DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

2018
University of Arkansas
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

Table of Contents

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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.

Five producer fields were enrolled in the WRVP for the 2017-2018 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.

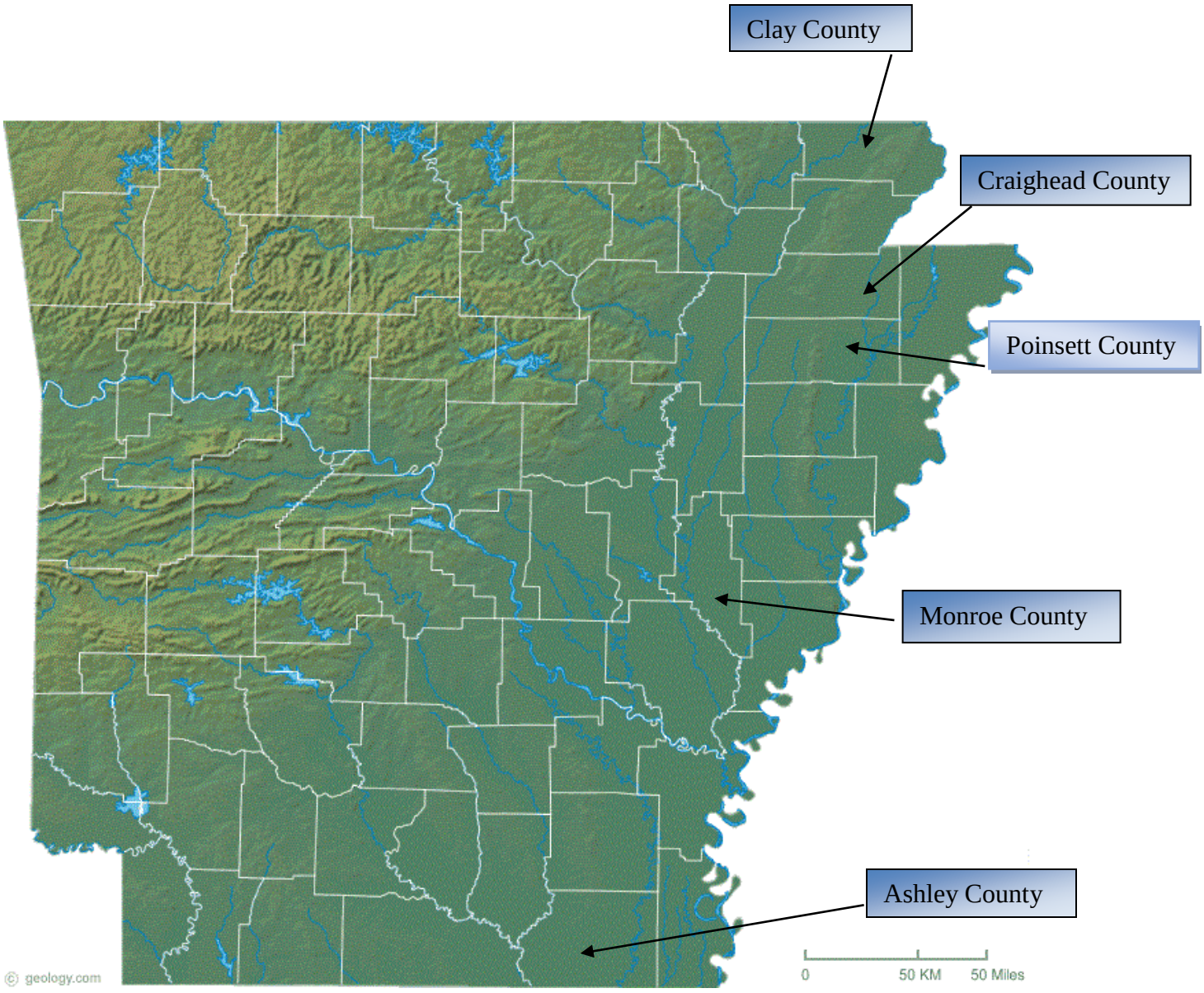
Soil types for fields enrolled in the program ranged from sandy loam to silt loam, with previous crops of soybean and corn. Fields were planted from mid-October to late-October with seeding rates ranging from 100-120lbs drilled. No fields were treated for insects throughout the growing season. The Clay and Poinsett County fields were sprayed with a fungicide to control foliar diseases. The Ashley and Monroe County fields were sprayed with a fungicide as a preventative for fusarium head scab. The Clay, Craighead, Poinsett, and Monroe fields were treated with herbicides to control ryegrass or broadleaf winter weeds. Yields from verification fields ranged from 53.7 bushels/acre in Craighead County to 99.3 bushels/acre in Ashely County.

The 2017-2018 Arkansas wheat production season started off with a relatively dry and warm fall, but most areas received adequate rainfall to get timely wheat emergence. Frequent light showers and mild temperatures helped to keep growing conditions favorable and good tillering was observed prior to winter dormancy. The winter was colder than in past years and

the cool temperatures continued into spring greenup. February was unusually cold and wet with many areas receiving flooding rains that resulted in saturated soil conditions that hampered growth and delayed fertilizer and herbicide applications on many fields. A late freeze on the first week of April caused some levels of freeze damage, depending on region of the state and growth stage of the wheat at the time of the freeze with areas in the central portion of the state experiencing the greatest level of freeze damage. Foliar disease levels were generally low for leaf and stripe rust, but with adequate rainfall the potential for Fusarium Head Scab warranted preventative treatment on several fields. Despite being wet for most of the growing season, May brought near record warm and dry conditions that shorted grain fill duration, but resulted in good grain quality this year. With warm and dry weather, harvest started in late May in Southern Arkansas and was completed by late June in Northeast Arkansas. Arkansas producers planted an estimated 180,000 acres of wheat in the fall of 2017 with a statewide estimated yield of 56 bushel/acre. The verification program average yield for the 2017-2018 season was 69 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 13 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 2017-2018 Wheat Research Verification Program Fields



Field Reviews

Southern Fields – Chad Norton

Ashley County

The 80 acre field with a McGehee and Arkabutla silt loam soil type, was located east of Hamburg and followed corn. Following land preparation and a fertilizer application of 0-50-90, according to soil test recommendations, the field was drill seeded on October 15, 2017 with Pioneer 26R41 with Cruiser 5FS seed treatment, at 120 pounds/acre. It emerged on October 22, 2017 to a stand of 25 plants/ft². No herbicide applications were warranted for weed control. Initial early spring fertilizer application of 100 pounds DAP plus 50 pounds ammonium sulfate plus 100 pounds urea per acre was applied January 31, 2018. Second spring fertilizer application of 100 pounds urea/acre was applied March 5, 2018 for a total spring N rate of 120 pounds/acre. Second nitrogen application was delayed due to standing water and extremely wet soil conditions from heavy February rains. On April 12, 2018 a fungicide application of 8 ounces/acre Prosaro was applied as a preventative for head scab. The field was harvested on May 28, 2018 yielding 99.25 bushels/acre adjusted to 13.5% moisture.

Monroe County

The 33 acre field with a Foley-Calhoun-Bonn complex soil, was located northeast of Holly Grove and followed soybeans. Following a fertilizer application of 0-90-120, according to soil test recommendations, the field was drill seeded on October 24, 2017 with AGS 2038 with Cruiser 5FS seed treatment, at 110 pounds/acre. It emerged November 5, 2017 to a stand of 19 plants/ft². During January the field was severely grazed by geese. On February 1, 2018 the initial early spring fertilizer application of 100 pounds/acre ammonium sulfate was applied. In the next couple of weeks after the initial fertilizer application, the field was again grazed by geese. Harmony Extra at 0.9 ounces/acre was applied as a post-emergence herbicide for broadleaf weed control on March 7, 2018. Second fertilizer application of 130 pounds urea/acre was applied March 8, 2018 and third fertilizer application of 50 pounds DAP plus 110 pounds urea per acre was applied March 15, 2018 for a total spring N rate of 140 pounds/acre. Second and third fertilizer applications were severely delayed due to extremely saturated soil conditions from heavy February rain. In addition, freezing temperatures the last couple weeks in March and first couple weeks in April resulted in noticeable freeze damage to heads that did result in a yield reduction. On April 30, 2018 a fungicide application of 8 ounces per acre Prosaro was used as a preventative for head scab. The field was harvested June 11, 2018 yielding 59.7 bushels/acre adjusted to 13.5% moisture.

Northern Fields – Chris Elkins

Clay County

The 76 acre field with Dundee and Foley Silt Loam soils, was located west of McDougal and followed corn. Following land preparation and a fertilizer application of 0-50-80, according to soil sample recommendations, the field was drill seeded on October 30, 2017 with Armor Havoc with Vibrance Extreme seed treatment, at 120 pounds/acre. Emergence occurred on November 8, 2017 and had a stand of 32 plants/ft². On March 17, 2018, Harmony Extra at 0.75 ounces/acre was applied as a post-emergence herbicide for broadleaf weed control. The initial early spring fertilizer application of 75 pounds ammonium sulfate plus 75 pounds urea/acre was applied March 9, 2018. The second fertilizer application of 160 pounds urea/acre was applied March 16, 2018, for a total spring N rate of 124 pounds/acre. Early spring nitrogen applications were made later due to excess rains and flooding during the month of February. On May 4, 2018, 4oz Tilt was applied for control of Septoria Tritici Blotch. The field was harvested on June 26, 2018 yielding 58.0 bushel/acre.

Craighead County

The 147 acre field with a Beulah Fine Sandy Loam soil, was located 3 miles south of Lake City and followed soybeans. The field was drilled seeded on October 13, 2017 with Pioneer 26R41 at 100 pounds/acre. The field emerged on October 19, 2017 to a stand of 23 plants/ft². On October 20, 2017 a fertilizer application of 0-0-90 was applied, according to soil sample recommendations. The initial early spring fertilizer application of 75 pounds ammonium sulfate plus 75 pounds urea/acre was applied February 19, 2018. On March 12, 2018, Harmony Extra at 0.9 ounces/acre was applied as a post-emergence herbicide for broadleaf control. The second fertilizer application of 115 pounds urea/acre was applied March 14, 2018. Several areas of the field remained wet during late spring and delayed herbicide and second fertilizer application timing. Disease and insect pressure remained low and did not reach treatment threshold. The field was harvest on June 6, 2018 yielding 53.7 bushels/acre adjusted to 13.5% moisture.

Poinsett County

The 66 acre field with a Falaya Silt Loam soil type, was located 5 miles east of Harrisburg and followed soybeans. Following land preparation and a fertilizer application of 0-60-90, according to soils sample recommendations, the field was drill seeded on October 20, 2017 with Dyno Gro 9012 with Cruiser 5FS seed treatment, at 106 pounds/acre. On October 23, 2017 an application of 32 ounce generic glyphosate and 1.5 ounce Zidua was applied as a delayed pre-emerge for ryegrass control. Wheat emerged on October 31, 2017 to a stand of 21 plants/ft². On November 17, 2017, 16.4 ounces Axial XL was applied as a 100 feet field border treatment for ryegrass control. The initial early spring fertilizer application of 50 pounds ammonium sulfate and 50 pounds of urea/acre was applied February 5, 2018. Second and third spring fertilizer applications of 100 pounds/acre urea each were applied February 17, 2018 and March 16, 2018 respectively, for a total spring N rate of 126 pounds/acre. Excellent field drainage allowed for timely fertilizer application. On April 27, 2018 10.5 ounces/acre Azoxyprop Xtra was applied for the control of Septoria Tritici Blotch. The field was harvested on June 4, 2018 yielding 73.2 bushels/acre adjusted to 13.5% moisture.

Table1. General Agronomic Information of Verification Fields in 2017-2018.						
County	**Variety**	**Acres**	**Planting Method and Rate**	**Planting Date**	**Previous Crop**	**Yield Bu/a**
Ashley	Pioneer 26R41	80	Drill 120 lbs/A	Oct. 15	Corn	99.3
Clay	Armor Havoc	76	Drill 120lbs/A	Oct. 30	Corn	58.0
Craighead	Pioneer 26R41	147	Drill 100lbs/A	Oct. 13	Soybean	53.7
Monroe	AGS 2038	33	Drill 110lbs/A	Oct. 24	Soybean	59.7
Poinsett	Dyna-Gro 9012	66	Drill 106lbs/A	Oct. 20	Soybean	73.2
Average						**68.8bu/A**

Table 2. Soil Type and Fertilizer Inputs for 2017-2018 Wheat Verification Fields.				
County	**Soil Type**	**Fall Fertilizer**	**Spring Fertilizer**	**Total Spring Nitrogen**
Ashley	Calhoun & Arkabutla silt loam	0-50-90	Jan. 31 – 100lbs. DAP + 100lbs. Urea + 50lbs. Ammonium Sulfate Mar. 5 – 100lbs. Urea	120
Clay	Dundee/Foley Silt Loam	0-50-80	Mar. 9 – 75lbs Ammonium Sulfate + 75lbs Urea Mar.16 – 160lbs. Urea	124
Craighead	Beulah Fine Sandy Loam	0-0-90	Feb. 19- 75lbs. Ammonium Sulfate + 75lbs Urea Mar. 14 – 115lbs. Urea	103
Monroe	Foley-Calhoun-Bonn Complex	0-90-120	Feb.1 – 100lbs. Ammonium Sulfate Mar. 8 – 130lbs. Urea Mar. 15- 50lbs. DAP +110lbs Urea	140
Poinsett	Falaya Silt Loam	0-60-90	Feb. 5 – 50lbs Ammonium Sulfate + 50lbs Urea Feb. 17 – 100lbs Urea March 16 – 100lbs Urea	126
Average				**123 lbs N**

Table 3. Pesticide Information for the 2017-2018 Wheat Verification Fields.			
County	**Herbicide**	**Insecticide**	**Fungicide**
Ashley	-	-	Apr. 12 – 8 oz/A Prosaro
Clay	March 17- .75oz/A Harmony Extra + 1% NIS	-	May 4- 4 oz/A Tilt
Craighead	March 12- .9 oz/A Harmony Extra + 1%NIS	-	
Monroe	March 7 -.9oz Harmony Extra + 1% NIS	-	Apr. 30- 8 oz/A Prosaro
Poinsett	Oct. 22 -32oz Generic Glyphosate, 1.5oz Zidua Nov 17(Border only)-16.4 oz Axial Xl,	-	Apr. 27 – 10.5 oz/A Azoxyprop Xtra

Economic Analysis of the 2018 Wheat Research Verification Program

This section reports information on costs and returns for the 2018 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 5 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 2017 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 1. 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 2. Price received for wheat of $5.00/bu. is determined by the Arkansas average cash price during the reported harvest period of the WRVP fields. Average wheat yield is 68.77 bu. per acre.

Average operating costs for wheat in Table 1 are $244.17 per acre. Table 2 indicates that fertilizers and nutrients are the largest expense category at $90.93 per acre, or 37% of total production expenses. Seed costs average $37.25 per acre, and fungicides average $10.07 per acre. One field, Craighead, had no fungicides applied.

With average yield of 68.77 bu. per acre, average operating costs are $3.67/bu. Operating costs range from a low of $188.83 per acre in Craighead County to a high of $293.96 per acre in the Monroe County field. Returns to operating costs average $99.68 per acre. The low is $4.54 in Monroe County, and the high is $220.82 in Ashley County. Average fixed costs are $50.75 per acre which leads to average total costs of $294.93 per acre. Returns to total costs average $48.92 per acre with a low of -$29.82 in Monroe County and a high of $150.90 in Ashley County. Total specified costs average $4.42/bu.

Table 1. 2018 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	275.43	2.78	220.82	69.92	345.35	150.90	3.48
Clay	228.75	3.94	61.25	55.68	284.42	5.58	4.90
Craighead	188.83	3.52	79.67	46.42	235.25	33.25	4.38
Monroe	293.96	4.92	4.54	34.36	328.32	-29.82	5.50
Poinsett	233.90	3.20	132.10	47.39	281.29	84.71	3.84
Average	**244.17**	**3.67**	**99.68**	**50.75**	**294.93**	**48.92**	**4.42**

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

Table 2. 2018 Revenue and Expenses per Acre

	Field					
Revenue	Ashley	Clay	Craighead	Monroe	Poinsett	**Average**
Yield (bu.)	99.25	58.00	53.70	59.70	73.20	68.77
Price ($/bu.)	5.00	5.00	5.00	5.00	5.00	5.00
Total Crop Revenue	**496.25**	**290.00**	**268.50**	**298.50**	**366.00**	**343.85**
Expenses						
Seed	43.20	38.40	32.00	38.71	33.92	37.25
Fertilizers & Nutrients	104.80	80.29	60.79	128.31	80.45	90.93
Herbicides	0.00	10.09	13.34	12.51	16.21	10.43
Insecticides	0.00	0.00	0.00	0.00	0.00	0.00
Fungicides	18.31	1.64	0.00	18.31	12.10	10.07
Custom Applications	31.50	42.70	32.55	48.30	35.00	38.01
Diesel Fuel	14.19	9.81	8.62	6.26	8.12	9.40
Irrigation Energy Costs	0.00	0.00	0.00	0.00	0.00	0.00
Input Costs	**212.60**	**188.33**	**147.30**	**252.40**	**185.80**	**197.29**
Crop Insurance	7.85	7.85	7.85	7.85	7.85	7.85
Repairs & Maintenance[1]	14.21	13.29	11.24	8.05	10.63	11.48
Labor, Field Activities	8.49	4.08	3.83	3.25	4.74	4.88
Production Expenses	**243.15**	**213.55**	**170.22**	**271.55**	**209.02**	**221.50**
Interest	5.09	4.37	3.57	5.70	4.39	4.62
Post-harvest Expenses	26.80	16.24	15.04	16.72	20.49	19.06
Total Operating Expenses	**275.43**	**228.75**	**188.83**	**293.96**	**233.90**	**244.17**
Returns to Operating Expenses	**220.82**	**61.25**	**79.67**	**4.54**	**132.10**	**99.68**
Capital Recovery & Fixed Costs	69.92	55.68	46.42	34.36	47.39	50.75
Total Specified Expenses[2]	**345.35**	**284.42**	**235.25**	**328.32**	**281.29**	**294.93**
Returns to Specified Expenses	**150.90**	**5.58**	**33.25**	**-29.82**	**84.71**	**48.92**
Operating Expenses/bu.	2.78	3.94	3.52	4.92	3.20	3.67
Total Specified Expenses/bu.	3.48	4.90	4.38	5.50	3.84	4.42