: Creating and integrating novel aflatoxin control resources*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$6,786				$6,786	$6,786	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$6,786	$0	$0	$0	$6,786	$6,786	$0
	Total for Proposal	$45,000	$0	$0	$0	$45,000	$45,000	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Bluhm, Burt				Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Assess Management Options for Corn Nematodes in Arkansas

Lead Investigators: Travis Faske

Co-Investigators: Daniel Rivera, Amanda Greer, and Michael Emerson

Status: Year 3 of 3

Research Area: Diseases

Goal: To determine the diversity and impact of corn nematodes in Arkansas. Gain a better understanding of the distribution and impact of corn nematodes in Arkansas corn production. Further, evaluate nematode management tactics to protect corn yield potential and encourage farmers to sample for corn nematodes by offering free soil nematode assays.

Objectives:

1. Evaluate the vertical distribution and changes population dynamics of corn nematodes over the cropping season. (Faske)

2. Evaluate the efficacy of commercially available and experimental seed- and soil-applied nematicides for control of stubby-root and other corn nematodes. (Faske)

3. Promote the importance of sampling corn fields for corn nematodes and identify the most important species of corn nematode that affect corn production by offering "free" nematode soil assays sponsored by the GSPB. (Greer)

4. Extend and educate farmers and consultants on the distribution of important corn nematodes in the state and deliver strategies to manage nematodes developed by this project. (Faske)

Methods:

Objective 1: The stubby-root nematode is one of several corn nematodes where there is little information on vertical distribution over time and how that might affect management strategies. Sites with a history of the pest will be monitored and sampled every 30 days for changes in nematode population densities. Information about rainfall, soil types, temperatures, and cropping systems will be used to investigate the practicality of cultural practices. For example, if stubby-root nematode has a greater impact when corn is planted in cool soil where it is slow to emerge, recommendation would be to plant those fields last when soils are warmer.

Objective 2: Evaluate seed- and soil-applied nematicides in a greenhouse and field. A greenhouse method provides initial efficacy information with uniform density of nematodes at the Lonoke Extension Center (LEC). Additionally, these nematicides will be evaluated in small plot on-farm field trials to measure the effect of nematicides to protect corn yield potential and the practical use of nematicides at various corn nematode densities and soil textures.

Objective 3: Early detection and monitoring corn nematodes is important to develop management guidelines. To encourage sampling and way to give back to the farmer, we will promote a "free" nematode soil sample assays conducted by the Nematode Diagnostic Lab (NDL) in Hope. This information will also help researchers determine what species of corn nematodes are the most problematic in the state.

Objective 4: Education platform will consist of but not limited to the traditional approach with fact sheets and production meetings, but also electronic delivery through webinars and blog articles.

Planned Milestones: Each year, corn nematodes densities and distribution will be sampled in fields with history of corn production. This will be done in conjunction with field trials to evaluate impact of nematicides to suppress corn nematodes and protect corn yield potential. A survey of corn nematodes will establish a baseline of what species are important and educate consultants and farmers on how to sample corn fields. A fact sheet on corn nematodes will be published at the end of this study on nematode management and survey data could be published in a survey in Plant Health Progress. A publication on the efficacy of nematicides to manage nematodes in corn will be published in Journal of Nematology.

Statement of Projected Value: Currently, there is little information on the biology of stubby-root nematode, root-knot nematode, and lesion nematodes on corn in Arkansas. Therefore, any information on biology or impact of commercial nematicides would be helpful to manage these pests. We will also begin to develop an experience base as well as an experimental database on the use and impact of nematicides in managing corn nematodes, and we will look at novel chemicals and strategies for existing chemicals in more effective management.

Budget Justification: The budget supports full- and part-time personnel at the LEC that will be play an active role in sampling and establishing field trials across the state; and personnel at the NDL to process soil nematode assays. Travel budget would pay for mileage for on-farm field trials, sampling, and delivery of soil samples to NDL. Overnight travel is possible if necessary. Supplest budget will pay for field and greenhouse supplies such as plot stakes, hoses, bags, tags, pesticides… The direct cost will support soil nematode assays submitted to the NDL by Arkansas consultants and farmers.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Faske, Travis *Assess management options for corn nematodes in Arkansas*

Year	2024/2025	**Project Year**	Year 3 of 3	**Version: 6.0 (11/01/2023)**
Lead Investigator	Faske, Travis	**Co-PI #1**	Rivera, Daniel	
Co-PI #2		**Co-PI #3**		
Department	ENPL Entomology and Plant Pathology			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Assess management options for corn nematodes in Arkansas			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

			Faske, Travis	Rivera, Daniel			Total Board Funding Requested	AES Portion	CES Portion
			Select "AES" or "CES" for each PI	CES	AES				
Fulltime Personnel									
Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
Program Assoc.			$18,000				$18,000	$0	$18,000
Program technician				$9,000			$9,000	$9,000	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
		Subtotal: Salaries	$18,000	$9,000	$0	$0	$27,000	$9,000	$18,000
	Graduate Student								
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
		Tuition					$0	$0	$0
		Subtotal: Graduate Student	$0	$0	$0	$0	$0	$0	$0
			Hourly						
			Wages				**Total**	**AES Portion**	**CES Portion**
		Hourly-Personnel	$8,000	$3,000			$11,000	$3,000	$8,000
		Hourly-Students					$0	$0	$0
		Subtotal: Hourly	$8,000	$3,000	$0	$0	$11,000	$3,000	$8,000
			Fringe Benefits						
Fringe benefits are calculated when salary and wage amounts are entered above.			**Benefits**				**Total**	**AES Portion**	**CES Portion**
		Fulltime Personnel	$5,688	$2,844	$0	$0	$8,532	$2,844	$5,688
		Graduate Students	$0	$0	$0	$0	$0	$0	$0
		Hourly Personnel	$632	$237	$0	$0	$869	$237	$632
		Hourly-Students	$0	$0	$0	$0	$0	$0	$0
		Subtotal: Fringe Benefits	$6,320	$3,081	$0	$0	$9,401	$3,081	$6,320
		Personnel Total	$32,320	$15,081	$0	$0	$47,401	$15,081	$32,320
			Travel						
Justify out-of-state travel in proposal.			**Travel**				**Total**	**AES Portion**	**CES Portion**
		In-State	$2,000				$2,000	$0	$2,000
		Out-of-State					$0	$0	$0
		Travel Total	$2,000	$0	$0	$0	$2,000	$0	$2,000

University of Arkansas System Division of Agriculture
Promotion Board Budget

Faske, Travis — *Assess management options for corn nematodes in Arkansas*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$3,000	$1,000			$4,000	$1,000	$3,000
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs	nematode Assays		$2,000			$2,000	$2,000	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$3,000	$3,000	$0	$0	$6,000	$3,000	$3,000
	Total for Proposal	$37,320	$18,081	$0	$0	$55,401	$18,081	$37,320

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Faske, Travis	Rivera, Daniel			Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Title: Corn and Grain Sorghum Enterprise Budgets and Production Economic Analysis

Lead Investigators: Breana Watkins, Instructor, Agriculture and Natural Resources

Co-Investigators: Dr. Victor Ford, Associate Director, Agriculture and Natural Resources

Status: Year 2 of 3

Research Areas: Economics and Conservation

Stated Goal: The goal of this project is to provide corn and grain sorghum enterprise budgets that are flexible for representing alternative production practices of Arkansas producers. Table CGS-1 provides a look at a stacked gene corn budget that is furrow irrigated. Aside from the stacked gene, furrow irrigated corn budget, there are conventional seed type corn budgets and grain sorghum budgets for each irrigation type (furrow, center pivot, and non-irrigated). With commodity prices retreating, remaining profitable will take due diligence in tracking all financial statements. Costs and returns analysis with the budgets are developed by economists to provide research results for a variety of projects. The research verification coordinators utilize production economics analysis to investigate factors impacting farm profitability. The crop enterprise budgets are designed to evaluate solvency of various field activities associated with crop production and provide comparison of various crop's profitability in order to make sound decisions on-farm.

Specific Objectives:

(1) Determine base representative production activities of the most common production practices of corn and grain sorghum in Arkansas.
(2) Collect data for input prices and equipment costs associated with the base representative production activities.
(3) Establish and maintain a computational budget calculator for base representative production practices. The budget calculator is interactive and flexible in order to represent alternative production methods. Crop enterprise budgets are developed with methods that are consistent over all field crops. A total of 9 corn and grain sorghum budgets are produced for fall release and are updated on an as needed basis.
(4) Finalize the crop budget and irrigation costs applications for public availability.
(5) Update farm budget program for financial management and public policy analysis. The farm budget program includes an interactive calculator for users to represent unique farm situations and determine breakeven prices and yields for each individual budget.
(6) Create a cost estimate of various farm activities to show the expenses that are incurred for each field activity associated with production.
(7) Investigate the economics of conservation practices in Arkansas, specifically in concern to irrigation, cover crops, and carbon sequestration.

Methods: Crop enterprise budgets will be developed in collaboration with crop and soil science specialists, weed scientists, agronomists, pathologists, and entomologists. Production procedures for base budgets will represent University of Arkansas System Division of Agriculture recommendations. Unique budgets will be customized for individuals based on Extension recommendations and information from producers.

Planned Milestones: Crop budgets based on Extension recommendations are standards for Arkansas crop production. Individual producers will utilize interactive computational capabilities for representing alternative production practices and determining profit potential with a range of commodity prices and yields. Producers and financial institutions will apply crop enterprise budgets in evaluating costs and returns for aspects of each production year. Public policies affecting producers are investigated by government organizations with crop enterprise budgets

that are representative of Arkansas production.

Projected Value to the Corn and Grain Sorghum Industry: The benefits provided by the economic analysis of alternative corn and grain sorghum production methods provide a significant reduction in financial risk inherent in agricultural production. Arkansas producers will benefit from economic analyses of their individual production activities. Unique crop enterprise budgets developed for individual farms are useful for determining credit needs when seeking financial assistance and planning crop rotations for the upcoming crop seasons. Flexible crop enterprise budgets are beneficial for planning that determines production methods with the greatest potential for financial success. Flexible budgets enable farm financial outlooks to be revised during the production season as inputs, input prices, yields, and commodity prices change. Thoroughness of computational methodology and straightforward application will facilitate use of the budget calculator by research and extension specialists conducting economic analysis of water use efficiency, weed control, insect management, cover crops, and many other aspects of production practices. The crop enterprise budget system is being utilized by economists currently working on the development of the upcoming Farm Bill.

	ACGSPB	CES
	dollars	
Personnel Salaries		
Breana Watkins		7,599.00
Other Personnel	7,599.00	
Benefits	2,401.00	2,401.00
Total Personnel	**10,000.00**	**10,000.00**
Total	**10,000.00**	**10,000.00**

Table 4. 2023 Corn Enterprise Budget, Stacked Gene, Furrow Irrigation

CROP VALUE	Grower %	Unit	[1]Yield	Price/Unit	Revenue
Crop Value, Enter Expected Farm Yield & Price	100%	Bu.	215.00	6.50	1,397.50
OPERATING EXPENSES		**Unit**	**Quantity**	**[2]Price/Unit**	**Costs**
Seed, per acre	100%	Thous	32.0	3.86	123.52
Nitrogen (Urea, 46-0-0)	100%	Lbs/ac	435.00	0.290	126.15
Phosphate (0-46-0)	100%	Lbs/ac	130.00	0.380	49.40
Potash (0-0-60)	100%	Lbs/ac	175.00	0.293	51.28
Ammonium Sulfate (21-0-0-24)	100%	Lbs/ac	100.00	0.263	26.30
Zinc Sulfate	100%	Lbs/ac	29.00	1.730	50.17
Other Nutrients, Including Poultry Litter	100%	Acre	1	0.00	0.00
Herbicide	100%	Acre	1	81.09	81.09
Insecticide	100%	Acre	1	0.00	0.00
Fungicide	100%	Acre	1	0.00	0.00
Custom Chemical & Fertlizer Applications					
Ground Application: Fertilizer & Chemical	100%	Acre	3	8.00	24.00
Air Application: Lbs	100%	Lbs/ac	100	0.080	8.00
Machinery and Equipment					
Diesel Fuel, Pre-Post Harvest	100%	Gallons	3.800	3.85	14.63
Repairs and Maintenance, Pre-Post Harvest	100%	Acre	1	7.99	7.99
Diesel Fuel, Harvest	100%	Gallons	2.027	3.85	7.81
Repairs and Maintenance, Harvest	100%	Acre	1	8.58	8.58
Irrigation Energy Cost	100%	Ac-In	14	4.55	63.66
Irrigation System Repairs & Maintenance		Ac-In	14	0.24	3.36
Supplies (ex. polypipe)	100%	Acre	1	3.88	3.88
Labor, Field Activities	100%	Hrs	0.800	12.45	9.96
Scouting/Consultant Fee	100%	Acre	1	6.00	6.00
Other Expenses	100%	Acre	1	0.00	0.00
Crop Insurance	100%	Acre	1	16.15	16.15
Interest, Annual Rate Applied for 6 Months	100%	Rate %	8.00	681.93	27.28
Post-Harvest Expense					
Drying	100%	Bu.	215.00	0.19	40.85
Hauling	100%	Bu.	215.00	0.25	53.75
Check Off, Boards	100%	Bu.	215.00	0.0100	2.15
Cash Land Rent		Acre	1	0.00	0.00
Total Operating Expenses					**$805.96**
Returns to Operating Expenses					**$591.54**
CAPITAL RECOVERY & FIXED COSTS					
Machinery and Equipment		Acre	1	80.79	80.79
Irrigation Equipment		Acre	1	27.01	27.01
Farm Overhead; see Note 3		Acre	1	4.04	4.04
Total Capital Recovery & Fixed Costs					**$111.84**
TOTAL SPECIFIED EXPENSES					**$917.80**
NET RETURNS					**$479.70**

Note 1: Yield and inputs are based on Extension research data. Enter expected farm yield and inputs.
Note 2: All price estimates do not include rebates, bulk deals, or discounts available through suppliers.
Note 3: Estimate based on machinery and equipment.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Watkins, Breana — *Corn and Grain Sorghum Enterprise Budgets and Production Economic Analysis*

Year	2024/2025	**Project Year**	Year 2 of 3	**Version: 6.0 (11/01/2023)**
Lead Investigator	Watkins, Breana	**Co-PI #1**	Ford, Vic	
Co-PI #2		**Co-PI #3**		
Department	CES Associate Director of Agriculture & Natural Resources			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Corn and Grain Sorghum Enterprise Budgets and Production Economic Analysis			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

		Watkins, Breana	Ford, Vic			Total Board Funding Requested	AES Portion	CES Portion
	Select "AES" or "CES" for each PI	CES	CES					
Fulltime Personnel								
Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
Instructor	Breana Watkins	20%	$7,599				$7,599	$0	$7,599
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Subtotal: Salaries		$7,599	$0	$0	$0	$7,599	$0	$7,599
	Graduate Student								
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Tuition						$0	$0	$0
	Subtotal: Graduate Student		$0	$0	$0	$0	$0	$0	$0
	Hourly								
			Wages				**Total**	**AES Portion**	**CES Portion**
	Hourly-Personnel						$0	$0	$0
	Hourly-Students						$0	$0	$0
	Subtotal: Hourly		$0	$0	$0	$0	$0	$0	$0
	Fringe Benefits								
Fringe benefits are calculated when salary and wage amounts are entered above.			**Benefits**				**Total**	**AES Portion**	**CES Portion**
	Fulltime Personnel		$2,401	$0	$0	$0	$2,401	$0	$2,401
	Graduate Students		$0	$0	$0	$0	$0	$0	$0
	Hourly Personnel		$0	$0	$0	$0	$0	$0	$0
	Hourly-Students		$0	$0	$0	$0	$0	$0	$0
	Subtotal: Fringe Benefits		$2,401	$0	$0	$0	$2,401	$0	$2,401
	Personnel Total		$10,000	$0	$0	$0	$10,000	$0	$10,000
	Travel								
Justify out-of-state travel in proposal.			**Travel**				**Total**	**AES Portion**	**CES Portion**
	In-State						$0	$0	$0
	Out-of-State						$0	$0	$0
	Travel Total		$0	$0	$0	$0	$0	$0	$0

University of Arkansas System Division of Agriculture
Promotion Board Budget

Watkins, Breana *Corn and Grain Sorghum Enterprise Budgets and Production Economic Analysis*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies					$0	$0	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$0	$0	$0	$0	$0	$0	$0
	Total for Proposal	$10,000	$0	$0	$0	$10,000	$0	$10,000

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Watkins, Breana	Ford, Vic			Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Fine-tuning Potassium Recommendations and Investigating Intensive Tissue Analysis for Sustainable Corn Production

Lead Investigators: Trenton Roberts

Co-Investigators: Jason Kelley and Gerson Drescher

Status: Year 3 of 3

Research Areas: Fertility and General Agronomics

Stated Goal: The goal of this proposal is to fine-tune current potassium fertilizer recommendations for corn and investigate the utility of intensive in-season tissue nutrient monitoring to aid in corn production.

Specific Objectives:

1. Establish field experiments to evaluate corn yield response to varying rates of potassium fertilizer.
   a. Correlate leaf tissue potassium concentration to corn grain yield.
   b. Measure potassium removal in the grain
   c. Fine-tune existing potassium rate recommendations for corn.
2. Validate the potash rate calculator developed in conjunction with Dr. Michael Popp
3. Determine the utility of intensive in-season tissue sampling and monitoring as a tool for high-yielding corn production systems.

Methods:

1. Potassium rate trials will be established on experiment station sites with varying levels of soil test K (STK). The K rates included in these trials will range from 0-200 lb K_2O/acre and should encompass the yield maximizing K rate for all locations included. Starting at the V6 growth stage whole aboveground plant samples will be collected to determine tissue-K concentration. During the V10-VT growth stages the uppermost collared leaf will be sampled and from VT-R2 the earleaf (leaf subtending the ear) will be sampled and analyzed for tissue-K concentration. The whole plant or leaf tissue-K concentration will be correlated with corn grain yield to determine the critical tissue-K concentration from the V6-R2 growth stage. During harvest grain samples will be collected from selected K rates to determine the grain K concentration to determine the K content and nutrient removal which can be scaled for yield.
2. In the replicated K rate trials and in cooperation with selected corn producers across the state we will collect data to validate the potash rate calculator. The potash rate calculator uses corn grain price, fertilizer price, historical field yield, and soil test K level to predict the profit-maximizing K rate. Preplant soil samples will be collected as well as actual or projected producer fertilizer prices to determine the profit maximizing K fertilization rate. The profit maximizing K rate will be compared to an untreated control as well as the yield maximizing K rate based on the soil sample analysis. In the replicated K rate trials, the yield maximizing K rate will be compared to the calculated profit-maximizing K rate post hoc and statistically compared.
3. Corn verification fields and selected producer fields will be identified with the help of Dr. Kelley and Chuck Capps. These fields will be sampled at the V6, V10, V14 VT, R1 and R2 growth stages using the recommended sampling procedure as it relates to the specific corn growth stage. Samples will be submitted for rapid diagnostic analysis (48 hr turnaround time)

to mimic what a producer might implement for an intensive in-season sampling program. The resulting tissue analysis will be compared to currently published critical concentration values to determine if any nutrients are limiting corn grain yield. In producer fields where a potential nutrient deficiency is identified small-scale strips will be implemented to determine if the application of the deficient nutrient resulted in a significant yield increase. Concurrently, data will be collected to modify current critical concentrations for major corn nutrients across the growth stages sampled. A report will be provided to the producers regarding the nutrient sufficiency of their crop throughout the season.

Planned Milestones: Field trials will be established at varying locations in 2023-2024. Progress reports will provide updates on the status of the project and year-end findings will be published in the Arkansas Corn and Grain Sorghum Research Studies. The intensive tissue monitoring program will be modified as needed throughout the season and across years as more data is collected and we are able to refine how that needs to be implemented. At the end of the three-year study, data collected from these trials will strengthen potassium recommendations for corn and could change overall potassium fertilizer recommendations.

Statement of Projected Value: The Corn and Grain Sorghum Promotion Board has provided funding in past years to support the development and validation of existing potassium (K) recommendations. Results were recently summarized and found that there were areas across the range of soil test K values that would benefit from additional data. However, we know that the response to K fertilization progressively decreases as soil test K level increases until a point where no response to K fertilization is observed. Current Extension recommendations for K range from 160 lb K_20 per acre for K levels under 61 ppm K to no K recommended for soil test levels above 175 ppm. There is a lack of data at very low soil test K and very high soil test K values limiting the robustness of the current recommendations. Adding data from soils testing "optimum" and "above optimum" and “very low” would allow us to properly define the soil test level at which no response is expected and modify recommendations as needed.

Budget Justifications/Explanation of Travel and Direct Costs: The out of state travel included in this proposal is to cover a portion of the cost for graduate students to attend professional scientific meetings which in this calendar year will include the international annual agronomy meetings in San Antonio, TX. The attendance at these meetings allows presentations to be made concerning the research work conducted and also for increased education by attending other scientific presentations and workshops. In-state travel and salary are budgeted for field data collections.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Roberts, Trenton — *Fine-tuning Potassium Recommendations and Investigating Intensive Tissue Analysis for Sustainable Corn*

Year	2024/2025	**Project Year**	Year 3 of 3
Lead Investigator	Roberts, Trenton	**Co-PI #1**	Drescher, Gerson
Co-PI #2		**Co-PI #3**	
Department	CSES Crop, Soil, Environmental Science		
Commodity Board	Corn and Grain Sorghum Board		
Project Title	Fine-tuning Potassium Recommendations and Investigating Intensive Tissue Analysis for Sustainable Corn Production		

Version: 6.0 (11/01/2023)

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Roberts, Trenton	Drescher, Gerson			Total Board Funding Requested	AES Portion	CES Portion
Select "AES" or "CES" for each PI	AES	AES					

Fulltime Personnel

Position Title	Name *(if position is filled)*	% Time	Salaries				Total	AES	CES
Program Associate	Dave Smith	15%	$9,300				$9,300	$9,300	$0
Program Associate	Stephanie Williamson	10%	$7,000				$7,000	$7,000	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
	Subtotal: Salaries		$16,300	$0	$0	$0	$16,300	$16,300	$0

Graduate Student

Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.

Name *(if position is filled)*	% Time	Wages				Total	AES Portion	CES Portion
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
Tuition						$0	$0	$0
Subtotal: Graduate Student		$0	$0	$0	$0	$0	$0	$0

Hourly

	Wages				Total	AES Portion	CES Portion
Hourly-Personnel					$0	$0	$0
Hourly-Students	$1,500	$2,000			$3,500	$3,500	$0
Subtotal: Hourly	$1,500	$2,000	$0	$0	$3,500	$3,500	$0

Fringe Benefits

Fringe benefits are calculated when salary and wage amounts are entered above.

	Benefits				Total	AES Portion	CES Portion
Fulltime Personnel	$5,151	$0	$0	$0	$5,151	$5,151	$0
Graduate Students	$0	$0	$0	$0	$0	$0	$0
Hourly Personnel	$0	$0	$0	$0	$0	$0	$0
Hourly-Students	$11	$14	$0	$0	$25	$25	$0
Subtotal: Fringe Benefits	$5,161	$14	$0	$0	$5,175	$5,175	$0
Personnel Total	$22,961	$2,014	$0	$0	$24,975	$24,975	$0

Travel

Justify out-of-state travel in proposal.

	Travel				Total	AES Portion	CES Portion
In-State	$2,500	$3,000			$5,500	$5,500	$0
Out-of-State		$2,000			$2,000	$2,000	$0
Travel Total	$2,500	$5,000	$0	$0	$7,500	$7,500	$0

University of Arkansas System Division of Agriculture

Promotion Board Budget

Roberts, Trenton *Fine-tuning Potassium Recommendations and Investigating Intensive Tissue Analysis for Sustainable Corn*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$2,000	$2,000			$4,000	$4,000	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs	Analysis and Publication	$5,500	$7,500			$13,000	$13,000	$0
Station Maintenance	SAREC, Fayetteville	$1,780	$0	$0	$0	$1,780	$1,780	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$1,780	$0	$0	$0	$1,780	$1,780	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$3,360	$0	$0	$0	$3,360	$3,360	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$14,420	$9,500	$0	$0	$23,920	$23,920	$0
	Total for Proposal	$39,881	$16,514	$0	$0	$56,395	$56,395	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Roberts, Trenton	Drescher, Gerson			Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Assessing Susceptibility of Insect Pests of Corn in Storage to Selected Insecticides

Lead Investigators: Glenn Studebaker

Co-Investigators: Nick Bateman, Ben Thrash, Neelendra Joshi

Status (i.e., New, Year 2 of 3, Year 2 of 2, etc.): Year 3 of 3

Research Areas (Verification Program, General Agronomics, Diseases, Insects, Fertility, Irrigation, Weed Control, Misc. Projects): Insect

Stated Goal: To develop cost-effective methods and recommendations for preventing losses to insect pests of corn in storage in Arkansas.

Specific Objectives: Several insect pests are known to attack corn in storage (Rees, 2004). Among them, internal feeders, such as different species of weevils (e.g., granary weevil, rice weevil and lesser grain borer), are economically most important Arbogast and Throne, 1997). If not managed effectively, these insect pests have potential to cause total loss in stored grain commodities. Numerous other pests such as the Indian meal moth larva, confused flour beetle, red flour beetle etc. are also known to infest stored-corn (Storey et al. 1983). Recent studies have indicated that the red flour beetle is the most common insect detected in stored corn grain in Arkansas. Confused flour beetle and Angoumais grain moth were also detected to a lesser extent. If found, other important stored pests such as rice weevil also have high potential to damage corn kernals. Red flour beetle has been shown to be resistant to some of the insecticides (spinosad, malathion and phosphine) commonly used to protect stored grains (Bajracharya et al. 2013; Zettler & Cuperus, 1990). Chlorpyrifos-methyl has been shown to still be an effective means of control of stored pests in stored corn and other grains. However, the EPA has recently revoked all tolerances for chlorpyrifos on food crops and this product will not likely be available to growers in the future. Therefore, it is important to determine what insecticides are most effective at preventing infestations of these insect pests in stored corn.

Objective 1: Preventative insecticide treatments are one option available to growers to protect corn in storage. These treatments are recommended to be applied to grain as it is loaded into storage bins to prevent stored grain insect pests. Efficacy data on recommended products is lacking for Arkansas. It is important to know what products are efficacious and how long one can expect these products to provide protection for corn in storage. Efficacy studies will be conducted to determine both the effectiveness and longevity of control of recommended insecticide treatments.

Objective 2: To determine relative susceptibility of stored grain insect pests to various insecticides and other chemicals. These bioassays will evaluate sensitivity of flour beetles and other stored pests to new chemicals as outlined under Obj. 1. Finding of these laboratory bioassays will provide information on susceptibility or resistance of stored pests that are found in Arkansas corn to new insecticide chemicals have, and the findings will be helpful in making insecticide recommendations for stored pest management.

Methods:

Objective 1: Newly harvested corn will be treated with insecticides currently labeled for stored grains and placed into 20 gallon barrels for storage to simulate the conditions of on-farm storage in bins. Barrels will be sampled monthly for the presence of stored grain insects throughout the year to determine the

length of residual protection against stored grain insects. Barrels will be maintained until all treatments become infested. Treatments are listed in table 1.

Table 1. Insecticides and rates for stored grain insecticides.

Insecticide	**Rate**	**Method of Application**
Actellic 5E	9.2 oz/1,071 bu	incorporated
Actellic 5 E	12.3 oz/1,071 bu	incorporated
Centynal 0.42 SC	9 oz/1,000 bu	incorporated
Centynal 0.42 SC	18 oz/1,000 bu	incorporated
Diacon Plus EC	9 oz/1,000 bu	incorporated
Diacon Plus EC	18 oz/1,000 bu	incorporated
Diacon 2.4 EC	3.5 oz/1,000 bu	incorporated
Diacon 2.4 EC	7 oz/1,000 bu	incorporated
Malathion 6% Dust	10 lbs/1,000 bu	incorporated
Silicon Dioxide Dust	1 lb/1,000 bu	incorporated
Silicon Dioxide Dust	2 lb/1,000 bu	incorporated
Untreated		

Objective 2: Multiple laboratory bioassays will be conducted to determine susceptibility of stored grain insect pests found in Arkansas corn to new chemicals as described under objective 1. Colonies of flour beetles and other pests will be maintained in the laboratory. These insects will be exposed to insecticides via two different methods in two set of bioassays. In the first set of bioassays, we will exposed adult stages of insect pests to different insecticide concentrations applied topically, and will measure acute toxicity up to 96 hrs after exposure. In the second set of bioassays, we will expose same stages of insect pests to treated corn kernels and containers, and will measure residual toxicity.

Planned Milestones:

1. Determine efficacy of currently labeled insecticides against major insect pests of stored corn.
2. Determine insecticide resistance development in major insect pests of stored corn.
3. Update insecticide recommendations and control options.

Statement of Projected Value: This project will provide needed information to update current recommendations on preventative insecticides applications to corn in storage. This information will provide growers up-to-date information on the best practices to minimize grain losses to insect pests during storage.

Budget Justifications/Explanation of Travel and Direct Costs:

Salaries.....$22,372

Hourly wages.....$2,158

Graduate Student.....$14,775

Supplies (barrels, containers, products for testing).....$2,000

Total.....$41,305

Literature Cited:

Bajracharya, N., G. Opit, J. Talley and C. Jones. 2013. Efficacies of Spinosad and a Combination of Chlorpyrifos-Methyl and Deltamethrin Against Phosphine-Resistant Rhyzopertha dominica (Coleoptera: Bostrichidae) and Tribolium castaneum (Coleoptera: Tenebrionidae) on Wheat. *J. Econ. Entomology* 106,

Zettler, L. and G. Cuperus. 1990. Pesticide Resistance in Tribolium castaneum (Coleoptera: Tenebrionidae) and Rhyzopertha dominica (Coleoptera: Bostrichidae) in Wheat. *J. Econ. Entomology* 83, pp. 1677-1681.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Studebaker, Glenn *Assessing Susceptibility of Insect Pests of Corn in Storage to Selected Insecticides*

Year	2024/2025	**Project Year**	Year 3 of 3	**Version: 6.0 (11/01/2023)**
Lead Investigator	Studebaker, Glenn	**Co-PI #1**	Bateman, Nick	
Co-PI #2	Joshi, Neelendra	**Co-PI #3**	Thrash, Ben	
Department	ENPL Entomology and Plant Pathology			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Assessing Susceptibility of Insect Pests of Corn in Storage to Selected Insecticides			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

			Studebaker, Glenn	Bateman, Nick	Joshi, Neelendra	Thrash, Ben	Total Board Funding Requested	AES Portion	CES Portion
		Select "AES" or "CES" for each PI	CES	CES	AES	CES			
Fulltime Personnel									
Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
Program Associate	Matthew Mann	14%	$5,000				$5,000	$0	$5,000
Program Associate	Garrett Felts	10%		$5,000			$5,000	$0	$5,000
Program Associate	Andrew Plummer	10%				$3,500	$3,500	$0	$3,500
Program Associate	Lauren Amos	10%				$3,500	$3,500	$0	$3,500
							$0	$0	$0
		Subtotal: Salaries	$5,000	$5,000	$0	$7,000	$17,000	$0	$17,000
	Graduate Student								
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
				$500	$10,000		$10,500	$10,000	$500
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
		Tuition			$3,834		$3,834	$3,834	$0
		Subtotal: Graduate Student	$0	$500	$13,834	$0	$14,334	$13,834	$500
		Hourly							
			Wages				**Total**	**AES Portion**	**CES Portion**
		Hourly-Personnel	$2,000				$2,000	$0	$2,000
		Hourly-Students					$0	$0	$0
		Subtotal: Hourly	$2,000	$0	$0	$0	$2,000	$0	$2,000
		Fringe Benefits							
Fringe benefits are calculated when salary and wage amounts are entered above.			**Benefits**				**Total**	**AES Portion**	**CES Portion**
		Fulltime Personnel	$1,580	$1,580	$0	$2,212	$5,372	$0	$5,372
		Graduate Students	$0	$21	$420	$0	$441	$420	$21
		Hourly Personnel	$158	$0	$0	$0	$158	$0	$158
		Hourly-Students	$0	$0	$0	$0	$0	$0	$0
		Subtotal: Fringe Benefits	$1,738	$1,601	$420	$2,212	$5,971	$420	$5,551
		Personnel Total	$8,738	$7,101	$14,254	$9,212	$39,305	$14,254	$25,051
		Travel							
Justify out-of-state travel in proposal.			**Travel**				**Total**	**AES Portion**	**CES Portion**
		In-State					$0	$0	$0
		Out-of-State					$0	$0	$0
		Travel Total	$0	$0	$0	$0	$0	$0	$0

University of Arkansas System Division of Agriculture
Promotion Board Budget

Studebaker, Glenn — *Assessing Susceptibility of Insect Pests of Corn in Storage to Selected Insecticides*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$500	$500	$500	$500	$2,000	$500	$1,500
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$500	$500	$500	$500	$2,000	$500	$1,500
	Total for Proposal	$9,238	$7,601	$14,754	$9,712	$41,305	$14,754	$26,551

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Studebaker, Glenn	Bateman, Nick	Joshi, Neelendra	Thrash, Ben	Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: The Arkansas Irrigation Yield Contest

Lead Investigators: Chris Henry, Professor, Water Management Engineer, RREC

Status: Year 7

Goal: The University of Arkansas Division of Agriculture has been demonstrating irrigation Water Management Practices on cooperator farms for five years. Experience has shown that when applied effectively water use can be reduced by 24% on average with no yield penalty. Reductions in water use of around 40% have been documented. The adoption rate of Computerized Hole Selection is over 40% indicating that this is now a mainstream practice in Arkansas. However, a significant need still exists to secure the sustainability of irrigated agriculture in Arkansas. It is still unknown and not well documented how much irrigation water use is needed for crops in Arkansas. A critical need is the documentation of the irrigation water use that is possible with a combination of IWM practices and the ingenuity of Arkansas farmers.

Approach: An irrigation yield contest is proposed. No such contest exists that incorporates the competitive nature of maximizing yield with maximizing water use efficiency. Many growers are familiar with the state and National Corn Growers Contest, National Wheat Growers contest and Arkansas's own "Go for the Green" soybean yield contest. The contest would be operated using the existing proposal supporting irrigation water management projects previously and currently proposed to these boards. Current yield contests focus only on yield, where this contest would highlight Arkansas farmer's efforts to improve sustainability and profitability, which are paramount to the future of agriculture.

Planned Milestones: What is proposed is funding directly from each commodity board of $10,000 to fund the first place award the corn irrigation contest. Essentially each commodity board would support the award for its commodity. The boards would provide the award directly to the first place winner, $6,000, $3,000 for second place, and $1,000 for third place. The rules are similar to existing commodity yield contests, with the additional requirement of a propeller flow meter, sealed by the program and that the yield must exceed the county average irrigated yield for the county (to eliminate dryland or severe deficit entries). Contestants will be announced at the annual Arkansas Soil and Water Conservation Conference in Jonesboro, Arkansas in late January 2024.

Request: $10,000 in awards and credits payable directly to winners. Support for the contest logistics, advertising, meter loaning, and operation of the contest will be done under the irrigation project.

-----No land use spreadsheet or routing form is used for this request as funds come directly from board to contest winners---

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Improving Irrigation Technology for Corn Production in Arkansas

Lead Investigators: Chris Henry, Professor, Water Management Engineer, RREC

Co-investigators: Terry Spurlock, Extension Plant Pathologist
Jason Kelley, Associate Professor, Extension Corn and Grain Sorghum Specialist, CES
Chuck Capps, Corn and Grain Sorghum Research Verification Coordinator

Status: Year 2 of 3
Research Area: Irrigation
Goal: Provide irrigation information for corn growers on how to irrigate corn effectively and efficiently using soil moisture sensors and other schedulers. This project measures irrigation water-use in corn through the CGSRVP and the Arkansas Irrigation Yield Contest. The program works to improve furrow irrigation systems efficiency through evaluation of surge valves, computerized hole-selection for poly pipe (CSH), and investigation of innovative tail-water recovery solutions. This project is helping growers improve yields and reduce costs.

Specific Objectives:

1. Measure sap flow in corn to develop and confirm water use in corn.
2. Measure irrigation water use, water use efficiency and efficacy of IWM tools through novel irrigation contest. Demonstrate Irrigation Water Management through the Irrigation Yield Contest. Pilot cloud meters in contest.
3. Finalize retention curves for the major soil Arkansas soil types, incorporate into mobile app and factsheets.
4. Conduct Irrigation schools for surge irrigation and soil moisture sensor education.
5. Develop prototypes for new methods and promote existing known methods to improve irrigation efficiency. Test cover crop crimper for furrow irrigation. Continue surge valve development, poly pipe printer, new soil moisture sensor and novel flowmeter and digital asset water trading system.
6. Pilot remote valve and pump timer technology on a working farm.

Methods: Currently there is some uncertainty about the crop coefficients, trigger levels, and soil moisture deficits for corn and conditions in Arkansas. Sap flow will be measured from corn by growth stage to develop water use by stage for use in irrigation recommendations within a weekly versus calendar irrigation study. A post dc student will finish work on classifying the irrigated soils in Arkansas and the difference in no-till, cover crop and tillage on water holding capacity in 2024. This data will be used to publish a publication on sensors and finalize another version of the mobile app for sensor interpretation.

A novel flowmeter is under development that will be pilot tested in the irrigation contest. It will allow for real-time feedback to the contestants. A novel cover crop crimper has been developed, in 2024 additional testing of design revisions will be conducted. The poly pipe printer will undergo testing using a new ink

system. Another prototype of the advanced surge system is under development. The simple pump timer is ready for pre-commercialization field testing in 2024 but will also include a remote valve.

On average we have shown a 25% reduction in water use while maintaining yields, in 2018 we implemented the Arkansas Irrigation Yield Contest. In the last four years we have had 8-12 contest participants, but in 2022 we expect over 20 to enter if pandemic allows winter meetings. The contest delivers a wealth of knowledge about what is possible when the focus on production is water management. Repeat corn participants in the contest are INCREASING their Water Use Efficiencies over time and adoption of IWM is high or improving. Many farmers are using IWM to win the contest and have great stories to share with others about how to manage water and achieve very high yields. The contest resulted in a good dataset of Water Use Efficiency, water use, total water and yield. To add to the contest, we plan to provide a second meter on some of the contest fields, to provide real time water use data to their mobile device. A mobile app will be developed and a three prototype meters will be constructed and testing with contest fields.

Planned Milestones: Data will be collected on plots, through the contest, and through field observations. Sap flow results and plot results will be used to validate current irrigation scheduling thresholds for soil moisture sensors. Retention curve soil samples are nearly completed, a post-doc should finish in 2024. The mobile app for soil moisture sensors will be further developed to include weather prediction support. Meters for real time monitoring will be deployed. Soil moisture sensors will be installed in contest and verification fields. Cover crop crimper will be tested and design modifications made to get to a finished product.

Statement of Projected Value: Based on 2012 Corn Research Verification Water use data, corn used 25 inches of irrigation water, almost as much water as rice (30 inches) in Arkansas. Based on a three year average the contest participants are only using 9.3 ac-inches/ac with an average yield of 218 bpa. Long term crop water needs are estimated for corn in Arkansas is between 12-18ac-in/ac, assuming 70% irrigation efficiencies, so contestants are demonstrating how corn can be sustainably grown in the mid-south. There is a critical need to provide resources and improve the current knowledge for irrigating corn in the sub-humid region. This project will also work to improve and promote irrigation efficiency tools. With such tools and better irrigation recommendations for corn, this project will greatly increase profitability for corn growers in Arkansas and allow for reduced water and energy use.

Budget Justification/ Explanation of Travel and Direct Costs: Funds will be used for supplies of crimper parts (steel, bearings, tool bar, hitch, etc.), combine parts and labor, flowmeter and surge parts, actuators, valves, custom -made components, pcb board fabrication, contractors, components for poly pipe printer and meals for irrigation schools and meetings. Meters, fittings, surge valves, sensors deployment in contest fields, labor, travel, supplies.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Henry, Christopher *Improving Irrigation Technology for Corn Production in Arkansas*

Year	2024/2025	**Project Year**	
Lead Investigator	Henry, Christopher	**Co-PI #1**	
Co-PI #2		**Co-PI #3**	
Department	BAEG Biological & Agricultural Engineering		
Commodity Board	Corn and Grain Sorghum Board		
Project Title	Improving Irrigation Technology for Corn Production in Arkansas		

Version: 6.0 (11/01/2023)

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Henry, Christopher				**Total Board Funding Requested**	**AES Portion**	**CES Portion**
Select "AES" or "CES" for each PI	AES						
Fulltime Personnel							
Position Title / **Name** *(if position is filled)* / **% Time**	**Salaries**				**Total**	**AES**	**CES**
Program Specialist — Shruti Vaman	$30,080				$30,080	$30,080	$0
Program Associate — Russ Parker	$5,000				$5,000	$5,000	$0
Program Associate — M. Ismanov — 100%	$47,250				$47,250	$47,250	$0
Program Specialist — Nathan Blankenship	$17,000				$17,000	$17,000	$0
					$0	$0	$0
Subtotal: Salaries	$99,330	$0	$0	$0	$99,330	$99,330	$0
Graduate Student							
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.							
Name *(if position is filled)* / **% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Tuition					$0	$0	$0
Subtotal: Graduate Student	$0	$0	$0	$0	$0	$0	$0
Hourly							
	Wages				**Total**	**AES Portion**	**CES Portion**
Hourly-Personnel	$3,000				$3,000	$3,000	$0
Hourly-Students					$0	$0	$0
Subtotal: Hourly	$3,000	$0	$0	$0	$3,000	$3,000	$0
Fringe Benefits							
Fringe benefits are calculated when salary and wage amounts are entered above.	**Benefits**				**Total**	**AES Portion**	**CES Portion**
Fulltime Personnel	$31,388	$0	$0	$0	$31,388	$31,388	$0
Graduate Students	$0	$0	$0	$0	$0	$0	$0
Hourly Personnel	$237	$0	$0	$0	$237	$237	$0
Hourly-Students	$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits	$31,625	$0	$0	$0	$31,625	$31,625	$0
Personnel Total	$133,955	$0	$0	$0	$133,955	$133,955	$0
Travel							
Justify out-of-state travel in proposal.	**Travel**				**Total**	**AES Portion**	**CES Portion**
In-State	$5,000				$5,000	$5,000	$0
Out-of-State	$5,000				$5,000	$5,000	$0
Travel Total	$10,000	$0	$0	$0	$10,000	$10,000	$0

University of Arkansas System Division of Agriculture
Promotion Board Budget

Henry, Christopher *Improving Irrigation Technology for Corn Production in Arkansas*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$27,500				$27,500	$27,500	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs	toolbar, combine, meals	$10,000				$10,000	$10,000	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$3,825	$0	$0	$0	$3,825	$3,825	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$41,325	$0	$0	$0	$41,325	$41,325	$0
	Total for Proposal	$185,280	$0	$0	$0	$185,280	$185,280	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Henry, Christopher				Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Arkansas Discovery Farms

Lead Investigators: Mike Daniels

Status (i.e., New, Year 2 of 3, Year 2 of 2, etc.): Year 3 of 3

Research Areas (Verification Program, General Agronomics, Diseases, Insects, Fertility, Irrigation, Weed Control, Misc. Projects):): Miscellaneous Project to monitor runoff water quality on private farms to determine nutrient and sediment losses, evaluate conservation practices and verify sustainability of current production practices.

Stated Goal: The overall goal of the program is to document sustainable and viable farming systems that remain cost-effective in an environmentally sound manner.

Specific Objectives: Conduct on-farm demonstration and monitoring to assess the need for and effectiveness of conservation practices.

1. Provide on-farm verification and documentation of nutrient and sediment loss reductions and water conservation in support of nutrient management planning and sound environmental farm stewardship.
2. Develop and deliver educational programs from on-farm data that will assist producers in achieving both production and environmental goals in support of sustainable farming.
3.

Methods: The ARDF program, which presently consists of a network of 17 farms throughout Arkansas, is an effective stakeholder-driven conservation demonstration program, where extensive, state-of-the-art water quality monitoring systems are installed on private, working farms including both livestock and row-crop systems to document environmental impact and to demonstrate the potential of NRCS-approved conservation practices' on- and off-farm impacts with respect to documented water quality (Daniels et al., 2018; Daniels et al., 2019), water-use efficiency, and soil health improvements under different management practices.

Planned Milestones: Continue on-farm monitoring and data collection to document impact and sustainability as well as empower farmers to: 1) be a part of the solution on the froint-end and 2) educate other farmers using data collected on their farm at field days and tours and educational meetings.

Statement of Projected Value: The Discovery Farm Program (ARDF; Sharpley et al., 2015) has emerged as an important educational platform that has been successful in addressing water quality, water use efficiency, and improving soil health. **The n**on-agricultural sector of society including lawmakers, the agricultural supply chain from consumers to large retailers continues to raise questions of natural resource conservation and sustainability as little data exists that documents agriculture's impact on the environment and natural resources. The continuation of this program is critical to helping agriculture document ecosystem services and sustainable use of natural resources and to demonstrate that agricultural producers are voluntarily and proactively addressing sustainability concerns

Budget Justifications/Explanation of Travel and Direct Costs: $5000 for In-State Travel.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Daniels, Mike *Arkansas Discovery Farms*

Year	2024/2025	**Project Year**	Year 3 of 3	**Version: 6.0 (11/01/2023)**
Lead Investigator	Daniels, Mike	**Co-PI #1**		
Co-PI #2		**Co-PI #3**		
Department	CSES Crop, Soil, Environmental Science			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Arkansas Discovery Farms			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Daniels, Mike				Total Board Funding Requested	AES Portion	CES Portion
Select "AES" or "CES" for each PI	CES						
Fulltime Personnel							
Position Title / **Name** *(if position is filled)* / **% Time**	**Salaries**				**Total**	**AES**	**CES**
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Subtotal: Salaries	$0	$0	$0	$0	$0	$0	$0
Graduate Student							
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.							
Name *(if position is filled)* / **% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Tuition					$0	$0	$0
Subtotal: Graduate Student	$0	$0	$0	$0	$0	$0	$0
Hourly							
	Wages				**Total**	**AES Portion**	**CES Portion**
Hourly-Personnel					$0	$0	$0
Hourly-Students					$0	$0	$0
Subtotal: Hourly	$0	$0	$0	$0	$0	$0	$0
Fringe Benefits							
Fringe benefits are calculated when salary and wage amounts are entered above.							
	Benefits				**Total**	**AES Portion**	**CES Portion**
Fulltime Personnel	$0	$0	$0	$0	$0	$0	$0
Graduate Students	$0	$0	$0	$0	$0	$0	$0
Hourly Personnel	$0	$0	$0	$0	$0	$0	$0
Hourly-Students	$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits	$0	$0	$0	$0	$0	$0	$0
Personnel Total	$0	$0	$0	$0	$0	$0	$0
Travel							
Justify out-of-state travel in proposal.							
	Travel				**Total**	**AES Portion**	**CES Portion**
In-State	$5,000				$5,000	$0	$5,000
Out-of-State					$0	$0	$0
Travel Total	$5,000	$0	$0	$0	$5,000	$0	$5,000

University of Arkansas System Division of Agriculture
Promotion Board Budget

Daniels, Mike *Arkansas Discovery Farms*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies					$0	$0	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$0	$0	$0	$0	$0	$0	$0
	Total for Proposal	$5,000	$0	$0	$0	$5,000	$0	$5,000

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Daniels, Mike				Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Arkansas Corn & Grain Sorghum Research Studies Series, an annual report and archival system for all Board-funded research

Lead Investigators: Jason Kelley & Nathan McKinney

Co-Investigators: Vic Ford

Status: Year 1 – New project - Renewal

Research Areas: Miscellaneous Project

Stated Goal: Prior to publishing the 2020 Arkansas Corn & Grain Sorghum Research Studies Series, there was no mechanism of capturing and broadly distributing the knowledge gained from research projects funded by the Arkansas Corn & Grain Sorghum Board. The Arkansas Corn & Grain Sorghum Research Studies Series is available online and hard copies are distributed to County Extension offices in all corn producing counties. The Series is proposed as an annual publication of research results that provides details beyond the extent communicated in shorter formats and serves as a lasting and citable literature source documenting statistically analyzed results of the research funded by the Board. The Arkansas Corn & Grain Sorghum Research Studies Series was initiated in 2020 and is published online at https://arkansas-ag-news.uark.edu/research-series.aspx

Specific Objectives:

1. Publish all annual research reports and project final reports in an edited publication that will be posted online allowing access by all Arkansas farmers, County Extension Agents, consultants, industry representatives, and researchers on an annual basis.
2. Print a limited number of hard copies for distribution to the Arkansas Corn & Grain Sorghum Board, County Extension offices, Agricultural Experiment Stations and Research & Extension Centers in Arkansas.

Methods and Milestones:

1. The Arkansas Agricultural Experiment Station has publication guidelines for literature classified as Research Series. The Arkansas Rice Checkoff Program, Soybean Checkoff Program, and Fertilizer Tonnage Fees all require researchers to published their annual research results in Research Series publications named the B.R. Wells Arkansas Rice Research Studies, Arkansas Soybean Research Studies, and Wayne E. Sabbe Arkansas Soil Fertility Studies, respectively. These documents are prepared by researchers, reviewed and edited by a technical editor, and formatted for online publication by the Division of Agriculture Communications Services (https://arkansas-ag-news.uark.edu/research-series.aspx).
2. The process for publication begins with a call for Annual Progress or End-of-Project Reports issued to all lead investigators along with instructions for preparing Research Series reports. Each funded project would be required to submit at least one report that typically consists of 4 to 6 double-spaced pages with tables and figures showing statistically analyzed research results. The final section of these Research Series summarizes the results in practical language.
3. A tentative timeline for the reports is:
    a. Call for Reports in mid-January
    b. Report submission date of March 1

c. Online publication available by mid-July of each year

4. Dr. Jason Kelley, Dr. Nathan McKinney and Dr. Vic Ford will serve as technical editors for reports with assistance sought from other investigators as needed. The reports will be submitted online using the system recently established for the B.R. Wells Arkansas Rice Research Studies (https://aaesbusinessoffice.uark.edu/commodity-board-grants/rice/).
5. The publication is intended to be accessed online but a limited number of hard copies will be printed and distributed to all County Extension offices in corn producing counties, all research stations, and Research and Extension Centers, and members of the Arkansas Corn & Grain Sorghum Board. Additional copies may be printed upon request from the Board.

Statement of Projected Value: The data and conclusions arising from each project will be readily available for all interested parties. The Arkansas Corn & Grain Sorghum Research Studies Series will be organized by subject/year, edited for uniform format and style, thus making the reports easy to find and to read. The intended audience will include:

- Farmers and their advisors. They may access the Research Series in a timely manner, to aid in decision making and planning.
- Current investigators. They may use the Research Series to inform their programs and to plan 'next steps'.
- Future researchers. The archival value can provide background of prior funded research to help future researchers avoid 'reinventing the wheel' and provide insight for developing next-generation research ideas.

The Research Series also will serve as a vehicle for publishing applied research that is of high interest to Arkansas farmers, but not always publishable in refereed journals with more rigorous requirements.

Budget Justifications/Explanation of Travel and Direct Costs: $4,326 annually. A format and style editor is required to make the publication uniform and readable to a broad audience. The budget is requested to pay a style editor on an hourly basis and to print a limited number of hard copies.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Kelley, Jason *Arkansas Corn and Grain Sorghum Research Studies Series*

Year	2024/2025	**Project Year**	New	**Version: 6.0 (11/01/2023)**
Lead Investigator	Kelley, Jason	**Co-PI #1**	McKinney, Nathan	
Co-PI #2		**Co-PI #3**		
Department	CSES Crop, Soil, Environmental Science			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Arkansas Corn and Grain Sorghum Research Studies Series			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Kelley, Jason	**McKinney, Nathan**			**Total Board Funding Requested**	**AES Portion**	**CES Portion**
Select "AES" or "CES" for each PI	CES	AES					

Fulltime Personnel

Position Title	**Name** *(if position is filled)*	**% Time**	**Salaries**				**Total**	**AES**	**CES**
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
		Subtotal: Salaries	$0	$0	$0	$0	$0	$0	$0

Graduate Student

Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.	**Name** *(if position is filled)*	**% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
		Tuition					$0	$0	$0
		Subtotal: Graduate Student	$0	$0	$0	$0	$0	$0	$0

Hourly

	Wages				**Total**	**AES Portion**	**CES Portion**
Hourly-Personnel		$4,325			$4,325	$4,325	$0
Hourly-Students					$0	$0	$0
Subtotal: Hourly	$0	$4,325	$0	$0	$4,325	$4,325	$0

Fringe Benefits

Fringe benefits are calculated when salary and wage amounts are entered above.	**Benefits**				**Total**	**AES Portion**	**CES Portion**
Fulltime Personnel	$0	$0	$0	$0	$0	$0	$0
Graduate Students	$0	$0	$0	$0	$0	$0	$0
Hourly Personnel	$0	$342	$0	$0	$342	$342	$0
Hourly-Students	$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits	$0	$342	$0	$0	$342	$342	$0
Personnel Total	$0	$4,667	$0	$0	$4,667	$4,667	$0

Travel

Justify out-of-state travel in proposal.	**Travel**				**Total**	**AES Portion**	**CES Portion**
In-State					$0	$0	$0
Out-of-State					$0	$0	$0
Travel Total	$0	$0	$0	$0	$0	$0	$0

University of Arkansas System Division of Agriculture
Promotion Board Budget

Kelley, Jason *Arkansas Corn and Grain Sorghum Research Studies Series*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies					$0	$0	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$0	$0	$0	$0	$0	$0	$0
	Total for Proposal	$0	$4,667	$0	$0	$4,667	$4,667	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Kelley, Jason	McKinney, Nathan			Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Use of gossypol to inhibit reproduction in domestic hogs as a model for feral hog control

Lead Investigators: B. P. Littlejohn

Co-Investigators: C. V. Maxwell, T. Tsai, M. A. Snider

Status: Year 2 of 3

Research Areas: Misc. Projects

Stated Goal: To evaluate the use of gossypol to inhibit reproduction in domestic hogs for development of a bait for feral hog control

Specific Objectives:

1. Using domestic hogs as a model for feral hogs, conduct a series of experiments to evaluate the use of feed containing gossypol to inhibit reproductive potential
2. Obtain input from 1) state and federal agencies and 2) collaborators in wildlife biology and population management to prepare for potential future phases of the project

Methods: *Objective 1.* Gossypol from cottonseed has been found to impede reproductive function in various species, including swine. Gossypol consumption has been associated with decreased sperm production and quality in males, suppressed fertility in females, and disruption of pregnancy leading to increased rates of abortion. Our *long-term goal* is to assess the potential for gossypol administration in the form of baiting to reduce hog populations in the state of Arkansas. As the first phase to accomplish this goal, our lab group proposes a series of trials to evaluate the use of gossypol to suppress fertility in sexually mature boars and gilts and to disrupt established pregnancies in sows. These trials will be sequential and conditional on each previous trial. Projects will be repeated and adjusted as necessary prior to starting subsequent trials to improve the effectiveness of methods. Our lab previously evaluated the use of cottonseed containing gossypol to inhibit reproductive function in domestic hogs. Based on findings from the previous studies, methods will be adjusted in the proposed study. Proposed trials will evaluate the use of purified gossypol rather than cottonseed meal. This will 1) minimize nutritional variation in research diets due to varying amounts of cottonseed and 2) minimize cottonseed batch variation, providing a more consistent product that can be used to develop a concentrated commercial product. All diets will be developed and evaluated for palatability. A pilot study will evaluate optimal gossypol concentrations and maximum tolerance. Sexually mature boars (n = 45) will be fed diets containing varying concentrations of gossypol or no gossypol for 30 days. Semen will be collected on a weekly basis during and following the feeding period to determine how quickly and how long gossypol might elicit effects. Libido will be simultaneously evaluated. Pending the need for study repetition and results from the boar trial, adjustments will be made to the experimental design and sexually mature gilts (n = 45) will be fed diets containing gossypol or no gossypol for 30 days (or as appropriately adjusted). Gilts will subsequently be bred to assess reproductive potential. Estrus expression, pregnancy rates, number of cycles to conceive, litter size, offspring survival, and postnatal offspring growth and viability will be assessed. Pending the need for study repetition and the effectiveness of gossypol to inhibit fertility in sexually mature boars and gilts, a third trial will be conducted as the project timeline allows to evaluate the use of gossypol to disrupt gestation. Pregnant females (n = 15) will be fed gossypol or no gossypol for 30 days (or as appropriately adjusted) during early gestation. Abortion rate, litter size, offspring survival, and postnatal offspring growth and viability will be assessed.

Objective 2. Historically, toxicants as methods of feral swine control have not been well accepted by the public and regulatory agencies of the state of Arkansas. In the event gossypol proves to be a viable method to reduce populations of feral hogs, it is essential to have support from state and federal

regulatory agencies. Our lab group will seek constructive input from these entities throughout the research process. It is important to note that *Objective 1*, seeks to establish the *proof-of-concept phase* of this project. In the event, *Objective 1* supports the use of gossypol as a viable method of reproductive control in domestic hogs, future phases will be conducted in the field with established collaborators in wildlife biology and population management. Our lab group has recently established working relationships with these collaborators and with the Arkansas Feral Hog Eradication Task Force, all of whom have agreed to be involved and provide input moving forward. Early input from collaborators in wildlife biology and population management will increase the potential for our methods to translate to field conditions, and early input from the Arkansas Feral Hog Eradication Task Force will help us ensure there is a place for such a product in the state of Arkansas.

Planned Milestones: It is anticipated that the proposed project will take up to 3 years to complete. In line with *Objective 1*, a postdoctoral associate has been hired (to be partially funded by this grant). This postdoctoral associate was selected rather than a graduate student due to current availability and needs of the project. Collaborators have met and initiated plans for development of treatment rations and an initial pilot study. A total of 20 boars have been secured as test subjects for the pilot study. Additionally, working relationships for *Objective 2* with state and federal agencies and collaborators in wildlife biology and population management have been established and continue to be maintained. Year 2 will primarily focus on conducting the aforementioned pilot study to determine appropriate concentrations of gossypol related to both animal tolerance and effectiveness. The pilot study will evaluate the influence of gossypol on health, libido, and semen quality. If semen quality is negatively impacted, sampling will continue past the conclusion of the treatment period to determine the duration of treatment effectiveness and long-term impacts on fertility. As stated above, trials conducted in years 2 and 3 will be sequential and conditional on each previous trial. Trials will be repeated and adjusted as necessary prior to starting subsequent trials to improve the effectiveness of methods. Ongoing results will be reported to the Arkansas Corn and Grain Sorghum Board on a regular basis.

Statement of Projected Value: Feral swine are an invasive species reported in at least 35 states in the U.S., a range that has continuously expanded over the past decades. Total estimated damages to crops, habitat, and private property are valued at over 1.5 billion dollars per year in the U.S., and total estimated damage and loss of crops in the state of Arkansas is valued at over 20 million dollars per year. There is an estimated feral hog population of 200,000 head in Arkansas, and the state would need to eliminate around 70% of the population (140,000 head) each year to halt population growth. Hunting, trapping, and shooting are common control practices, but are not effective enough to control the population of feral hogs. It is also important to note that currently, Arkansas law only allows poison bait for rodent control. Furthermore, it is imperative that control measures not cause harm to humans, other wildlife, or scavengers. Gossypol is an orally active polyphenolic compound naturally found in cottonseed that has been found to inhibit male reproduction in various species including humans.

Budget Justifications/Explanation of Travel and Direct Costs: The budget for year 2 of the proposed 3-year study includes funds to support salary and benefits for a postdoctoral associate to assist in conducting the proposed research. In-state and out-of-state travel will be necessary for *Objective 2* to maintain communication with state and federal agencies and collaborators in wildlife biology and population management. Out-of-state travel will also include travel to professional meetings to disseminate research results. Maintenance and operations costs will include the cost of animals, feed, sampling supplies, laboratory supplies, feed analyses, semen analyses, and laboratory analyses. Pending the need for study replication, the 3-year study is estimated to require up to 250 hogs at an estimated cost of $220 per animal in feed and maintenance costs.

University of Arkansas System Division of Agriculture

Promotion Board Budget

Brittni P. Littlejohn *Use of gossypol to inhibit reproduction in domestic hogs as a model for feral hog control*

Year	2024/2025	**Project Year**	Year 2 of 3
Lead Investigator	Brittni P. Littlejohn	**Co-PI #1**	Charles V. Maxwell
Co-PI #2	Tsung C. Tsai	**Co-PI #3**	Miriam A. Snider
Department	Department of Animal Science		
Commodity Board	Corn and Grain Sorghum Board		
Project Title	Use of gossypol to inhibit reproduction in domestic hogs as a model for feral hog control		

Version: 6.0 (11/01/2023)

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Brittni P. Littlejohn	Charles V. Maxwell	Tsung C. Tsai	Miriam A. Snider	Total Board Funding Requested	AES Portion	CES Portion
Select "AES" or "CES" for each PI	AES	AES	AES	AES			

Fulltime Personnel

Position Title	Name *(if position is filled)*	% Time	Salaries				Total	AES	CES
Postdoctoral Associa	Miriam Snider	100%	$26,000				$26,000	$26,000	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
							$0	$0	$0
		Subtotal: Salaries	$26,000	$0	$0	$0	$26,000	$26,000	$0

Graduate Student

Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.

Name *(if position is filled)*	% Time	Wages				Total	AES Portion	CES Portion
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
Tuition						$0	$0	$0
Subtotal: Graduate Student		$0	$0	$0	$0	$0	$0	$0

Hourly

	Wages				Total	AES Portion	CES Portion
Hourly-Personnel					$0	$0	$0
Hourly-Students					$0	$0	$0
Subtotal: Hourly	$0	$0	$0	$0	$0	$0	$0

Fringe Benefits

Fringe benefits are calculated when salary and wage amounts are entered above.

	Benefits				Total	AES Portion	CES Portion
Fulltime Personnel	$8,216	$0	$0	$0	$8,216	$8,216	$0
Graduate Students	$0	$0	$0	$0	$0	$0	$0
Hourly Personnel	$0	$0	$0	$0	$0	$0	$0
Hourly-Students	$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits	$8,216	$0	$0	$0	$8,216	$8,216	$0
Personnel Total	$34,216	$0	$0	$0	$34,216	$34,216	$0

Travel

Justify out-of-state travel in proposal.

	Travel				Total	AES Portion	CES Portion
In-State	$400				$400	$400	$0
Out-of-State	$400				$400	$400	$0
Travel Total	$800	$0	$0	$0	$800	$800	$0

University of Arkansas System Division of Agriculture

Promotion Board Budget

Brittni P. Littlejohn *Use of gossypol to inhibit reproduction in domestic hogs as a model for feral hog control*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$8,000				$8,000	$8,000	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs	Animal Use and Lab Analyses	$17,000				$17,000	$17,000	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$25,000	$0	$0	$0	$25,000	$25,000	$0
	Total for Proposal	$60,016	$0	$0	$0	$60,016	$60,016	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Brittni P. Littlejohn	Charles V. Maxwell	Tsung C. Tsai	Miriam A. Snider	Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Arkansas Future Ag Leaders Tour

Lead Investigators: Julie Robinson

Status (i.e., New, Year 2 of 3, Year 2 of 2, etc.): Year 3

Research Areas: Misc. Project

Stated Goal:
A five-day professional development opportunity for undergraduate juniors and seniors enrolled in Colleges of Agriculture or are pursuing agriculture related majors across the state of Arkansas. Agriculture and agriculture related professions are the number one employer in the state. This one-week experience will enhance students' leadership and employability skills, provide first-hand networking opportunities with potential employers, and highlight the vast resources, services, and careers available through Arkansas' agriculture industry. Participants will get to interact with farmers, producers, vendors, and many others that support the agricultural industry in Arkansas. The goal of this tour is to better prepare and inform new graduates. The tour helps participants discover jobs across the state, keeping homegrown talent in-state, and local.

Specific Objectives:
- Increase participant's employability in agricultural careers.
- Acquaint participants with the vast resources, market segments, and services available through Arkansas' number one industry.
- Provide participants with a "bird's eye view" of current employment opportunities in the Arkansas agriculture industry.
- Increase student's options and opportunities by networking with future employers.

Methods:
The third annual Arkansas Future Ag Leaders Tour was hosted in May 2023. Fifteen students from seven universities across the state participated. The tour was successful in connecting students with employers. To continue to provide this same professional development for future agricultural professionals, project coordinators are planning a five-day state-wide tour for undergraduate students who are in their junior and senior year of college. The call for applications will go out to all colleges with agriculture-related academic departments, including Arkansas State University, Arkansas Tech University, Southern Arkansas University, University of Arkansas – Fayetteville, University of Arkansas – Little Rock, University of Arkansas – Monticello, and University of Arkansas – Pine Bluff. The tour will begin at the Arkansas 4-H Center in Little Rock, on Monday, May 13, 2024. Participants will engage in leadership and team building activities to get to know each other and the coordinators. Participants will also participate in professional development activities related to networking, key tips for snagging the job of their dreams, and career advancement strategies. Each day, participants will travel across the state to pre-arranged tour sites to visit facilities and network with professionals. This will allow students to experience first-hand the diversity of opportunities within Arkansas'

agriculture industry. Growers, producers, processors, manufacturers, educators, and research facilities will host students across Arkansas.

Planned Milestones:

1. Formalization of a detailed project management and evaluation plan: February
2. Creation and dissemination of marketing resources: February.
3. Applications open: March
4. Coordination of the tour, scheduled for May 13 – 17, including arrangement and confirmation of tour stops including North East Arkansas, North West Arkansas, South East Arkansas, Southwest Arkansas, and Central Arkansas.
5. Communication with participants leading up to the tour: April
6. Conduct the Arkansas Future Ag Leaders Tour: May 13 – 17
7. Collaboration with news media and community partners to leverage resources. Management and utilization of program evaluation data to improve participation experience and outcomes.

Statement of Projected Value:

The Arkansas Future Ag Leaders Tour helps create a more prepared and informed workforce that better understands the needs and dynamics of the farmers and producers that they will serve in their agricultural related careers across the state. This professional development program addresses some job readiness skills that have been identified as deficient by employers. Other states, such as Georgia and South Carolina, offer similar opportunities for undergraduates for a significant cost. By providing this opportunity for free, many students who would not be able to otherwise afford to pay their way can participate, in addition to missing a week of work in order participate. The greatest value to the corn and grain sorghum industry is that this provides an opportunity to inform and educate future agriculture industry professionals and leaders about challenges facing farmers and producers. In addition, touring across the state makes students aware of what jobs are available in the state and in local communities all across Arkansas.

Budget Justifications/Explanation of Travel and Direct Costs:

Coordination will be provided by the University of Arkansas System Division of Agriculture project team, led by Community, Professional, and Economic Development faculty and staff. Monetary support for this project totals in the amount of $20,000. Program coordinators are requesting $5,000 from the Corn and Grain Sorghum Board and seeking additional contributions from other commodity and industry groups to fund the total. The greatest expenses for this program are lodging, meals, and bus rental. Funds will support meals for participants and guest speakers, vehicle usage and mileage, lodging, and materials and supplies. Program coordinators will utilize a coach bus to transport participants across the state. While several meals are usually donated by some of the companies visited, not all meals are covered and there are still mileage and fuel expenses, lodging, and supplies that need to be budgeted.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Robinson, Julie *Arkansas Future Ag Leaders Tour*

Year	2024/2025	**Project Year**	Year 3 of 3	**Version: 6.0 (11/01/2023)**
Lead Investigator	Robinson, Julie	**Co-PI #1**		
Co-PI #2		**Co-PI #3**		
Department	CES Community, Professional, & Economical Development			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Arkansas Future Ag Leaders Tour			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Robinson, Julie				**Total Board Funding Requested**	**AES Portion**	**CES Portion**
Select "AES" or "CES" for each PI	CES						
Fulltime Personnel							
Position Title / **Name** *(if position is filled)* / **% Time**	**Salaries**				**Total**	**AES**	**CES**
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Subtotal: Salaries	$0	$0	$0	$0	$0	$0	$0
Graduate Student							
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.							
Name *(if position is filled)* / **% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Tuition					$0	$0	$0
Subtotal: Graduate Student	$0	$0	$0	$0	$0	$0	$0
Hourly							
	Wages				**Total**	**AES Portion**	**CES Portion**
Hourly-Personnel					$0	$0	$0
Hourly-Students					$0	$0	$0
Subtotal: Hourly	$0	$0	$0	$0	$0	$0	$0
Fringe Benefits							
Fringe benefits are calculated when salary and wage amounts are entered above.							
	Benefits				**Total**	**AES Portion**	**CES Portion**
Fulltime Personnel	$0	$0	$0	$0	$0	$0	$0
Graduate Students	$0	$0	$0	$0	$0	$0	$0
Hourly Personnel	$0	$0	$0	$0	$0	$0	$0
Hourly-Students	$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits	$0	$0	$0	$0	$0	$0	$0
Personnel Total	$0	$0	$0	$0	$0	$0	$0
Travel							
Justify out-of-state travel in proposal.							
	Travel				**Total**	**AES Portion**	**CES Portion**
In-State	$5,000				$5,000	$0	$5,000
Out-of-State					$0	$0	$0
Travel Total	$5,000	$0	$0	$0	$5,000	$0	$5,000

University of Arkansas System Division of Agriculture
Promotion Board Budget

Robinson, Julie *Arkansas Future Ag Leaders Tour*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies					$0	$0	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$0	$0	$0	$0	$0	$0	$0
	Total for Proposal	$5,000	$0	$0	$0	$5,000	$0	$5,000

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Robinson, Julie				Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Performance of Crop Insurance as a Risk Management Tool for Corn and Grain Sorghum Producers in Arkansas

Lead Investigators: Lawson Connor

Co-Investigators:

Status (i.e., New, Year 2 of 3, Year 2 of 2, etc.): Year 3 of 3

Research Areas (Verification Program, General Agronomics, Diseases, Insects, Fertility, Irrigation, Weed Control, Misc. Projects): Misc. Projects

Stated Goal: Determining how use of crop insurance and changes to crop insurance rating methods can affect affordability crop insurance premium rates for corn producers in the state of Arkansas.

Previous Objectives and Findings

1. Determine the contribution of prevented planting to total crop insurance premium rates in Delta states.
2. Compare size of crop insurance rates net of Prevented planting with net rates in similar counties in other states.
3. Determine use, costs, and returns to Prevented Planting statewide, and differential returns and effects on premiums across the state.
4. Continue methods from round one to identify other potential contributors to rate discrepancies.

Findings:

Our work to date has revealed that 66% of all crop insurance indemnities for corn in the state are due to prevented planting. We also find that loss ratios (the ratio of payments made by crop insurance compared to premium paid into the program) is 1.5, meaning the program pays $1.50 in indemnities for every $1 paid in premiums. By this metric alone, the rates of the program appear to be appropriately priced, if not underpriced. The loss ratio falls to 0.53 when prevented planting claims are removed. Meaning that crop insurance pays $0.53 in indemnities for every $1 paid into the program in premiums.

More importantly, our work finds that prevented planting is higher on our lower/lowest quality soils and growing areas. While we are still not certain how prevented planting claims factor into the RMA rating system, it is certain that prevented planting claims are treated differently in the rating compared to harvest claims where harvest claims are aggregated at the county level while prevented planting claims are aggregated across all fields growing a crop (corn in this case) at the state level. So, it's possible that high prevented planting claims on our least productive acres are affecting crop insurance rates on our most productive lands.

Furthermore, suspect that our more productive lands are less likely to be insured than other lands. This would imply that the RMA record of the loss history for the state may over represent the areas with higher risk of claims which can also increase premium rates for land with a lower risk of claims as well. However, this is the subject of future exploration.

Specific Objectives:

1. Determine patterns of crop insurance demand in the state.

2. Determine how insurance demand patterns affect rating at the county/state levels.
3. Determine whether sub-state level aggregations are being used by the RMA for prevented planting and determine how such aggregations may change rates on more productive lands.

Methods:

1. Investigate RMA documentation to determine RMA Weather Districts boundaries within the state.[1]
2. Investigate how weather district boundaries are determined.
3. Aggregate previously collected RMA summary of business data and crop insurance actuarial data master (ADM) data, to the weather district level.
4. Using a means analysis approach, determine relative liabilities, indemnities, premiums, and loss ratios within each weather district in the state.
5. Using a crop insurance demand model, determine factors that affect crop insurance demand in the state.
6. Determine whether prevented planting losses are aggregated at the state vs weather district level, using RMA documentation and interactions with RMA actuarial scientists.
7. Perform simulation analysis to find how crop insurance rates may change across the state with different ways of aggregating prevented planting losses.

Planned Milestones:

1. Publish findings of each year's study
2. Produce final report on factors affecting crop insurance rates in the state of Arkansas and potential improvements addressing rating and use factors.

Statement of Projected Value:

Farming, like most businesses, involves risks. However weather and environmental risks play a significantly greater role in farming than many other production areas today from year to year. The use of insurance to cover these risks is a useful way to stabilize farm incomes from year to year which enhances the abilities to plan, increases lending opportunities and frees up capital for other types of investments. However, crop insurance is only valuable if it can provide those benefits without itself being a significant cost burden which precludes its general use and affects the accuracy of its rates for the typical producer in the state. This study aims to provide information to our grain sorghum and corn producers in Arkansas as well as the RMA that can help improve the performance and value of the crop insurance program for the RMA and our producers in the state.

Budget Justifications/Explanation of Travel and Direct Costs:

Funds outlined in the budget will be used for costs associated with a graduate assistant who will help to gather and analyze data and write reports.

[1]As a result of concerns raised from research on crop insurance by economists, and the RMA's own analysis of its rating methods, the RMA has introduced the Weather District approach to aggregating catastrophic losses. Before the introduction of Weather Districts, all catastrophic losses were grouped at the state level and spread across all insured acres in the state for a given crop. However, this meant that areas prone to e.g. flood or high wind risks, were contributing to premium rate calculations in growing areas that do not face similar risks, because they were in the same state. As a result, Weather Districts, where catastrophic losses are aggregated and spread only across areas determined to have similar weather risk patterns, were introduced to minimize this problem.

University of Arkansas System Division of Agriculture

Promotion Board Budget

Lawson Connor *Performance of Crop Insurance as a Risk Management Tool for Corn and Grain Sorghum*

Year	2024/2025	**Project Year**	Year 3 of 3	**Version: 6.0 (11/01/2023)**
Lead Investigator	Lawson Connor	**Co-PI #1**		
Co-PI #2		**Co-PI #3**		
Department	AEAB Agricultural Economics & Agribusiness			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Performance of Crop Insurance as a Risk Management Tool for Corn and Grain Sorghum			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Lawson Connor				**Total Board Funding Requested**	**AES Portion**	**CES Portion**
Select "AES" or "CES" for each PI	AES						
Fulltime Personnel							
Position Title / **Name** *(if position is filled)* / **% Time**	**Salaries**				**Total**	**AES**	**CES**
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Subtotal: Salaries	$0	$0	$0	$0	$0	$0	$0
Graduate Student							
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.							
Name *(if position is filled)* / **% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
50%	$11,936				$11,936	$11,936	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Tuition	$17,550				$17,550	$17,550	$0
Subtotal: Graduate Student	$29,486	$0	$0	$0	$29,486	$29,486	$0
Hourly							
	Wages				**Total**	**AES Portion**	**CES Portion**
Hourly-Personnel					$0	$0	$0
Hourly-Students					$0	$0	$0
Subtotal: Hourly	$0	$0	$0	$0	$0	$0	$0
Fringe Benefits							
Fringe benefits are calculated when salary and wage amounts are entered above.							
	Benefits				**Total**	**AES Portion**	**CES Portion**
Fulltime Personnel	$0	$0	$0	$0	$0	$0	$0
Graduate Students	$501	$0	$0	$0	$501	$501	$0
Hourly Personnel	$0	$0	$0	$0	$0	$0	$0
Hourly-Students	$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits	$501	$0	$0	$0	$501	$501	$0
Personnel Total	$29,987	$0	$0	$0	$29,987	$29,987	$0
Travel							
Justify out-of-state travel in proposal.							
	Travel				**Total**	**AES Portion**	**CES Portion**
In-State					$0	$0	$0
Out-of-State					$0	$0	$0
Travel Total	$0	$0	$0	$0	$0	$0	$0

University of Arkansas System Division of Agriculture
Promotion Board Budget

Lawson Connor *Performance of Crop Insurance as a Risk Management Tool for Corn and Grain Sorghum*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies					$0	$0	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$0	$0	$0	$0	$0	$0	$0
	Total for Proposal	$29,987	$0	$0	$0	$29,987	$29,987	$0

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Connor				Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Promotion Board – 2024-2025 Proposal

Title: Corn and Grain Sorghum Research Verification Program

Investigators: Dr. Jason Kelley, Wheat and Feed Grains Extension Agronomist
Mr. Chuck Capps, Program Associate

Cooperators: Dr. Travis Faske, Extension Plant Pathologist
Dr. Terry Spurlock, Extension Plant Pathologist
Dr. Trent Roberts, Soil Fertility
Dr. Tom Barber, Extension Weed Scientist
Dr. Glenn Studebaker, Extension Entomologist
Breana Watkins, Extension Economist Program Associate
Dr. Chris Henry, Irrigation Specialist

Crop: Corn and Grain Sorghum

Status: Year 1 of 3

Research Area: Verification

Stated Goal:
Conduct an on-farm educational demonstration program that serves as a hands-on program to help producers, county agents, and crop consultants learn proper agronomic, pest management, and production practices that produce high-yielding and economical corn and grain sorghum grown under Arkansas conditions.

Specific Objectives:

(1) Verify research-based recommendations for profitable corn and grain sorghum production in Arkansas

(2) Develop a database for economic analysis of all aspects of corn and grain sorghum production

(3) Demonstrate that consistently high yields of corn and grain sorghum can be produced economically with the use of available technology and inputs

(4) Identify specific problems and opportunities in Arkansas corn and grain sorghum production that may require further investigation

(5) Provide hands-on training for county extension agents, consultants, and producers through weekly field visits by coordinator

Methods:
Producers enroll (or re-enroll) a field in the Corn and Grain Sorghum Research Verification Program. These producers will receive advice on all aspects of corn and grain sorghum production. The Wheat and Feed Grains Extension Agronomist and verification program coordinator will work with an Extension/Research Advisory Committee to make plans for each field.

Weather data, plant populations, growth stages, and management practices will be evaluated weekly with county extension agents' assistance to help make management decisions. In addition, cooperating producers may be asked to dedicate a portion of the field for on-farm investigations of ongoing funded corn and grain sorghum promotion board projects such as evaluating plant populations, fertility recommendations, seed treatments, pest management, irrigation type/frequency/decision making, and other production issues that may arise during the growing season that needs more research.

At the end of the growing season, results will be compiled into a report that includes economic analysis, production practices implemented, and performance of each field in the program.

Statement of Projected Value:
Many Arkansas corn and grain sorghum producers can improve yields and profit by implementing research-based practices in a timely manner. Likewise, extension recommendations are designed to improve yields and profits based on unbiased research results. The research verification program integrates all available information and technology into a comprehensive demonstration of profitable corn and grain sorghum production in Arkansas.

Additionally, the verification program provides advanced training for county extension agents and cooperating producers. The information gained by county extension agents can then be applied to corn and grain sorghum producers statewide. Cooperators participate in the verification program for two successive years to obtain multi-year data and increase the county agents and cooperators' confidence in the program.

Planned Milestones: Each year an annual report, which will include inputs, yields, and economic analysis will be prepared and published in the Arkansas Corn and Grain Sorghum Research Reports. Results from the program will also be presented at county production meetings, in newsletters, blog postings, and other avenues of information dissemination.

Budget Justification of Direct Costs and Out of State Travel: $3,750 for upgrading aging weather stations, irrigation water flow meter, and soil moisture sensors and telemetry units. The $1,000 out-of-state travel requested would cover the costs of attending a professional meeting, such as the National Conservation Tillage Conference or the American Society of Agronomy meetings. Attending a professional meeting would serve as an opportunity to present results from the verification program to a larger audience and gain new ideas for the program.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Kelley, Jason *Arkansas Corn and Grain Sorghum Research Verification Program*

Year	2024/2025	**Project Year**	New	**Version: 6.0 (11/01/2023)**
Lead Investigator	Kelley, Jason	**Co-PI #1**		
Co-PI #2		**Co-PI #3**		
Department	CSES Crop, Soil, Environmental Science			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Arkansas Corn and Grain Sorghum Research Verification Program			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Kelley, Jason				**Total Board Funding Requested**	**AES Portion**	**CES Portion**
Select "AES" or "CES" for each PI	CES						
Fulltime Personnel							
Position Title / **Name** *(if position is filled)* / **% Time**	**Salaries**				**Total**	**AES**	**CES**
Associate / Chuck Capps / 100%	$76,000				$76,000	$0	$76,000
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Subtotal: Salaries	$76,000	$0	$0	$0	$76,000	$0	$76,000
Graduate Student							
Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.							
Name *(if position is filled)* / **% Time**	**Wages**				**Total**	**AES Portion**	**CES Portion**
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
					$0	$0	$0
Tuition					$0	$0	$0
Subtotal: Graduate Student	$0	$0	$0	$0	$0	$0	$0
Hourly							
	Wages				**Total**	**AES Portion**	**CES Portion**
Hourly-Personnel					$0	$0	$0
Hourly-Students					$0	$0	$0
Subtotal: Hourly	$0	$0	$0	$0	$0	$0	$0
Fringe Benefits							
Fringe benefits are calculated when salary and wage amounts are entered above.							
	Benefits				**Total**	**AES Portion**	**CES Portion**
Fulltime Personnel	$24,016	$0	$0	$0	$24,016	$0	$24,016
Graduate Students	$0	$0	$0	$0	$0	$0	$0
Hourly Personnel	$0	$0	$0	$0	$0	$0	$0
Hourly-Students	$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits	$24,016	$0	$0	$0	$24,016	$0	$24,016
Personnel Total	$100,016	$0	$0	$0	$100,016	$0	$100,016
Travel							
Justify out-of-state travel in proposal.							
	Travel				**Total**	**AES Portion**	**CES Portion**
In-State	$21,234				$21,234	$0	$21,234
Out-of-State	$1,000				$1,000	$0	$1,000
Travel Total	$22,234	$0	$0	$0	$22,234	$0	$22,234

University of Arkansas System Division of Agriculture
Promotion Board Budget

Kelley, Jason *Arkansas Corn and Grain Sorghum Research Verification Program*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies	$3,800				$3,800	$0	$3,800
	Fertilizer/Chemicals					$0	$0	$0
	Publication	$200				$200	$0	$200
	Statistical Consulting					$0	$0	$0
Other Direct Costs	weather stations/telemetry	$3,750				$3,750	$0	$3,750
Station Maintenance	SAREC, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	CTST, Marianna	$0	$0	$0	$0	$0	$0	$0
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$0	$0	$0	$0	$0	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$0	$0	$0	$0	$0	$0	$0
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$7,750	$0	$0	$0	$7,750	$0	$7,750
	Total for Proposal	$130,000	$0	$0	$0	$130,000	$0	$130,000

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Kelley, Jason				Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Arkansas Corn and Grain Sorghum Board – 2024-2025 Proposal

Title: Evaluation of new herbicides, premixes, programs, and application methods for improved control of problematic weeds in corn

Investigators: Dr. Tom Barber, Extension Weed Scientist, Lonoke;
Co-Instigator: Dr. Jason Norsworthy, Crop, Soil, and Environmental Sciences Dept., Fayetteville

Status: Year 2 of 3
Research Area: Weed Control
Stated Goal: To optimize season-long corn weed control through evaluation of various herbicide, technology, and cultural practice combinations.

Specific Objectives:

1. Continue to evaluate the weed control spectrum of new herbicide uses in corn such as how they might fit into a complete program.

2. Evaluate the effectiveness of weed control programs with proposed EPA guidelines on atrazine.

    a. Corn response and evaluation of weed control with various atrazine rates and mixtures at spiking
    b. Corn response to metribuzin and amicarbazone rates and mixtures PRE on various soil types

3. Determine off-target effects from drift rates of paraquat plus soybean and cotton residuals at various corn growth stages.

4. Determine off-target effects with Reviton and Sharpen spring burndown applications on corn.

5. Evaluate herbicide options for control of Texas panicum.

6. Evaluate the utility of the See & Spray Ultimate and See & Spray Premium in corn.

7. Determine the effectiveness of hairy vetch as an early season living mulch for improved weed control in corn.

8. To rapidly transfer weed control information to growers through multiple methods such as MP44 and other extension publications, blog posts, Weeds AR Wild podcasts, videos, text messages, and others.

Methods: Field experiments will be established at Fayetteville (silt loam), Keiser (clay), Marianna (silt loam), Newport, and on-farm to evaluate weed control efficacy as well as

corn cultivar tolerance to potential new herbicides such as Trivolt, Reviton, Maverick, and SC617. In addition, comparisons of new premixes of old herbicides will be evaluated for consistency in hybrid tolerance and weed control. Barnyardgrass has been found to be resistant to glyphosate in Mississippi and Tennessee. Studies will be conducted to evaluate barnyardgrass and other grass control alternatives in preparation for the onset of glyphosate resistance in barnyardgrass populations. Texas panicum has recently become a problem in many Northeast Arkansas counties. On-farm trials will be established to evaluate herbicide programs where this problem weed exists. Recently the EPA has released new potential guidelines for atrazine use in Arkansas which include lowering the annual maximum use rate. In most Arkansas counties, the EPA will require specific management practices to allow atrazine use on the acre. These options should be evaluated for effectiveness. All experiments will be analyzed for statistical significance and will be presented at annual county and state-wide producer meetings. Annual publications will be developed based on results of proposed research in the Extension Publication MP-44 and MP-519.

Value to the Corn Industry

Herbicide resistance is continuing to spread through the US. Palmer amaranth (pigweed) populations in Arkansas have been found to be resistant to 6 known herbicide modes of action, most of which have been used in corn production in the past. Populations of barnyardgrass have also been identified as resistant to 5 herbicide modes of action. Some populations of barnyardgrass and junglerice in Mississippi and Tennessee have already been identified as resistant to glyphosate (Roundup). The costs associated with weed control in corn will likely increase in the future due to increased resistance and the limitations placed on atrazine by the EPA. Best management practices (BMP's) for corn weed control must be determined to economically control weeds while minimizing further resistance. New technology, potential herbicide use, and cultural methods should be evaluated to determine these BMP's. Furthermore, this research will provide a highly inclusive dataset to submit as potential justification to continue atrazine registration in the state of Arkansas and if atrazine is denied further registration, these data will provide potential alternatives for weed control in Arkansas corn production systems.

Justification

New herbicide modes of action are not currently available in corn production systems. Therefore, we must evaluate the potential of new technology, new uses of registered products and cultural methods for corn weed control until new herbicide modes of action are discovered. Herbicide resistance in pigweed and barnyardgrass populations continue to increase because similar herbicide modes of action are used in current cropping systems regardless of crop planted. If glyphosate resistance is discovered in Arkansas barnyardgrass, few options will be available for control in corn production. These options should be evaluated to remain proactive with extension recommendations. New EPA regulations may limit the use of atrazine in certain situations. EPA rates and guidelines for atrazine should be evaluated for value and effectiveness in Arkansas corn production systems.

University of Arkansas System Division of Agriculture
Promotion Board Budget

Barber, Tom — *Evaluation of new herbicides, premixes, programs, and application methods for improved control of problematic*

Year	2024/2025	**Project Year**	Year 2 of 3	**Version: 6.0 (11/01/2023)**
Lead Investigator	Barber, Tom	**Co-PI #1**	Norsworthy, Jason	
Co-PI #2		**Co-PI #3**		
Department	CSES Crop, Soil, Environmental Science			
Commodity Board	Corn and Grain Sorghum Board			
Project Title	Evaluation of new herbicides, premixes, programs, and application methods for improved control of problematic weeds in corn			

Budgets are requested in separate columns if separate Worktags for AES and CES will be needed.

Budget for Personnel

	Barber, Tom	Norsworthy, Jason			Total Board Funding Requested	AES Portion	CES Portion
Select "AES" or "CES" for each PI	CES	AES					

Fulltime Personnel

Position Title	Name *(if position is filled)*	% Time	Salaries				Total	AES	CES
Program Associate	Leah Collie		$16,000				$16,000	$0	$16,000
Program Associate	Zach Hill		$7,000				$7,000	$0	$7,000
Program Associate	Rodrigo Botelho			$18,000			$18,000	$18,000	$0
							$0	$0	$0
							$0	$0	$0
		Subtotal: Salaries	$23,000	$18,000	$0	$0	$41,000	$18,000	$23,000

Graduate Student

Tuition to be budgeted in the same ratio as GA stipend time, e.g., full time GA stipend, full year's tuition.

Name *(if position is filled)*	% Time	Wages				Total	AES Portion	CES Portion
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
						$0	$0	$0
Tuition						$0	$0	$0
Subtotal: Graduate Student		$0	$0	$0	$0	$0	$0	$0

Hourly

	Wages				Total	AES Portion	CES Portion
Hourly-Personnel	$2,000	$6,000			$8,000	$6,000	$2,000
Hourly-Students					$0	$0	$0
Subtotal: Hourly	$2,000	$6,000	$0	$0	$8,000	$6,000	$2,000

Fringe Benefits

Fringe benefits are calculated when salary and wage amounts are entered above.

	Benefits				Total	AES Portion	CES Portion
Fulltime Personnel	$7,268	$5,688	$0	$0	$12,956	$5,688	$7,268
Graduate Students	$0	$0	$0	$0	$0	$0	$0
Hourly Personnel	$158	$474	$0	$0	$632	$474	$158
Hourly-Students	$0	$0	$0	$0	$0	$0	$0
Subtotal: Fringe Benefits	$7,426	$6,162	$0	$0	$13,588	$6,162	$7,426
Personnel Total	$32,426	$30,162	$0	$0	$62,588	$30,162	$32,426

Travel

Justify out-of-state travel in proposal.

	Travel				Total	AES Portion	CES Portion
In-State	$2,000	$6,000			$8,000	$6,000	$2,000
Out-of-State					$0	$0	$0
Travel Total	$2,000	$6,000	$0	$0	$8,000	$6,000	$2,000

University of Arkansas System Division of Agriculture
Promotion Board Budget

Barber, Tom — *Evaluation of new herbicides, premixes, programs, and application methods for improved control of problematic*

		Maintenance & Operations						
		M&O				Total	AES Portion	CES Portion
	Supplies					$0	$0	$0
	Fertilizer/Chemicals					$0	$0	$0
	Publication					$0	$0	$0
	Statistical Consulting					$0	$0	$0
Other Direct Costs						$0	$0	$0
Station Maintenance	SAREC, Fayetteville	$0	$3,075	$0	$0	$3,075	$3,075	$0
	CTST, Marianna	$4,655	$0	$0	$0	$4,655	$0	$4,655
	Lonoke County Ext. Center	$0	$0	$0	$0	$0	$0	$0
	NERE, Keiser	$0	$2,825	$0	$0	$2,825	$2,825	$0
	NERREC, Jonesboro	$0	$0	$0	$0	$0	$0	$0
	Jackson County Ext. Center	$3,325	$0	$0	$0	$3,325	$0	$3,325
	PTST, Colt	$0	$0	$0	$0	$0	$0	$0
	RIRE, Stuttgart	$0	$0	$0	$0	$0	$0	$0
	Rosen Center	$0	$0	$0	$0	$0	$0	$0
	SEST, Rohwer	$2,825	$0	$0	$0	$2,825	$0	$2,825
	SWRE, Hope	$0	$0	$0	$0	$0	$0	$0
	VGSS, Kibler	$0	$0	$0	$0	$0	$0	$0
	FRSS, Clarksville	$0	$0	$0	$0	$0	$0	$0
	LFST, Batesville	$0	$0	$0	$0	$0	$0	$0
	CSES Greenhouse, Fayetteville	$0	$0	$0	$0	$0	$0	$0
	M & O Total	$10,805	$5,900	$0	$0	$16,705	$5,900	$10,805
	Total for Proposal	$45,231	$42,062	$0	$0	$87,293	$42,062	$45,231

Budget errors delay submission of your proposal. Any proposal submitted with errors in the budget cannot be guaranteed accurate presentation for funding. Please check budgets for accuracy.

Fringe Benefit Rates (as of 7/1/2022)				
Campus	Fulltime	Temp/Hourly	Graduate	Student
AES	31.60%	7.90%	4.20%	0.70%
CES	31.60%	7.90%	4.20%	0.70%

Complete the following section ONLY if the project will be considered for an Ecosystem.

		%	Barber, Tom	Norsworthy, Jason			Total	
Ecosystems (Rice Only)	Grand Prairie	0%	$0	$0	$0	$0	$0	
	Mississippi Delta		$0	$0	$0	$0	$0	
	White River		$0	$0	$0	$0	$0	
	Totals	0%	$0	$0	$0	$0	$0	***Must match the proposal total.***

Proposal Presentations for Funding
Corn and Grain Sorghum Research
2024-2025

February 22, 2024

Submitted to the
Arkansas Corn and Grain Sorghum Board

Exploring Plasma Activated Water for Enhanced Biocontrol of Aflatoxins in Corn Plants

- **Investigators:** G. Atungulu, M. Rahman & B. Bluhm
- **Status:** (New)
- **Budget Request:** $63,1950
- **Objective:**
  1) *Generate various plasma-activated water types using a recently acquired plasma generator and assess their efficacy against fungal pathogens of corn.*
  2) *Evaluate plasma-activated water's ability to suppress pathogenic activity and prevent toxin accumulation when applied to corn plants.*
  3) *Analyze traits of harvested corn treated with plasma-activated water versus untreated samples.*

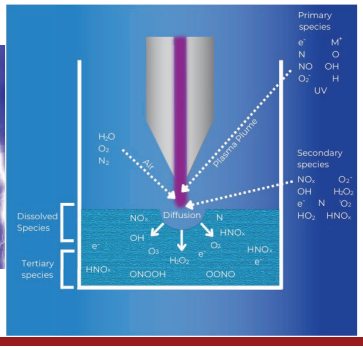
Background

➢ Traditional biocontrol methods show promise in managing aflatoxin contamination in field plants, but face limitations influenced by environmental factors.

➢ Integrating biocontrol with innovative approaches could enhance efficacy and sustainability in disease management, impacting grain quality positively.

➢ This research aims to evaluate the efficacy of plasma activated water on corn plants as a novel biocontrol method for aflatoxins and other plant diseases affecting grain quality.

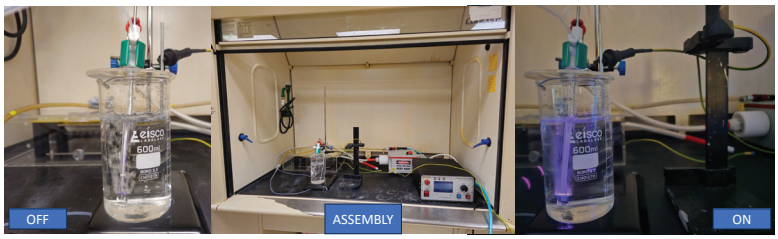
Plasma



➢ Plasma, the fourth state of matter, generates charged particles, altering atmospheric gases to create biologically active plasma activated water.

➢ This project exploits plasma properties to combat pathogenic fungi and microbes affecting corn.

Laboratory assembled Plasma Activated water- Bubble reactor



Dielectric barrier cold plasma discharge into water (direct and multiphase plasma discharge)

Approaches

Phase 1: Generate four plasma-activated water types, testing effectiveness and dosages against a wide range of corn pathogens, with emphasis on aflatoxigenic strains of A. flavus	**Phase 2:** Inoculate healthy corn plants with different pathogens, assessing treatment efficacy based on dosage and application timing.	**Phase 3:** Study treatment implications on corn traits post-treatment. Non-treated samples will serve as controls in each phase.

Value

Plasma technology offers scalability and cost-effectiveness. Leveraging existing infrastructure, like irrigation, and potential aerial application via planes or drones, could significantly reduce aflatoxin loads and combat a wide range of corn diseases.

The technology also could potentially be used in sanitation (e.g., trucks, bins) to reduce post-harvest infection with *A. flavus* and other storage fungi.

Economic Analysis of Corn and Grain Sorghum Production and Marketing Practices

Brian Deaton

Status: New
Budget Request: $5,777
Objectives:

- Conduct an economic analysis of production practices used in the Arkansas Corn and Grain Sorghum Research Verification Program.
- Verify Extension recommendations. (J. Kelley and C. Capps)
- Provide Arkansas corn market summaries for publication on the "Row Crops Blog" online newsletter.

Economic Analysis of Corn and Grain Sorghum Production and Marketing Practices

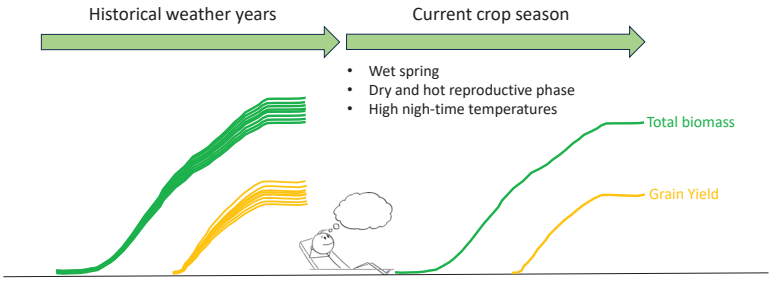
Methods:

- Analyze the economic feasibility of production management decisions in the Corn and Grain Sorghum Research Verification Program using enterprise budgets.
- Determine production practices that offer producers the highest expected net returns for their corn and grain sorghum enterprises.

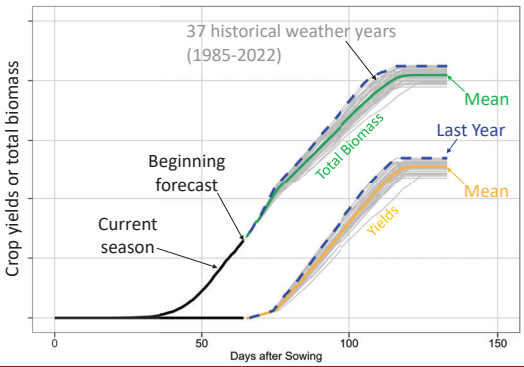
Corn Yield Forecast System for the US Mid-South

- **Investigators: Elvis Elli (PI)**
  Jason Kelley (Co-PI)
  Gerson Drescher (Co-PI)
- **Status: New (Year 1 of 3)**
- **Budget Request: $56,652**
- **Objectives: (1) Collect relevant crop and soil measurements**
  (2) Model testing
  (3) Develop the forecast system protocol

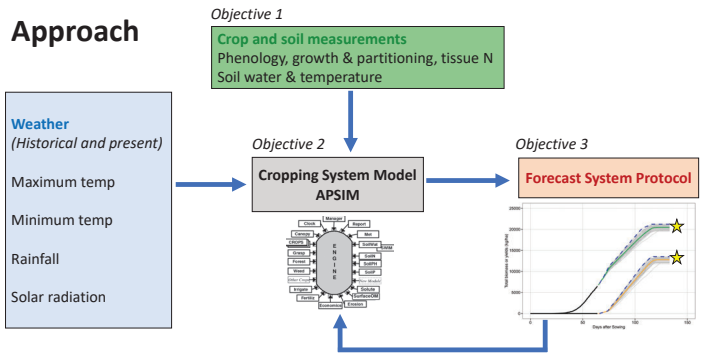
Rationale



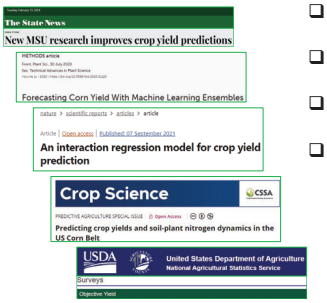
Proposed forecast protocol



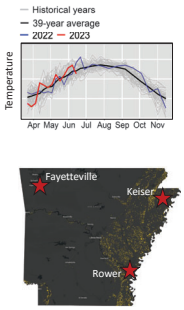
Approach



What can we deliver?



- ❑ Projected yields
- ❑ Benchmark conditions
- ❑ Managing climate risk
- ❑ Learning for the future



UADA Feed Kits

- Allison Harman and Dr. Mark Russell
- **Status:** New
- **Budget Request:** $2,500
- **Objectives:**
  - Provide each Arkansas county with a resource for youth and adult education.
  - Source as much feed as possible from Arkansas farms and businesses.
  - Increase awareness of the different commodities used as livestock feeds.
  - Increase a county's ability to train 4-H Animal Science contest teams.

What is a UADA Feed Kit?

36 feed samples in plastic jars (3-4 oz. samples) → Feed Identification Guide → Plastic container for the kit

UADA Feed Kit Project Management Plan

February
- Project Plan finalized
- Feed ID Guide drafted

March
- Begin sourcing and accumulating feeds

April
- Order plastic bins and containers

June/July
- Assemble UADA Feed Kits
- Feed ID Guide finalized

September
- Begin UADA Feed Kit distribution

December
- Project finished
- All UADA Feed Kits delivered

What is the impact of a UADA Feed Kit?

- Available to every county
- Arkansas sourced
- Wide variety of educational applications
  - Feed identification in 4-H Animal Science contests
  - Educating producer groups
  - Educational displays at County Fair

Use of Corn Protein Concentrate in Plant-Based Diets for Largemouth Bass to Optimize Production Sustainability and Profitability

- **Rebecca Lochmann, University of Arkansas at Pine Bluff**
- **Status: (New)**
- **Budget Request: $32,741**
- **Objectives:1) Determine growth, survival, feed conversion, native immune function, and body composition of LMB fed diets with increasing Corn Protein Concentrate (CPC) in place of fish meal in a feeding trial**
- **2) Conduct a partial budget analysis to determine the relative profitability of using the different diets**

Introduction

- Largemouth bass (LMB) is a popular sportfish and foodfish
- Carnivorous species – likes high protein diets (fish meal, other animal sources)
- Monterrey Bay Aquarium ranks LMB production as sustainable, with the exception of the diet (too high in fish meal)
- Big push toward plant-based diets across the board for aquaculture species
- Problem – Carnivores have no interest in becoming vegan!

Potential Solution

- Plant ingredients must be palatable, with balanced protein/amino acid profiles
- Plant protein concentrates are quickly gaining ground as sustainable alternatives to animal ingredients in aquafeeds
- Corn protein concentrates contain 60-75% protein and contain few anti-nutritional factors
- Good candidate for LMB diets – performance data is needed

Methods

- We will conduct a 12-wk feeding trial with LMB in aquaria
- 5 practical diets will be made with increasing CPC in place of fish meal and soybean meal
- Supplemental amino acids will be used to ensure that all diets meet the essential amino acid requirements of LMB
- Growth, survival, feed conversion efficiency, body composition and health assays will be measured to assess diets
- Economic analysis will be conducted

Value to the Corn Industry

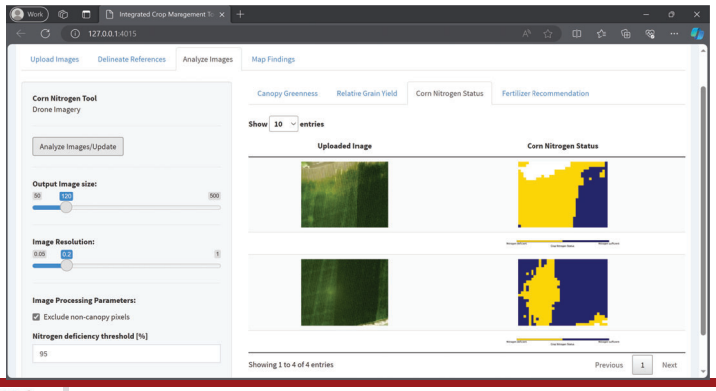
- Recent LMB sales totaled $27,500,000. Approximately 3,778,000 lbs of foodsize fish were produced, requiring 5,667,000 lbs of feed (conversion of 1.5)
- Demonstrated benefits of CPC to reduce fish meal in LMB diets could increase demand for refined corn concentrates
- Potential application to other carnivorous species would further increase demand

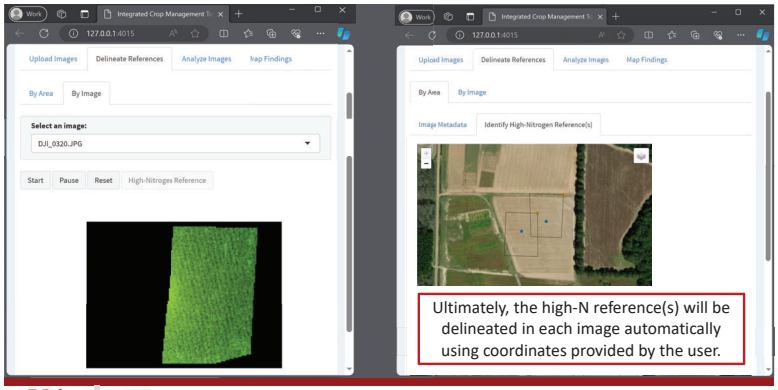
Remote sensing-based mid-season corn nitrogen fertilizer rate recommendations and web-tool extension.

Investigators: Aurelie Poncet (PI), Trenton Roberts, Jason Kelley
Status: NEW
Budget Request: $56,000

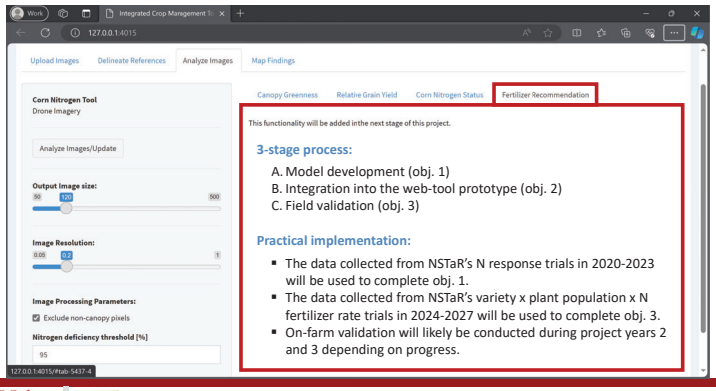
Objectives:

1. To create calibration curves that determine the amount of nitrogen (N) fertilizer required to recover 90% to 95% yield potential from field and high-N reference DGCI values when mid-season yield-limiting N deficiencies are identified.
2. To develop a new web-tool functionality that predicts the agronomically and economically optimum mid-season corn N fertilizer rate recommendation from raw drone images.
3. To verify that the new remote sensing-based mid-season corn N fertilizer rate recommendations can accurately predict how much N fertilizer is needed to maintain or increase yields.





Ultimately, the high-N reference(s) will be delineated in each image automatically using coordinates provided by the user.



3-stage process:

A. Model development (obj. 1)
B. Integration into the web-tool prototype (obj. 2)
C. Field validation (obj. 3)

Practical implementation:

- The data collected from NSTaR's N response trials in 2020-2023 will be used to complete obj. 1.
- The data collected from NSTaR's variety x plant population x N fertilizer rate trials in 2024-2027 will be used to complete obj. 3.
- On-farm validation will likely be conducted during project years 2 and 3 depending on progress.

Research Impacts and Projected Value

- Increased scouting efficiency
- Decision-support for optimized mid-season N fertilizer management
- Increased profitability from the use of inexpensive drone systems
- Relevant to both uniform and variable-rate N fertilizer applications
- Benefits achieved independently from operation size and technological capabilities
- Questions and feedback on tool functionalities / research objectives welcome!

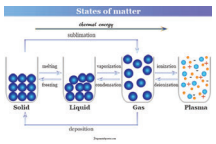
Thank you for your support!

Utilizing Plasma Technology to Inhibit Tannin Effects in Grain Sorghum for Enhanced digestibility and Protein Quality

- Investigators: Mahfuzur Rahman and Griffiths Atungulu
- **Status:** New
- **Budget Request:** $43,101
- **Objectives:**
- Optimize the cold plasma system based on inactivated tannin activity in grain sorghum.
- Determine the impact of plasma treatment on the quality of grain.
- Fractionate protein from grains and analyze the quality of protein to develop alternative protein-based food products.

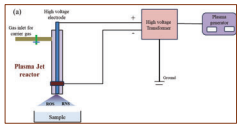
Plasma Technology

- Fourth state of matter
- Sustainable technology
- Does not produce heat
- No chemical residue

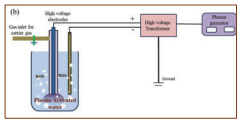


Lab picture

Methods



- Pass Grain Sorghum through a conveyor belt and apply plasma
- Measure tannin content
- Grain quality factors, such as protein content, protein digestibility, kernel hardness, kernel weight and diameter, and phenolic content



- Fractionate protein from grains using plasma-activated water
- Analyze tannin content and protein quality
- Develop sorghum protein-based food products.

Statement of Projected Value

- Tannins in train-sorghum sorghum can adversely impact their quality and utility.
- The bitter taste associated with tannins reduces the palatability of products from the grain-sorghum for both humans and animals.
- Additionally, high tannin levels hinder nutrient absorption, particularly affecting proteins, thereby lowering the overall nutritional value of the grain.
- These factors, combined with potential antinutritional effects, make tannins a significant concern for the grain-sorghum industry, affecting its market appeal and suitability for various uses, including livestock feed and food processing.

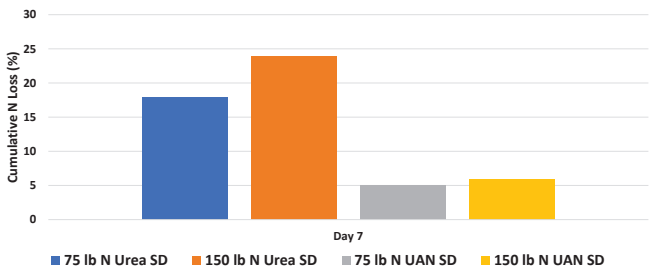
Statement of Projected Value

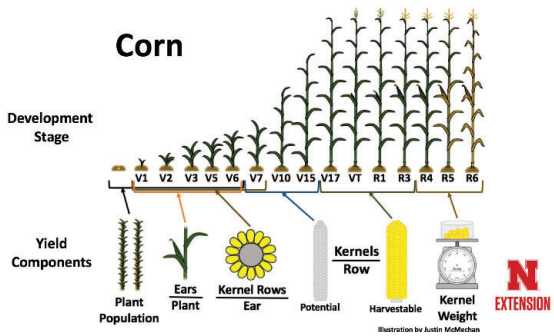
- In 2022, the plant-based protein market was valued at $8 billion in the U.S., experiencing a 7% increase in dollar sales compared to 2021.
- The major plant-based categories are plant-based meat and dairy alternatives.
- Soybean, pea, corn, and wheat proteins dominate the plant protein market.
- Although sorghum has a great protein to make alternative dairy products, tannin is the only hindrance to getting into the market.
- Successful results from this project would help to create a new market for sorghum protein in the alternative protein market.

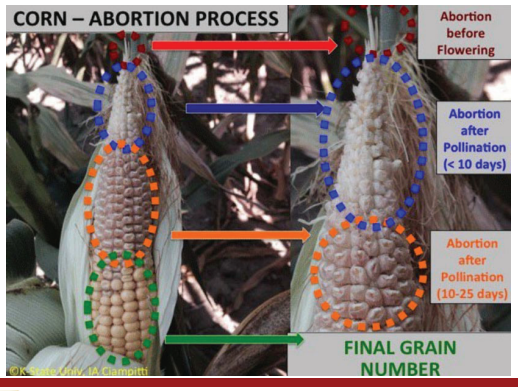
Improving Nitrogen Management for Arkansas Corn Production

- **Investigators: Trenton Roberts, Gerson Drescher, Jason Kelley**
- **Status: New**
- **Budget Request: $78,547**
- **Objectives:**
  1. **Validate the current nitrogen management strategies for irrigated Arkansas corn production in small plot and large block field trials.**
  2. **Quantify the potential nitrogen losses, primarily ammonia volatilization loss**
  3. **Evaluate the impacts of nitrogen rate and timing on corn yield components**

Ammonia Volatilization Losses: Rate x Source





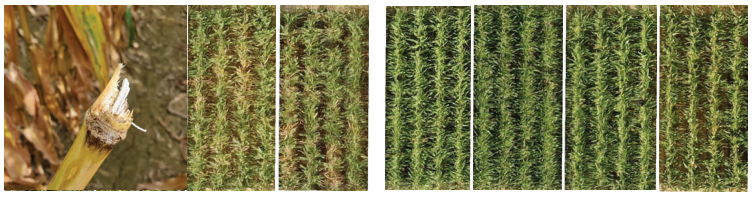


Determining disease resistance and susceptibility of corn and grain sorghum hybrids

- Dr. Terry Spurlock, Dr. Jason Kelley, Dr. Camila Nicolli, and John Carlin, University of Arkansas System Division of Agriculture
- Status: New
- Budget Request: $40,000
- Objectives: To extend disease resistance and susceptibility data of commercial corn and grain sorghum hybrids to growers annually

Determining disease resistance and susceptibility of corn and grain sorghum hybrids

Differences in severity of stalk rot on two different corn hybrids

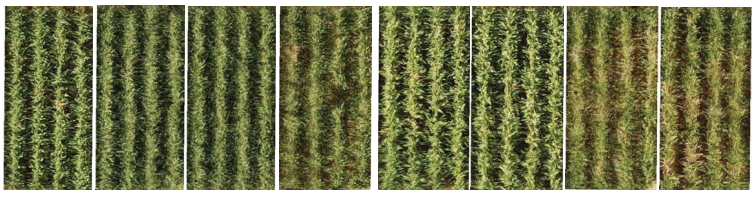


109 206 312 414 115 216 302 408

DKC 62-70 DKC 70-45

Determining disease resistance and susceptibility of corn and grain sorghum hybrids

Differences in severity of stalk rot on two different corn hybrids



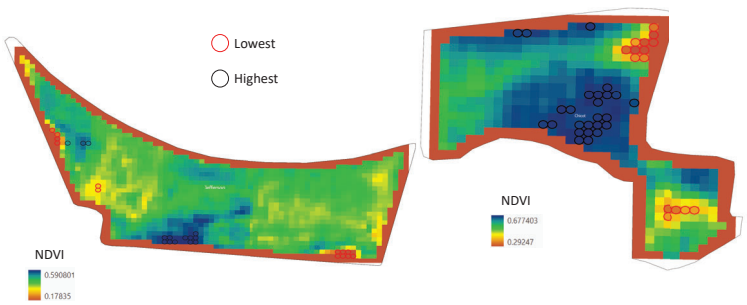
105 212 301 410 106 209 316 411

P1511YHR P1718VYHR

Developing a satellite-based field scouting tool for corn

- Dr. Terry Spurlock and Dr. Jason Kelley
  - University of Arkansas System Division of Agriculture
- Status: New
- Budget Request: $15,000
- Objectives: To develop a tool that uses publicly available satellite imagery to increase scouting efficiency by locating areas in fields that should be scouted

Developing a satellite-based field scouting tool for corn



Generating a high-value wax material from sorghum bran using an innovative green approach

Investigator: Ali Ubeyitogullari

Status: New, Year 1 of 3

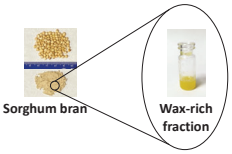
Budget Request: $42,761

Objectives:

- Extract high-value waxes from sorghum bran using supercritical carbon dioxide (SC-CO_2), optimize the extraction conditions, and create a model to describe the extraction process - ***value added products***.
- Separate and fractionate waxes from a recovered oil process stream of a bioethanol facility that uses grain sorghum in their fermenter - ***create new markets***.
- Coat fresh blackberries with the generated wax fractions to enhance their shelf life - ***create new markets + increase the utilization of grain sorghum***.

Grain Sorghum

- Inexpensive to grow & drought-tolerant crop.
- Has high-melting point waxes in its bran.
- However, **the potential of grain sorghum is underestimated** as its use in food and bioethanol production is still minimal.



Wax Materials

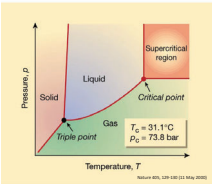
Carnauba Wax

- High-melting point

ISSUES

Sustainability concerns: Carnauba wax production is confined to Brazil, with notable issues surrounding deforestation.

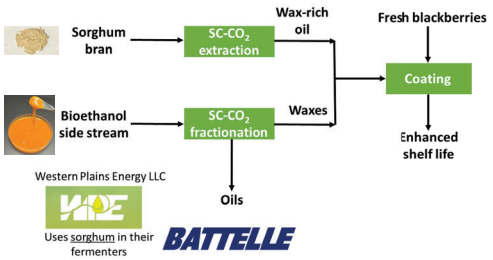
Supercritical Carbon Dioxide (SC-CO_2) Technology: A "Green" Alternative



Advantages of CO_2

- Nontoxic, inexpensive, and abundant.
- Environmentally friendly process.
- Easily separates from the product without any residue.
- No oxygen; oxidation is prevented.
- "Clean" food products.

Proposed Approach and Projected Value



Projected Value

- Maximize the value of grain sorghum.
- Produce sustainable wax materials.
- Contribute to Arkansas's economy by creating new markets for grain sorghum byproducts:
  - **(1)** High-value wax materials,
  - **(2)** Bioethanol production.

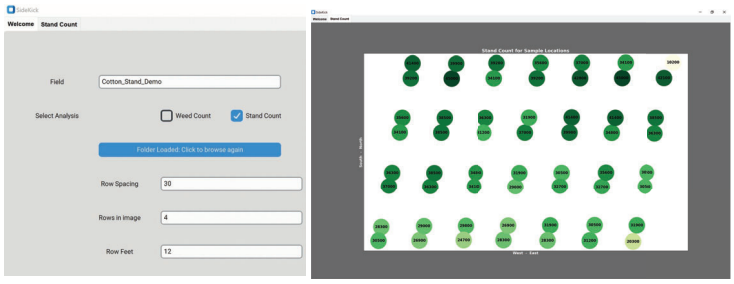
Development and verification of a stand counting application using drone imagery for research and production decision support

- **Dr. Jason Davis PI, Dr. Jason Kelly Co-PI**
- **Status: New**
- **Budget Request: $19,600**
- **Objectives:**
  - **(1) Collect drone imagery of plant population studies (small plots) and use it to train a custom corn plant counting object detection model.**
  - **(2) Validate detection accuracy of model with considerations for research and production applications.**
  - **(3) Develop and release a user-friendly software package that leverages the validated customized model.**

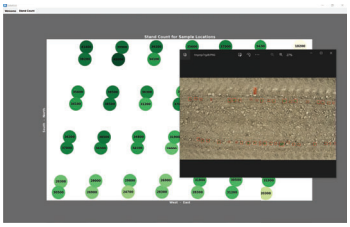
Statement of Projected Value:

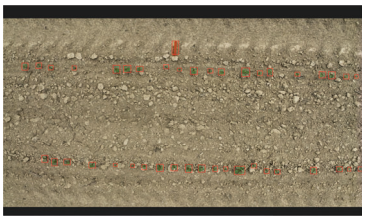
- Optimal plant populations heavily influence yield and profitability.
- However; establishing robust plant population estimates at scale to inform replant or other production decisions is cumbersome and time consuming.
- A user-friendly and robust counting tool that leverages the automated data collection capabilities of drones could significantly facilitate these estimates.

Prototype program already developed in cotton:



Example Outputs for Production and Research:





Budget Justification:

- A corn specific algorithm requires data collection time, processing, and annotation.
- Project funds will primarily be spent on:
  - Travel
  - Technician time
  - Time collecting, annotating, and processing data.
- Reduced cost due to collaboration with already established plots.

Optimizing Plant Population and Nitrogen Rate in Corn

- **Jason Kelley, Trent Roberts, Hunter Biram**
- **Status: (Year 2 of 3)**
- **Budget Request: $34,000**

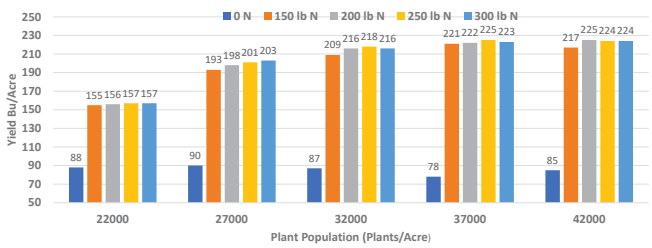
Objectives:

(1) Evaluate the impact of corn plant populations (populations of approximately 20k-45k plants/acre) on producer fields to compare yields, lodging potential, and economic return across diverse sites with varying yield potential and various commonly planted hybrids. (Large plots)

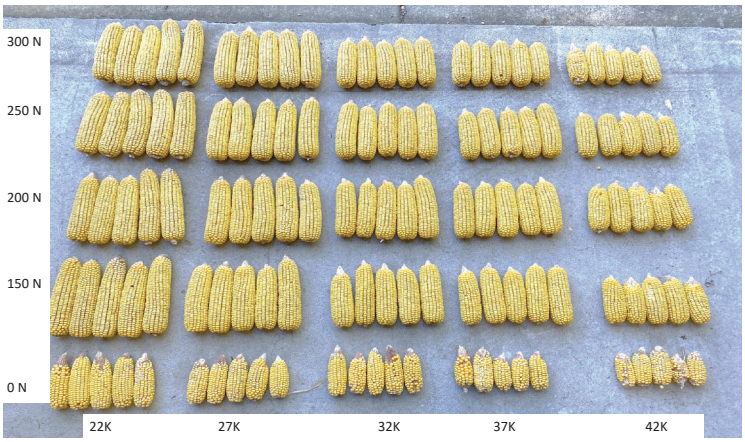
(2) Evaluate yield response to varying plant populations of new and commonly grown corn hybrids in combination with varying nitrogen rates (150, 200, 250, 300 lbs N) (Small Plots)
Locations: Rohwer, Marianna, Newport, Pine Tree, Fayetteville

(3) Evaluate resulting economic returns from trials (Hunter Biram)

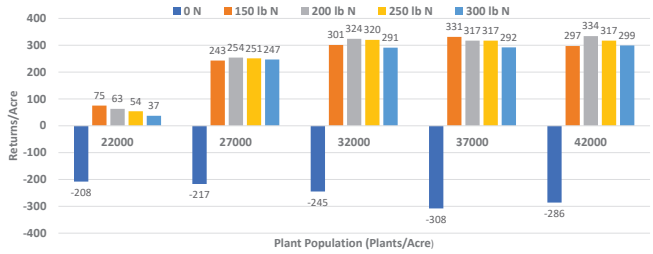
Impact of Plant Population and Nitrogen Rate on Corn Yield, 2023, Marianna



38 Inch row spacing, silt loam soil, DKC 66-06 and Progeny 2118



Impact of Plant Population and Nitrogen Rate on Economic Returns, 2023, Marianna



38 Inch row spacing, silt loam soil, DKC 66-06 and Progeny 2118

2024 Plans: Optimizing Plant Population and Nitrogen Rate in Corn

- Summarize 2023 results in the Corn and Grain Sorghum Research Series publication
  - More details, plant heights, greensnap, lodging, yield components (seeds/ear, seed weight), and economic returns for all trials.
- Five Hybrid X Nitrogen Rate Trials are planned: Rohwer, Marianna, Newport, Pine Tree, and Fayetteville
  - Evaluate commonly grown hybrids and new hybrids
  - Pioneer 1718, Pioneer 1847, DKC 66-06, DKC 68-35, DKC 65-99, Progeny 2118
- End of the year – 9 trials over 2 years
- Evaluate the need for year 3?
- Would like to evaluate short-stature hybrids as they become commercially available
  - New project or continuation of the current project?

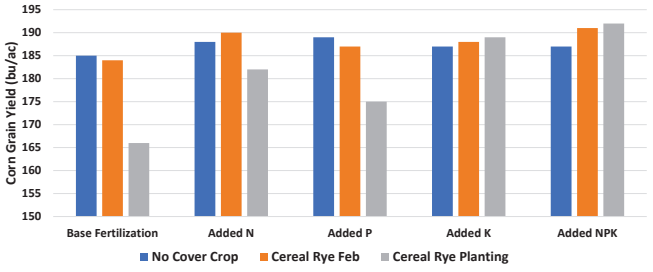
Cover Crops in Corn Rotations- What Works and What Doesn't

- **Investigators: Trenton Roberts, Gerson Drescher, Jason Kelley**
- **Status: 2**
- **Budget Request: $39,729**
- **Objectives:**
  1. **Determine the best management practices for growing corn following common cover crops**
  2. **Determine how implementing winter cover crops into a corn-soybean rotation influences nutrient cycling, soil physical properties, soil chemical properties and soil health.**

Major Changes in Soil Health Indices

- Soil Organic Matter- +0.5%
- Total N- Increased in Legume treatment
- POX-C - +60 ppm
- Wet Aggregate Stability- greater macroaggregate stability

Adding More Nutrients?



Towards a comprehensive aflatoxin solution: Creating and integrating novel aflatoxin control resources for an effective, sustainable management strategy

- **Investigator: Burt Bluhm**
- **Status: Year 2**
- **Budget Request: $45,000**
- **Objectives:**

1. **Identify genes in corn associated with protein misfolding during heat and drought stress**
2. **Create novel aflatoxin-resistance genes through transgenic approaches and genome editing**
3. **Incorporate aflatoxin resistance into new semi-dwarf maize hybrids**
4. **Acquire and organize resources to launch a comprehensive 'moon shot' among multiple institutions to control aflatoxin in corn**

Progress and Future Plans

- Identified promising candidate genes associated with drought stress – will construct a small hoop house (rainout shelter) for this year's field experiments
- Developed an approach to evaluate protein misfolding – will apply to field experiments this season
- Currently evaluating novel transgenic corn lines that specifically target aflatoxin biosynthesis in the pathogen
- Met with collaborators at Purdue who are developing semi-dwarf hybrids, will evaluate aflatoxin resistance in parental lines this season
- Attended a short-course organized by the University of Florida regarding the incorporation of AI in breeding for plant stress resistance – will incorporate this into our aflatoxin research

Arkansas Corn & Grain Sorghum Board

Management Options for Corn Nematodes

Investigators: **Travis Faske**
Amanda Greer - NDL

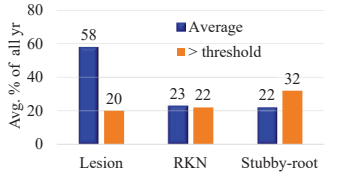
Status: Year 3

Budget Request: $55,401

Objectives:

1. Identify important corn nematodes (GSPB sponsored assays).

Samples processed:
201 in 2021
55 in 2022
190 in 2023



Arkansas Corn & Grain Sorghum Board

Management Options for Corn Nematodes

Objectives:

2. Nematode biology: vertical distribution
3. Nematicides efficacy: 2023

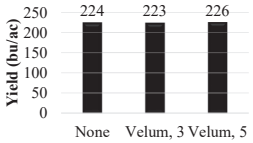
- Multiple on-farm field experiments
  - **Seed treatments** (Votivo, Avicta…) **similar yield protection** to **in-furrow** (Velum, Counter)
  - Low nematode counts

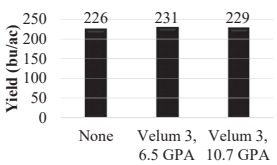
Arkansas Corn & Grain Sorghum Board

Management Options for Corn Nematodes

Objectives:

3. Nematicides efficacy:
   - Velum Rate (3 vs 5 oz) and GPA (norm and high) test on 5 hybrids





Arkansas Corn & Grain Sorghum Board

Management Options for Corn Nematodes

Objectives:

3. Nematicides efficacy:
   - New Nematicides: Lesion Pf >350/100 cm^3
     - Bayer, **Acceleron N-314** (2023): "ILEVO" + Votivo
       - 6 bu/ac over NTC in one exp.
     - Syngenta, **Tymirium** (2025): New SDHI
       - 6 bu/ac over NTC in one exp.

ACCELERON® N-314 Seed Treatment

TYMIRIUM

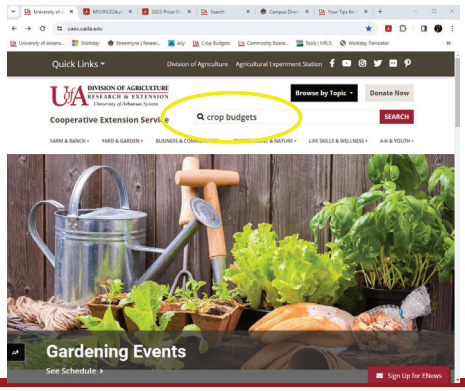
Arkansas Corn & Grain Sorghum Board

Crop Enterprise Budgets

- **Investigators: Breana Watkins**

- **Status: Year 2 or 3**
- **Budget Request: $10,000**
- **Objectives:**

The goal of this project is to provide crop enterprise budgets that are flexible in presentation allowing for analysis of numerous production practices and cropping systems utilized across Arkansas.



Arkansas Corn & Grain Sorghum Board

Estimated Costs and Returns per Acre
Stacked-Gene Corn
Furrow Irrigated, 14 ac-in., Arkansas, 2024

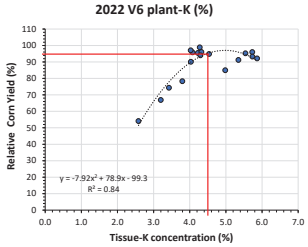
					Landlord	Tenant
ITEM	UNIT	PRICE	QUANTITY	Total Amount	Share %	Share	Share
INCOME							
Corn	bu	$ 4.80	215	$ 1,032.00	0.0%	$ -	$ 1,032.00
TOTAL INCOME				$ 1,032.00		$ -	$ 1,032.00
DIRECT EXPENSES							
LAND EXPENSE							
Cash Land Rent	acre			$ -			$ -
SEED/PLANTS							
Corn Seed	thous	$ 3.75	32	$ 120.00	0.0%	$ -	$ 120.00
CUSTOM SPRAY AND FERTILIZER							
Ground App[1,2,3,4,5]	appl	$ 8.00	5	$ 40.00	0.0%	$ -	$ 40.00
Aerial App Chem[6]	appl	$ 8.50	0	$ -	0.0%	$ -	$ -
Aerial App Fert[7]	lbs	$ 0.085	100	$ 8.50	0.0%	$ -	$ 8.50
FERTILIZERS							
Phosphate (0-46-0)[2]	lbs	$ 0.35	130	$ 45.50	0.0%	$ -	$ 45.50
Potash (0-0-60)[2]	lbs	$ 0.25	175	$ 43.75	0.0%	$ -	$ 43.75
Urea (46-0-0)[1,4,7]	lbs	$ 0.25	435	$ 108.75	0.0%	$ -	$ 108.75
Ammonium Sulfate[2]	lbs	$ 0.20	100	$ 20.25	0.0%	$ -	$ 20.25
Zinc Sulfate[2]	lbs	$ 1.80	29	$ 52.20	0.0%	$ -	$ 52.20
HERBICIDES							
Glyphosate[1]	pt	$ 5.38	2	$ 10.76	0.0%	$ -	$ 10.76
2,4-D[1]	pt	$ 3.33	2	$ 6.66	0.0%	$ -	$ 6.66

Fine-tuning Potassium Recommendations

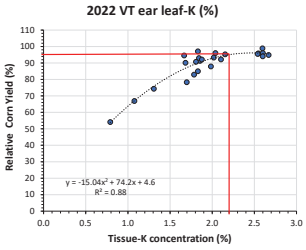
- **Investigators: Trenton Roberts, Gerson Drescher, Jason Kelley**

- **Status: Year 2**
- **Budget Request: $56,395**
- **Objectives:**
  1. **Establish field experiments to evaluate corn yield response to varying rates of potassium fertilizer.**
     a. **Correlate leaf tissue potassium concentration to corn grain yield.**
     b. **Measure potassium removal in the grain**
     c. **Fine-tune existing potassium rate recommendations for corn.**
  2. **Validate the potash rate calculator developed in conjunction with Dr. Michael Popp**
  3. **Determine the utility of intensive in-season tissue sampling and monitoring as a tool for high-yielding corn production systems.**

Tissue K Data-V6



Tissue K Data-VT



Potassium Timing in Corn

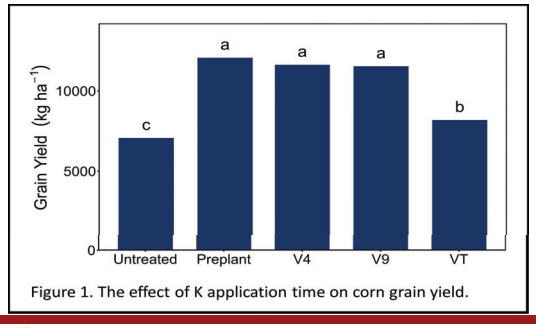


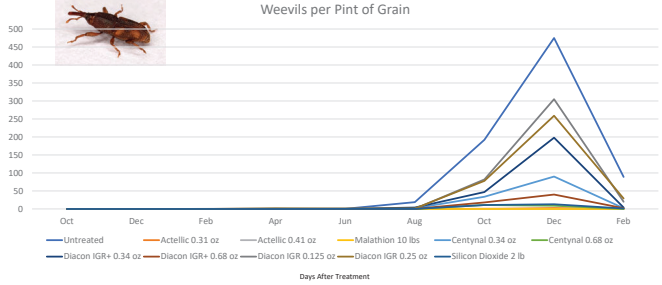
Figure 1. The effect of K application time on corn grain yield.

Assessing Susceptibility of Insect Pests of Corn in Storage to Selected Insecticides

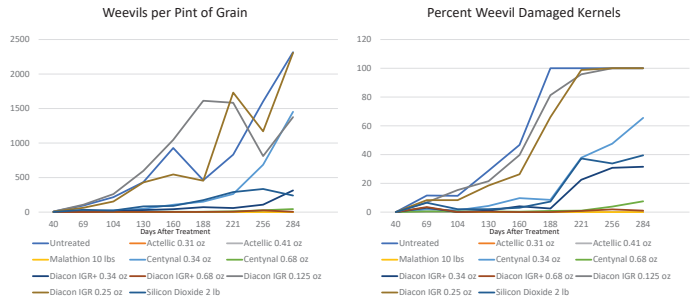
- **Glenn Studebaker, Ben Thrash, Nick Bateman, N. Joshi**

- **Status: Year 3**
- **Budget Request: $40,891**
- **Objectives:**
  1. **Efficacy studies will be conducted to determine both the effectiveness and longevity of control of recommended insecticide treatments.**
  1. **To determine relative susceptibility of stored grain insect pests to various insecticides and other chemicals. These bioassays will evaluate sensitivity of flour beetles and other stored pests to new chemicals as outlined under Obj. 1.**

Rice Weevil Infestation Levels in Infested Corn Barrel Study



Assessing Susceptibility of Insect Pests of Corn in Storage to Selected Insecticides



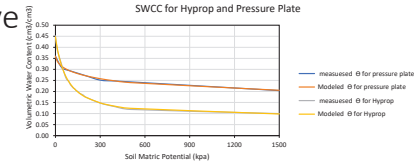
Assessing Susceptibility of Insect Pests of Corn in Storage to Selected Insecticides

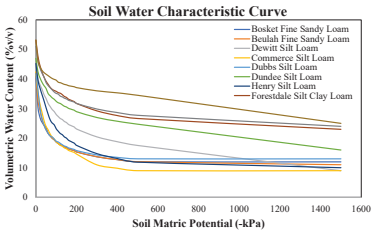
- Actellic, Malathion and high rate of Centynal showing longest residual control. (currently up to 9 months with Centynal starting to break)
- Diacon IGR alone breaks down by 2 months
- Low rate of Centynal begins to break at 4 months
- Silicone Dioxide and Diacon IGR Plus break down at 5-6 months

Improving Irrigation Technology for Corn Production in Arkansas

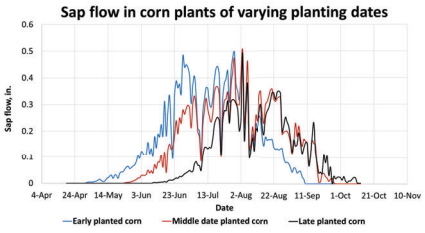
- **C.G. Henry**
- **Status: Year 2 of 3**
- **Budget Request: $185,280**
- **Objectives:**
  - **Measure sap flow in corn to develop and confirm water use in corn.**
  - **Measure irrigation water use, water use efficiency and efficacy of IWM tools through novel irrigation contest. Demonstrate Irrigation Water Management through the Irrigation Yield Contest. Pilot cloud meters in contest.**
  - **Finalize retention curves for the major soil Arkansas soil types, incorporate into mobile app and factsheets.**
  - **Conduct Irrigation schools for surge irrigation and soil moisture sensor education.**
  - **Develop prototypes for new methods and promote existing known methods to improve irrigation efficiency. Test cover crop crimper for furrow irrigation. Continue surge valve development, poly pipe printer, new soil moisture sensor and novel flowmeter and digital asset water trading system.**
  - **Pilot remote valve and pump timer technology on a working farm.**

Retention Curve Results





Sap Flow in 3 planting dates in Corn



UofA Division of Agriculture Research & Extension — Arkansas Corn & Grain Sorghum Board

Sap flow/water use of corn planted on different dates and according to the UofA App by growth stages

Growth stage	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11
Early planted	0	0	0.01	0.01	0.02	0.03	0.05	0.07	0.1	0.12	0.15
Middle date planted	0	0.01	0.02	0.03	0.04	0.06	0.09	0.12	0.15	0.2	0.23
Late planted	0.01	0.02	0.03	0.04	0.05	0.07	0.1	0.14	0.19	0.23	0.26
Current Recommendations										0.24	0.25

Growth stage	V12	V13	VT	R1	R2	R3	R4	R5	R5.25	R5.5	R5.75
Early planted	0.18	0.22	0.26	0.29	0.3	0.3	0.3	0.29	0.26	0.22	0.15
Middle date planted	0.26	0.28	0.3	0.3	0.31	0.31	0.3	0.27	0.25	0.23	0.14
Late planted	0.28	0.29	0.29	0.3	0.29	0.27	0.21	0.16	0.12	0.09	0.05
Current Recs	0.26	0.27	0.28	0.3	0.26	0.24	0.22	0.2	0.19	0.18	0.17

UofA Division of Agriculture Research & Extension — Arkansas Corn & Grain Sorghum Board

MOST CROP PER DROP
Arkansas Irrigation Yield Contest

Mark Ahrent 1st Place Corn


Blake Ahrent, Michael Ahrent, Mark Ahrent, and Matthew Ahrent

$128,552 in prizes for 2023.
58 entries, 13 in corn
Mark achieved highest WUE to date in contest.
Average yield 226 BPA, average WUE 9.4 bu/in and average water use is 9.4 inches of irrigation.


Stewart Runsick
Clay County Extension Agent

218 BPA
13.5 Bushels Per Inch WUE

Used Delta Plastics Pipeplanner, Valley Aquatrac, P&R Surge Valve, Watermark Sensors, & UA Arkansas Watermark mobile app

UofA Division of Agriculture Research & Extension — Arkansas Corn & Grain Sorghum Board — Corning, Arkansas (Clay County)

John Allen McGraw
2nd Place Corn
255 BPA
12.4 Bushels Per Inch WUE

Star City, Arkansas
(Lincoln County)

ALSO placed in #1 row rice and #2 soybeans

Jeremy Wiedeman
3rd Place Corn
222 BPA
11.95 Bushels Per Inch WUE

UofA Division of Agriculture Research & Extension — Arkansas Corn & Grain Sorghum Board — Corning, Arkansas (Clay, County)

Arkansas Discovery Farms

- **Mike Daniels and Discovery Farm Team**
- **Status: (Year 3)**
- **Budget Request: $5,000**
- **Objectives:**

1. Provide on-farm verification and documentation of water quality, water use, soil health and climate change services

2. Provide education from on-farm data that will assist producers in achieving both production and environmental goals in support of sustainable farming.

Thank You for all Your Support!

UofA Division of Agriculture Research & Extension — Arkansas Corn & Grain Sorghum Board

Important Findings / Accomplishments

- N and P losses are small relative to application
- K losses are of significant economic value
- Cereal Rye Cover Crops are allowing cash crop to extract water from 18 inches compared to 6 inches for non cover situations
- Soil Health in terms of physical and biological parameters need improvement
- Continue to generate much interest from Decision makers, agencies and others that may influence agricultural production

Corn & Grain Sorghum Research Studies

- **Kelley, J, et.al.**
- **Status: Ongoing**
- **Budget Request: $4,500**
- **Objectives: 1. Capture and broadly distribute results of projects funded by this board. 2. Serve as citable archive.**
- **Audience: Corn growers, consultants, county agents, future researchers.**

Arkansas Corn & Grain Sorghum Board

- Published online and available at: https://uada.edu/communications/publications
- County Extension offices and research stations/centers receive hard copies
- Hard copies may be printed upon request

Arkansas Corn & Grain Sorghum Board

Use of gossypol to inhibit reproduction in domestic hogs as a model for feral hog control

- **Investigators: B. P. Littlejohn, C. V. Maxwell, T. C. Tsai, M. A. Snider**
- **Status: Year 2**
- **Budget Request: $60,016/year**
- **Objectives:**
  1. Using domestic hogs as a model for feral hogs, conduct a series of experiments to evaluate the use of feed containing gossypol to inhibit reproductive potential.
  2. Obtain input from 1) state and federal agencies and 2) collaborators in wildlife biology and population management to prepare for potential future phases of the project.

Arkansas Corn & Grain Sorghum Board

Arkansas Corn & Grain Sorghum Board

Objective 1

- Our lab group proposes a series of trials to evaluate the use of gossypol to:
  - Suppress fertility in sexually mature males (Pilot Study and Experiment 1)
  - Suppress fertility in sexually mature females (Experiment 2)
  - Disrupt established pregnancies (Experiment 3)
- *Trials for each experiment will be sequential and conditional upon each previous trial.*
- Trials will be repeated and adjusted as necessary prior to starting subsequent trials to improve the effectiveness of methods.

Arkansas Corn & Grain Sorghum Board

Year 1 Progress

- Postdoctoral Associate hired (partially funded by grant)
- Gossypol treatments developed (cottonseed oil)
- 24 domestic boars secured as test subjects
  - Boars are currently being trained for semen collection
  - Sperm concentration is being assessed on a weekly basis to determine sexual maturity
- The pilot study will start after 20 boars are determined to be sexually mature:
  - Pilot study will evaluate the influence of gossypol from cottonseed oil consumed by domestic boars on health and reproductive function
    - Semen quality
    - Desire to breed

Study Timeline

- The proposed project is anticipated to take up to 3 years to complete.
  - Objective 1
    - Year 1: Accomplished Milestones:
      - Postdoctoral associate hired (partial funding)
      - Treatments developed (cottonseed oil)
      - Research subjects secured
      - Pilot study is in early stages
    - Years 2-3: A series of trials will be conducted to evaluate the use of gossypol to suppress reproductive potential of feral hogs.
  - Objective 2
    - Working relationships for Objective 2 have already been established and will be maintained throughout the duration of the study.

Arkansas Future Ag Leaders Tour

- **Investigators:** Julie Robinson
- **Status:** Year 3
- **Budget Request:** $5,000
- **Objectives:**
  - Increase participant's employability in agricultural careers.
  - Acquaint participants with the vast resources, market segments, and services available through Arkansas' number one industry.
  - Provide participants with a "bird's eye view" of current employment opportunities in the Arkansas agriculture industry.
  - Increase student's options and opportunities by networking with future employers.

Arkansas Future Ag Leaders Tour

Significant Findings for Previous Year for Current Studies or Value to Rice Industry:

1. The Arkansas Future Ag Leaders Tour helps create a more prepared and informed workforce that better understands the needs and dynamics of the farmers and producers that they will serve in their agricultural related careers across the state.
2. Addresses some job readiness skills that have been identified as deficient by employers.
3. Touring across the state makes students aware of what jobs are available in the state and in local communities all across Arkansas.
4. 15 Participants / 7 Universities / 6 Majors

Quotes:

- "I learned that there are way more ag jobs in AR than I thought."
- "I will use this experience to lead others and grow or carry this knowledge to others."
- "I will use the knowledge I have received from the many speakers on the job."
- "I learned that Ag careers are about passion for agriculture and helping people."

Missing Slides

Connor Lawson

Performance Crop Insurance

Corn and Grain Sorghum Research Verification Program

- **Jason Kelley, Chuck Capps, Brian Deaton, Chris Henry, and numerous others**
- **Status: (Year 1)**
- **Budget Request: $130,000**

Objectives:

1. Verify U of A research-based recommendations

2. Develop a database for economic analysis of corn and grain sorghum production.

3. Demonstrate that consistently high yields of corn and grain sorghum can be produced economically

4. Identify specific problems and opportunities

5. Provide training and assistance to producers and county agents

2023 Corn and Grain Sorghum Research Verification Program

County	Hybrid	Row Space(in)	Previous Crop	Plants per acre	Plant Date	Harvest Date	Yield (bu/ac)
Clark	DeKalb DKC 67-44	36	soybean	25,500	4/25	9/15	168.4
Clay	Pioneer 1718VYHR	30	soybean	31,500	4/1	9/28	214.4
Drew	DeKalb DKC 65-99	38	soybean	32,500	3/23	8/19	245.2
Faulkner	Stine 9818-12 RR/LL	30	soybean	30,625	4/15	8/28	197.1
Independence	DeKalb DKC 65-99	30	soybean	34,800	4/13	9/5	176.0
Jefferson	Progeny 2118VT2P	38	soybean	33,250	4/12	8/21	215.9
Lonoke	DeKalb DKC 65-99	30	soybean	35,000	4/18	8/25	225.0
Mississippi	Becks 6774	38	soybean	34,000	3/29	8/27	234.1
White	Progeny 2118VT2P	30	soybean	31,900	4/14	9/30	201.9
Mean	---	---	---	32,199	**4/10**	**9/5**	**208.7**

Evaluation of new herbicides, premixes, programs, and application methods for improved control of problematic weeds in corn

Investigators: Tom Barber and Jason Norsworthy
Status: Year 1
Budget Request: $80,616

Objectives:

1. To evaluate current, new and potential herbicide options for weed control in corn and provide rapid transfer of weed control information & recommendations to stakeholders through multiple outreach methods.
2. Evaluate effectiveness of weed control programs with proposed EPA guidelines on atrazine
3. Determine off-target effects from drift rates of paraquat plus soybean and cotton residuals at various corn growth stages.
4. Determine off-target effects with Reviton and Sharpen spring burndown applications on corn.
5. Evaluate herbicide options for control of Texas panicum
6. Evaluate the utility of the See and Spray Ultimate in corn.

Evaluation of new herbicides, premixes, programs, and application methods for improved control of problematic weeds in corn

Investigators: Tom Barber and Jason Norsworthy
Status: Year 1
Budget Request: $ $80,616

Objectives:

1. To evaluate current, new and potential herbicide options for weed control in corn.

Surtain (Sharpen + Zidua Encapsulation)
Storan (pyroxasulfone + S-metolachlor + mesotrione + bicyclopyrone)
Maverick (pyroxasulfone + mesotrione + clopyralid)
Trivolt (isoxaflutole + TCM + flufenacet)
Kyro (acetochlor + mesotrione + clopyralid)
Zalo (glufosinate + quizalofop)
Diflufenican- experimental MOA for corn
Amicarbazone – experimental for atrazine replacement

Evaluation of new herbicides, premixes, programs, and application methods for improved control of problematic weeds in corn

Investigators: Tom Barber and Jason Norsworthy
Status: Year 1
Budget Request: $ $80,616

Objectives:

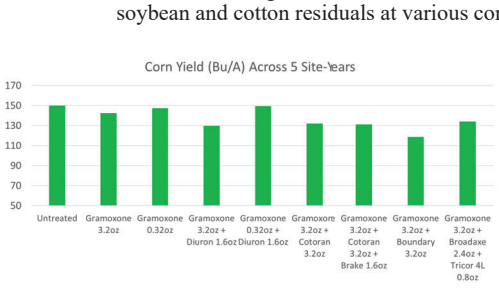
2. Evaluate effectiveness of weed control programs with proposed EPA guidelines on atrazine.

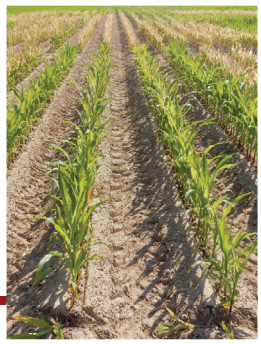
- Amicarbazone alone and with metribuzin was evaluated as a potential replacement for atrazine. Corn had good tolerance to amicarbazone over a range of rates on a clay soil, but injury was observed under cool, wet conditions on a silt loam soil. Efforts are underway to determine if injury is more likely with high soil moisture or cool conditions shortly after planting.

- Corn hybrids differed in sensitivity to amicarbazone in a greenhouse trial. A subsequent trial under field conditions will be conducted this spring.

- Soybean could not be immediately planted in a failed stand of corn treated with amicarbazone + metribuzin without some injury to the later crop.
- Amicarbazone was often more effective than atrazine on several annual grasses and yellow nutsedge.

3. Determine off-target effects from drift rates of paraquat plus soybean and cotton residuals at various corn growth stages.





Evaluation of new herbicides, premixes, programs, and application methods for improved control of problematic weeds in corn

Investigators: Tom Barber and Jason Norsworthy
Status: Year 1
Budget Request: $ $80,616

Objectives:

4. Determine off-target effects with Reviton and Sharpen spring burndown applications on corn.
Multi-state project – no significant injury observed across 3 locations

5. Evaluate herbicide options for control of Texas panicum – on-farm projects planned but fell through in 2023. In-field research will continue in 2024

6. Evaluate the utility of the See and Spray Ultimate in corn.
The occurrence of morninglories in the absence of atrazine resulted in minimal reduction of postemergence herbicides. Atrazine was critical for morningglory control.

DIVISION OF AGRICULTURE RESEARCH & EXTENSION University of Arkansas System
Arkansas Corn & Grain Sorghum Board

ATTACHMENT 7

Request Type	(All)	
Row Labels	**Approved Board Amount**	**Sum of 2024-2025**
Promotion	**$ 182,666.00**	**124,766.00**
Decision Innovations Solutions (Proposal # 1) Feed Flow Analysis for Arkansas' Critical Livestock and Poultry Industries	$ -	-
Decision Innovations Solutions (Proposal # 2) Historical Livestock and Poultry Feed Demand in Arkansas; Econnomic Impact Study	$ -	-
Decision Innovations Solutions (Proposal # 3) Carbon Intensity Implications for Arkansas Commodities	$ -	-
Export Exchange (Sponsorship)	$ 15,000.00	15,000.00
National Corn Growers Association	$ 28,500.00	28,500.00
Sign (Jackson County Ext. Center. AR Grain Building)	$ 49,900.00	
The Arkansas Irrigation Yield Contest (Year 7).	$ 10,000.00	10,000.00
The Communications Group	$ 8,000.00	-
US Grain Council	$ 71,266.00	71,266.00
Research	**$ 1,053,801.00**	**1,214,490.00**
Arkansas Corn & Grain Sorghum Research Studies Series, an annual report and archival system for all Board-funded research (Year 3 of 3).	$ 4,667.00	4,667.00
Arkansas Discovery Farms (Year 3 of 3).	$ 5,000.00	5,000.00
Arkansas Future Ag Leaders Tour (Year 3 of 3).	$ 5,000.00	5,000.00
Assess Management Options for Corn Nematodes in Arkansas (Year 3 of 3).	$ 55,401.00	55,401.00
Assessing Susceptibility of Insect Pests of Corn in Storage to Selected Insecticides (Year 3 of 3).	$ 41,305.00	41,305.00
Corn and grain sorghum enterprise budgets and production economic analysis (Ongoing)	$ 10,000.00	10,000.00
Corn and Grain Sorghum Research Verification Program (Year 1 of 3).	$ 130,000.00	130,000.00
Corn Yield Forecast System for the US Mid-South (New, Year 1 of 3).	$ -	56,652.00
Cover Crops in Corn Rotations- What Works and What Doesn't? (Year 2 of 3).	$ 39,729.00	39,729.00
Determining disease resistance and susceptibility of corn and grain sorghum hybrids (New, Year 1 of 3).	$ 40,000.00	40,000.00
Developing a satellite-based field scouting tool for corn (New, Year 1 of 3).	$ -	15,000.00
Development and verification of a stand counting application using drone imagery for research and production decision support.	$ 19,660.00	19,660.00
Economic Analysis of Corn and Grain Sorghum Production and Marketing Practices (New, Year 1 of 1)	$ 5,777.00	5,777.00
Evaluation of new herbicides, premixes, programs, and application methods for improved control of problematic weeds in corn (Year 2 of 3).	$ 87,293.00	87,293.00
Exploring Plasma-Activated Water for Enhanced Biocontrol of Aflatoxins and Diseases in Corn Plants (New, Year 1 of 3).	$ -	63,195.00
Fine-tuning Potassium Recommendations and Investigating Intensive Tissue Analysis for Sustainable Corn Production (Year 3 of 3)	$ 56,395.00	56,395.00
Generating a high-value wax material from sorghum bran using an innovative green approach (New, Year 1 of 3).	$ 42,761.00	42,761.00
Improving Irrigation Technology for Corn Production in Arkansas (Year 2 of 3).	$ 185,280.00	185,280.00
Improving Nitrogen Management for Arkansas Corn Production (New, Year 1 of 3).	$ 78,547.00	78,547.00
Optimizing Plant Population and Nitrogen Rate in Corn (Year 3 of 3).	$ 34,000.00	34,000.00
Performance Crop Insurance as a risk management tool for corn and grain sorghum producers in Arkansas (Year 3 of 3).	$ 29,486.00	29,486.00
Remote sensing-based mid-season corn nitrogen fertilizer rate recommendations and web-tool extension (New, Year 1 of 3).	$ 56,000.00	56,000.00
Towards a comprehensive aflatoxin solution: Creating and integrating novel aflatoxin control resources for an effective, sustainable management strategy (Year 2 of 3).	$ 45,000.00	45,000.00
University of Arkansas System Division of Agriculture Feed Kits (New, Year 1 of 3).	$ 2,500.00	2,500.00
Use of Corn Protein Concentrate in Plant-Based Diets for Largemouth Bass to Optimize Production Sustainability and Profitability (New, Year 1 of 1).	$ 50,000.00	32,741.00
Use of gossypol to inhibit reproduction in domestic hogs as a model for feral hog control (Year 2 of 3).	$ 30,000.00	30,000.00
Utilizing Plasma Technology to Inhibit Tannin Effects in Grain Sorghum for Enhanced digestibility and Protein Quality (New, Year 1 of 3).	$ -	43,101.00
Grand Total	**$ 1,236,467.00**	**1,339,256.00**

Request Type	Project Title	2023-2024	2024-2025	2024-2025 Approved Board Amount
New	National Corn Growers Association	$ 28,000	$ 28,500	$ 28,500
New	US Grain Council	$ 68,525	$ 71,266	$ 71,266
New	Export Exchange (Sponsorship)	$ -	$ 15,000	$ 15,000
~~New~~	~~Decision Innovations Solutions (Proposal # 1) Feed Flow Analysis for Arkansas' Critical Livestock and Poultry Industries~~	~~$ ———~~	~~$ ———~~	~~$ ———~~
~~New~~	~~Decision Innovations Solutions (Proposal # 2) Historical Livestock and Poultry Feed Demand in Arkansas; Economic Impact Study~~	~~$ ———~~	~~$ ———~~	~~$ ———~~
~~New~~	~~Decision Innovations Solutions (Proposal # 3) Carbon Intensity Implications for Arkansas Commodities~~	~~$ ———~~	~~$ ———~~	~~$ ———~~
New	The Communications Group	$ -	$ -	$ 8,000
New	Sign (Jackson County Ext. Center. AR Grain Building)			$ 49,900
Continuation	The Arkansas Irrigation Yield Contest (Year 7).	$ 10,000.00	$ 10,000.00	$ 10,000
New	Exploring Plasma-Activated Water for Enhanced Biocontrol of Aflatoxins and Diseases in Corn Plants (New, Year 1 of 3).	$ -	$ 63,195	$ -
New	Economic Analysis of Corn and Grain Sorghum Production and Marketing Practices (New, Year 1 of 1)	$ -	$ 5,777	$ 5,777
New	Corn Yield Forecast System for the US Mid-South (New, Year 1 of 3).	$ -	$ 56,652	$ -
New	University of Arkansas System Division of Agriculture Feed Kits (New, Year 1 of 3).	$ -	$ 2,500	$ 2,500
New	Use of Corn Protein Concentrate in Plant-Based Diets for Largemouth Bass to Optimize Production Sustainability and Profitability (New, Year	$ -	$ 32,741	$ 50,000
New	Remote sensing-based mid-season corn nitrogen fertilizer rate recommendations and web-tool extension (New, Year 1 of 3).	$ -	$ 56,000	$ 56,000
New	Utilizing Plasma Technology to Inhibit Tannin Effects in Grain Sorghum for Enhanced digestibility and Protein Quality (New, Year 1	$ -	$ 43,101	$ -
New	Improving Nitrogen Management for Arkansas Corn Production (New, Year 1 of 3).	$ -	$ 78,547	$ 78,547
New	Determining disease resistance and susceptibility of corn and grain sorghum hybrids (New, Year 1 of 3).	$ -	$ 40,000	$ 40,000
New	Developing a satellite-based field scouting tool for corn (New, Year 1 of 3).	$ -	$ 15,000	$ 15,000
New	Generating a high-value wax material from sorghum bran using an innovative green approach (New, Year 1 of 3).	$ -	$ 42,761	$ 42,761
New	Development and verification of a stand counting application using drone imagery for research and production decision support.	$ -	$ 19,660	$ 19,660
Continuation	Corn and grain sorghum enterprise budgets and production economic analysis (Ongoing)	$ 10,000	$ 10,000	
Continuation	Optimizing Plant Population and Nitrogen Rate in Corn (Year 3 of 3).	$ 31,000	$ 34,000	
Continuation	Cover Crops in Corn Rotations- What Works and What Doesn't? (Year 2 of 3).	$ 46,599	$ 39,729	
Continuation	Towards a comprehensive aflatoxin solution: Creating and integrating novel aflatoxin control resources for an effective, sustainable	$ 45,000	$ 45,000	
Continuation	Assess Management Options for Corn Nematodes in Arkansas (Year 3 of 3).	$ 53,713	$ 55,401	
Continuation	Fine-tuning Potassium Recommendations and Investigating Intensive Tissue Analysis for Sustainable Corn Production (Year 3 of 3)	$ 55,934	$ 56,395	
Continuation	Assessing Susceptibility of Insect Pests of Corn in Storage to Selected Insecticides (Year 3 of 3).	$ 40,563	$ 41,305	
Continuation	Improving Irrigation Technology for Corn Production in Arkansas (Year 2 of 3).	$ 185,281	$ 185,280	
Continuation	Arkansas Discovery Farms (Year 3 of 3).	$ 5,000	$ 5,000	
Continuation	Arkansas Corn & Grain Sorghum Research Studies Series, an annual	$ 4,498	$ 4,667	
Continuation	Use of gossypol to inhibit reproduction in domestic hogs as a model for feral hog control (Year 2 of 3).	$ 30,000	$ 30,000	
Continuation	Arkansas Future Ag Leaders Tour (Year 3 of 3).	$ 5,000	$ 5,000	
Continuation	Performance Crop Insurance as a risk management tool for corn and grain sorghum producers in Arkansas (Year 3 of 3).	$ 29,810	$ 29,486	
Continuation	Corn and Grain Sorghum Research Verification Program (Year 1 of 3).	$ 126,000	$ 130,000	
Continuation	Evaluation of new herbicides, premixes, programs, and application methods for improved control of problematic weeds in corn (Year 2 of	$ 80,616	$ 87,293	

Sequence	Budget Category	Page Num	Sec1	Sec2	Variance	Text
0.5	Promotion	0.1	1		$ 500.00	$ 28,500
0.75	Promotion	0.2	2		$ 2,741.00	$ 71,266
	Promotion		3			Add-on
0.95	Promotion	0.3	4		$ -	$ 32,850
0.96	Promotion	0.4	5		$ -	$ 29,925
0.97	Promotion	0.5	6		$ -	$ 19,575
0.98	Promotion	0.6	7		$ -	
0.99	Promotion					
20	Promotion	83	27		$ (10,000.00)	
1	Research	5	8		$ 63,195.00	
2	Research	9	9		$ 5,777.00	
3	Research	13	10		$ 56,652.00	
4	Research	17	11		$ 2,500.00	
5	Research	21	12		$ 32,741.00	
6	Research	25	13		$ 56,000.00	
7	Research	29	14		$ 43,101.00	
8	Research	33	15		$ 78,547.00	
9	Research	37	16		$ 40,000.00	
10	Research	41	17		$ 15,000.00	
11	Research	45	18		$ 42,761.00	
12	Research	49	19		$ 19,660.00	
17	Promotion	69	24		$ -	Promotion
13	Research	53	20		$ 3,000.00	
14	Research	57	21		$ (6,870)	
15	Research	61	22		$ -	
16	Research	65	23		$ 1,688	
18	Research	74	25		$ 461	
19	Research	78	26		$ 742	
21	Research	84	28		$ (1)	
22	Research	88	29		$ -	
23	Research	91	30		$ 169	
24	Research	95	31		$ -	
25	Research	99	32		$ -	
26	Research	103	33		$ (324)	
27	Research	107	34		$ 4,000	
28	Research	111	35		$ 6,677	

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$ 855,539.00 $ 1,339,256.00 $ 492,911.00

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Funding Available for Future Project: $ 2,181,050.42

Reserve:

Reserve: $ 944,583.42