University of Arkansas System Division of Agriculture

Irrigation Yield Contest

Conducted by:

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All Grain Merchandisers & Personnel at Contestant Affiliated Elevators

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Executive Summary

The University of Arkansas System Division of Agriculture Irrigation Yield Contest, sometimes called “Most Crop per Drop”, is a research and Extension program that promotes the adoption of irrigation water management practices. In 2021, There were 30 producers from 19 counties throughout the Arkansas Delta region who entered 40 fields in the contest. Seven of the growers entered multiple crops and/or fields. The contest is an opportunity for farmers to explore their individual aptitude to reduce energy, water use, labor, and improve profitability. There are three categories available for the contest: Corn, Soybean, and Rice. Each producer used at least one irrigation management tool (computerized hole-selection, multiple inlet rice irrigation, soil moisture sensors, Variable Flow Tailwater Recovery System, or surge irrigation).

Rules specific to an irrigation contest were developed and a website was created to host information as well as entry and harvest forms. The contest was adapted from traditional yield contests (Arkansas Soybean Association, 2014; National Corn Growers Association, 2015; National Wheat Foundation, 2018; University of California Cooperative Extension, 2018). Unlike traditional yield contests, the Arkansas Irrigation Contest winners are selected based on the highest Water Use Efficiency (WUE), where WUE is defined as the yield estimate divided by the total water received by the field. Total water includes rain plus irrigation. Rain was estimated from meteorological computer models, and irrigation water was measured with a portable propeller-style flow meter that was installed in a tamper-proof fashion. As in traditional yield contests, the yield estimate at harvest was supervised and witnessed by impartial observers (Extension and or NRCS workers). Of the three categories, nine winners were selected and awarded prizes totaling $62,809.

White County producer Brandon Cain was first in the corn division with a yield of 279.4 bushels/acre and WUE of 12.43 bushels/inch. Greene County producers Terry and Clay Smith were second in the corn division with a yield of 252 bushels/acre and a WUE of 12.27 bushels/inch. Woodruff County producer Adam Chappell was third in the corn division with a yield of 247 bushels/acre and a WUE of 10.56 bushels/inch.

Jefferson County producer Chad Render first in the soybean division with a yield of 98.84 bushels per acre and a WUE of 5.23 bushels per inch. Mississippi County producer Cody Fincher was second in the soybean division with a yield of 100.8 bushels/acre and a WUE of 4.69 bushels/inch. Mississippi County producer Heath Donner was third in the soybean division with a yield of 89.7 bushels/acre and a WUE of 4.63 bushels/inch.

Arkansas County producer Stephen Hoskyn was first in the rice division growing furrow irrigated rice. He achieved a yield of 239.9 bushels/acre and a WUE of 9.77 bushels/inch. Drew County producer Seth Tucker was second in the rice division growing furrow irrigated rice for the second time on his operation with yield of 205 bushels/acre and a WUE of 6.31 bushels/inch. Arkansas County producer Matthew Feilke placed third in rice growing furrow irrigated rice achieving a yield of 216.3 bushels/acre and WUE of 4.84 bushels/inch.

Water Use Efficiencies are improving over time by contestants, the general trend in corn and soybeans is more pronounced, and less in rice. However, in 2021 the highest water use efficiencies ever achieved for first place winners were achieved in all three categories. The contest appears to be having the effect of improving WUE of the contestants and the winners. Additionally, utilization of Irrigation Water Management Tools, specifically, Computerized Hole Selection (CHS), soil moisture sensors, and to a lesser degree surge irrigation are increasing with the highest utilization rate recorded in the four years.

Utilization of IWM practices increased in 2021. Utilization of soil moisture sensors increased from 40% in past years to 87% in 2021. Computerized hole selection increased from 43% to 97%, and surge irrigation increased from 28% to 35%. There is also an increasing trend to use furrow irrigated rice in the contest increasing from 38% in past years to 80% in 2021 with only one contestant utilizing flood irrigation in the contest in 2021. Also, three contestants utilized the novel University of Arkansas pit-less tailwater pump in furrow irrigated rice, with one of them winning first place in the contest.

The best results appear to have a high correlation of the owner's commitment and hands-on approach for irrigation scheduling, as opposed to delegating these decisions to employees with little or no incentive or direction on water management.

Awards for the winners were sponsored by Ricetec, the Arkansas Corn and Grain Sorghum Promotion Board, the Arkansas Soybean Promotion board, McCrometer, Seametrics, Delta Plastics, Irrometer, Trellis, and Agsense. Crop X provided Moisture Sensors to several of Contest entrants.

Each participant receives an individualized report card, providing feedback on their WUE and yield performance on their farm compared to the aggregated results from all the entries. The contest is strongly supported by the volunteer efforts of NRCS field offices and Extension agents who serve as supervisors for the contest. The irrigation industry and commodity boards also supported the contest through product and cash donations.

Introduction

The overall objectives of the irrigation contest are:

- Educate producers on the benefits of using Irrigation Water Management Practices to improve profitability, sustainability, and reduce labor requirements for irrigation.
- Document the highest achievable Water Use Efficiency by crop type under irrigated row crop production in Arkansas.
- Reward and recognize producers who achieve a high level of irrigation water management acumen among their peers.
- Transfer knowledge of good irrigation water management practices from contestants to irrigation peers and to those that advise irrigators.
- Provide a platform for demonstration of Irrigation Water Management Practices at the county and local level.
- Provide a feedback mechanism for irrigators to benchmark their irrigation management skills.

Participation in the contest is entirely voluntary. Generally, the distribution of the contestants is well distributed across the delta. Additionally, the winners are well distributed across the Delta.

Materials and Methods

Rules were drafted in the spring of 2018 then edited each year. The contest rules are inspired by long-standing yield contests (Arkansas Soybean Association, 2014; National Corn Growers Association, 2015; National Wheat Foundation, 2018; University of California Cooperative Extension, 2018). Close attention was given to make the competition as unobtrusive to normal planting and harvest operations as possible while preserving the ability to produce accurate data and maintain a fair competition. In 2020 a change to how the growing season was determined was done for soybeans for more consistency. Harvest yield estimates are similar to or adapted from the California Rice Yield Contest, National Corn Growers Association Yield Contest, National Wheat Yield Contest, and the Arkansas "Go for the Green" Contest. Contestants harvest a minimum of three acres, harvested from the top of the field to the bottom, skipping two harvest machine widths between paths. A supervisor and a flowmeter are required to participate in the contest. UADA staff facilitates the contest, however a panel of impartial technical irrigation experts serve as judges to review methods and confirm the results.

Water Use Efficiency

Water use efficiency (WUE) is defined as the amount of yield produced for a specified amount of water input. Irmak defines Crop Water Use Efficiency as a benchmark water use efficiency where:

$$\mathbf{WUE_b = Y_i / (P_e + IR + \Delta\ SW)}$$

WUE_b = benchmark water use efficiency

Y_i = yield of irrigated crop (bu/ac)

P_e = effective rainfall (in)

IR = Irrigation applied (in)

Δ SW = change in soil water content in the root zone during the growing season (in)

(Irmak et al., 2011)

Equation 1

For the irrigation contest, this same equation is used, without consideration of Δ SW. Given the high rainfall amounts experienced in Arkansas, the soil water content is relatively high during the first month of emergence, so it is assumed that contestants begin the season with a full or nearly full profile. Also, estimating this parameter adds unnecessary complexity to determining the results of the contest.

A challenge in determining WUE is the difficulty in estimating effective precipitation. Effective precipitation is defined as the amount of rainfall that is stored by the soil after the excess leaves the field as runoff. The precipitation events for each contestant were carefully evaluated for magnitude and impact on the results. There are dozens of published methods to estimate effective precipitation, however, they are all untested in this region. Rather than try to select a method to estimate effective precipitation using a published method, effective rainfall is defined as less than 2 inches for thirty days after emergence and 3 inches for the remainder of the season until maturity. Rainfall events over 2 inches in depth are reduced to 2 inches for the first 30 days after emergence. After 30 days from emergence, any rain events that exceed 3 inches are reduced to 3 inches. Most furrow irrigation events are nearly 3 inches; this is the reasoning behind using 3 inches as an effective rainfall depth. With this adjustment, in 2018, 2019 and 2020 there were only a few extreme events and the adjustment did not have any impact on the results. In 2021, a significant rain event occurred south of Interstate 40 over a 6 day period from June 5 through June 10. Total rainfall ranged from 11.9” to 6.4”, and the adjustments were minimal. This affected approximately 5 growers. In the future, more work may be needed to develop a regionally specific adjustment for effective rainfall.

The equation (Equation 2) used to calculate the water use efficiency for each contestant is defined as the harvest yield estimate divided by the total water delivered to the field,

$$\mathbf{WUE = Y / (P_e + IRR)}$$ where,

WUE = Water Use Efficiency in bushels per inch

Y = Yield estimate from harvest in bushels per acre

P_e = Effective precipitation in inches.

IRR = Irrigation application in ac-inches/ac.

Equation 2

Meter Sealing

Irrigations were totalized using 6”, 8”, and 10” portable propeller mechanical meters manufactured by McCrometer. Each meter was sealed using the following process.

Figure 1. Example of Universal Hydrant Sealing

- Meters were sealed to the universal hydrant by using circle lock clamps or horseshoe clamps
- Serialized cable ties are used to secure the clamps and fittings. These cables can only be removed by cutting the cable.
- The fitting connections are wrapped with poly pipe tape.
- A unique identifying stamp is used across the tap.

Universal hydrants are secured to the alfalfa valve and from the alfalfa valve to the meter using the same procedure. Any additional fittings, if needed, are also secured using this procedure to ensure that no other irrigation water source can contribute to the field. Figure 1 shows a typical meter sealing configuration. All other possible sources of irrigation water to that field were sealed to prevent non-measured irrigation sources from being used in the contest field (Figure 2).

Figure 2. Example of an alfalfa valve sealing done to exclude other sources.

Only mechanical propeller meters are used in the contest. For the winning entries, all meters are checked against a reference meter and must test within 5% of the reference meter, or else the water use is adjusted according to the reference meter and the contest results adjusted accordingly.

Assigning Days to Measure Rainfall

Part of the rainfall measurement is the decision concerning exactly which days to measure rainfall for each field. The intent is to measure rainfall from emergence to physiological maturity. For every crop field entered in the contest the planting date is the basis for emergence date which is recorded on every entry form. Seven days after the planting date is the assumed emergence date and rainfall contributions are accumulated from then until maturity. Corn is the most straightforward crop to assign the date of physiological maturity. Seed companies publish their maturity information in sales literature. Published days to maturity are used to determine the time after emergence. Emergence is assumed as 7 days after planting. This defines the period for which rainfall contributions are accumulated.

For rice, the University of Arkansas Division of Agriculture DD50 models are used (Hardke, 2020). Such models can be used to plan fertilizer, pesticide, and scouting decisions. The UA DD50 program (dd50.uaex.edu) requires the variety, location, and emergence date, then returns dates of growth stage management events. The predicted drain date for the planted variety for each contestant is used as the last day to measure rainfall on that contest field. Emergence date is assumed as 7 days after planting. The rainfall between these periods is accumulated for the precipitation contribution for each contestant field.

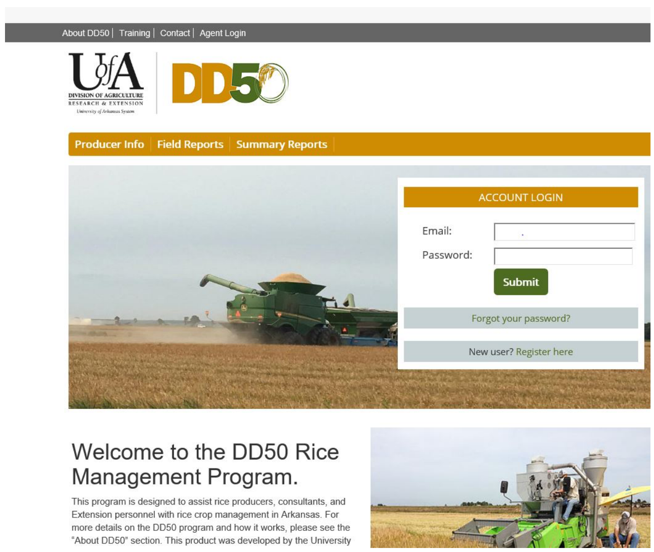

Figure 3. University of Arkansas DD50 Rice Website

For soybeans, the previous method was to use commercially available published data, but in 2020 the following procedure was adopted. A similar process is used to establish the emergence data, 7 days after the planting date reported. The end of rainfall accumulation is assumed to be at R 6.5. This is chosen so that late season rainfalls do not penalize contestants, as it is assumed that R 6.5 would be the latest that rainfall accumulations would affect yield. Next the University of Arkansas soybean crop model SoyStage (http://soystage.uark.edu) is used to model the growth stages. SoyStage (*Figure 4*)was developed using Arkansas research trials (dos Santos et al., 2014; Salmeron et al., 2015; Salmeron et al., 2016; Weeks et al., 2016; Salmeron et al., 2016; Salmeron et al., 2017). The SoyStage model provides R5 and R7 but not R6.5. To determine R6.5 the Mississippi State University Extension, Maturity Date Calculator – SoyPheno (https://webapps.msucares.com/deltasoy/) is used to determine R6 for the maturity group and planting date reported by the contest grower (Mississippi State University, 2020). Then the difference in the dates from R7 from SoyStage and R6 from SoyPheno are used to determine the R6.5 date. Rainfall is accumulated from the assumed emergence date until this estimated R6.5 date.

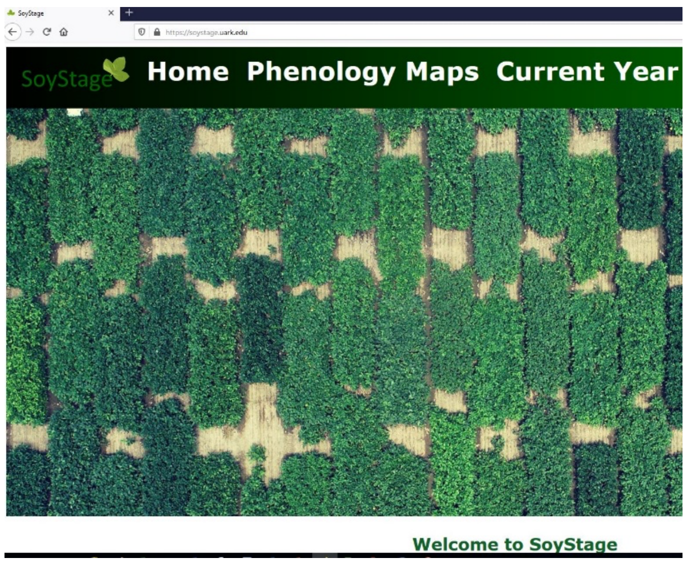

Figure 4. SoyStage website

Rainfall Estimation

Farmlogs™ (Ann Arbor, MI) was used exclusively for 2021. Comparisons between Farmlogs™ and Climate Corporations Fieldview™ (San Francisco, CA) were done in 2020, with similar results. Both programs are computer-based services that provide rainfall estimates for user defined areas, using mobile apps or internet browsers. For the contest, rainfall amounts for each contest site using the data provided on entry forms was used to track rainfall contributions to the fields. The rainfall values were added with total applied irrigation to get the total water use. Figure 5 shows the total rain during the growing seasons the contest has been conducted.

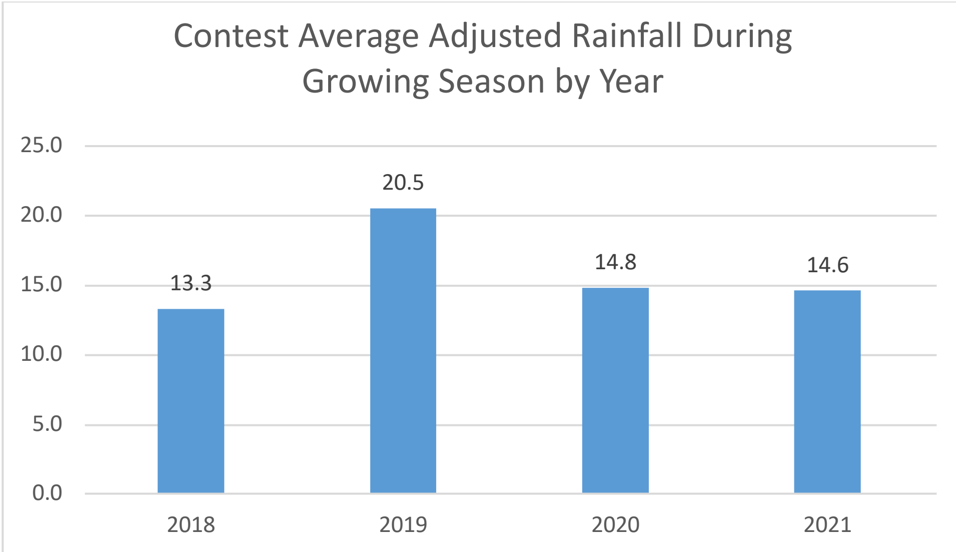

Figure 5. Average Total Rainfall for contest locations

The precipitation was assessed for each contest site utilizing the commercial rain prediction service, Farmlogs™. This service uses a computer algorithm to determine rain intensity derived from National Weather Service products. This approach is used instead of rain gages so that tampering of rainfall data is not possible. The rainfall generated data may not be completely accurate against a well-maintained weather station, but it is assumed to be equally unbiased across all contest sites.

Table 1. Rainfall from April 1 to September 30, 2020 comparing three methods.

	Rain bucket	**Farmlogs™**	**Climate Corp Fieldview™**
McGehee	30.7	31.7	32.8
Gould	37.1	30.7	31.2
Stuttgart	28.0	33.6	33.0
Carlisle	22.3	33.2	30.9
Keiser	20.6	23.3	20.7
Delaplaine	24.3	24.7	23.9
Mean	**28.1**	**29.5**	**28.8**

In 2020, rainfall data from April 1 to September 30, 2020 was collected at six locations, identified to have well maintained rain buckets and monitored during the growing season to provide a comparison to the rainfall prediction generated from Farmlogs™ and Fieldview™ during the growing season (Table 1 & Figure 6). Using an Analysis of Variance (ANOVA) no difference was found in the difference (p=0.502) in annual rainfall from the weather station measured data to the computer predictions.

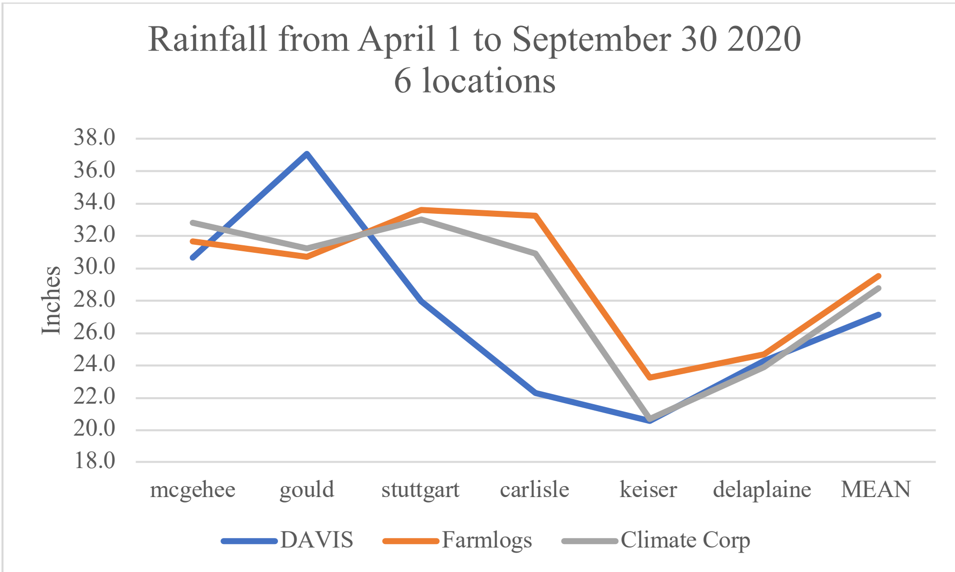

Figure 6. Rainfall from 6 weather station sources for 2020

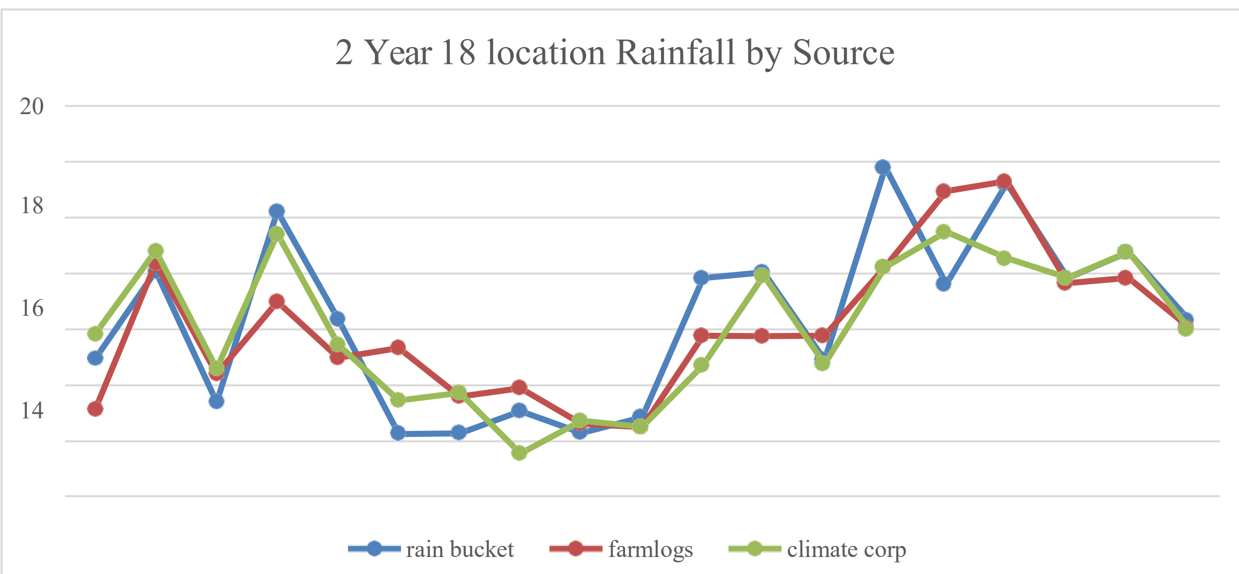

Figure 7. Two-year 18 location rainfall

In 2020, A 2-year comparison was analyzed as well with 18 locations from June 5 to August 31 have no significant difference between rain buckets, Farmlogs^{TM}, and Climate Corp Fieldview^{TM} (**Error! Reference source not found.**). Farmlogs^{TM} and Fieldview^{TM} produced similar results when compared to rain gauges. An absolute match was not necessary in terms of data accuracy because it was more important to collect rain information for every location from one method, but these two programs were used to check against each other for consistency. Also, for the contest, accumulated seasonal rainfall was considered more important than single event accuracy.

When deciding which computer model to use, the first source was the National Weather Service (NWS), but their data was more difficult to obtain because it is part of an estimation product that required some interfacing. Farmlogs^{TM} was easier to use because rain data was provided in tabular form. Farmlogs^{TM} utilizes raw weather data from the NWS then establishes a proprietary model to estimate precipitation for a given location. Climate Corp Fieldview^{TM} application was found to be dependable as well for rain data collection. Retrieving data from Fieldview^{TM} was more difficult and time consuming than Farmlogs^{TM}. A difference between the programs was that Fieldview^{TM} reported more events but less rain per event, where Farmlogs^{TM} reported fewer events but larger ones. For example, Fieldview^{TM} reported several small events but the total would be near to one reported event by Farmlogs^{TM}. However, the difference in the total rainfall depth reported was not significantly different. Because of the ease in reporting, Farmlogs^{TM} was used for the contest. Rainfall estimation seems to under report heavy rainfall events compared rain bucket data. However, Farmlogs^{TM} seems to report high rainfall more often than Fieldview^{TM}. **Error! Reference source not found.** shows the mean rain data comparing locations where tipping bucket rain stations are located and where predictions for Farmlogs^{TM} rainfall to Fieldview^{TM} rainfall estimates were compared.

The 2018 and 2019 18 locations of raw data were compared to the rain prediction services, Farmlogs^{TM} and Fieldview^{TM}. A one- way Analysis of Variance (ANOVA) was done to test if there were numerical differences between rain gage data and the estimates generated from Farmlogs^{TM} and Fieldview^{TM}. The differences between the groups were not significantly different ($p=0.95$), and the data was found to have equal variances and normality. The lack of difference suggests that using the computer rainfall prediction method is a reliable way to determine rainfall contributions to contest fields. Additional data will be collected in future years to confirm the reliability and accuracy of this approach to rainfall estimation for the contest. At this time, it appears the use of using Farmlogs™ to estimate season long rainfall is appropriate.

Table 3 shows the irrigation system type, maturity, planting date and season long rainfall for each of the contest categories, corn, rice, and soybeans. Most of the contestants use furrow irrigation and similar maturities for the contest.

In 2021 there was an extreme weather event over a 6 day period beginning on June 5, 2021 affecting contest fields south of Interstate 40. Extreme rainfall occurred sequentially over several days, with a cumulative total at the end of the event of near 12” of water. After saturating the profile with the 3 inch effective rainfall, excess water was likely was not available to the crop. Previously in the contest only a few adjustments had been made for rainfall events slightly over 3 inches in on day, and never had an event occurred during previous years that resulted in such high cumulative rainfall depths over such a short period of time.

Table 2. Extreme Weather Events in 2021 for relevant contestants

Extreme Event Daily Rainfall Amounts Consecutive days of Rainfall							
Rice	5-Jun	6-Jun	7-Jun	8-Jun	9-Jun	10-Jun	Total
Contestant 1	0.27	1.8	2.39	7.13	0.58	0.01	12.16
Contestant 2	0.68	0.3	3.42	2.63	0.2	3.39	10.59
Contestant 3	0.22	2.1	2.6	6.68	0.59	0.02	12.17
Soybeans	5-Jun	6-Jun	7-Jun	8-Jun	9-Jun	10-Jun	Total
Contestant 1	0.42	1.7	4.5	2.82	0.12	1.83	11.38
Contestant 2	0.06	3.3	2.94	2.34	0.23	0.07	8.96

Therefore, an additional adjustment method was applied as follows for this widespread extreme weather event. When the modeled daily rainfall resulted in consecutive days of more than 3 inches, the total amount of the rainfall for the period was reduced to 3 inches. Likely any transpiration or evaporation occurred during this time. The 3” rainfall adjustment ended after a single day with no recorded rain. This adjustment was made to account for one extreme weather event in 2021 that was applicable to several contestants, and such future events that exceed 3 inches may need to be adjusted differently in the future based on the how the rainfall may impact the total water available to the crop from rain and irrigation.

Table 3. Rainfall Data for 2021 Contest Fields

Location	Crop	Irrigation Type	Variety	Relative Maturity Or GDD	Planting Date	Rainfall Inches (Unadjusted)	Rainfall Inches (Adjusted)
White	Corn	Furrow	DeKalb 65-92	4/22/2021	8/15/2021	14.3	14.1
Greene	Corn	Furrow	DeKalb 70-27	4/22/2021	8/20/2021	15.0	15.0
Woodruff	Corn	Furrow	Dyna-Gro D57CC51	4/6/2021	8/1/2021	14.4	14.4
Crittenden	Corn	Furrow	Pioneer 1870	4/5/2021	8/1/2021	13.5	13.5
Chicot	Corn	Furrow	Pioneer 1870	3/12/2021	7/8/2021	20.0	16.4
Lee	Corn	Furrow	Pioneer 1870	4/5/2021	8/1/2021	19.3	17.3
Lawrence	Corn	Furrow	DeKalb 70-27	4/6/2021	8/4/2021	16.7	16.7
Jefferson	Soybean	Furrow	Pioneer 48A60	3/22/2021	7/25/2021	19.7	13.8
Mississippi	Soybean	Furrow	Asgrow 46X6	4/22/2021	8/17/2021	13.2	13.2
Mississippi	Soybean	Furrow	Becks 4885	4/7/2021	8/8/2021	13.5	13.5
Lincoln	Soybean	Furrow	45a29LL	4/20/2021	8/8/2021	19.1	10.7
Clay	Soybean	Furrow	Pioneer 47A64X	4/20/2021	8/14/2021	17.1	15.5
Lawrence	Soybean	Furrow	Pioneer 49A41	4/15/2021	8/11/2021	16.1	16.1
Clay	Soybean	Furrow	Asgrow 46X6	4/13/2021	8/10/2021	20.2	18.3
Poinsett	Soybean	Furrow	P48A60X	4/16/2021	8/9/2021	13.7	13.7
Monroe	Soybean	Furrow	S49-15	5/25/2021	9/1/2021	15.6	10.4

Cross	Soybean	Furrow	Pioneer 46A35X	5/11/2021	8/26/2021	11.0	11.0
Desha	Soybean	Furrow	P48A60X	4/5/2021	8/4/2021	21.4	17.0
Lawrence	Soybean	Furrow	Pioneer 48A60x	4/11/2021	8/10/2021	21.4	21.4
White	Soybean	Furrow	NK47Y9X	4/6/2021	8/6/2021	17.3	17.1
Mississippi	Soybean	Furrow	Asgrow 48Xfo	5/15/2021	8/29/2021	11.8	11.8
Arkansas	Rice	Row Rice	RT753	4/27/2021	8/16/2021	20.22	11.07
Drew	Rice	Row Rice	RT7521	4/20/2021	8/15/2021	24.1	16.51
Arkansas	Rice	Row Rice	RT753	4/6/2021	8/14/2021	23.37	14.2
Lawrence	Rice	Row Rice	RT7321	4/15/2021	8/10/2021	16.18	16.18
Lawrence	Rice	Row Rice	RT753	5/10/2021	8/26/2021	11.26	11.26
Craighead	Rice	Flood	RT7321	4/17/2021	8/13/2021	14.58	14.58

Harvest Yield Estimate

The yield estimate for the contest is determined by harvesting a three-acre sample of the contest field. Every contest field harvest was witnessed or supervised by a third party. Supervisors must not have a financial interest in the contest field. In most cases extension agents and or NRCS personnel are contest supervisors.

Supervisors are encouraged to help with the decision making of irrigation decisions and can be involved during the season. Harvest operations were witnessed by supervisors or University of Arkansas Division of Agriculture (UADA) staff designated on the entry form. Before harvest, the combine grain hopper, grain cart, and truck hoppers are inspected and confirmed to be empty. A minimum of three acres was harvested and weighed using a certified scale. The supervisor witnesses the full and tare weighing of the harvest truck.

Yields are adjusted to 12% moisture for rice, 13.0% for soybeans and 15.5% for corn. Foreign matter % is deducted from the yield for corn and soybeans. Harvested area must be measured and certified by a supervisor. The contest harvest area was generally determined by measuring row lengths and width of cut, regardless of the crop. Measurements were taken using a digital rangefinder. Passes must be from the top to the bottom of the field with as many passes as necessary from the top and bottom to facilitate harvest of at least 3 acres.

In 2019, a minimum yield requirement was added to account for deficit irrigation and reasonable commercially acceptable yields. It is well known by irrigation scientists that high Water Use Efficiency (WUE) can be achieved through deficit irrigation. For 2021, minimum yield was set at 200 BPA for corn, 180 BPA for rice and 60 BPA for soybean. Thus, the contestants must achieve a commercially acceptable yield and a high WUE to win. As the contest develops the judge panel can use past results to further justify a fair minimum yield.

2021 Contest Participants & Field Requirements

The 2021 Arkansas Irrigation Yield Contest was conducted on 40 commercial fields that were 30 acres or larger from across the Arkansas Delta region. Nineteen counties participated in the program: Arkansas, Chicot, Clay, Cross, Craighead, Crittenden, Desha, Drew, Greene, Jefferson, Lawrence, Lee, Lincoln, Lonoke, Monroe, Mississippi, Poinsett, Woodruff, and White counties totaling 1875 acres. The field may have only one irrigation water source or riser to the field (multiple pumps may supply the field through a single hydrant). Entries are for rice, soybeans, and corn irrigated fields. A contestant may enter the competition with more than one crop but may not win for more than one crop per year. The first-place winners in a crop may never win or enter the same crop again, but are allowed to enter other crops in subsequent years. Unlike other yield contests that have multiple categories and production systems represented, the irrigation contest is limited. This limitation is meant to recognize as many irrigators as possible given the limited resources available. Contestants must be 18 years old at the time of entry, and promotion board members (and spouses) who support the contest are not allowed to enter in the respective commodity category contest.

Description of Awards

Participants were awarded for highest water use efficiency in each crop category (Corn, Soybean, & Rice). is given to each of the nine winners that contain various cash prizes and or products from the sponsors who generously contributed to the contest. Table 4 highlights the prizes for the winners. Additional support for the program has been provided by McCrometer, through a discount program to provide meters for the contest in addition to providing 10" flowmeters to the winners. In total over $62,809 in cash and products are distributed to the winners of the contest.

Table 4. Prizes Awarded

Rice Division	Corn Division	Soybean Division
$11,000 seed tote credit sponsored by RiceTec	**$6,000** cash sponsored by the Arkansas Corn and Grain Sorghum Promotion Board	**$6,000** cash sponsored by the Arkansas Soybean Promotion Board
$7,260 of RiceTec seed	**$3,000** cash sponsored by the Arkansas Corn and Grain Sorghum Promotion Board	**$3,000** cash sponsored by the Arkansas Soybean Promotion Board
$3,740 of RiceTec seed	**$1,000** cash sponsored by the Arkansas Corn and Grain Sorghum Promotion Board	**$1,000** cash sponsored by the Arkansas Soybean Promotion Board
$2,000 in cash from Delta Plastics		

For First Place Winners of the Corn, Rice and Soybean Division Prizes	
	Irrometer manual reader and three watermark sensors $325 in product retail value plus $500 cash $2,475 in Total
	10” Mccrometer portable flow meter with a FS-100 Flow Straightener $2,271 in product retail value $6813 in total

	Trellis Base and Sensor Station $1,000 in product retail value $3,000 in total
	10” Seametrics AG 90 Insertion Magmeter (Flowmeter) $1,507 in product retail value $4,521 in total
	Aquatrac AgSense Soil Moisture Monitoring Unit $1,200 retail value $3,600 in total
	CropX Soil Moisture Monitoring Unit $1,500 retail value $4,500 in total

Irrigation Water Management Tools

Contestants were asked about the Irrigation Water Management (IWM) tools they would utilize on the contest field when they enter the contest. All but two of the contestants used Computerized Hole Selection (Pipe Planner or PHAUCET or the Rice Irrigation app) during the 2020 growing season in their contest fields. Table 5 shows mixed use of sensors in the contest field. However, it is common, when sensors are used. to see them be used for decision making in several adjacent fields. Considering this, it is possible sensors are being used by contestants at a rate higher than these numbers indicate. The data from entry forms is incomplete, but shows positive change in computerized hole selection use. Furrow Irrigated Rice (FIR) continues to be a popular practice to use and increased from previous years.

Table 5. Percent of Contestants Using Irrigation Technologies in Contest Field

	Soil Moisture Sensors	**Pipe Planner**	**Furrow Irrigated Rice**	**Surge Valves**
2021	87%	97%	80%	35%
2020	42%	100%	73%	16%
2019	40%	43%	38%	28%
2018	50%	73%	50%	44%

Contest 4 Year Data

The Arkansas Irrigation Yield Contest's primary goal is to encourage the use of irrigation water management tools by farmers. As an added benefit, data from 149 fields have been recorded across the delta region. Most importantly the WUE of each field was determined. Though WUE data from production fields can be found intermittently from various sources such as the Arkansas verification fields, a large data set of WUE from a number of locations across multiple years is not readily available. The data set from the competition, in addition to WUE, also provides the yield, applied irrigation, adjusted rainfall, and total water applied.

An effort was made to compare data from the four years the contest was conducted, but it is difficult to infer trends in WUE over the years due to the variation among contestants' results. A wide range of management styles and field conditions are represented.

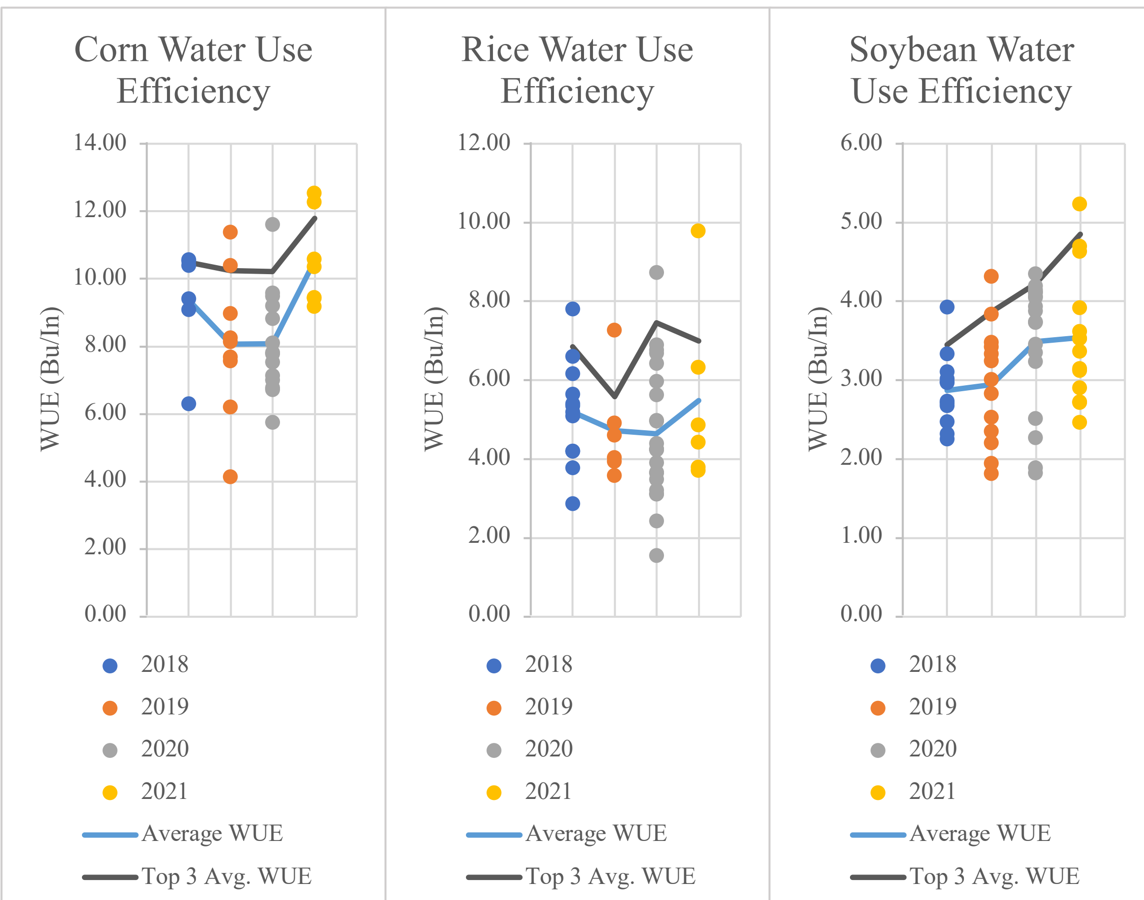

Figure 8. 4 Year Scatterplot for Rice, Corn, and Soybean Water Use Efficiency

shows the distribution of WUE over the four years. The 2021 results included the highest winning Water Use Efficiency across all three crops in 2021.

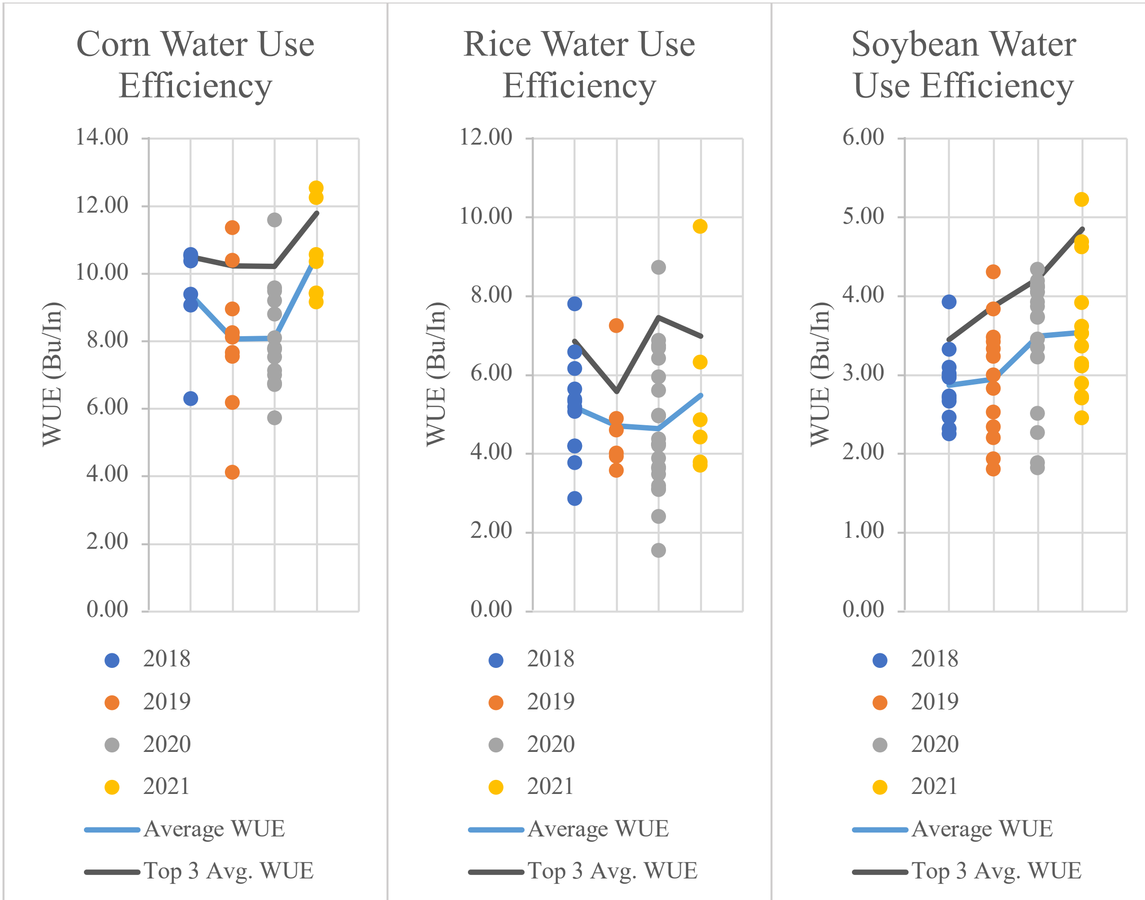

Figure 8. 4 Year Scatterplot for Rice, Corn, and Soybean Water Use Efficiency

The data was then combined from all four years for each crop. This data can be seen in Table 6 for soybeans, Table 7 rice, and Table 8 corn. The average WUE over the 4-year period for soybean was 3.16 Bu/In, the average for corn was 8.94 Bu/In, and the average for rice was 4.83 Bu/In.

In the calculation for WUE the amount of rainfall that the field receives can be a large component in the total water. More rain does not always translate to less irrigation water needed, but WUE is determined by both rainwater and irrigation water. By plotting rainfall against WUE using all three years, linear regression and goodness of fit was determined. Across all three crop types, no linear relationship was found between rainfall and WUE Figure 9. Adjusted rainfall is used in this calculation because it was what was used in determine the WUE, but less than ten of the 149 data points have an adjusted rainfall that differs from the recorded rainfall. Thus, the amount of rainfall received is not a factor in the WUE results.

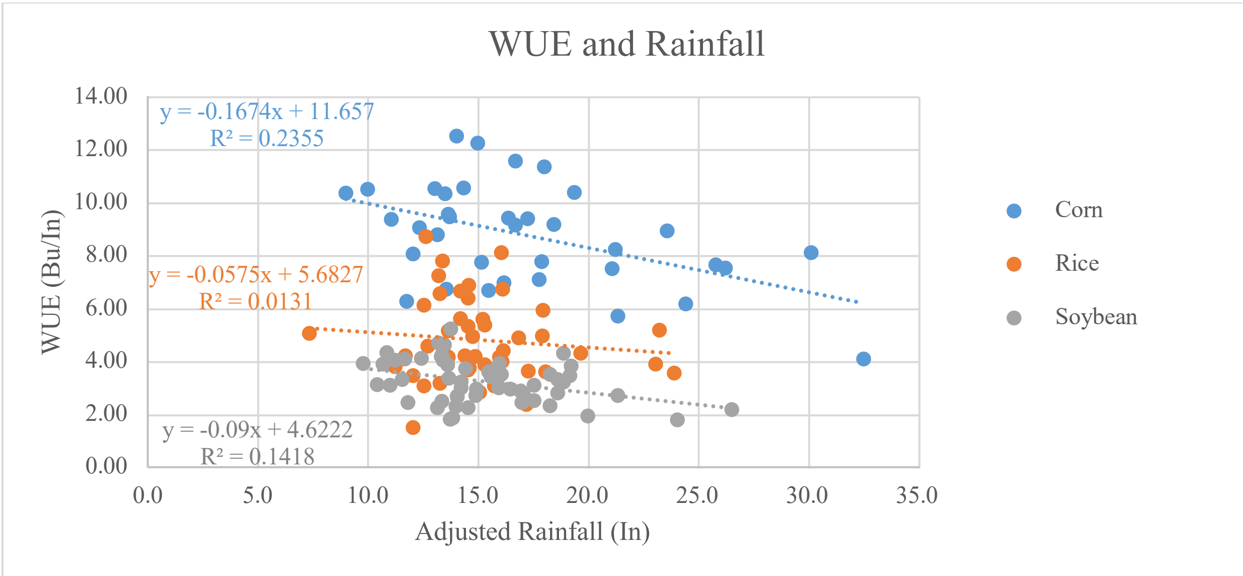

Figure 9. WUE vs. Rainfall for All Years and Crops

By plotting the yield against the WUE, linear regression was performed to determine the goodness of fit between WUE and yield as shown in Figure 10. Across all three crop types there is no significant relationship between yield and WUE. While it may appear visually that there is relationship between lower yields and lower WUE, in most instances the fields that are on the lower ends were irrigated as if they would yield higher but had some sort of crop failure. This causes a normal amount of water to be used with a below normal yield resulting in a lower WUE. Thus, the yield obtained is not a significant factor in the end WUE for a contest entry.

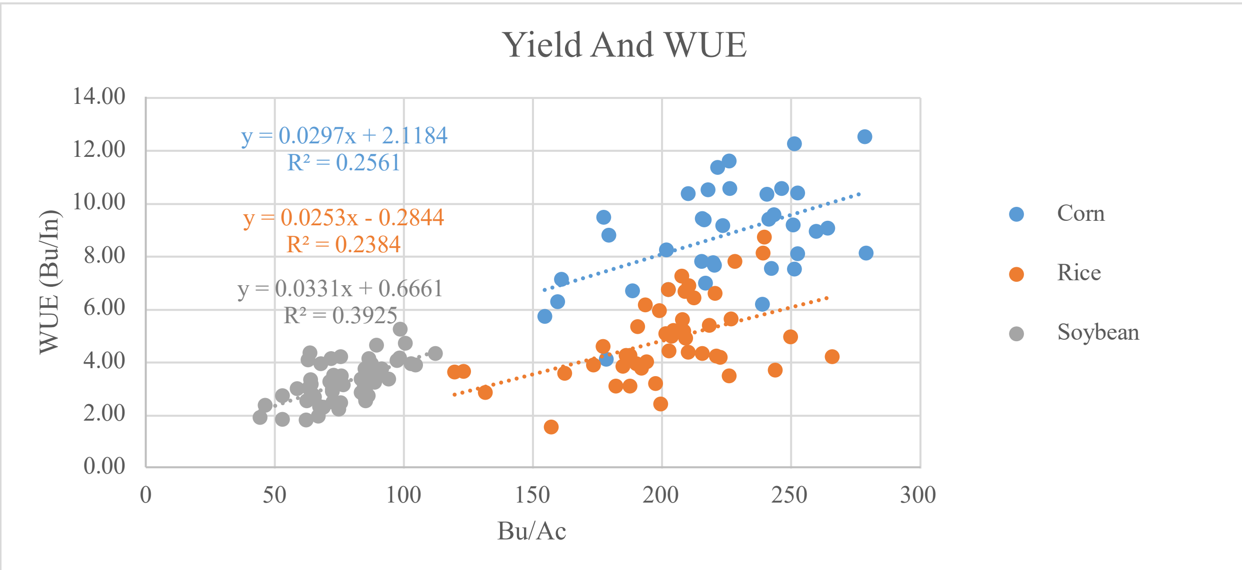

Figure 10. Yield vs. WUE for All Years and Crops

Table 6.Four Year Soybean Data

Year	Yield (Bu/Ac)	Applied Irrigation (Ac-In/Ac)	Adjusted Rainfall (In)	Total Water (In)	WUE (Bu/in)
2018	103	10.3	16.0	26.3	3.92
2018	64	7.7	11.6	19.3	3.32
2018	85	9.9	17.6	27.5	3.09
2018	85	12.4	16.0	28.4	3.01
2018	59	4.9	15.0	19.8	2.97
2018	72	8.0	16.5	24.5	2.96
2018	65	8.9	14.9	23.9	2.72
2018	53	5.6	14.1	19.7	2.70
2018	65	10.5	14.1	24.6	2.66
2018	73	12.6	17.0	29.6	2.46
2018	68	15.3	14.0	29.3	2.31
2018	69	17.4	13.2	30.6	2.24
2019	112	6.5	18.9	26.1	4.31
2019	88	3.8	19.3	23.0	3.83
2019	73	3.8	19.2	21.0	3.47
2019	73	6.1	15.6	21.5	3.42
2019	84	4.2	18.6	25.1	3.33
2019	71	2.0	18.9	22.1	3.23
2019	63	6.0	14.3	21.1	3.00
2019	84	8.7	18.6	29.6	2.82
2019	62	8.7	17.6	24.8	2.52
2019	46	3.5	18.3	19.8	2.34
2019	75	3.7	26.6	34.2	2.19
2019	67	13.1	20.0	34.7	1.93
2019	62	8.4	24.1	34.7	1.80
2020	64	3.8	10.9	14.7	4.34
2020	76	4.6	13.4	18.1	4.19
2020	99	10.4	13.4	23.8	4.13
2020	87	8.7	12.4	21.1	4.11
2020	72	5.8	11.7	17.5	4.11
2020	63	4.3	11.3	15.5	4.06
2020	98	10.7	13.4	24.1	4.04
2020	88	12.5	9.8	22.3	3.93
2020	105	13.5	13.6	27.1	3.87
2020	85	7.0	15.9	22.8	3.73
2020	92	10.1	14.5	24.6	3.72
2020	76	6.3	15.7	22.0	3.45
2020	94	12.3	15.9	28.2	3.34
2020	89	13.3	14.3	27.6	3.23
2020	85	20.8	13.4	34.1	2.50
2020	69	16.0	14.6	30.5	2.26
2020	44	8.8	13.9	23.7	1.87
2020	53	15.5	13.8	29.3	1.81
2021	99	5.1	13.8	18.9	5.23
2021	101	8.3	13.2	21.5	4.69

2021	90	5.9	13.5	19.4	4.63	
2021	68	6.7	10.7	17.4	3.91	
2021	89	9.1	15.5	24.6	3.61	
2021	88	9.0	16.1	25.0	3.52	
2021	91	7.6	18.3	25.9	3.52	
2021	85	11.7	13.7	25.4	3.36	
2021	64	10.1	10.4	20.5	3.14	
2021	77	13.6	11.0	24.6	3.11	
2021	72	8.1	17.0	25.1	2.89	
2021	85	9.9	21.4	31.3	2.71	
2021	86	14.9	17.1	32.0	2.70	
2021	76	19.0	11.8	30.9	2.45	
	78	9.2	15.4	24.8	3.24	**Average**

Table 7. Four Year Rice Data

Year	Yield (Bu/Ac)	Applied Irrigation (Ac-In/Ac)	Adjusted Rainfall (In)	Total Water (In)	WUE (Bu/In)
2018	229	16.0	13.4	29.4	7.80
2018	221	20.3	13.3	33.6	6.58
2018	194	19.0	12.6	31.6	6.14
2018	227	26.2	14.2	40.4	5.63
2018	219	25.4	15.3	40.8	5.37
2018	191	21.3	14.6	35.9	5.32
2018	209	20.3	13.7	43.4	5.17
2018	202	32.6	7.4	39.9	5.06
2018	267	47.9	16.0	63.8	4.18
2018	223	39.8	13.7	53.5	4.17
2018	193	36.7	14.6	51.3	3.75
2018	132	31.4	15.1	46.4	2.84
2019	208	13.4	13.2	28.7	7.24
2019	210	24.3	16.9	43.0	4.89
2019	178	23.8	12.7	38.8	4.58
2019	195	30.5	16.1	48.6	4.00
2019	191	23.7	23.1	48.7	3.91
2019	163	18.7	24.0	45.8	3.55
2020	240	14.9	12.6	27.6	8.72
2020	211	16.1	14.6	30.7	6.87
2020	203	14.0	16.1	30.1	6.74
2020	209	17.2	14.2	31.4	6.67
2020	213	18.7	14.6	33.3	6.40
2020	200	15.6	18.0	33.6	5.94
2020	209	22.0	15.3	37.3	5.60
2020	204	23.2	18.0	41.2	4.96
2020	251	35.9	14.8	50.7	4.94
2020	211	34.9	13.4	48.3	4.36
2020	187	32.4	11.7	44.2	4.23
2020	188	30.1	14.4	44.5	4.22
2020	222	37.7	14.9	52.7	4.20
2020	174	29.7	15.3	45.0	3.87
2020	123	16.6	17.3	33.9	3.64
2020	120	15.2	18.1	33.2	3.61
2020	227	53.5	12.1	65.6	3.46
2020	198	49.1	13.3	62.4	3.17
2020	183	46.7	12.6	59.3	3.08
2020	188	45.4	15.8	61.2	3.07
2020	200	66.6	17.2	83.8	2.39
2020	158	92.1	12.1	104.2	1.51
2021	240	13.5	11.1	24.5	9.77
2021	207	16.2	16.5	32.7	6.31

2021	216	30.5	14.2	44.7	4.84	
2021	203	30.0	16.2	46.2	4.40	
2021	183	37.3	11.3	48.6	3.77	
2021	245	51.7	14.6	66.3	3.69	
	201	29.96	14.79	45.24	4.88	**Average**

Table 8. Four Year Corn Data

Year	Yield (Bu/Ac)	Applied Irrigation (Ac-In/Ac)	Adjusted Rainfall (In)	Total Water (In)	WUE (Bu/In)	
2018	227	8.4	13.1	21.5	10.55	
2018	218	10.8	10.0	20.8	10.52	
2018	211	11.3	9.0	20.3	10.38	
2018	217	12.0	11.1	23.1	9.38	
2018	265	16.9	12.4	29.2	9.06	
2018	160	13.7	11.8	25.5	6.27	
2019	222	1.5	18.0	19.5	11.36	
2019	253	5.0	19.4	24.4	10.39	
2019	260	5.5	23.6	29.1	8.94	
2019	202	3.3	21.3	24.6	8.24	
2019	280	4.3	30.2	34.5	8.11	
2019	221	3.0	25.9	28.9	7.65	
2019	243	6.0	26.3	32.3	7.54	
2019	240	14.3	24.5	38.8	6.17	
2019	179	11.1	32.6	43.6	4.10	
2020	227	2.8	16.7	19.6	11.59	
2020	244	11.8	13.7	25.5	9.56	
2020	178	5.1	13.7	18.8	9.47	
2020	251	8.5	18.5	27.4	9.18	
2020	180	7.3	13.2	20.5	8.79	
2020	253	19.3	12.1	31.3	8.08	
2020	216	9.8	17.9	27.7	7.79	
2020	221	13.2	15.2	28.4	7.75	
2020	252	12.4	21.1	33.5	7.52	
2020	161	4.9	17.8	22.7	7.11	
2020	218	14.9	16.2	31.1	6.98	
2020	203	16.5	13.6	30.1	6.74	
2020	189	12.8	15.5	28.3	6.69	
2020	155	5.7	21.4	27.1	5.71	
2021	279	8.2	14.1	22.3	12.53	
2021	252	5.6	15.0	20.6	12.26	
2021	247	9.0	14.4	23.4	10.56	
2021	241	9.8	13.5	23.3	10.34	
2021	216	6.6	16.4	23.0	9.42	
2021	242	8.5	17.3	25.7	9.40	
2021	224	7.7	16.7	24.5	9.16	
	224	9.1	17.3	26.4	8.76	**Average**

Contest Results

Contest results were calculated for each contestant. First the effective precipitation was determined, and meter readings were calculated and verified. The yield estimates were then taken from the verified harvest forms and the WUE was determined. Contestants were ranked from high to low. The winning meters were checked against a reference meter to confirm accuracy within five percent. The contest results were presented to a panel of three judges, who are experts in the field of irrigation, to review the technical methods used to determine the rankings. The judge panel reviewed the rankings and confirmed the results.

Figure 11 reports the average Water Use Efficiency for each crop category in the contest for comparison to the winners WUE. Water use efficiency is reported in bushels of grain per volume of irrigation water and precipitation depth. Soybeans averaged 3.53 bushels per inch, the rice category averaged 4.59 bushels per inch and corn averaged 10.53 bushels per inch.

Reference to the irrigation water use and yields in Arkansas Verification Programs is only done for reference to other measured water use and yield estimates for commodity crops and should only be interpreted as an average water use one may expect from these crops under average recent history conditions.

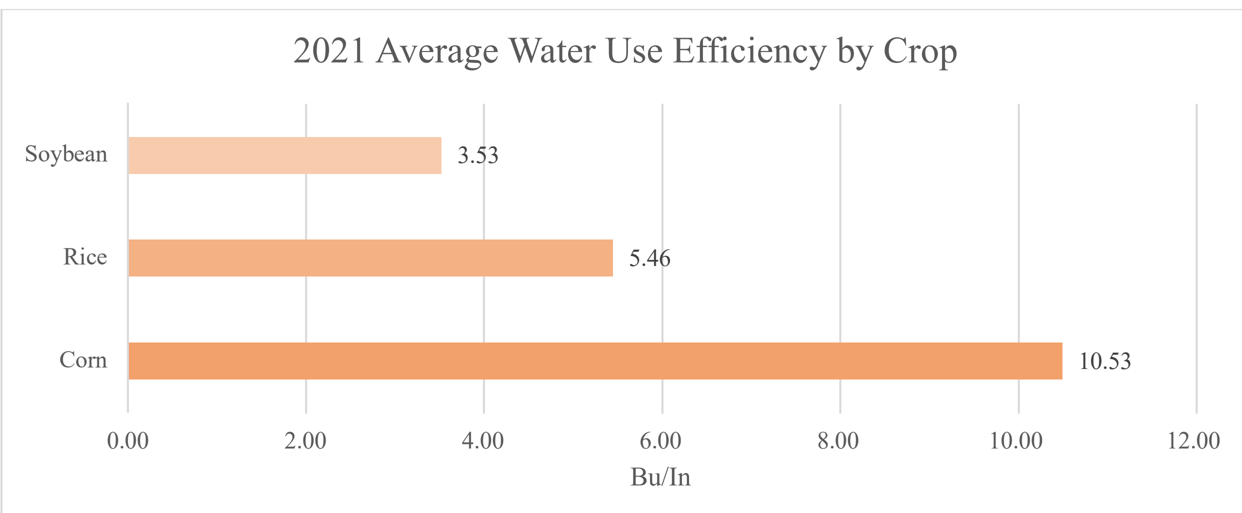

Figure 11. Average WUE by Crop for 2021

Corn Contest Results

Table 9. Corn Yield and Water Use Efficiency

Grower	Variety Selection	Yield (Bushels per Acre)	Irrigation (ac – in/ac applied)	Rain (inches) (unadjusted)	Rain (inches) (adjusted)	Total Water Use (inches)	Water Use Efficiency (Bushels per Inch)
1	DeKalb 65-92	279.30	8.23	14.25	14.05	22.28	12.53
2	DeKalb 70-27	252.06	5.56	15	15	20.56	12.26
3	Dyna-Gro D57CC51	247.10	9.02	14.38	14.38	23.40	10.56
4	Pioneer 1870	241.44	9.80	13.54	13.54	23.34	10.34
5	Pioneer 1870	216.30	6.56	20	16.4	22.96	9.42
6	Pioneer 1870	242.02	8.45	19.33	17.29	25.74	9.40
7	DeKalb 70-27	224.07	7.74	16.72	16.72	24.46	9.16
Mean		243.19	7.91	16.17	15.34	23.25	10.53

Overall, ten corn fields were entered into the contest. The average yield of corn grown for the contest was 243.2 BPA and the average water use efficiency of corn grown for the contest was 10.22 bushels/inch (Table 9). This average yield was 34.25% higher than the state average for 2019 of 181 BPA (USDA National Agricultural Statistics Service, 2018). Corn yield was corrected to 15.5% moisture for every field.

The highest yielding corn field was in White County with a yield of 279.3 BPA. The water use efficiency ranged from a high of 12.42 bushels/inch to a low of 9.16 bushels/inch. The average irrigation water added to corn contest fields was 7.91 inches. The highest irrigation water added to a corn contest field was 9.8 inches and the lowest irrigation water added was with 5.6 inches of irrigation. Two fields were withdrawn from the contest prior to harvest, and one field did not achieve the minimum yield (significant green snap insurance claim)

Figure 12. Brandon Cain and White County Agent Jan Yingling

First place in corn was awarded to Brandon Cain of White County. His contest field yielded 279.3 bushels per acre with a water use efficiency of 12.42 bushels per inch. Brandon used watermark moisture sensors paired with Aquatrac telemetry, UA Soil Moisture App, Pipeplanner, and Cover Crops. This was Brandon's second year in the contest.

Brandon stated: "Participation in the contest has made me realize that I've been slightly overwatering my crop, but enough that I can save an irrigation or two by the end of the season and not sacrifice yield."

Figure 13. Left To Right: Cori Smith, Terry Smith, Wesly Laws, and Nick Newberry

Second place was awarded to Terry Smith of Greene County. His contest field yielded 252 bushels per acre with a water use efficiency of 12.26 bushels per inch. Terry used moisture sensors with John Deere Field Connect Telemetry, Surge Valve, Pipeplanner, and cover crop. This is Terry's third year to enter the contest, and his third year to place second in corn.

Figure 14. Adam Chappell (Left) With His Brother Seth Chappell

Third place was awarded to Adam Chappell of Woodruff County. His contest field yielded 2 bushels per acre with a water use efficiency of 10.56 bushels per inch. Adam used cover crops. This is Adam's second year to enter the contest in corn.

Rice Contest Results

The Rice Irrigation Contest produced a broad range of results in terms water use between the producers. In 2021, furrow irrigated rice was used in 8 contest fields with an average yield of 200 BPA and an average WUE of 4.35 bushels/inch; 2 Fields were cascade (levee irrigated), using polypipe for multiple inlet.

All rice contest fields planted RiceTec hybrids seed. Tabular results from the rice contest are shown in Table 10**.** Two entries did not meet the minimum yield. Two fields were not harvested correctly. Three fields were planted with RT XP753, three fields were planted with RT7521 FP, two fields were planted with RT7321 FP, one field was planted with RT 7311 Clearfield, one field was planted with Gemini 214C.

The average rice yield in the contest was 215.7 BPA and the average rice water use efficiency was 5.46 bushels/inch Table 10. The yield average for the rice contest was 16.5% higher than the state average rice yield of 167 BPA for 2019 (USDA National Agriculture Statistics Service, 2018).

Table 10. 2021 Rice Yield and Water Use Efficiency

Grower	Irrigation Method	Variety Selection	Yield (Bushels/ Acre)	Irrigation Applied (ac-in/ac)	Rain (inches) (unadjusted)	Rain (inches) (adjusted)	Total Water Use (in)	WUE (Bushels/ inch)
1	Row Rice vftwrs	RT753	239.91	13.47	20.22	11.07	24.54	9.77
2	Row Rice	RT7521	206.60	16.22	24.1	16.51	32.73	6.31
3	Row Rice	RT753	216.32	69.88	23.37	14.2	84.08	4.84
4	Row Rice vftwrs	RT7321	203.32	13.09	16.18	16.18	29.27	4.40
5	Row Rice vftwrs	RT753	183.24	37.35	11.26	11.26	48.61	3.77
6	Flood	RT7321	244.65	51.75	14.58	14.58	66.33	3.69
Mean			215.70	29.90	18.30	14.00	43.8	5.46

*vftwrs-Variable Flow Tailwater Recovery System developed by the University of Arkansas

The average yield for all rice fields were corrected to 12% moisture. Yields in the rice contest ranged from a high of 245 BPA (flooded rice) to a low of 183.24 (row rice). The average irrigation water added for all contest rice fields was 29.9 inches. The highest irrigation water applied to a contest rice field was 69.88 inches and the lowest amount of irrigation water added to a contest rice field was 13.47 inches (Table 10). The average WUE was 5.46 Bu/in.

Figure 15. Stephen Hoskyn Harvesting His Rice Field

First place in rice was awarded to Stephen Hoskyn of Arkansas County. His contest field yielded 239.91 bushels per acre with a water use efficiency of 9.77 bushels per inch. Stephen entered a furrow irrigated rice field, using Pipe Planner™, Delta Plastics polypipe, and the U of A pit-less tailwater recirculating pump. This was Stephen's first year in the contest.

Figure 16. Seth Tucker

Second place was awarded to Seth Tucker of Drew County. His contest field yielded 206.6 bushels per acre with a water use efficiency of 6.31 bushels per inch. Seth's field was also in the Rice Verification Program. This is Seth's second year to enter the contest, and his second year to place second in rice. Seth said experience from entering the contest has helped him improve his irrigation since he has transitioned to 100% furrow irrigated rice.

Figure 17. Matthew Feilke (Right) With Chris Henry

Third place was awarded to Matthew Feilke of Arkansas County. His contest field yielded 216.32 bushels per acre with a water use efficiency of 4.84 bushels per inch. Matthew used Pipe Planner™ and good management to achieve his results. This is Matthew's first year to enter the contest.

Soybean Contest Results

Twenty fields were entered in the soybean division. The average yield for all soybean contest fields was 83.6 BPA (36.7% above the state average yield of 52.9 BPA) (USDA National Agricultural Statistics Service, 2017). The soybean contest average water use efficiency was 3.51 bushels/inch (Table 11). All contest fields were corrected to a 13.0% moisture for the soybean yields.

Table 11. Soybeans yield and Water Use Efficiency

Grower	Variety Selection	Yield (Bushels/ Acre)	Irrigation (ac-in/ac)	Rain (inches) (unadjusted)	Rain (inches) (adjusted)	Total Water Use (inches)	Water Use Efficiency (Bushels/ Inch)
1	Pioneer 48A60	98.84	5.13	19.67	13.78	18.91	5.23
2	Asgrow 46X6	101	8.3	13.8	13.8	21.5	4.69
3	Becks 4885	89.70	5.88	13.51	13.51	19.39	4.63
4	45a29LL	68.01	6.68	19.08	10.7	17.38	3.91
5	Pioneer 47A64X	88.68	9.07	17.06	15.5	24.57	3.61
6	Pioneer 49A41	88.16	8.97	16.08	16.08	25.05	3.52
7	Asgrow 46X6	91.23	7.62	20.17	18.29	25.91	3.52
8	P48A60X	85.22	11.67	13.7	13.7	25.37	3.36
9	S49-15	64.34	10.07	15.6	10.44	20.51	3.14
10	Pioneer 46A35X	76.64	13.63	11.01	11.01	24.64	3.11
11	P48A60X	72.49	8.14	21.41	16.96	25.10	2.89
12	Pioneer 48A60x	84.91	9.88	21.4	21.4	31.28	2.71
13	NK47Y9X	86.41	14.85	17.31	17.11	31.96	2.70
14	Asgrow 48Xfo	75.61	19.05	11.83	11.83	30.88	2.45
Mean		83.6	9.9		14.5	24.5	3.5

The average irrigation water added to a contest soybean field was 9.9 acre-inches Table 11 compared to the irrigator reported state average soybean water use of 16.3 acre-inches (Arkansas Water Plan, 2014). The highest irrigation water use by a contested soybean field was 19.05 inches. The lowest irrigation water applied to a contested field was 5.13 inches to the 1st place soybean contest field.

The maximum yield in the contest was 100.8 bushels/acre while the contest average was 83.6 BPA Table 11.

Figure 18. Left to Right Kurt Beauty, Chad Render, Scott Crabb, and Caleb Reaves

First place in rice was awarded to Chad Render of Jefferson County. His contest field yielded 98.84 bushels per acre with a water use efficiency of 5.23 bushels per inch. Chad utilized Water Mark and Trellis Sensors in adjacent fields, as well as Pipe Planner™, Delta Plastics polypipe, and good water management practices. This was Chad's third year in the contest with soybeans. Chad also won the Corn Division in 2020.

Figure 19. Cody Fincher

Second place was awarded to Cody Fincher of Mississippi County. His contest field yielded 101 bushels per acre with a water use efficiency of 4.69 bushels per inch. Cody used a CropX moisture sensor for irrigation scheduling. Cody shared that he irrigated all of his soybean fields on the same schedule as the contest field, but withheld the final irrigation on the contest field. All soybean fields were the same variety and soil type. The contest field was his highest yielding field. This is Cody's second year to enter the contest. When asked if participation in the contest has changed his irrigation practices, he had the following reply "Absolutely, the soybean contest was definitely a learning experience for me and I will be implementing what I learned for years to come. There were many other benefits besides saving money and water that came with skipping the last watering." Cody won the Rice Division in 2021.

Figure 20. Heath Donner and Ethan Grant Brown

Third place was awarded to Heath Donner of Mississippi County. His contest field yielded 89.7 bushels per acre with a water use efficiency of 4.63 bushels per inch. Heath used Watermark moisture sensors, paired with an Aquatrac telemetry unit to monitor the moisture level of the soil. The Arkansas watermark app was used to interpret sensor readings and schedule irrigation, along with weekly discussions with Extension Agents Ray Benson and Ethan Brown. He also used surge valve and Pipe Planner™ for more uniform distribution of irrigation water. Heath said this about his experience from the contest “The contested has changed the way I will irrigate my farm going forward. One month into the contest I purchased two more Aquatrac systems. I installed one in a cotton field and one in a peanut field. I hope to purchase two more systems before the 2022 crop.”   This is Heath’s first year to enter the contest.

Conclusions

The Arkansas Irrigation Yield Contest is a novel approach to promoting the adoption of Irrigation Water Management Practices. While there is a monetary prize, for motivation, the feedback mechanism that provides data to each contestant on how they compare to their peers provides each participant with a benchmark to improve water management skills and to recognize those that have achieved a highly developed skill to manage water resources. The impact and synergisms of utilizing the many water management practice technologies that are available are also quantified through this program. The 2021 Irrigation Yield Contest results were significant and created many success stories. Both corn and soybeans achieved the highest water use efficiency since the beginning of the contest. A few of the contest winners this year participated in 2018 with the same crop and saw many improvements using IWM tools. Many of the contest producers stated that adoption of the IWM tools such as watermark sensors and surge valves have a cost and take time in the first year to establish trust and acceptance, but in the end are beneficial at reducing labor and input costs.

An observation that the contest author team has noticed is that the best WUE results have appear to be a function of the contestant's commitment and involvement in the day to day decision-making, as opposed to delegating these decisions to employees with little or no incentive to conserve.

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