DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

2023
University of Arkansas System
Division of Agriculture
Wheat 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

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 an on-farm demonstration 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.

Four fields were enrolled in the WRVP for the 2022-2023 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 all silt loam, with three fields having a previous crop of corn and one field summer fallow. Fields were planted in mid-October with a seeding rate ranging from 100 to 125lbs/acre. All fields were drilled planted on 7.5” seed spacing. The Ashley and White County fields were sprayed with a foliar fungicide at flowering for Fusarium Head Blight suppression. The Greene, Jefferson and White County fields were treated with herbicides to control winter annuals. Yields from verification fields ranged from 92.3 bushels/acre in Ashley County to 62.0 bushels/acre in White County.

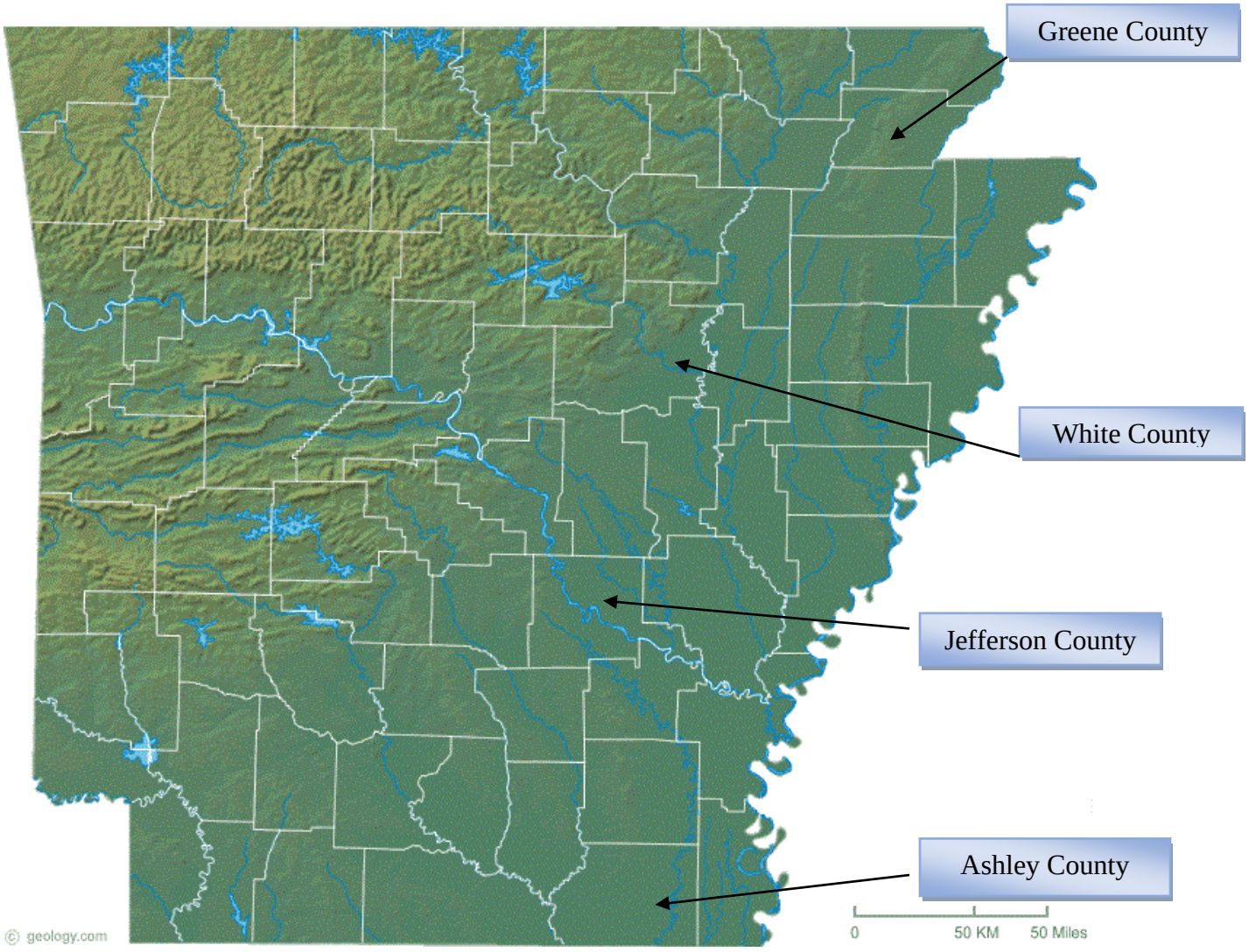
The 2022-2023 Arkansas wheat production season started off dry and several fields needed rain prior to planting or emergence. In late October rains occurred and fields emerged to an excellent stand. The precipitation from November to March was above average and fields with poor surface drainage suffered. Rainfall also delayed spring nitrogen applications in many instances. Dry weather during April and May was beneficial.

Spring nitrogen applications were applied starting in late February and continued until mid-March. Foliar disease levels were generally low. Ashley and White Counties were treated

with a foliar fungicide at flowering for suppression of Fusarium Head Blight. Insect pressure remained low throughout the growing season and no treatment was needed. Wheat research verification fields were harvested late May to mid- June. Arkansas producers planted an estimated 230,000 acres of wheat in the fall of 2022 and harvested 150,000 acres. Statewide average yield was estimated at 55 bu/acre. The verification program average yield for the 2022-2023 season was 74.5 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 the last 10-year period, the WRVP has averaged approximately 9 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 2022-2023 Wheat Research Verification Program Fields



Field Reviews

Southern Fields – Chad Norton

Ashley County

The 22-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 21, 2022 with AGS 2055 at 110 pounds/acre + Cruiser 5FS and Helena Seed Shield seed treatments. Wheat emerged on October 30 to a plant population of 23 plants/ft². Initial early spring fertilizer application 100 pounds/acre DAP plus 50 pounds/acre ammonium sulfate plus 100 pounds/acre urea was applied February 24, 2023, and second spring fertilizer application of 100 pounds/acre urea March 15 resulted in a total spring nitrogen rate of 120 pounds/acre. No herbicides were needed for weed control. Miravis Ace fungicide was aerially applied at flowering on April 30 at 13.7 ounces/acre for Fusarium Head Blight suppression. The field was harvested on May 28 and yielded 92.3 bushels/acre adjusted to 13.5% moisture.

Jefferson County

The 57-acre field with a Rilla silt loam soil was located east of Cornerstone and followed corn. Following land preparation and a fertilizer application of 0-0-60, according to soil test recommendations, the field was drill seeded October 22, 2022 at 100 pounds/acre with Delta Grow 1800 + Cruiser 5SF seed treatment. Wheat emerged October 30 to a plant population of 21 plants/ft². An application of .9 ounces/acre of Harmony Extra herbicide was made on February 22, 2023, for winter annual broadleaf weed control. Initial early spring fertilizer application of 50 pounds/acre Ammonium sulfate plus 140 pounds/acre urea was applied February 27 and second spring fertilizer application of 100 pounds/acre urea March 18 resulted in a total spring nitrogen rate of 120 pounds/acre. The field was harvested June 4 and yielded 65 bushels/acre adjusted to 13.5% moisture.

Northern Fields – Chris Elkins

Greene County

The 75-acre field with Calloway & Fountain silt loam soil was located west of Walcott and followed corn. Following burndown application of 1 quart/acre glyphosate, a pre-plant fertilizer application of 0-50-80, according to soil test recommendations was applied. The field was no-till drilled planted on October 10, 2022, with Pioneer P26R41 + Cruiser 5SF seed treatment at 125 pounds/acre. Wheat emerged on October 19, 2022, to a stand of 19.9 plants/ ft². Initial early spring fertilizer application of 50lbs/acre ammonium sulfate plus 50 pounds/acre urea was on February 21, 2023, followed by 100 pounds/acre urea on March 7, 2023. The final spring nitrogen application of 100 pounds/acre 41-0-0-4 was applied on March 29, 2023, for a total spring nitrogen rate of 121 pounds/acre. One herbicide application of 0.9 ounces/acre Harmony Extra was applied on March 15, 2023, for broadleaf weed control. The field was harvested June 6 and yielded 78.6 bushels/acre adjusted to 13.5% moisture.

White County

The 48-acre field with Calloway silt loam soil was located south of Higginson and was planted on summer fallow ground. A pre-plant fertilizer of 1.5 tons poultry litter was applied, according to soil test recommendation. The field was drill planted on October 21, 2022 with Progeny Chad at 120 pounds/acre. A delayed pre-emerge application of 3.25 ounces/acre Zidua for ryegrass control was made on October 26, 2022. Wheat emerged on October 28, 2022 to a stand of 33.3 plants/ ft². Initial early spring fertilizer application of 75 pounds/acre urea plus 50 pounds/acre ammonium sulfate was applied on February 20, 2023. The final nitrogen application of 100 pounds/acre urea was applied on March 6, 2023. Total spring nitrogen rate of 91 pounds/acre was applied. Prosaro fungicide was aerially applied at flowering on April 19 at 6.5 ounces/acre for Fusarium Head Blight suppression. The field was harvested on June 20, 2023, and yielded 62.0 bushels/acre adjusted to 13.5% moisture.

Table1. General Agronomic Information of Verification Fields in 2022-2023.

County	Variety	Acres	Planting Method	Seeding Rate lb/a	Planting Date	Previous Crop	Yield Bu/a
Ashley	AGS 2055	22	Drilled	110	10/21/22	Corn	92.3
Greene	Pioneer P26R41	75	Drilled	125	10/10/22	Corn	78.6
Jefferson	Delta Grow 1800	57	Drilled	100	10/22/22	Corn	65
White	Progeny Chad	48	Drilled	120	10/21/22	Fallow	62
Average		**50.5**		**113.8**	**10/19/22**		**74.5 bu/A**

Table 2. Soil Type and Fertilizer Inputs for 2022-2023 Wheat Verification Fields.

County	Soil Type	Fall Fertilizer	Spring Fertilizer	Total Spring Nitrogen
Ashley	Arklabutla, Calhoun silt loam	0-45-90	1st; 100# DAP + 50 # ammonium sulfate + 100 # urea 2nd; 100# urea	120
Greene	Calloway & Fontaine silt loam	0-50-80	1st, 50# ammonium sulfate + 50# urea; 2nd, 100# urea; 3rd, 100# 41-0-0-4	121
Jefferson	Rilla silt loam	0-0-60	1st; 50 # ammonium sulfate + 140 # urea 2nd; 100 # urea	120
White	Calloway Silt Loam	1.5 ton Poultry Litter	1st, 75# urea + 50# ammonium sulfate; 2nd, 100 # urea	91
Average				**113 lbs N**

Table 3. Pesticide Information for the 2022-2023 Wheat Verification Fields.			
County	**Herbicide**	**Insecticide**	**Foliar Fungicide**
Ashley	None	None	13.7 oz. Miravis Ace
Greene	Burndown: 1 qt. glyphosate. Post emergence: .9 oz Harmony Extra	None	None
Jefferson	.9 oz. Harmony Extra	None	None
White	3.25 oz. Zidua	None	6.5 oz. Prosaro

Economic Analysis of the 2023 Wheat Research Verification Program

This section reports information on costs and returns for the 2023 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 4 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 fall 2022 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.

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. Budget summaries for wheat are presented in Table 4. Price received for wheat grain was estimated to be $8.70/bu. and is determined by the Arkansas average cash price during the reported harvest period of the WRVP fields. Average wheat yield was 74.5 bu. per acre.

Average operating costs for wheat in Table 4 are $367.34 per acre. Table 5 indicates that fertilizers and nutrients are the largest expense category at $170.45 per acre, or 46% of total production expenses. Seed cost is the second largest expense category at $51.19 per acre, or 14% of total production expenses.

With an average yield of 74.5 bu. per acre, average operating costs are $5.00/bu. Operating costs range from a low of $327.97 per acre in Jefferson County to a high of $432.79 per acre in the Greene County field. Returns to operating costs average $280.59 per acre. The low is $205.79 in White County, and the high is $428.02 in Ashley County. Average fixed costs are $62.86 per acre which leads to average total costs of $430.20 per acre. Returns to total costs average $217.74 per acre with a low of $144.47 in Jackson County and a high of $354.69 in Ashley County. Total specified costs average $5.86/bu.

Table 4. 2023 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
Ashley	374.99	4.06	428.02	73.32	448.32	354.69	4.86
Greene	432.79	5.51	251.03	52.83	485.62	198.20	6.18
Jefferson	327.97	5.05	237.53	63.95	391.92	173.58	6.03
White	333.61	5.38	205.79	61.32	394.93	144.47	6.37
Average	**367.34**	**5.00**	**280.59**	**62.86**	**430.20**	**217.74**	**5.86**

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

Table 5. 2023 Revenue and Expenses per Acre

	Field				
Revenue	Ashley	Greene	Jefferson	White	**Average**
Yield (bu.)	92.30	78.6	65.0	62.0	74.5
Price ($/bu.)	8.70	8.70	8.70	8.70	8.70
Total Crop Revenue	**803.01**	**683.82**	**565.50**	**539.40**	**647.93**
Expenses					
Seed	49.50	56.25	45.00	54.00	51.19
Fertilizers & Nutrients	173.38	218.28	152.50	137.50	170.45
Chemicals	18.36	32.35	11.83	30.84	23.35
Custom Applications	36.00	48.00	39.20	34.00	39.30
Diesel Fuel	23.50	12.95	18.02	17.12	17.90
Irrigation Energy Costs	0.00	0.00	0.00	0.00	0.00
Input Costs	**300.74**	**367.80**	**266.55**	**273.46**	**302.14**
Crop Insurance	8.22	8.22	8.22	8.22	8.22
Repairs & Maintenance[1]	15.64	11.71	13.97	13.58	13.72
Labor, Field Activities	7.25	3.62	5.06	4.79	5.18
Scouting/Consultant Fee	5.50	5.50	5.50	5.50	5.50
Production Expenses	**337.35**	**396.85**	**299.30**	**305.55**	**334.76**
Interest	11.81	13.89	10.48	10.69	11.71
Post-harvest Expenses	25.84	22.01	18.20	17.36	20.85
Total Operating Expenses	**374.99**	**432.79**	**327.97**	**333.61**	**367.34**
Returns to Operating Expenses	**428.02**	**251.03**	**237.53**	**205.79**	**280.59**
Capital Recovery & Fixed Costs	73.32	52.83	63.95	61.32	62.86
Total Specified Expenses[2]	**448.32**	**485.62**	**391.92**	**394.93**	**430.20**
Returns to Specified Expenses	**354.69**	**198.20**	**173.58**	**144.47**	**217.735**
Operating Expenses/bu.	4.06	5.51	5.05	5.38	5.00
Total Specified Expenses/bu.	4.86	6.18	6.03	6.37	5.86