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RESEARCH & EXTENSION
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Rice Research Verification Program

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University of Arkansas
Cooperative Extension Service
Agriculture Experiment Station
U.S. Department of Agriculture
And County Governments Cooperating

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RICE RESEARCH VERIFICATION PROGRAM, 2021

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INTRODUCTION

The 2021 growing season was the thirty-eighth year for the Rice Research Verification Program (RRVP). The RRVP is an interdisciplinary effort between growers, county extension agents, extension specialists, and researchers. The RRVP is an on-farm demonstration of all the research-based recommendations developed by the University of Arkansas System Division of Agriculture for the purpose of increasing the profitability of rice production in Arkansas. The specific objectives of the program are:

1. To demonstrate and verify research-based recommendations for profitable rice production throughout the rice-producing areas of Arkansas.

2. To develop a database for economic analysis of all aspects of rice production.

3. To demonstrate the benefits of available technology and inputs for the economic production of consistently high rice yields.

4. To identify specific problems and opportunities in Arkansas rice for further investigation.

5. To promote timely implementation of management practices among rice growers.

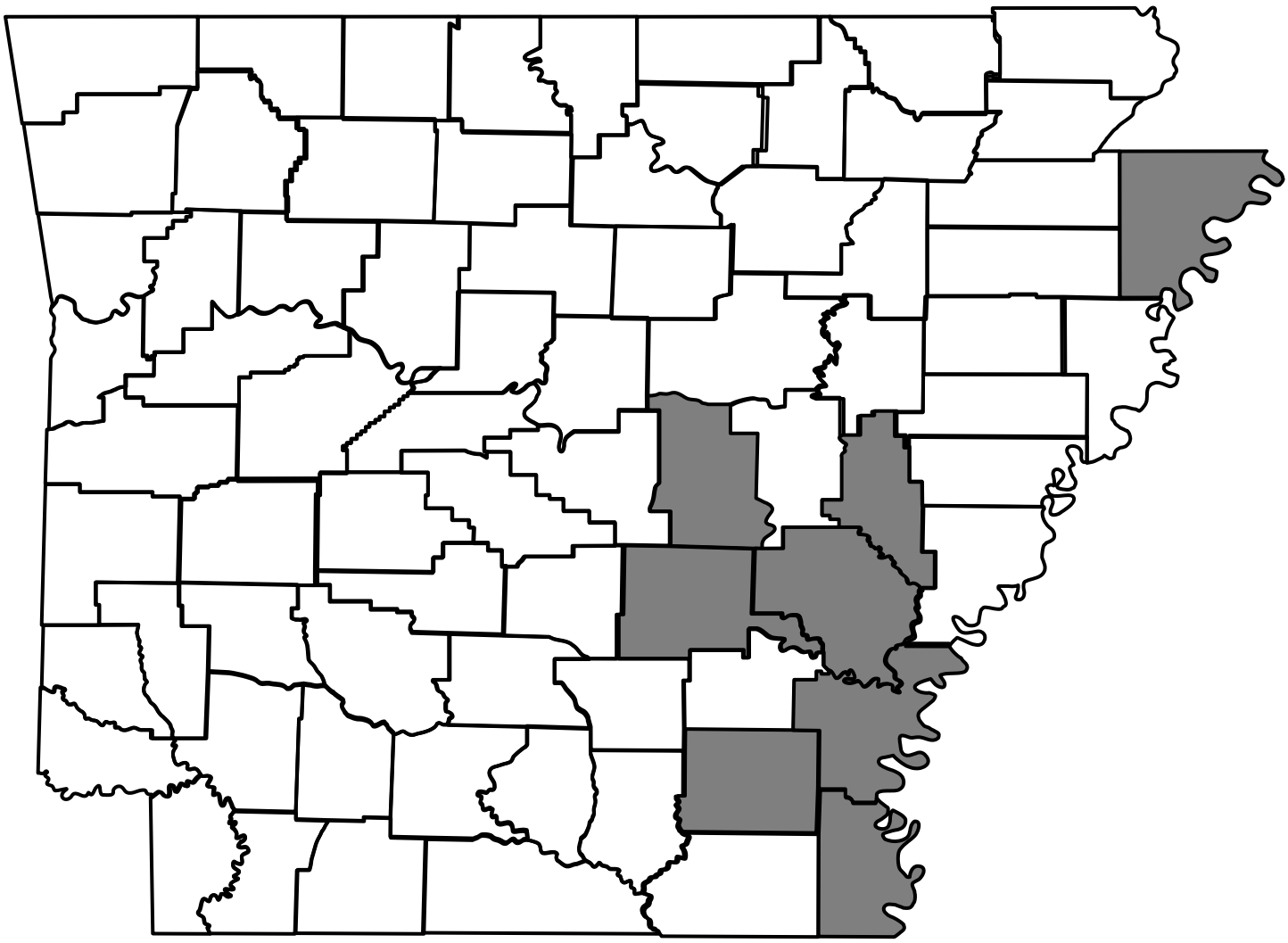
6. To provide training and assistance to county agents and growers with limited expertise in rice production.

The RRVP fields and cooperators are selected prior to planting. Cooperators agreed to pay production expenses, provide crop expense data for economic analysis, and implement the recommended production practices in a timely manner from seedbed preparation to harvest. Nine fields were enrolled in the RRVP in 2020. The fields were located on commercial farms ranging in size from 40 to 145 acres. The average field size was 73 acres.

Counties participating in the program during 2021 included Arkansas, Chicot, Desha, Drew, Jefferson, Lonoke, Mississippi, Monroe, (Figure 1).

The eight rice fields totaled 462 acres enrolled in the program. Six different cultivars were seeded: DynaGro DG263L [1 field]; RiceTec [RT] 7521 FP [2 fields]; RT 7321 FP [2 fields]; RT 7301 [1 field]; RT Gemini 214 CL [1 field]; and Horizon Ag Provisia PVL02 [1 field]. University of Arkansas System Division of Agriculture Cooperative Extension Service recommendations were used to manage the RRVP fields. Agronomic and pest management decisions were based on field history, soil test results, rice cultivar, observations, and data collected from individual fields during the growing season. An integrated pest management philosophy was utilized based on CES recommendations. Data collected included components such as stand density, weed populations, disease infestation levels, insect populations, rainfall, irrigation amounts, and dates for specific growth stages, grain yield, milling yield, and grain quality.

Figure 1. County Locations (shaded) of 2021 Rice Research Verification Program Fields.



FIELD REVIEWS

Verification Coordinator – Ralph Mazzanti

Arkansas County

The Arkansas County furrow-irrigated rice (FIR) field was located just west of Hagler (Bayou Meto) on a Hebert silt loam soil. The field consisted of 40 acres and the previous crop grown was soybean. The cultivar chosen was DG263L treated with the company's standard seed treatment. The field was drill-seeded at 65 lbs/acre planted April 6. Emergence was observed on April 26 with a stand count of 13.2 plants/ft^2. No tillage practices were used for spring field preparation. According to the soil test fertilizer was applied at 0-0-60-0 lbs/acre (N-P_2O_5-K_2O-Zn) in the spring. Glyphosate, Command, and League herbicides were applied at planting on April 6. Command and Facet were applied as post-emergence herbicides on May 6. Facet L and Permit Plus were applied May 28 for weed escapes. N-STaR (Nitrogen Soil Test for Rice) was taken on the field. Nitrogen in the form of urea plus an approved NBPT was applied at 100 lbs/acre on May 7 followed by 100 lbs/acre on June 14. Two more applications were made with 100 lbs/acre on June 21 followed by 100 lbs/acre on June 28. Using GreenSeeker, the N response levels remained adequate throughout the season. Intermittent flushing was utilized for irrigation. Sheath blight reached threshold level and the field was treated with Quadris on July 12. Rice stink bug numbers remained low and did not require treatment. The field was harvested on September 3 yielding 188 bu/acre and a milling yield of 58/69. The average harvest moisture was 15.4%. Total irrigation was 18.7 acre-inches and total rainfall was 22.2 inches.

Chicot County

The Chicot County furrow-irrigated rice (FIR) field was located southwest of Halley on Sharkey clay soil. The field consisted of 49 acres and the previous crop grown was soybean. The cultivar chosen was RT 7321 FP treated with the company's standard seed treatment. The field was drill-seeded at 26 lbs/acre planted April 19. Emergence was observed on April 28 with a stand count of 6.3 plants/ft^2. No tillage practices were used for spring field preparation. According to the soil test fertilizer was applied at 18-46-0-0 lbs/acre (N-P_2O_5-K_2O-Zn) in the spring. Glyphosate, Command, and Sharpen herbicides were applied at planting on April 19. Facet L and Command were applied as post-emergence herbicides on May 15. Preface herbicide was applied on June 3. Postscript herbicide was applied June 24. N-STaR (Nitrogen Soil Test for Rice) was taken on the field. Nitrogen in the form of urea plus an approved NBPT was applied at 100 lbs/acre on May 18 followed by 100 lbs/acre on May 27. Two more applications were made with 100 lbs/acre on June 4 followed by 100 lbs/acre on June 11. Using Trimble GreenSeeker, the N response levels remained adequate throughout the season. Late boot N application 65 lbs/acre was applied July 2. Intermittent flushing was utilized for irrigation. Propiconazole was applied July 3 due to smut history. Rice stink bug numbers reached threshold levels and Lambda cyhalothrin was applied July 23. The field was harvested on August 8 yielding 228 bu/acre and a milling

yield of 60/69. The average harvest moisture was 19.8%. Total irrigation was 21.3 acre-inches and rainfall totaled 20.8 inches.

Desha County

The Desha County furrow-irrigated rice (FIR) field was located just east of Arkansas City on Sharkey and Desha clay soils. The field consisted of 110 acres and the previous crop grown was soybean. A pre-plant fertilizer blend of 18-46-0-0 lbs/acre (N-P_2O_5-K_2O-Zn) was applied according to the soil sample analysis. The cultivar chosen was RT 7521 FP treated with the company's standard seed treatment. The field was drill-seeded at 27 lbs/acre planted April 6. Emergence was observed on April 16 with a stand count of 7.2 plants/ft^2. No tillage practices were used for spring field preparation. Command, Facet L, and Sharpen herbicides were applied after planting on April 7. Command and Prowl were applied as overlapping pre-emergence herbicides on May 5. Preface herbicide was applied May 29. N-STaR (Nitrogen Soil Test for Rice) was taken on the field. Nitrogen in the form of urea plus an approved NBPT was applied at 100 lbs/acre on April 7 followed by 100 lbs/acre on June 7. Two more applications were made with 100 lbs/acre on June 13 followed by 100 lbs/acre on June 18. The late boot N application was applied July 12 at 70 lbs/acre. Using GreenSeeker, the N response levels remained adequate throughout the season. Intermittent flushing was utilized for irrigation. The field did not require a fungicide treatment, nor did it require a treatment for stink bugs. The field was harvested on September 13 yielding 243 bu/acre and a milling yield of 58/69. The average harvest moisture was 17%. Total irrigation was 30 acre-inches and total rainfall was 28.8 inches.

Drew County

The Drew County furrow-irrigated rice (FIR) field was located just west of Tiller on a Portland clay soil. The field consisted of 35 acres and the previous crop grown was soybean. The cultivar chosen was RT 7521 FP treated with the company's standard seed treatment. The field was drill-seeded at 25 lbs/acre planted April 20. Emergence was observed on April 29 with a stand count of 9.9 plants/ft^2. No tillage practices were used for spring field preparation. According to the soil test fertilizer was applied at 18-46-0-0 lbs/acre (N-P_2O_5-K_2O-Zn) in the spring. Glyphosate, Command, and League herbicides were applied at planting on April 20. Command and Facet L were applied as post-emergence herbicides on May 3. Preface herbicide was May 28. N-STaR (Nitrogen Soil Test for Rice) was taken on the field. Nitrogen in the form of urea plus an approved NBPT was applied at 100 lbs/acre on May 4 followed by 165 lbs/acre on July 15, followed by 165 lbs/acre on June 18. Using GreenSeeker, the N response levels remained adequate throughout the season. Intermittent flushing was utilized for irrigation. Sheath blight disease exceeded threshold levels and Quadris fungicide was applied July 15. Rice stink bugs numbers remained low and did not require treatment. The field was harvested on September 2 yielding 210 bu/acre and a milling yield of 47/67. The average harvest moisture was 15%. Total irrigation was 16.2 acre-inches and total rainfall was 18.6 inches.

Jefferson County

The 77-acre Jefferson County field was located just off the Arkansas River south of Altheimer on a Portland clay and Rilla silt loam soil. Conventional tillage practices were used for spring preparation. A pre-plant fertilizer blend of 0-50-0-0 lbs/acre (N-P_2O_5-K_2O-Zn) was applied according to the soil sample analysis. The field was drill-seeded with PVL02 at 55 lbs/acre. The seed was treated with CruiserMaxx Rice and zinc rice seed treatments. Rice emergence was observed on May 24. Command and Roundup were used as pre-emergence and burndown herbicides on May 16. Provisia was applied as a post-emergence herbicide on June 16. Using the N-STaR recommendation N fertilizer in the form of urea plus NBPT was applied at 250 lbs/acre on June 18. The midseason N application was made July 12 at 100 lbs/acre. GreenSeeker was utilized during midseason growth stages to monitor the crop's N level. Armyworms reached threshold levels and were treated with Lambda-cyhalothrin on July 20. Due to a history of smuts the field was treated with Propiconazole on July 25. Stink bugs reached threshold levels and were treated with Endigo on August 23. The field was harvested September 27. The yield was 172 bu/acre. The milling yield was 68/71 and average harvest moisture was 17%. Total irrigation use was 30 acre-inches and rainfall totaled 18.4 inches.

Lonoke County

The 81-acre contour field was located west of Parkers Corner on a Dewitt silt loam soil. Spring conventional tillage practices were utilized, and pre-plant fertilizer was applied at 0-40-60-0 lbs/acre (N-P_2O_5-K_2O-Zn) according to the soil test. Glyphosate, Command, and Preface were applied as burndown and pre-emergence herbicides May 9. The cultivar RT 7521 FP treated with the company's standard seed treatment was drill-seeded at 22 lbs/acre on May 8. Stand emergence was observed on May 19 with 8.4 plants/ft^2. Preface and Facet were applied as post-emergence herbicides on May 26. Nitrogen fertilizer in the form of urea plus NBPT was applied May 18 at 210 lbs/acre according to the N-STaR recommendation. Multiple-inlet rice irrigation (MIRI) was utilized to achieve a more efficient permanent flood. GreenSeeker was utilized during mid-season growth stages to monitor the crop's N level. The late boot N fertilizer application was made on July 2 at 70 lbs/acre. The field was harvested on September 24 yielding 180 bu/acre and a milling yield of 57/69. Total irrigation usage use was 30 acre-inches and total rainfall was 11.17 inches.

Mississippi County

The precision-graded Mississippi County field was located just west of Burdette on a Sharkey-Steel complex soil. Conventional tillage practices were used for field preparation in the spring. Based on soil test analysis pre-plant fertilizer was applied at 0-50-60-0 lbs/acre (N-P_2O_5-K_2O-Zn). Gramoxone was applied in the spring as a burndown herbicide. On April 18, RT 7321 FP treated with the company's standard seed treatment was drill-seeded at 23 lbs/acre. Command, Roundup, and League were applied on April 18 as pre-emergence and burndown herbicides. Stand emergence was observed on April 29 with 6.6 plants/ft^2. Preface and Facet herbicides were applied on May 19. N fertilizer in the form of urea plus NBPT was applied at 260 lbs/acre on May 18, according to the

N-STaR recommendation. The late boot urea application of 70 lbs/acre was made on July 16. Stink bugs reached threshold levels and the field was sprayed with Mustang Maxx on August 18. The field was harvested September 16 yielding 236 bu/acre with a milling yield of 63/73. The harvest moisture was 16%. Total irrigation use was 18.9 acre-inches and rainfall totaled 11.1 inches.

Monroe County

The 29-acre furrow irrigated (FIR) field was located east Clarendon. The soil classification is a Foley-Bonn complex soil. Spring conventional tillage practices were used for field preparation and based on soil analysis a fertilizer blend of 0-50-60-0 lbs/acre (N-P_2O_5-K_2O-Zn) was applied April 4. The cultivar RT Gemini 214 CL treated with the company's standard seed treatment was drill-seeded at 20 lbs/acre on April 6. Command and Sharpen were applied at planting as pre-emergence herbicides. Emergence was observed on April 27 with 7.3 plants/ft^2. Command and Prowl were applied May 14 as over-lapping pre-emergence herbicides. N-STaR (Nitrogen Soil Test for Rice) was taken on the field. N fertilizer in the form of urea was applied at 100 lbs/acre on May 15 followed by 100 lbs/acre on May 22. Another 100 lbs/acre was applied on June 5 followed by the late boot 70 lbs/acre on July 16. GreenSeeker was utilized during midseason growth stages to monitor the crop's N level. Stink bugs reached threshold levels and lambda-cyhalothrin was applied on August 6. The field was harvested August 31 yielding 187 bu/acre. The milling yield was 64/69 and the average harvest moisture was 19%. Total irrigation for the season was 30 acre-inches and total rainfall was 11.75 inches.

Table 1. Agronomic information for fields enrolled in the 2021 Rice Research Verification Program.

Field Location by County	Cultivar	Field size (acres)	Previous crop	Seeding rate (lbs/acre)	Stand density (plants/ft^2)	Planting date	Emergence date	Harvest date	Yield (bu/A)	Milling yield [a]	Harvest Moisture
Arkansas	DG263L	40	Soybean	65	13	6-April	26-April	3-Sept	188	58/69	15%
Chicot	RT 7321 FP	49	Soybean	26	6	19-April	28-April	28-Aug	228	60/69	20%
Desha	RT 7521 FP	110	Soybean	27	7	6-April	16-April	9-Sept	243	49/69	17%
Drew	RT 7521 FP	35	Soybean	25	10	4-April	29-April	2-Sept	210	47/67	15%
Jefferson	PVL02	77	Rice	55	19	16-May	24-May	27-Sept	172	62/71	17%
Lonoke	RT 7521 FP	81	Soybean	22	8	8-May	19-May	24-Sept	180	47/69	14%
Mississippi	RT 7321 FP	35	Soybean	23	7	18-April	29-April	16-Sept	236	50/71	16%
Monroe	RT Gemini 214 CL	29	Soybean	20	7	6-April	27-April	31-Sept	187	47/68	19%
Average	------	**57**	------	**33[b]**	**10[c]**	**11-May**	**24-May**	**14-Sep**	**206**	**53/69**	**17%**

[a] Milling yield: % Head rice (whole kernel) / % Total white rice (whole kernel + broken kernels).

[b] Seeding rates averaged 78 lbs/acre for conventional cultivars and 24 lbs/acre for hybrid cultivars.

[c] Stand density averaged 18 plants/ft^2 for conventional cultivars and 7 plants/ft^2 for hybrid cultivars.

Table 2. Soil test results, fertilization program, and soil classification for fields enrolled in the 2021 Rice Research Verification Program.

Field Location by County	Soil Test				Applied Fertilizer (lbs/acre)			Soil Classification
		lbs/acre						
	pH	P	K	Zn	Mixed Fertilizer [a] N-P-K-Zn [b]	N-Star Urea (46%N) rates and timing [c, d]	Total N rate (lbs N/acre)	
Arkansas	5.3	42	416	8.6	0-0-60-0	100-100-100-100-80	220	Hebert Silt Loam
Chicot	7.3	93	768	10.8	18-46-0-0	100-100-120-100-65	223	Sharkey Clay
Desha	7.4	43	636	6.6	0-50-0-0	100-100-100-100-70	216	Sharkey and Desha Clay
Drew	6.7	34	581	4.3	18-46-0-0	100-165-165	198	Portland Clay
Jefferson	7.0	62	352	6.6	0-50-0-0	250-100	161	Portland Clay and Rilla Silt Loam
Lonoke	6.1	30	209	3.3	0-40-60-5	210-70	129	Dewitt Silt Loam and Stuttgart Silt Loam
Mississippi	7.1	64	423	9.5	0-50-60-0	260-70	152	Sharkey-Steele Complex
Monroe	7.1	35	198	6.8	0-50-60-0	100-100-100-70	170	Foley-Calhoun-Bonn Complex

[a] Column represents regular pre-plant applications.

[b] N=nitrogen, P=phosphorus, K=potassium, Zn=zinc.

[c] Timing: preflood – midseason – boot. Each field was fertilized according to its N-STaR recommendation. The mark (*) denotes an adjusted N-STaR rate and timing for furrow irrigated rice.

[d] The N-Star preflood N recommendation in all fields was treated with an approved NBPT product to minimize N loss due to ammonia volatilization.

[e] Row rice fields received additional seasonal N exceeding the N-Star recommendation by 46 lbs N/acre.

Table 3. Herbicide rates and timings for fields enrolled in the 2021 Rice Research Verification Program.

Field Location by County	Burndown/Pre-emergence Herbicide Applications (Trade name & product rate/acre)[a]	Post-emergence Herbicide Applications (Trade name & product rate/acre)[a]
Arkansas	Glyphosate (32 oz) + Command (16 oz) + League (6.4 oz)	Command (16 oz) + Facet L (28 oz) FB Facet L (15 oz) + Permit Plus (0.75 oz)
Chicot	Select (12.8 oz) + Valor (2 oz) + Dicamba (8 oz) Command (16 oz) + Glyphosate (21 oz) + Sharpen (2 oz)	Command (16 oz) + Facet L (32 oz) FB Preface (6 oz) FB Postscript (5 oz)
Desha	Command (24 oz) + Facet L (32 oz) + Sharpen (3 oz)	Command (8 oz) + Prowl H_2O (2.1 pts)
Drew	Command (16 oz) + Glyphosate (32 oz) + League (6.4 oz)	Command (12 oz) + Facet L (32 oz)
Jefferson	Command (19 oz) + Glyphosate (40 oz)	Provisia (15.5 oz)
Lonoke	Command (16 oz) + Glyphosate (32 oz) Preface (6 oz)	Preface (4 oz) + Facet L (32 oz)
Mississippi	Command (16 oz) + Glyphosate (32 oz) + League (6.4 oz)	Facet L (32 oz) + Preface (4 oz)
Monroe	Command (12.8 oz) + (Sharpen (2 oz)	Command (12 oz) + Prowl (2.1 pts)

[a] 'FB' = 'followed by' and is used to separate herbicide application events.

Table 4. Seed treatments used and foliar fungicide and insecticide applications made on fields enrolled in the 2021 Rice Research Verification Program.

Field Location by County	Seed treatments (trade name and product rate/cwt seed)	Foliar fungicide and insecticide applications (trade name and product rate/acre)			
	Fungicide and/or Insecticide Seed Treatment for Control of Diseases and Insects of Seedling Rice[z]	Fungicide Applications for Control of Sheath Blight/Kernel Smut/False Smut	Fungicide Applications for Control of Rice Blast	Insecticide Applications for Control of Rice Water Weevil	Insecticide Applications for Control of Rice Stink Bug/Chinch Bug/Armyworms
Arkansas	DGST	Quadris (10 oz)	------	------	--------
Chicot	RTST	-------	------	------	Lambda-Cyhalothrin (2.5 oz)
Desha	RTST	-------	------	------	------
Drew	RTST	Quadris (10 oz)	------	------	------
Jefferson	CruiserMaxx Rice/Zinc	Propiconazole (6 oz)	------	------	Lambda-Cyhalothrin (1.8 oz) + Dimilin (3 oz) Endigo (5 oz)
Lonoke	RTST	-------	------	------	------
Mississippi	RTST	-------	------	------	Mustang Maxx (2 oz)
Monroe	RTST	--------	------	------	Lambda-Cyhalothrin (2.5 oz)

[z] RTST = 'RiceTec Seed Treatment' and DGST – 'DynaGro Seed Treatment'. These abbreviations define those fields with seed treated by RiceTec, Inc. or DynaGro prior to seed purchase.

Table 5. Rainfall and irrigation information for fields enrolled in the 2021 Rice Research Verification Program.

Field Location by County	Rainfall (inches)	Irrigation[z] (acre-in/acre)	Rainfall + Irrigation (inches)
Arkansas	22.2	18.7	40.9
Chicot	20.8	21.3	42.1
Desha	5.3	28.0	33.3
Drew	18.6	16.2	34.8
Jefferson	18.4	30.0*	48.4
Lonoke	11.1	30.0*	41.1
Mississippi	11.1	18.9	30.0
Monroe	11.5	30.0*	41.5

[z] Not all fields were equipped with flow meters to monitor water use for irrigation. Therefore, the historical average irrigation amount in fields with flow meters was used for fields with no irrigation data. Irrigation amounts using this calculated average are followed by an asterisk (*).

ECONOMIC ANALYSIS

This section provides information on production costs and returns for the 2021 Rice Research Verification Program (RRVP). Records of field operations on each field provided the basis for estimating production costs. The field records were compiled by the RRVP coordinator, county Extension agents, and cooperators. Production data from the 8 fields were applied to determine costs and returns above operating costs, as well as total specified costs. Operating costs and total costs per bushel indicate the commodity price needed to meet each cost type.

Operating costs are those expenditures that would generally require annual cash outlays and would be included on an annual operating loan application. Actual quantities of all operating inputs as reported by the cooperators are used in this analysis. Input prices are determined by data from the 2021 Crop Enterprise Budgets published by the Cooperative Extension Service and information provided by the cooperating producers. Fuel and repair costs for machinery are calculated using a budget calculator based on parameters and standards established by the American Society of Agricultural and Biological Engineers. Machinery repair costs should be regarded as estimated values for full-service repairs, and actual cash outlays could differ as producers provide unpaid labor for equipment maintenance.

Fixed costs of machinery are determined by a capital recovery method which determines the amount of money that should be set aside each year to replace the value of equipment used in production. Machinery costs are estimated by applying engineering formulas to representative prices of new equipment. This measure differs from typical depreciation methods, as well as actual annual cash expenses for machinery.

Operating costs, fixed costs, costs per bushel, and returns above operating and total specified costs are presented in Table 6. Costs in this report do not include land costs, management, or other expenses and fees not associated with production. Operating costs ranged from $517.67/acre for Jefferson County to $748.57 for Desha County, while operating costs per bushel ranged from $2.76/bushel for Mississippi County to $3.27/bushel for Chicot County. Total costs per acre (operating plus fixed) ranged from $611.38/acre for Jefferson County to $837.89/acre for Chicot County, and total costs per bushel ranged from $3.06/bushel for Mississippi County to $3.67/bushel for Chicot County. Returns above operating costs ranged from $468.12/acre for Lonoke County to $725.13/acre for Mississippi County and returns above total costs ranged from $369.31/acre for Lonoke County to $654.52/acre for Mississippi County.

A summary of yield, rice price, revenues, and expenses by expense type for each RRVP field is presented in Table 7. The average rice yield for the 2021 RRVP was 206 bu/acre but ranged from 172 bu/acre for Jefferson County to 243 bu/acre for Desha County. An Arkansas average long-grain cash price of $5.90/bu was estimated using USDA, National Agricultural Statistics Service (NASS) US long grain price data for the months of August through October. The RRVP had all fields planted to long grain rice. A premium or discount was given to each field based on the milling yield observed for each field, a standard milling yield of 55/70 for long-grain rice, and 2021 loan values for whole kernels ($11.06/cwt; $4.98/bu) and broken kernels ($6.76/cwt; $3.04/bu). Estimated long-grain prices adjusted for milling yield varied from $5.65/bu in Drew County to $6.06/bushel in Jefferson County (Table 7).

The average operating expense for the 8 RRVP fields was $629.81/acre (Table 7). Seed expenses accounted for the largest share of operating expenses on average (23.6%) followed by post-harvest expenses (19.7%), fertilizers & nutrients (16.1%), and chemicals (13.5%). Although seed's share of operating expenses was 23.6% across the 8 fields, it's average cost and share of operating expenses varied depending on whether a herbicide tolerant cultivar was used ($71.50/acre; 13.8% of operating expenses), a proprietary non-herbicide tolerant pure-line cultivar was used

($97.50/acre; 16.34% of operating expenses), or a herbicide-tolerant hybrid was used ($169.65/acre; 25.9% of operating expenses).

The average return above operating expenses for the 8 fields was $565.64/acre and ranged from $468.12/acre for Lonoke County to $725.13/acre for Mississippi County. The average return above total specified expenses for the 8 fields was $481.94/acre and ranged from $369.31/acre for Lonoke County to $654.52/acre for Mississippi County. Table 8 provides select variable input costs for each field and includes a further breakdown of chemical costs into herbicides, insecticides, and fungicides. Table 8 also lists the specific rice cultivars grown on each RRVP field.

Table 6. Operating Costs, Total Costs, and Returns for fields enrolled in the 2021 Rice Research Verification Program.

County	Operating Costs ($/acre)	Operating Costs ($/bushel)	Returns to Operating Costs ($/acre)	Fixed Costs ($/acre)	Total Costs ($/acre)	Returns to Total Costs ($/acre)	Total Costs ($/bushel)
Arkansas	596.67	3.17	516.79	64.85	661.51	451.94	3.52
Chicot	744.68	3.27	614.50	93.21	837.89	521.29	3.67
Desha	748.57	3.08	648.31	78.69	827.26	569.62	3.40
Drew	672.62	3.20	513.66	70.60	743.22	443.06	3.54
Jefferson	517.67	3.01	524.80	93.70	611.38	431.09	3.55
Lonoke	559.64	3.11	468.12	98.81	658.45	369.31	3.66
Mississippi	650.44	2.76	725.13	70.60	721.04	654.52	3.06
Monroe	548.20	2.93	513.84	99.15	647.34	414.70	3.46
Average	**629.81**	**3.07**	**565.64**	**83.70**	**713.51**	**481.94**	**3.48**

Table 7. Summary of Revenue and Expenses per Acre for fields enrolled in the 2021 Rice Research Verification Program.

Receipts	Arkansas	Chicot	Desha	Drew
Yield (bushels)	188	228	243	210
Price Received ($/bushel)	5.92	5.96	5.75	5.65
Total Crop Revenue	**1113.45**	**1359.18**	**1396.88**	**1186.28**
Operating Expenses				
Seed	97.50	186.16	193.32	179.00
Fertilizers & Nutrients	111.71	116.40	130.93	107.86
Chemicals	110.77	120.99	93.27	102.64
Custom Applications	60.00	69.00	58.00	54.75
Diesel Fuel	5.54	8.81	6.35	6.34
Repairs & Maintenance	18.98	19.72	21.02	17.95
Irrigation Energy Costs	24.63	28.06	42.15	21.34
Labor, Field Activities	43.56	44.74	43.79	44.12
Other Inputs & Fees, Pre-harvest	10.52	13.21	13.10	11.88
Post-harvest Expenses	113.46	137.60	146.65	126.74
Total Operating Expenses	**596.67**	**744.68**	**748.57**	**672.62**
Returns to Operating Expenses	**516.79**	**614.50**	**648.31**	**513.66**
Capital Recovery & Fixed Costs	64.85	93.21	78.69	70.60
Total Specified Expenses [z]	**661.51**	**837.89**	**827.26**	**743.22**
Returns to Specified Expenses	**451.94**	**521.29**	**569.62**	**443.06**
Operating Expenses/Yield Unit	3.17	3.27	3.08	3.20
Total Expenses/Yield Unit	3.52	3.67	3.40	3.54

[z] Does not include land costs, management, or other expenses and fees not associated with production.

Table 7. Summary of Revenue and Expenses per Acre for fields enrolled in the 2021 Rice Research Verification Program (Continued).

Receipts	Jefferson	Lonoke	Mississippi	Monroe	Average
Yield (bushels)	172	180	236	187	206
Price Received ($/bushel)	6.06	5.71	5.83	5.68	5.82
Total Crop Revenue	**1042.47**	**1027.76**	**1375.57**	**1062.04**	**1195.45**
Operating Expenses					
Seed	71.50	157.52	167.67	134.20	148.36
Fertilizers & Nutrients	90.38	81.20	81.62	89.70	101.22
Chemicals	52.17	68.61	82.45	50.48	85.17
Custom Applications	69.75	45.25	63.50	37.50	57.22
Diesel Fuel	12.44	10.76	9.54	9.53	8.66
Repairs & Maintenance	20.76	22.56	18.12	19.27	19.80
Irrigation Energy Costs	39.52	7.81	24.90	39.52	28.49
Labor, Field Activities	47.64	46.79	48.45	45.66	45.59
Other Inputs & Fees, Pre-harvest	9.71	10.52	11.76	9.48	11.27
Post-harvest Expenses	103.80	108.63	142.43	112.85	124.02
Total Operating Expenses	**517.67**	**559.64**	**650.44**	**548.20**	**629.81**
Returns to Operating Expenses	**524.80**	**468.12**	**725.13**	**513.84**	**565.64**
Capital Recovery & Fixed Costs	93.70	98.81	70.60	99.15	83.70
Total Specified Expenses [z]	**611.38**	**658.45**	**721.04**	**647.34**	**713.51**
Returns to Specified Expenses	**431.09**	**369.31**	**654.52**	**414.70**	**481.94**
Operating Expenses/Yield Unit	3.01	3.11	2.76	2.93	3.07
Total Expenses/Yield Unit	3.55	3.66	3.06	3.46	3.48

[z] Does not include land costs, management, or other expenses and fees not associated with production.

Table 8. Selected Variable Input Costs per Acre for fields enrolled in the 2021 Rice Research Verification Program.

County	Rice Type	Seed	Fertilizers & Nutrients	Herbicides	Insecticides	Fungicides & Other Inputs	Diesel Fuel	Irrigation Energy Costs
Arkansas	DG263L	97.50	111.71	94.47	---	16.30	5.54	24.63
Chicot	RT 7321 FP	186.16	116.40	113.88	2.73	4.38	8.81	28.06
Desha	RT 7521 FP	193.32	130.93	93.27	---	---	6.35	42.15
Drew	RT 7521 FP	179.00	107.86	86.34	---	16.30	6.34	21.34
Jefferson	PVL02	71.50	90.38	32.95	14.84	4.38	12.44	39.52
Lonoke	RT 7521 FP	157.52	81.20	68.61	---	---	10.76	7.81
Mississippi	RT 7321 FP	167.67	81.62	79.79	2.66	---	9.54	24.90
Monroe	RT Gemini 214 CL	134.20	89.70	47.76	2.73	---	9.53	39.52
Average	**---**	**148.36**	**101.22**	**77.13**	**5.74**	**10.34**	**8.66**	**28.49**