

**2001- 2002 Arkansas**



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**UNIVERSITY OF ARKANSAS**  
**DIVISION OF AGRICULTURE**  
Cooperative Extension Service

**U.S. Department of Agriculture  
and County Governments Cooperating**

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is funded by Arkansas wheat producers  
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## 2001-2002 WHEAT RESEARCH VERIFICATION PROGRAM

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## **Abstract**

The 2001-2002 Wheat Research Verification Program (WRVP) was implemented by the University of Arkansas Cooperative Extension Service on 14 producer fields located in Ashley, Clay, Conway, Craighead, Cross, Jefferson, Johnson, Lafayette, Lee, Lincoln, Logan, Prairie (2), and St. Francis Counties. Favorable fall weather resulted in good to excellent stand establishment. Eight varieties were selected based upon performance and characteristics determined by the University of Arkansas variety tests. Soil types ranged from sandy loam to clay, with previous crops of corn, soybean, rice, and summer fallow. Seeding dates ranged from October 9 through November 10, with seeding rates varying from 100 to 160 lbs/ac. Nine fields were drill seeded with the remaining five broadcast seeded. Ryegrass, wild garlic, and other winter weeds were common and required the use of herbicide on 10 fields. Significant spring rainfall occurred in many areas throughout the state, which attributed to poor wheat yields in some poorly drained fields. Although many acres across the state were treated for stripe rust, only three WRVP fields were treated with a fungicide in the spring. True armyworm numbers were down from the previous year, and only one WRVP field was treated with an insecticide. A May hailstorm caused 100% crop loss of the Craighead County field; therefore, no data from this location will be reported. Harvest dates ranged from June 4 through June 21. Average yield for the WRVP was 56 bu/ac, compared to a state average yield of 46 bu/ac on 800,000 harvested acres. In 2001, wheat yield averages were 63.4 and 52 bu/ac for the WRVP and the state, respectively. As with yield, test weight varied among locations, with an average of 57.3 lb/bu. Improved variety selection, good surface drainage, timely fertilization, and effective pest management practices have been frequently mentioned by producers and county agents as factors which make WRVP fields more profitable and/or produce higher yields. Economic analysis is being conducted on each field to estimate the production costs for each farming operation. The Wheat Research Verification Program continues to demonstrate that Extension's research-based recommendations will produce profitable, high yields of wheat across a wide range of conditions and soil types. Over a 16-year period, the WRVP has averaged 12.4 bu/ac greater than the state average yield. The program is funded by the wheat checkoff dollars and administered through the Arkansas Wheat Promotion Board.

## **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.

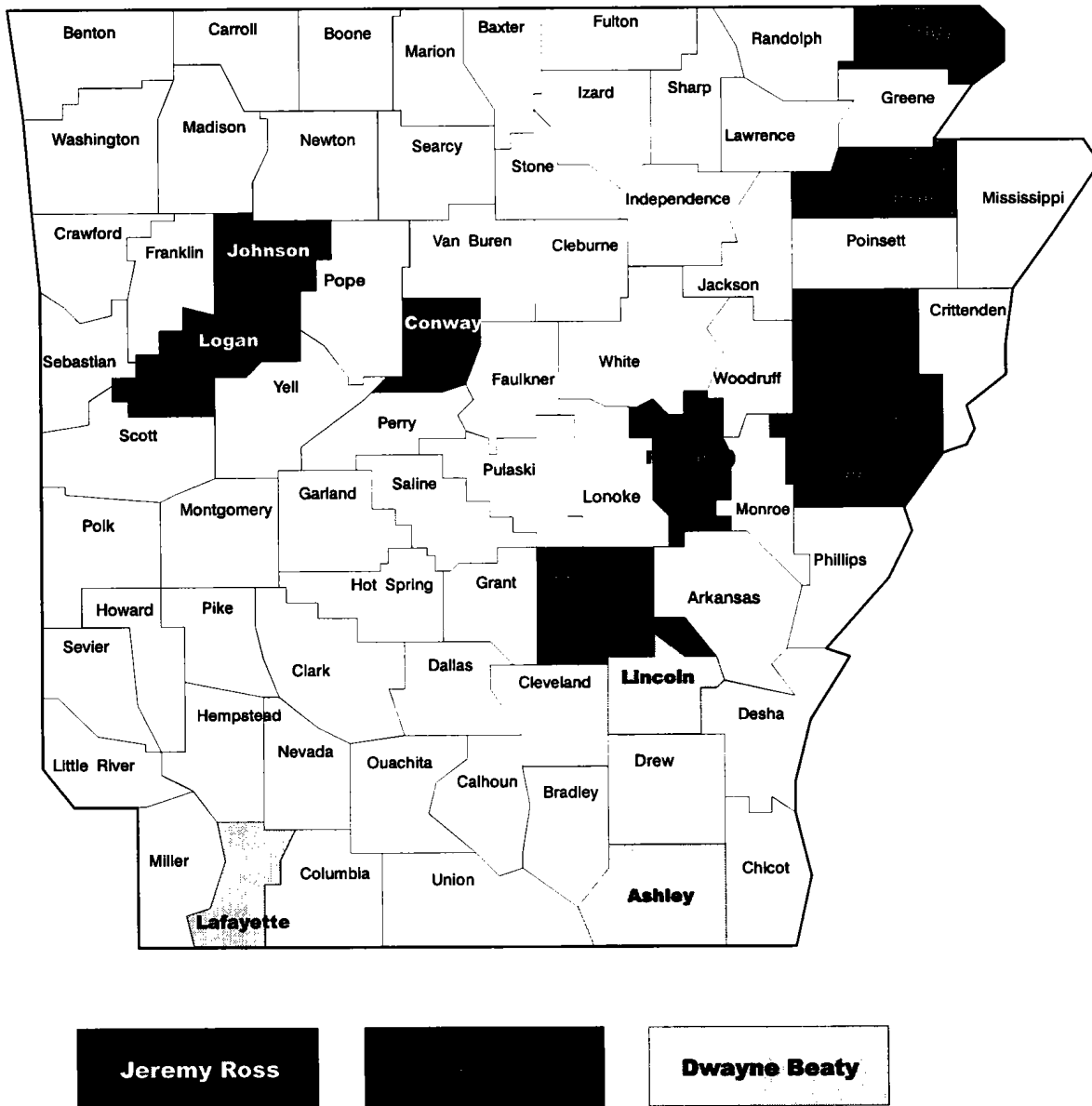
The WRVP program is designed as on-farm demonstrations of all the research-based recommendations required to grow wheat profitably in Arkansas. The WRVP program is part of the University of Arkansas Extension Service's goal of helping wheat producers make economically, agronomically, and environmentally 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.
3. To demonstrate that consistently high yields of wheat can be produced economically with the use of available technology and inputs.
4. To identify specific problems and opportunities in Arkansas wheat production for further investigation.
5. To promote timely cultural and management practices among all wheat farmers.
6. To provide training and assistance to county agents with limited expertise in wheat production.

## 2001-2002 Wheat Research Verification Program Fields

Fourteen farms enrolled a field in the Wheat Research Verification Program in the fall of 2001. The fields were located on commercial wheat farms and ranged in size from 31 to 120 acres. The locations of the WRVP fields are shown in Figure 1, designated according to the WRVP coordinator responsible for each field.

**Figure 1. Location of 2001-02 WRVP Fields**



The program is conducted for two consecutive years with each grower/cooperator. When an interested cooperator was identified, the cooperator, county agent, and specialist selected a field to enroll in the program in the fall of 2001. Prospective fields are required to meet the following criteria specified by the WRVP advisory committee:

1. Field size greater than 15 acres.
2. A yield potential equal to or greater than the county average.
3. A soil pH above 5.6.
4. A previous crop of corn, sorghum (without atrazine), soybeans, summer fallow, rice, or pasture.
5. The potential for good surface drainage.

A representative soil sample of the field was analyzed and the field was inspected by the coordinator and county agent. When the soil test results were obtained, the county agent, cooperator, and coordinator met to discuss recommended practices for seedbed preparation, wheat variety selection, and fertilization. All management decisions were made based on current Extension recommendations.

For situations where there were no specific recommendations included in the field plan, a member of the Wheat Verification Committee was consulted. As often as practical, members of the committee were consulted and updated on the condition of the fields. Once seedbed preparation began, the day-to-day management decisions were made by the county agent and coordinator with assistance from appropriate specialists and researchers as conditions warranted.

Data were collected on stand counts, growth stage, tillering, heads per square foot, diseases, weeds, and insects during the course of the growing season. A May hailstorm destroyed the field in Craighead County; therefore, no data for the field will be included in this report.

Grain yields and test weights were determined by elevator weigh tickets on all WRVP fields except Johnson County. Where demonstrations were conducted within a field or problem areas within a field were identified during the season, weigh wagons were used to determine yields. Occasionally, a WRVP is located in an odd-shaped field where acreage is difficult to measure. Thus, estimating field-wide yields using a weigh wagon is more accurate than using weigh tickets. To estimate the field-wide yields in a WRVP, a random strip in the field was harvested with the farmer's combine and the grain was augered into the weigh wagon. The weight of the grain was recorded. The strip was measured for length and width and the yield was then calculated on a per acre basis. The entire procedure was repeated at least four times and an average yield was recorded. Test weight was determined from a composite sample from the four strips.

Harvest loss was estimated by determining the number of grains per square foot remaining after harvest. Twenty-one grains per square foot is equal to the threshold value of one bushel per acre. The 2001-2002 WRVP fields had low harvest loss estimates.

An economic analysis of each field is being conducted by an Extension economist and will be included in the final report. To facilitate comparisons among fields and to allow year-to-year comparisons, average costs of certain operations are computed and used to generate the budgets in this report.

## Results and Discussion

The variety, field size and preplant fertilizer for each WRVP field are listed in Table 1. The average field size was 57.5 acres ranging from 31 to 120 acres.

**Table 1. Variety, Field Size, and Preplant Fertilizer, WRVP Fields 2001-02**

County	Variety	Field Size (Acres)	Preplant Fertilizer <sup>1</sup> (lbs/ac)
Ashley	Pioneer 26R24	36	0-69-45
Clay	Pioneer 26R24	103	10-18-36
Conway	Pioneer 26R24	40	24-60-0
Cross	AGS 2000	120	39-46-0-24
Jefferson	Terral TV 8555	74	18-46-90
Johnson	Roane	40	24-24-76
Lafayette	Terral TV 8555	43	None
Lee	Armor 3035	71	None
Lincoln	Delta Grow 5300	35	None
Logan	Pioneer 26R24	40	20-51-0
Prairie 1	AGS 2000	52	21-110-110-24
Prairie 2	Pioneer 26R38	40	40-140-140
St. Francis	Armor 3035	31	32-83-81

<sup>1</sup>Nitrogen – Phosphorus – Potassium – Sulfur.

Coordinators of the Wheat Research Verification Program met with the Extension Wheat Agronomist to develop a short list of varieties suited to each potential verification field's environment. *Wheat Update*, a summary of variety trials conducted by the University of Arkansas Agricultural Experiment Station, was used to obtain yield, physiological, and disease data for certain varieties on a range of soil types. The producer made the final variety selection using those on the list provided by the county agent. The best overall disease resistance and yield history is sought in variety selection. Eight varieties were planted in the WRVP in the fall of 2001, reflecting the specific needs of different soil types, geographic regions, and the overall management strategy employed by the cooperators. Four varieties, Pioneer 26R24, AGS 2000, Armor 3035, and Delta Grow 5300 were planted in the WRVP for the first time.

The preplant fertilizer was applied according to soil test recommendations. Lime was not applied to any WRVP fields in 2001. The fields in Lafayette, Lee, and Lincoln Counties did not require any fall fertilization due to the previous crop. All others received mixed fertilizer. In most cases, it is expedient and practical to apply fertilizer for both wheat and double-cropped soybeans in the fall. Thus, the fertilizer applied may not accurately reflect the needs of the wheat crop alone. Thus, the cost of preplant fertilizer was assigned to wheat according to the following schedule: 100% of nitrogen applied and 50% of phosphorus and potash.



Table 2 shows the soil classification for each WRVP field. These fields consisted of clay, silty clay, silt loam and sandy loam soils. The range in soil types reflects the range of soils where wheat could be planted in Arkansas during the fall of 2001.

Good surface drainage is key to profitable wheat production, and each WRVP cooperator was encouraged to provide the best drainage possible. In all WRVP fields drainage furrows were constructed at regular intervals to enhance surface drainage. Additionally, growers were requested to monitor and maintain drainage from planting through harvest.

**Table 2. General Soil Information, WRVP Fields 2001-02**

<b>County</b>	<b>Soil Classification</b>
Ashley	Rilla silt loam
Clay	Buelah fine sandy loam
Conway	Roxana/Dardanelle silt loam
Cross	Alligator clay
Jefferson	Coushatta/Portland silty clay
Johnson	Roxana silt loam
Lafayette	Billyhaw clay
Lee	Loring silt loam
Lincoln	Desha silty clay
Logan	Moreland silty clay
Prairie 1	Calloway/Calhoun silt loam
Prairie 2	Calloway/Calhoun silt loam
St. Francis	Calloway silt loam

The soil analysis results for each field are displayed in Table 3. These data were used to establish fall fertilization recommendations.

**Table 3. Fall 2001 Soil Test Results, WRVP**

<b>County</b>	<b>pH</b>	<b>P</b>	<b>K</b>	<b>Ca</b>	<b>Mg</b>	<b>Na</b>	<b>SO<sub>4</sub>-S</b>	<b>Fe</b>	<b>Mn</b>	<b>Cu</b>	<b>Zn</b>	<b>CEC</b>
Ashley	5.4	17	146	1544	308	73	24	188	255	1.6	2.6	10
Clay	6.1	110	224	1006	196	40	29	198	259	1.8	11.3	7
Conway	6.4	49	278	2324	568	48	22	244	109	3.3	4.5	12
Cross	5.3	54	429	4515	1035	70	32	282	109	4.1	5.1	23
Johnson	6.2	66	253	4061	2323	149	19	324	96	5.0	6.4	15
Lafayette	6.2	66	438	4061	2323	149	29	324	96	5.0	6.4	24
Lincoln	7.2	43	403	7195	1220	244	62	396	85	3.7	6.3	26
Lee	5.9	109	347	1540	332	39	18	207	209	2.4	11	9
Logan	6.9	86	314	3714	541	26	19	317	127	3.4	9.0	14
Prairie 1	7.1	34	199	2668	239	111	9	325	468	1.8	3.9	11
Prairie 2	6.3	66	259	2422	341	174	86	346	128	2.2	25	11
St. Francis	6.2	29	213	1626	258	55	32	197	456	2.5	3.8	8

Previous crop and tillage operations are listed in Table 4. Four fields were planted following corn, three following soybean, three following summer fallow, two following rice, and one following grain sorghum. Conventional tillage operations were used for seedbed preparation in all fields. Fields following rice, corn, or grain sorghum generally require more tillage operations due to heavy crop residue.

**Table 4. Previous Crop and Preplant Tillage Operation for WRVP Fields, 2001-02**

<b>County</b>	<b>Previous Crop</b>	<b>Tillage Operations</b>
Ashley	Fallow	Disk, Field cultivate, Roll
Clay	Corn	Disk (2x), Cultimulch
Conway	Corn	Disk, Landplane
Cross	Soybean	Disk, Drag harrow
Jefferson	Grain Sorghum	Disk (2x)
Johnson	Corn	Disk (2x), Field cultivate
Lafayette	Fallow	Disk (2x)
Lee	Fallow	Disk
Lincoln	Rice	Roll, Disk (3x), Landplane, Field cultivate
Logan	Corn	Disk (2x), Landplane, Field cultivate
Prairie 1	Soybean	Disk, DMI Finisher (2x)
Prairie 2	Rice	DMI Finisher (2x)
St. Francis	Soybean	Disk, Field cultivate (2x)

The seeding date and rate for each county and variety are given in Table 5 on page 10. The recommended planting dates for wheat are: North Arkansas - October 1 through October 30, Central Arkansas – October 10 through November 10, South Arkansas – October 15 through November 20. All fields were planted within the recommended seeding date for their region in 2001.

Seeding rates ranged from 100 to 160 pounds per acre. The recommended seeding rates vary according to seed size, seedbed conditions, anticipated germination, and seedling survival. Seeding rates are designed to achieve a final stand of 26 plants per square foot. Nine fields were drill seeded and four fields were broadcast seeded.

**Table 5. Variety, Seeding Date, Rate, Method, WRVP Fields, Fall, 2001.**

County	Variety	Seeding Date	Seeding Rate (lbs/ac)	Seeding Method
Ashley	Pioneer 26R24	2-Nov	160	Drill
Clay	Pioneer 26R24	9-Oct	135	Drill
Conway	Pioneer 26R24	17-Oct	150	Broadcast
Cross	AGS 2000	22-Oct	120	Drill
Jefferson	Terral TV 8555	27-Oct	150	Broadcast
Johnson	Roane	19-Oct	150	Broadcast
Lafayette	Terral TV 8555	1-Nov	100	Broadcast
Lee	Armor 3035	19-Oct	120	Drill
Lincoln	Delta Grow 5300	23-Oct	120	Drill
Logan	Pioneer 26R24	22-Oct	120	Drill
Prairie 1	AGS 2000	23-Oct	125	Drill
Prairie 2	Pioneer 26R38	23-Oct	150	Drill
St. Francis	Armor 3035	10-Nov	120	Drill

Data on spring nitrogen applications are displayed in Table 6 on page 11. Total applied nitrogen ranged from 111.5 lbs/acre on the Lee County field to 178 lbs/acre on the Prairie 2 County field. The average spring nitrogen rate was 127.3 lbs/acre.

The first spring nitrogen application is based on soil texture and drainage classification. On clay and poorly drained silt loam soils, 55 pounds of nitrogen per acre is recommended for the first application with the remaining 45 pounds of nitrogen to be applied 3-4 weeks later. On clay soils with a yield potential greater than 55 bu/ac, 75 pounds of nitrogen per acre is recommended at early tillering with the remaining 65 pounds to be applied 3-4 weeks later.

On loamy soils with good drainage, 90-100 pounds of nitrogen per acre is generally recommended for high yields. A single application at mid-tillering stage of wheat development may often satisfy the nitrogen requirements of the crop. However, heavy or frequent spring rainfall causes saturated soils and subsequent loss and/or leaching of nitrates outside the root zone. Thus, split applications of nitrogen are often required to avoid excessive nitrogen losses. In addition, standing water may cause nitrogen losses that can be corrected with supplemental fertilizer of 20-40 pounds of nitrogen per acre, according to Extension recommendations. Frequent rainfall, heavy rainfall, and standing water did occur on WRVP fields in the spring.

All 2001-2002 WRVP fields except those located in the Arkansas River Valley (Conway, Johnson, and Logan Counties) received split applications of nitrogen.

Nine WRVP fields received sulfur with the first spring nitrogen application. Two received sulfur with the mixed fertilizer in the fall (Table 1). Sulfur was applied due to

the sandy, low organic matter soil types and the potential of sulfur deficiency from the heavy and frequent winter rains.

**Table 6. Spring Nitrogen, WRVP Fields, 2001-02**

County	First Spring Application				Second Application			Total lb N/A
	Date	Source <sup>1</sup>	lb/A <sup>2</sup> N	lb/A <sup>3</sup> S	Date	Source	lb/A N	
Ashley	2/13	Urea	46		3/23	Urea	46	120.5
		DAP	18					
		A.S.	10.5	12				
Clay	2/8	Urea	46		3/10	Urea	59.8	116.3
		A.S.	10.5	12				
Conway	2/13	Urea	115					136
		A.S.	21	24				
Cross	2/21	Urea	55.2		3/15	Urea	55.2	110.4
Jefferson	2/10	Urea	46		3/12	Urea	59.8	116.3
		A.S.	10.5	12				
Johnson	2/16	Urea	106					130
		A.S.	24	28				
Lafayette	2/14	Urea	46		3/15	Urea	69	143.5
		DAP	18					
		A.S.	10.5	12				
Lee	2/12	DAP	9.0		3/5	Urea	92	111.5
		A.S.	10.5	12				
Lincoln	2/15	Urea	92		3/11	Urea	46	156
		DAP	18					
Logan	2/15	Urea	115					136
		A.S.	21	24				
Prairie 1	2/14	Urea	50.6		3/7	Urea	50.6	120.7
		DAP	9.0					
		A.S.	10.5	12				
Prairie 2	2/24	Urea	50.6		3/10	Urea	92	138
St. Francis	3/10	Urea	46		3/29	Urea	59.8	119.6

<sup>1</sup>A.S. = Ammonium sulfate (21-0-0-24), DAP = Diammonium phosphate (18-46-0).

<sup>2</sup>N = nitrogen

<sup>3</sup>S = sulfur

The stand counts, tiller counts, and head counts for each field are given in Table 7. Each of these data represents the average of 15 randomly selected square foot counts. The initial stand was measured as the number of plants per square foot at Feekes' growth stage 2. The tiller count was measured as total number of culms per plant at Feekes' growth stage 6. The head count was determined by counting the number of heads per square foot at Feekes' growth stage 11.

**Table 7. Stand, Tiller, and Head Counts, WRVP Fields, 2001-02**

<b>County</b>	<b>Initial Stand (#plts/ft<sup>2</sup>)</b>	<b>Tiller Count (#tillers/plant)</b>	<b>Head Count (#heads/ft<sup>2</sup>)</b>
Ashley	40.6	4.1	47.5
Clay	31.6	5.7	N/A
Conway	42.6	8.3	52
Cross	28.4	4.1	66.2
Jefferson	17.6	3.8	59.8
Johnson	35.2	8.7	69.4
Lafayette	25.8	8.2	58
Lincoln	26	5	45
Logan	26.0	7.0	56.8
Lee	20.1	5.9	80
Prairie 1	20.3	3.4	N/A
Prairie 2	26.4	4.2	59.0
St. Francis	17.6	3.1	64

The initial stand averaged 27.6 plants/ft<sup>2</sup> across all 2001-02 WRVP fields. This figure is similar to those observed in 2000 (28.8 plts/ft<sup>2</sup>) and 1999 (26.7 plts/ft<sup>2</sup>). Tiller counts observed in 2002 averaged 5.5 tillers/plant compared to 5.3 tillers in 2000 and 6.0 tillers in 1999. The 2002 head counts averaged

Pest management was a challenge during 2001-2002 in many areas across the state. While stripe rust was a common nuisance across the state, only three fields were treated for the disease (Table 8). Fields in four counties were treated for ryegrass with either Finesse or Hoelon. Garlic, vetch, and winter junk weeds reached treatment threshold in seven fields. True armyworm populations were much lower in 2002 compared to 2001, and Prairie 2 was the only WRVP field to be treated for that pest. The WRVP fields in Jefferson and Johnson Counties experienced low pest levels throughout the growing season; therefore, no treatments were applied.

**Table 8. Weed, Disease, and Insect Summary - Wheat Research Verification Program, 2001-02**

<b>County</b>	<b>Pest Summary and Chemical Application</b>
Ashley	Finesse was applied at 0.5 oz/ac on 11/03/01 for ryegrass control.
Clay	2,4-D applied on 3/6/02 at 2 pt/ac for garlic, vetch, and winter junk weeds.
Conway	On 3/8, applied 2,4-D at 1 pt/ac plus 0.25 oz/ac Harmony Extra for garlic, vetch, and winter junk weeds.
Cross	Applied 2,4-D at 1 pt/ac on 2/16/02 for garlic control.
Jefferson	None needed, low pest levels throughout season.
Johnson	None needed, low pest levels throughout season.
Lafayette	Finesse was applied at 0.5 oz/ac on 11/20/01 for ryegrass control.
Lee	Field was treated with 0.5 oz/ac of Harmony Extra on 3/5 for suppression of winter junk weeds.

**Table 8 cont'd**

Lincoln	Hoelon was applied at 2.0 pt/ac on 2/15/02 for ryegrass control.
Prairie 1	Applied Express at 0.5 oz/ac on 3/10 for winter junk weeds. Twenty acres each of Tilt (4 oz/ac) and Stratego (10 oz/ac) were applied on 4/15 for suppression of stripe rust.
Prairie 2	On 4/6, Tilt was applied at 4 oz/ac for stripe rust. Warrior T was applied at rate of 2 oz/ac on 5/7 for true armyworm control.
Logan	Applied Hoelon at 1.33 pt/ac plus 0.25 oz/ac Peak on 11/5/01 for ryegrass and garlic control.
St. Francis	On 3/30, applied Harmony Extra at 0.5 oz/ac plus 1 pt/ac of 2,4-D for garlic, buttercup, henbit, and dock control.

The harvest date, grain yield, test weight, and pounds of nitrogen per bushel are shown in Table 9. All WRVP fields were harvested in June. Due to excessive winter and early spring rainfall in most areas, WRVP yields ranged from 34.5 bu/ac in Ashley Co. to 82.0 bu/ac in Prairie 1 Co. Average yield for the WRVP in 2002 was 56 bu/ac. Although this figure was the lowest yield for WRVP fields since 1991, it was higher than the state average yield of 46 bu/ac.

**Table 9. Harvest Date, Grain Yield, Test Weight for WRVP Fields, 2001- 02**

County	Harvest Date	Yield (bu/ac @ 13.5%)	Test Wt. (lb/bu)	Pounds N/bu
Ashley	12-Jun	34.5	54.5	3.5
Clay	21-Jun	52.0	58.0	2.2
Conway	10-Jun	50.3	55.2	2.7
Cross	12-Jun	80.9	59.5	1.4
Jefferson	6-Jun	54.2	57.5	2.2
Johnson	20-Jun	65.4	58.0	2.0
Lafayette	7-Jun	39.7	56.8	3.6
Lee	4-Jun	55.4	56.0	2.0
Lincoln	5-Jun	41.0	54.9	3.8
Logan	15-Jun	53.0	57.7	2.6
Prairie 1	8-Jun	82.0	59.7	1.5
Prairie 2	6-Jun	67.0	60.0	2.1
St. Francis	18-Jun	52.8	57.0	2.3
<b>Average</b>	11-Jun	56.0	57.3	2.5

The WRVP attempts to avoid low test weights by planting varieties with good test weight characteristics and timely harvest. Despite reports of low test weights across the state, the average test weight for WRVP fields was 57.3 lb/bu, a normal figure considering the growing conditions throughout the year. The test weight range was relatively small: 54.5 lb/bu in Ashley Co. to 60.0 lb/bu in Prairie 2 Co.

The pounds of nitrogen per bushel variable is a simple ratio of total applied nitrogen divided by the grain yield. It attempts to measure the efficiency of nitrogen fertilizer applications. The efficiency ranged from 1.7 lbs N/bu to 3.8 lbs N/bu and averaged 2.8 lbs N/bu of wheat.

An economic analysis of each field is being conducted to estimate the production cost for each farming operations. Budgets will be developed from records of field operations compiled by county Extension faculty and coordinators of the Wheat Research Verification Program.

The Wheat Research Verification Program continues to demonstrate that high yields of wheat can be produced consistently and economically according to the research-based recommendations published by the Cooperative Extension Service.