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Wheat Research Verification Program

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**ROW CROP
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Table of Contents

Authors and Acknowledgements	Page 2
Introduction	Page 3
Figure 1. Location of 2019 Wheat Research Verification Program Fields	Page 5
Field Reviews	Page 6
Table 1. General Agronomic Information	Page 7
Table 2. Soil Type and Fertilizer Inputs	Page 7
Table 3. Pesticide Information	Page 8
Economic Analysis	Page 9
Table 4. Operating Costs, Total Costs, and Returns	Page 10
Table 5. Summary of Revenue and Expenses per Acre	Page 11

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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.

Two producer fields were enrolled in the WRVP for the 2018-2019 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.

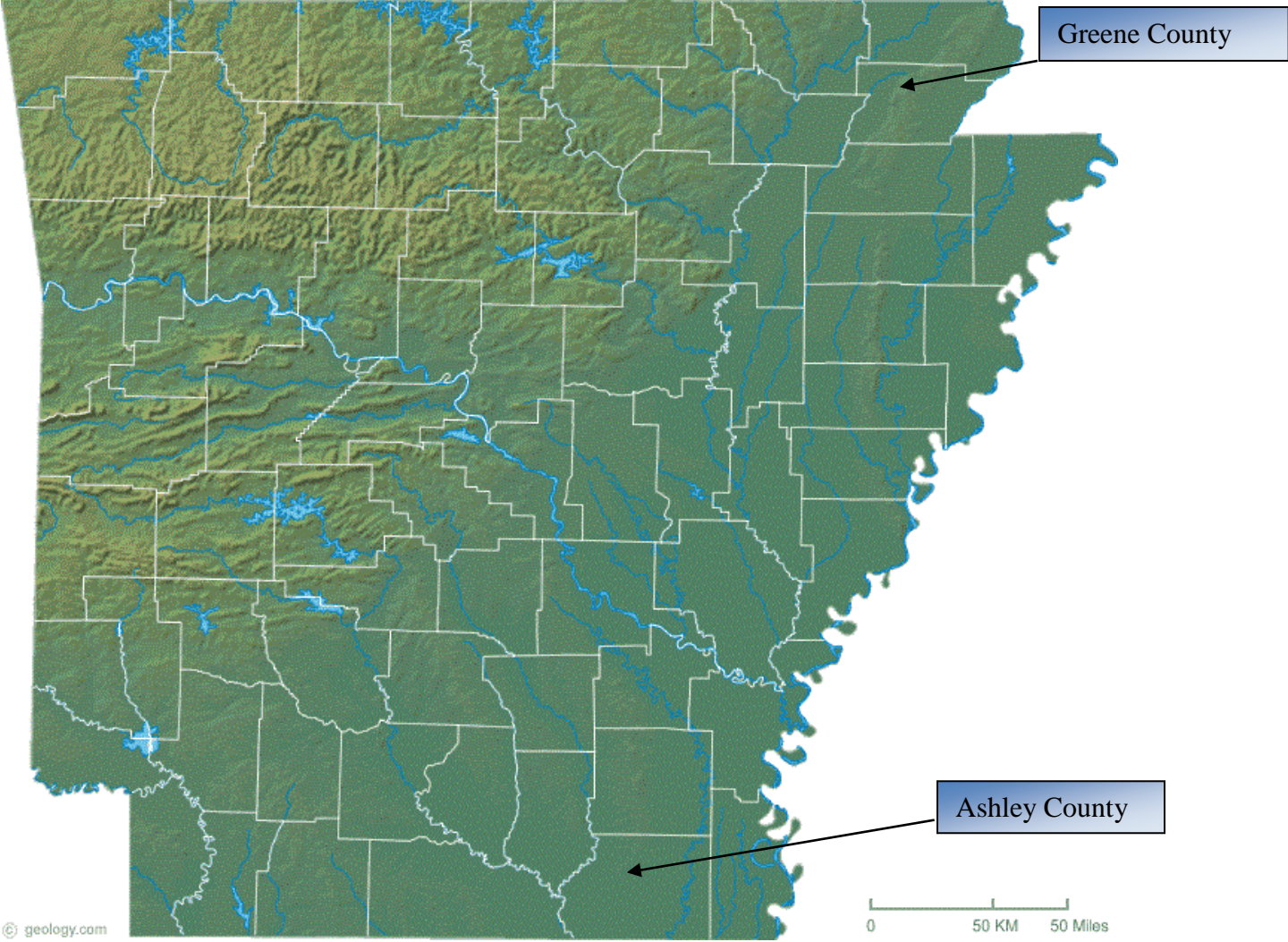
Soil type for fields enrolled in the program was silt loam, with previous crops of soybean and corn. Fields were planted in mid-October with a seeding rate of 120lbs drilled. The Greene County field was treated for armyworms at flowering to prevent head clipping. The Ashley County field was sprayed with a fungicide at flowering as a preventative for fusarium head scab. The Ashley and Greene County fields were both treated with herbicides to control broadleaf winter annual weeds. Yields from verification fields ranged from 55.3 bushels/acre in Greene County to 74.5 bushels/acre in Ashley County.

The 2018-2019 Arkansas wheat production season started slow with delayed rotational crop harvest due to excess rains. Above average rainfall totals had a significant impact on the number of acres planted and on planting dates statewide. The WRVP program had four planned fields that were impacted and unable to plant. The two fields planted had planting dates in mid-October. Unfortunately, the above average rainfall pattern continued into 2019 and in some parts of the state record monthly rainfall totals were recorded. The WRVP fields had adequate drainage, but high rainfall amounts still reduced overall yield potential on both fields.

Due to wet weather, spring nitrogen applications were delayed, which may have also reduced yield potential. Temperatures for the fall and spring growing season were relatively normal and freeze damage was not significant. Foliar disease levels were generally low for leaf and stripe rust, but with adequate rainfall the potential for Fusarium Head Scab warranted a preventative fungicide treatment in the Ashley County field. Armyworm pressure was unusually high at flowering in the Greene County field and an insecticide was applied for control. Harvest started in Southern Arkansas in late May and was completed in mid-June in Northern Arkansas. Arkansas producers planted an estimated 90,000 acres of wheat in the fall of 2018 and harvested 60,000 acres. Due to a very wet fall that prevented most acres from being planted, state acreage was the lowest in recent history. Statewide average yield was estimated at 60 bu/acre. The verification program average yield for the 2018-2019 season was 65 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 2018-2019 Wheat Research Verification Program Fields



Field Reviews

Southern Field – Chad Norton

Ashley County

The 40 acre field, soil types Calhoun and Arkabutla silt loam, 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 on October 22, 2018 with Pioneer 26R41 with Cruiser 5FS seed treatment, at 120 pounds/acre. It emerged on October 29, 2018 to a stand of 28 plants/sq.ft. Initial early spring fertilizer application of 100 pounds/acre DAP plus 50 pounds/acre Ammonium Sulfate plus 100 pounds/acre Urea per acre was applied February 2, 2019. An application of 0.9 ounces/acre Harmony Extra plus 1% non-ionic surfactant on February 25, 2019 was utilized for broadleaf annual weeds control. Second spring fertilizer application of 100 pounds/acre Urea was applied February 27, 2019 for a total spring Nitrogen rate of 120 pounds/acre. On April 21, 2019 a foliar fungicide application of 7.4 ounces/acre Prosaro was applied as a preventative for head scab. The field was harvested on May 30, 2019 yielding 74.5 bushels/acre adjusted to 13.5% moisture.

Northern Field – Chris Elkins

Greene County

The 21 acre field with a Calloway silt loam soil type, was located west of Walcott and followed soybeans. A fertilizer application of 0-100-120 was applied, according to soil test recommendations. The field was drill seeded on October 19, 2018 with Pioneer 26R41 at 120 pounds/acre. It emerged on November 2, 2018 to a stand of 26 plants/sq.ft. Initial spring fertilizer application of 50 pounds/acre Ammonium Sulfate plus 50 pounds/acre Urea was applied February 27, 2019. An application of 0.9 ounces/acre Harmony Extra plus 1% non-ionic surfactant on March 12, 2019 was utilized for broadleaf annual weed control. Second spring fertilizer application of 100 pounds/acre Urea was applied March 19, 2019. Final application of spring fertilizer of 100 pounds/acre Urea was applied March 27, 2019 for a total spring Nitrogen rate of 126 pounds/acre. On May 13, 2019 an insecticide application of 1.92 ounces/acre Ravage was applied for control of armyworms that were starting to cut heads. Due to the wet spring all spring fertilizer and insecticide applications were made by air. The field was harvested on June 14, 2019 yielding 55.3 bushels/acre adjusted to 13.5% moisture.

County	Variety	Acres	Planting Method and Rate	Planting Date	Previous Crop	Yield Bu/a
Ashley	Pioneer 26R41	40	Drill 120lb/A	10/22/18	Corn	74.5
Greene	Pioneer 26R41	21	Drill 120lbs/A	10/19/18	Soybean	55.3
Average						64.9 bu/A

County	Soil Type	Fall Fertilizer	Spring Fertilizer	Total Spring Nitrogen
Ashley	Calhoun silt loam Arklabutla silt loam	0-45-90	1 st Feb 2- 100lbs DAP +100lbs Urea +100lbs Ammonium Sulfate 2 nd Feb 27 100lbs Urea	120
Greene	Calloway Silt loam	0-100-120	1 st Feb 27- 50lbs Ammonium Sulfate +50lbs Urea, 2 nd March 19- 100lbs Urea, 3 rd March 27-100lbs Urea	126
Average				123 lbs N

Table 3. Pesticide Information for the 2017-2018 Wheat Verification Fields.			
County	Herbicide	Insecticide	Fungicide
Ashley	February 25- .9oz/A Harmony Extra + 1% NIS	-	Apr. 21 – 7.4 oz/A Prosaro
Greene	March 12- .9oz/A Harmony Extra + 1% NIS	May13- 1.92oz/A Ravage	-

Economic Analysis of the 2019 Wheat Research Verification Program

This section reports information on costs and returns for the 2019 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 2 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 2018 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 \$4.80/bu. is determined by the Arkansas average cash price during the reported harvest period of the WRVP fields. Average wheat yield is 64.9 bu. per acre.

Average operating costs for wheat in Table 1 are \$300.98 per acre. Table 2 indicates that fertilizers and nutrients are the largest expense category at \$123.37 per acre, or 41% of total production expenses. Seed costs average \$39.00 per acre, and fungicides average \$8.59 per acre. One field, Greene, had no fungicides applied.

With average yield of 64.9 bu. per acre, average operating costs are \$4.76/bu. Operating costs range from a low of \$294.61 per acre in Ashley County to a high of \$307.34 per acre in the Greene County field. Returns to operating costs average \$10.55 per acre. The low is -\$41.90 in Greene County, and the high is \$62.99 in Ashley County. Average fixed costs are \$50.20 per acre which leads to average total costs of \$351.17 per acre. Returns to total costs average -\$39.65 per acre with a low of -\$83.13 in Greene County and a high of \$3.83 in Ashley County. Total specified costs average \$5.53/bu.

Table 4. 2019 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	294.61	3.95	62.99	59.16	353.77	3.83	4.75
Greene	307.34	5.56	-41.90	41.23	348.57	-83.13	6.30
Average	300.98	4.76	10.55	50.20	351.17	-39.65	5.53

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

Table 5. 2019 Revenue and Expenses per Acre

	Field		
Revenue	Ashley	Greene	Average
Yield (bu.)	74.5	55.3	64.9
Price (\$/bu.)	4.80	4.80	4.80
Total Crop Revenue	357.60	265.44	311.52
Expenses			
Seed	42.00	36.00	39.00
Fertilizers & Nutrients	91.56	155.18	123.37
Herbicides	12.72	11.38	12.05
Insecticides	0.00	0.90	0.45
Fungicides	17.17	0.00	8.59
Custom Applications	44.00	47.50	45.75
Diesel Fuel	13.48	8.23	10.86
Irrigation Energy Costs	0.00	0.00	0.00
Input Costs	235.12	259.18	247.15
Crop Insurance	10.00	10.00	10.00
Repairs & Maintenance ¹	13.55	10.46	12.01
Labor, Field Activities	7.75	4.40	6.08
Production Expenses	266.43	284.04	275.24
Interest	7.33	7.81	7.57
Post-harvest Expenses	20.87	15.48	18.18
Total Operating Expenses	294.61	307.34	300.98
Returns to Operating Expenses	62.99	-41.90	10.55
Capital Recovery & Fixed Costs	59.16	41.23	50.20
Total Specified Expenses²	353.77	348.57	351.17
Returns to Specified Expenses	3.83	-83.13	-39.65
Operating Expenses/bu.	3.95	5.56	4.76
Total Specified Expenses/bu.	4.75	6.30	5.53