DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

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University of Arkansas System Division of Agriculture Wheat Research Verification Program

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University of Arkansas
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Arkansas ROW CROP VERIFICATION
DIVISION OF AGRICULTURE RESEARCH & EXTENSION University of Arkansas System

ARKANSAS WHEAT PROMOTION BOARD

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Introduction

The Wheat Research Verification Program (WRVP) represents an interdisciplinary effort of farmers, county Extension agents, Extension specialists, and researchers committed to improving the profitability of wheat production in Arkansas. The WRVP program began in 1986 under the direction of the University of Arkansas Cooperative Extension Service. The Arkansas Wheat Promotion Board has allocated the funding necessary for the WRVP program each year since its inception.

The WRVP program is designed as on-farm demonstrations of all the research-based recommendations required to grow wheat profitably in Arkansas. The WRVP program is part of the University of Arkansas Extension Service's goal of helping wheat producers make economical, agronomical, and environmentally sound decisions on their farms. The specific objectives of the program are:

1. To verify research-based recommendations for profitable wheat production in all wheat producing areas of Arkansas.
2. To develop a database for economic analysis of all aspects of wheat production to demonstrate that consistently high yields of wheat can be produced economically.
3. To identify specific problems and opportunities in Arkansas wheat production for further investigation.
4. To promote timely cultural and management practices among all wheat farmers.
5. To provide training and assistance to county agents with limited expertise in wheat production.

Six fields were enrolled in the WRVP for the 2021-2022 growing season. Cooperators from the counties selected varieties from a short list provided by the agent and research verification coordinator. These varieties were selected based upon multi-year performance and characteristics determined by the University of Arkansas wheat variety testing program.

Soil type for fields enrolled in the program were silt loam and the previous crop was corn or soybean. Fields were planted in mid-October with a seeding rate ranging from 100 to 120 lb./acre. Ashley, Drew and Greene County fields were drilled planted with 7.5 inch wide rows and Arkansas, Lee and Mississippi County fields were broadcast planted and incorporated. The Arkansas, Ashley, Drew, and Greene County fields were preventively sprayed with a foliar fungicide at flowering for fusarium head blight suppression. The Arkansas, Drew and Lee County fields were treated with herbicides to control winter annual weeds. Yields from verification fields ranged from 86 bushels/acre in Ashley County to 55 bushels/acre in Arkansas County.

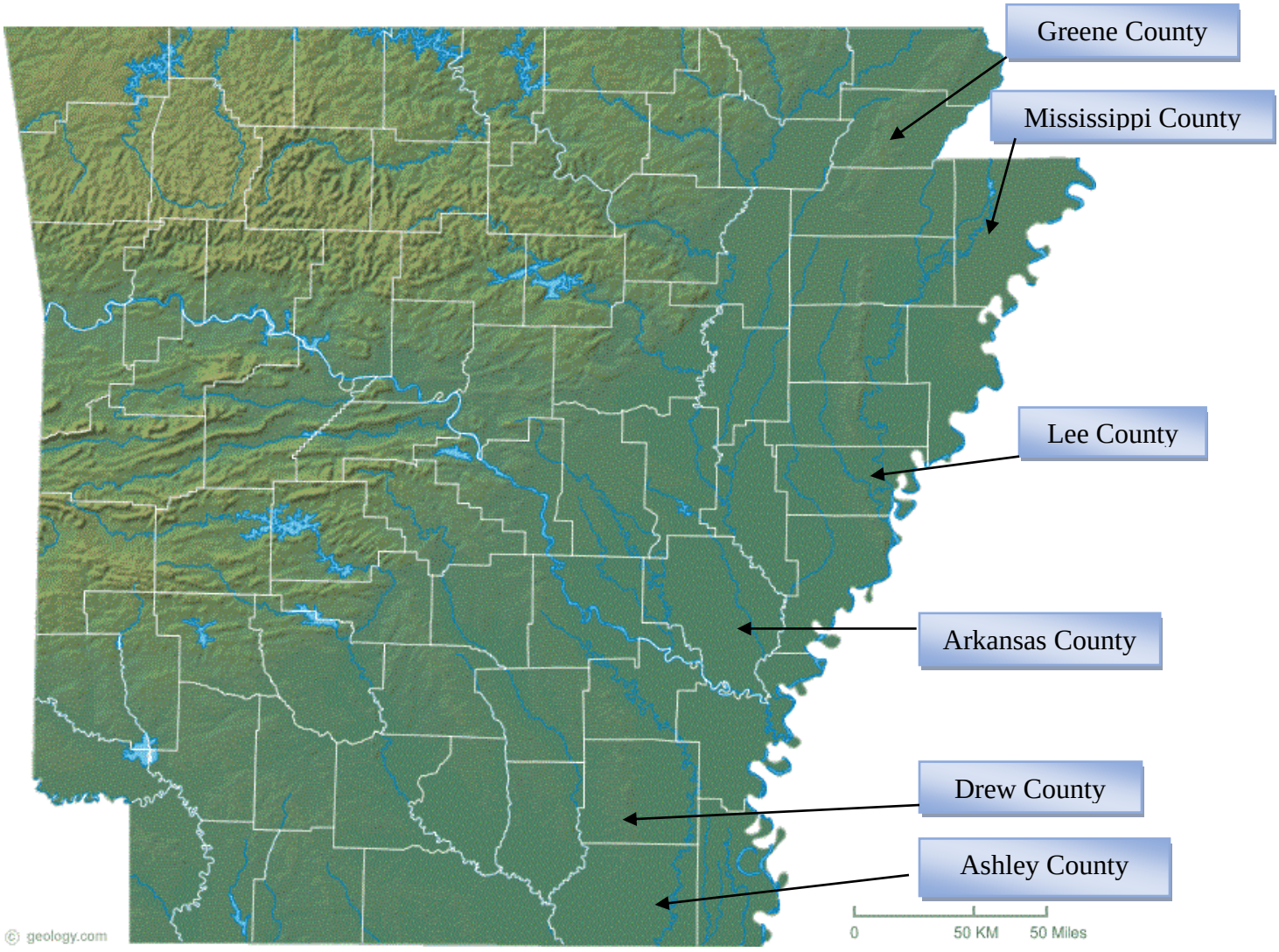
The 2021-2022 Arkansas wheat production season started with very mild weather during October, November and December and was conducive for good fall growth and establishment. January temperatures were cold and wheat growth stopped for most of the winter until late February.

Spring nitrogen applications were applied starting in late January and continued until early April. Foliar disease levels were generally low for leaf and stripe rust, but with adequate

rainfall the potential for Fusarium Head Blight warranted a preventative fungicide treatment in the Arkansas, Ashley, Drew and Greene County fields. Insect pressure remained low throughout the growing season and no treatment was needed. Wheat research verification fields were harvested early to mid- June. Arkansas producers planted an estimated 220,000 acres of wheat in the fall of 2021 and harvested 150,000 acres. Statewide average yield was estimated at 53 bu/acre. The verification program average yield for the 2021-2022 season was 68.7 bushels/acre.

The Wheat Research Verification Program continues to demonstrate that Extension's research-based recommendations can produce profitable, high yielding wheat across a wide range of conditions and soil types. Over a 30-year period, the WRVP has averaged approximately 12 bushels above the average state yield. The program is funded by wheat check-off dollars and is administered through the Arkansas Wheat Promotion Board.

Figure 1. Locations of 2021-2022 Wheat Research Verification Program Fields



Field Reviews

Southern Fields – Chad Norton

Arkansas County

The 30-acre field, with a Dewitt silt loam soil, was located southeast of Dewitt and followed corn. Following land preparation and fertilizer application of 0-26-26, according to soil test recommendations, the field was broadcast seeded at 120 pounds/acre on October 26, 2021 with Maxie treated with Cruiser 5FS seed treatment. Wheat emerged November 3 to a plant population of 23 plants/ft². An application of. .9 ounces/acre Harmony Extra was applied January 20, 2022 for emerged broadleaf weed control. Initial early spring fertilizer application of 100 pounds/acre DAP + 50 pounds/acre ammonium sulfate + 100 pounds/acre urea applied March 8, 2021 and second spring fertilizer application of 100 pounds/acre urea March 28 resulted in a total spring nitrogen rate of 120 pounds/acre. Prosaro fungicide as aerially applied April 19 at 8 ounces/acre for Fusarium Head Blight suppression. The field was harvested June 16 and yielded 55 bushels/acre adjusted to 13.5% moisture.

Ashley County

The 118-acre field, with an Arkabutla and Calhoun silt loam soil was located east of Hamburg and followed corn. Following land preparation and a fertilizer application of 0-45-90, according to soil test recommendations, the field was drill seeded October 16, 2021 with AGS 2055 at 110 pounds/acre + Cruiser 5FS and Helena Seed Shield seed treatments. Wheat emerged on October 23 to a plant population of 26 plants/ft². Initial early spring fertilizer application 100 pounds/acre DAP plus 50 pounds/acre ammonium Sulfate plus 100 pounds/acre urea applied February 11, 2022 and second spring fertilizer application of 100 pounds/acre urea March 12 resulted in a total spring nitrogen rate of 120 pounds/acre. Miravis Ace fungicide was aerially applied April 3 at 13.7 ounces/acre for Fusarium Head Blight suppression. The field was harvested on June 8 and yielded 86 bushels/acre adjusted to 13.5% moisture.

Drew County

The 24 acre field, with a Calloway silt loam soil was located east of Monticello and followed corn. The field was drill seeded October 23, 2021 with Pioneer P26R36 at 110 pounds/acre + Cruiser 5FS seed treatment. Wheat emerged November 2 to a plant population of 15 plants/ft². An application of 2 ounces/acre Zidua SC herbicide was made on November 20 for residual ryegrass control. Initial early spring fertilizer application of 50 pounds/acre DAP + 50 pounds/acre ammonium sulfate + 120 pounds/acre urea applied February 4, 2022 and second spring fertilizer application of 100 pounds/acre urea March 6 resulted in a total spring nitrogen rate of 120 pounds/acre. An application of 16.4 ounces/acre Axial XL was applied February 10 for emerged ryegrass control. Miravis Ace fungicide was aerially applied April 26 at 13.7 ounces/acre for Fusarium Head Blight suppression. The field was harvested on June 16 and yielded 56 bushels/acre adjusted to 13.5% moisture.

Lee County

The 248 acre field with a Sharkey clay and Dubbs loam soil was located southwest of Brickeys and followed corn. Following land preparation, the field was broadcast seeded October 22, 2021 at 100 pounds/acre with Local Seed LW2848 + Cruiser 5SF seed treatment. Wheat emerged October 30 to a plant population of 25 plants/ft². An application of 2 ounces/acre of Zidua SC herbicide was made on November 4 for residual ryegrass control. Initial early spring fertilizer application of 75 pounds/acre DAP plus 75 pounds/acre of ammonium sulfate was applied January 27, 2022. The second spring fertilizer application of 130 pounds/acre urea March 12 and third spring application of 70 pounds/acre urea April 8 resulted in a total spring nitrogen rate of 120 pounds/acre. The field was harvested June 18 and yielded 76 bushels/acre adjusted to 13.5% moisture.

Northern Fields – Chris Elkins

Greene County

The 76 acre field with a Fountain & Calhoun silt loam soil was located west of Paragould and followed corn. A pre-plant fertilizer application of 0-70-120 was applied. An application of 40 ounces/acre Roundup Powermax was applied for burndown on October 11. The field was no-till drill planted on October 18, 2021 at 120 pounds/acre with Pioneer 26R36 + Cruiser 5SF seed treatment. Wheat emerged on October 26, 2021 to a stand of 22.8 plants/ ft². Initial early spring fertilizer application of 50lbs/acre ammonium sulfate plus 50lbs/acre urea on February 15, 2022 followed by 100lbs urea on March 4, 2022. The final spring nitrogen application of 83lbs/acre urea plus 17lbs/acre ammonium sulfate was applied on March 17, 2022 for a total spring nitrogen rate of 121 pounds/acre. A Fungicide application of 13.7oz/acre Miravis Ace was applied for Fusarium Head Blight suppression. The field was harvested June 15 and yielded 73 bushels/acre adjusted to 13.5% moisture.

Mississippi County

The 134 acre field with a Dundee silt loam soil was located near Bassett and followed soybeans. No pre-plant fertilizer was applied. Following land preparations, the field was broadcast planted on October 25, 2021 at 115 pounds/acre with Dyna Gro 9811 + Cruiser Maxx Vibrance Cereal seed treatment. Wheat emerged on November 1, 2022 to a stand of 20 plants/sq.ft. Initial early spring fertilizer application of 50lbs/acre ammonium sulfate plus 50lbs/acre urea on March 17, 2022 followed by a second application of 100lbs/acre urea on March 30, 2022. The final application of spring fertilizer of 100lbs/acre urea was applied on April 7, 2022 for a total spring nitrogen rate of 126 pounds/acre. The field was harvested on June 20, 2022 and yielded 66 bushels/acre adjusted to 13.5% moisture.

Table1. General Agronomic Information of Verification Fields in 2021-2022.						
County	**Variety**	**Acres**	**Planting Method and Rate**	**Planting Date**	**Previous Crop**	**Yield Bu/a**
Arkansas	Maxie	30	Broadcast	10/26/21	Corn	55
Ashley	AGS 2055	118	Drilled	10/16/21	Corn	86
Drew	Pioneer P26R36	24	Drilled	10/23/21	Corn	56
Greene	Pioneer P26R36	76	Drilled	10/18/21	Corn	73
Lee	Local Seed LW 2848	248	Broadcast	10/20/21	Corn	76
Mississippi	Dyna Gro 9811	134	Broadcast	10/25/21	Soybean	66
Average		**105**		**10/21/2021**		**68.7 bu/A**

Table 2. Soil Type and Fertilizer Inputs for 2021-2022 Wheat Verification Fields.				
County	**Soil Type**	**Fall Fertilizer**	**Spring Fertilizer**	**Total Spring Nitrogen**
Arkansas	Dewitt silt loam	0-26-26	1st; 100# DAP + 50 # ammonium sulfate + 100 # urea 2nd; 100# urea	120
Ashley	Arklabutla, Calhoun silt loam	0-45-90	1st; 100# DAP + 50 # ammonium sulfate + 100 # urea 2nd; 100# urea	120
Drew	Calloway silt loam	0-0-0	1st; 50# DAP + 50# ammonium sulfate + 120# urea 2nd; 100 # urea	120
Greene	Fontaine & Calhoun Silt Loam	0-70-120	1st 50#ammonium sulfate + 50# urea 2nd 100# urea 3rd 83# urea + 17 # ammonium sulfate	121
Lee	Sharkey clay, Dubbs loam	0-0-0	1st; 75# DAP + 75# ammonium sulfate 2nd; 130# urea 3rd; 70# urea	120
Mississippi	Dundee Silt Loam	0-0-0	1st 50# ammonium sulfate + 50# urea 2nd 100# urea 3rd 100# urea	126
Average				**121 lbs N**

Table 3. Pesticide Information for the 2021-2022 Wheat Verification Fields.			
County	**Herbicide**	**Insecticide**	**Fungicide**
Arkansas	.9 oz. Harmony Extra	-	8 oz. Prosaro
Ashley	-	-	13.7 oz. Miravis Ace
Drew	2 oz. Zidua SC + 16.4 oz. Axial XL	-	13.7 oz. Miravis Ace
Greene	40 oz. Roundup Powermax- Burndown	-	13.7 oz. Miravis Ace
Lee	2 oz. Zidua SC	-	-
Mississippi	-	-	-

Economic Analysis of the 2022 Wheat Research Verification Program

This section reports information on costs and returns for the 2022 Wheat Research Verification Program (WRVP). Records of field operations on each field are the basis for estimating these costs. The field records were compiled by the WRVP coordinators, county Extension agents, and cooperators. Production data from the 6 fields were applied to determine costs and returns above operating costs, as well as total specified costs. Operating costs per bushel and total costs per bushel indicate the commodity price needed to meet each costs type.

Production expenses are those expenditures that would generally require annual cash outlays and would be included on an annual operating loan application. Actual quantities of all production 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. 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 and maintenance costs should be regarded as estimated values, and actual cash outlays could differ as producers utilize employee labor for equipment maintenance.

Ownership 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.

Budget summaries for wheat include operating costs, total costs, costs per bushel, and returns are presented in Table 4. Costs in this report do not include land costs, management, or other expenses and fees not associated with production. Price received for wheat was set at $7.57/bu for Northern and Southern fields. Price received is determined by the Arkansas average cash price during the reported harvest period of the WRVP fields. Average wheat yield for 2022 is 68.7 bu. per acre.

Average operating costs for wheat presented in Table 4 are $203.41 per acre. Table 5 indicates that fertilizers and nutrients are the largest expense category at $70.81 per acre, or 35% of total production expenses. Custom application cost is the second largest expense category at $30.96 per acre, or 15% of total production expenses.

With average yield of 68.7 bu. per acre, average operating costs are $3.04/bu. Operating costs range from a low of $148.99 per acre in Mississippi County to a high of $246.42 per acre for the Greene County field. Returns to operating costs average $316.62 per acre. The lowest operating cost is $201.43 in Arkansas County, and the high is $446.38 in Ashley County. Average fixed costs are $42.61 per acre which leads to average total costs of $245.92 per acre. Returns to total costs average $274.02 per acre with a low of $166.36 in Arkansas County and a high of $389.94 in Ashley County. Total specified costs average $3.66/bu.

Table 4. 2022 Operating Costs, Total Costs, and Returns

Field	Operating Costs	Operating Costs per Bushel	Returns to Operating Costs	Total Fixed Costs	Total Costs[1]	Returns to Total Costs	Total Costs per Bushel
Arkansas	214.92	3.91	201.43	35.06	249.99	166.36	4.55
Ashley	204.64	2.38	446.38	56.45	261.08	389.94	3.04
Drew	206.99	3.70	216.93	34.02	241.01	182.91	4.30
Greene	246.42	3.38	306.19	38.55	284.97	267.64	3.90
Lee	197.92	2.60	377.40	46.98	244.90	330.42	3.22
Mississippi	148.99	2.25	351.39	44.57	193.56	306.82	2.93
Average	**203.41**	**3.04**	**316.62**	**42.61**	**245.92**	**274.02**	**3.66**

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

Table 5. 2022 Revenue and Expenses per Acre

	Field						
Revenue	Arkansas	Ashley	Drew	Greene	Lee	Mississippi	**Average**
Yield (bu.)	55.0	86.0	56.00	73.00	76.0	66.0	68.7
Price ($/bu.)	7.57	7.57	7.57	7.57	7.57	7.57	7.57
Total Crop Revenue	**416.35**	**651.02**	**423.92**	**552.61**	**575.32**	**500.38**	**519.93**
Expenses							
Seed	28.80	26.40	24.00	28.80	24.00	27.60	26.60
Fertilizers & Nutrients	70.59	83.40	54.88	105.55	61.19	49.26	70.81
Chemicals	29.14	17.40	48.74	25.40	24.47	0.00	24.19
Custom Applications	43.00	14.50	35.50	36.50	33.75	22.50	30.96
Diesel Fuel	4.66	8.35	4.40	4.60	6.83	5.82	5.78
Irrigation Energy Costs	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Input Costs	**176.19**	**150.05**	**197.45**	**200.85**	**150.24**	**105.18**	**163.33**
Crop Insurance	8.22	8.22	8.22	8.22	8.22	8.22	8.22
Repairs & Maintenance[1]	7.45	11.77	8.28	8.70	9.50	10.08	9.30
Labor, Field Activities	3.34	6.60	3.13	3.29	4.84	4.17	4.23
Production Expenses	**195.20**	**176.64**	**224.14**	**221.06**	**172.80**	**127.65**	**186.25**
Interest	4.34	3.93	4.16	4.92	3.84	2.84	4.01
Post-harvest Expenses	14.85	24.08	15.68	20.44	21.28	18.51	19.14
Total Operating Expenses	**214.92**	**204.64**	**206.99**	**246.42**	**197.92**	**148.99**	**203.31**
Returns to Operating Expenses	**201.43**	**446.38**	**216.93**	**306.19**	**377.40**	**351.39**	**316.62**
Capital Recovery & Fixed Costs	35.06	56.45	34.02	38.55	46.98	44.57	42.61
Total Specified Expenses[2]	**249.99**	**261.08**	**241.01**	**284.97**	**244.90**	**193.56**	**245.92**
Returns to Specified Expenses	**166.36**	**389.94**	**182.91**	**267.64**	**330.42**	**306.82**	**274.02**
Operating Expenses/bu.	3.91	2.38	3.70	3.38	2.60	2.26	3.04
Total Specified Expenses/bu.	4.55	3.04	4.30	3.90	3.22	2.93	3.66