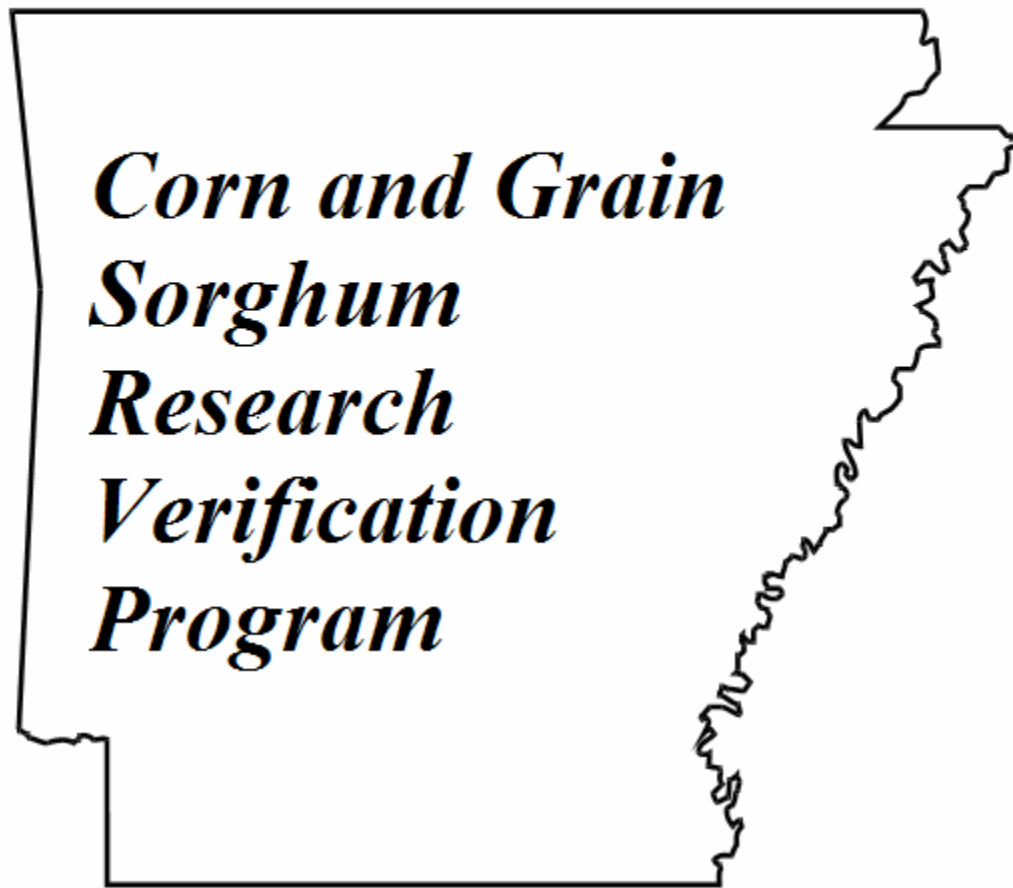


**2006 Arkansas**



***Corn and Grain  
Sorghum  
Research  
Verification  
Program***

**UofA**

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

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

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## Table of Contents

	<b>Page</b>
Authors and Acknowledgments.....	2
Abstract.....	3
Introduction.....	4
Results and Discussion.....	4
Economic Analysis.....	5
Table 1. County, Hybrid, Field Size, and Total Fertilizer, CGSRVP Fields 2006....	8
Table 2. General Soil Information, CGSRVP Fields 2006.....	9
Table 3. Irrigation, Hybrid, Field Size, Previous Crop, and Yield, CGSRVP 2006.....	9
Table 4. Estimated costs per acre for corn fields, CGSRVP 2006.....	10
Table 5. Estimated costs per acre for grain sorghum fields, CGSRVP 2006.....	10
Table 6. Selected economic information for the 2006 CGSRVP.....	11

## CORN & GRAIN SORGHUM RESEARCH VERIFICATION PROGRAM, 2006

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## **ABSTRACT**

The Corn and Grain Sorghum Research Verification Program (CGSRVP) was conducted on seven corn and two grain sorghum fields in 2006 by the University of Arkansas Cooperative Extension Service. Grain yields ranged from 102 to 208 bushels per acre for corn with an average of 167 bushels per acre, and 101 and 104 bushels per acre for grain sorghum with an average of 103 bushels per acre. Arkansas farmers harvested 180,000 acres of corn and 59,000 acres of grain sorghum with an average yield of 145 and 88 bushels per acre, respectively.

Agronomic and economic data for specified operating costs were collected for each CGSRVP field to evaluate the effectiveness and profitability of production recommendations. The economic analysis show total specified operating costs ranged from \$309.15 to \$389.18 per acre for corn with an average of \$349.24 per acre, and \$174.71 to \$216.42 per acre for grain sorghum with an average of \$207.94 per acre. The average break-even prices needed to cover total specified operating costs averaged \$2.05 per bushel for both corn and grain sorghum. Specified operating and ownership costs averaged \$416.40 and \$269.70 per acre with a break-even price of \$2.44 and \$2.66 per bushel for corn and grain sorghum, respectively.

The CGSRVP was used to demonstrate Extension's research-based recommendations to help corn and grain sorghum growers to produce a profitable, high yielding crop. The CGSRVP is funded by the Corn and Grain Sorghum Checkoff monies and administered through the Arkansas Corn and Grain Sorghum Promotion Board.

## **INTRODUCTION**

The 2006 growing season was the seventh year for the Corn and Grain Sorghum Research Verification Program (CGSRVP). The CGSRVP is an interdisciplinary effort between growers, county Extension agents, Extension specialists, and researchers. The CGSRVP is an on-farm demonstration of all the research-based recommendations required to grow corn and grain sorghum profitably in Arkansas. The specific objectives of the program are:

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

Each CGSRVP field and cooperator was selected prior to planting. Cooperators agreed to pay production expenses, provide crop expense data for economic analysis and implement the recommended production practices in a timely manner from seedbed preparation to harvest. Eight growers were enrolled in the CGSRVP in the spring of 2006, seven corn and two grain sorghum fields. The fields were located on commercial farms ranging in size from 17 to 128 acres for corn fields, and 37 and 145 for grain sorghum fields. The average field size was 58 and 91 acres for the corn and grain sorghum fields, respectively.

The 2006 CGSRVP corn fields were conducted in Clay, Crittenden, Desha, Greene, Mississippi, Poinsett and Randolph Counties; and two grain sorghum fields in Poinsett County. Seven different corn hybrids (DeKalb DK69-71, DeKalb DK69-72, Pioneer 31G96, Pioneer 32W86, Pioneer 33M54, Pioneer 33R76, and Pioneer 33R81) and one grain sorghum (Pioneer 83G66) were planted. Management decisions were based on field history, soil test results, hybrids, and data collected from each individual field during the growing season.

## **RESULTS AND DISCUSSION**

The planting date, row spacing, hybrid, field size, and total fertilizer for each CGSRVP field are listed in Table 1. Hybrids for each field were selected from the past years performance in the University of Arkansas Corn and Grain Sorghum Hybrid Trials. A hybrid must have two or three year averages in the Hybrid Trials to be considered for the CGSRVP. Also, agronomic characteristics, such as relative maturity, disease and insect resistance of each hybrid is considered depending on specific situations of each field.

Preplant fertilizer was applied according to soil test recommendations. A third of the total nitrogen was applied for both the corn and grain sorghum fields preplant. The remainder of the total nitrogen was applied at approximately the 6-leaf stage for corn and grain sorghum. Most corn fields in the CGSRVP received an additional application of nitrogen a week prior to tassel emergence. Total nitrogen applied averaged 244 lbs/acre for corn and 165 lbs/acre for grain sorghum.

Table 2 shows the soil classification for each CGSRVP field. All fields consisted of either silt loam, sandy loam or clay soils.

Grain yields in the 2006 CGSRVP averaged 167 bu/acre with a range of 102 to 208 bu/acre for corn, and averaged 103 bu/acre with a range of 101 to 104 bu/acre for grain sorghum (Table 3). The average 2006 CGSRVP corn yield was 13% greater, and the average grain sorghum yield was 3% greater than the estimated Arkansas state average of 145 bu/acre and 88 bu/acre for corn and grain sorghum, respectively. The highest corn yield (208 bu/acre) was in Desha County. The lowest corn yield (102 bu/acre) was in Mississippi County. All of the corn fields and one of the grain sorghum fields were irrigated in the 2006 CGSRVP.

The yields for the Mississippi County fields were low due to several unforeseen problems. The entire field was leveled five years ago, with five foot cuts on the east side. This side of the field was where the 102 bu/acre yield was harvested. Due to the land leveling and equipment traffic, the entire field had poor water infiltration and restricted root growth due to soil compaction. This field would have benefited from a deep subsoil cultivation to increase water infiltration and enhanced root exploration of the soil.

## **ECONOMIC ANALYSIS**

This section provides information on the development of estimated production costs for the 2006 CGSRVP. Records of field operations on each field provided the basis for estimating these costs. The field records were compiled by the CGSRVP coordinator, county Extension agents, and cooperators in the 2006 CGSRVP.

Using CGSRVP production data from the 9 fields (7 corn and 2 grain sorghum), operating costs, and net returns above total specified costs assuming a 25 percent land rent were estimated for each field. Break-even prices needed to cover total specified costs are also presented.

### **Specified Operating Costs**

Specified operating costs listed in Table 6 are those expenditures that would generally require annual cash outlays and would be included on an annual operating loan application. Actual quantities of all operating inputs were used in this analysis. However, since prices of inputs may be influenced by quantity discounts, and similar factors, which are independent of production management issues being tested by CGSRVP; constant input prices were used across all fields. This procedure was used so that the objective to verify research recommendations would not be obscured by highly variable input prices.

Machinery fuel and repair costs were calculated using a budget generator based on parameters and standards published in the American Society of Agricultural Engineers 2002 Handbook. Therefore, the producer's actual machinery costs will likely vary somewhat from the machinery cost estimates that are presented in this report. However, the producer's actual field

operations were used as a basis for the calculations. Equipment size and type were matched as closely as possible to the existing data set used in the series of Extension Technical Bulletins *Estimating 2003 Production Costs in Arkansas*.

Specified operation costs for the 7 CGSRVP corn fields ranged from \$309.15 to \$389.18 per acre, with an average of \$349.24 per acre. The 2 grain sorghum fields had specified operation costs of \$174.71 and \$216.42 per acre, with an average of \$207.94 per acre.

### **Specified Ownership Costs**

Machinery ownership costs represent the capital replacement costs of owning and using equipment and can vary greatly from one farm to another depending on the farm's size, management skills, and annual use. Specified ownership costs presented in Table 6 include depreciation, interest, taxes, and insurance. These costs were based on the initial cost and expected useful life of the machinery and were allocated on a per acre basis using estimated performance rates and hours of annual use.

These are economic costs and may differ from short-run tax based cash accounting figures for a particular year. The economic approach spreads these costs over the entire useful life of the machinery. In the long-run the farm business must cover these costs to remain viable.

Specified ownership costs ranged from \$45.65 to \$95.30 per acre for the corn fields and \$22.04 to \$71.89 per acre for the grain sorghum fields, with an average of \$67.17 and \$61.76 per acre for the corn and grain sorghum fields, respectively.

### **Total Specified Costs**

Total specified costs presented in Table 6 are the summation of total specified operating costs and total specified ownership costs. Not included in these costs are charges for land, risk, overhead, and management. The overhead and management costs would be better addressed in a whole-farm analysis and will not be dealt with in this discussion. Total specified costs plus ownership costs ranged from \$365.46 to \$444.65 per acre for the corn fields and \$196.75 to \$288.31 per acre for the grain sorghum fields, with an average of \$416.40 and \$269.70 per acre for the corn and grain sorghum fields, respectively.

Break-even prices needed to cover total specified costs plus ownership costs ranged from \$2.13 to \$4.18 per bushel for the corn fields and \$1.89 to \$2.85 per bushel for the grain sorghum fields, with an average of \$2.44 and \$2.66 per bushel for the corn and grain sorghum fields, respectively.

### **Land Costs**

Land costs incurred by producers participating in the CGSRVP would likely vary from land ownership, cash rent, or some form of crop share arrangement. Therefore, a comparison of these divergent cost structures would contribute little to this analysis. For this reason, a 25 percent crop share rental arrangement, with no cost sharing was assumed to provide a consistent standard for comparison (Table 6). This is not meant to imply that this arrangement is normal or that it should be used in place of existing arrangements. It is simply a constant measure to be used across all CGSRVP fields.

## **Net Returns Per Acre**

Table 6 also presents estimated returns per acre above Total Specified Costs plus a 25 percent crop share rent assuming a corn price of \$3.18 per bushel and a grain sorghum price of \$3.40 per bushel. The corn price used was obtained from the Grain Market Newsletter (August 1 – October 25, 2006). The grain sorghum price was the average cash price reported in the Grain Market News from August, 2006 through October, 2006. Sales price is the greater of average Arkansas market price from August 2006 through October 2006 and CCC Loan Price plus LDP. Net returns ranged from -\$182.94 to \$51.94 per acre for corn and -\$30.82 to \$68.39 per acre for grain sorghum. If the two Mississippi County fields were to be removed, the average net return for corn would be \$15.65 per acre. Cost for risk, overhead, and management have also not been included. These costs must be accounted for in any further interpretation of this data.

## **Various Specified Operating Costs**

Tables 4 and 5 lists various specified operating costs that are required for corn and grain sorghum production. The largest specified operating cost for the corn and grain sorghum fields was the fertilization cost, averaging \$141.71 and \$96.22 per acre for the corn and grain sorghum fields, respectively.



**Table 1. County, Hybrid, Field Size, and Total Fertilizer, CGSRVP Fields 2006.**

<b>County</b>	<b>Planting Date</b>	<b>Row Spacing (inches)</b>	<b>Hybrid</b>	<b>Field Size (Acres)</b>	<b>Fertilizer (N-P-K-S-Zn pounds/acre)</b>
<b>Corn</b>					
Clay	4/11/06	36	Pioneer 33M54	17	230-40-90
Crittenden	4/1/06	38	DeKalb DK6971 RR	79	245-34-45-30-3
Desha	3/15/06	38	Pioneer 31G96 RRHX	62	250-100-100-24-10
Greene	3/28/06	30	Pioneer 33R76	32	205-30-0-24-10
Mississippi 1	3/30/06	38	DeKalb DK6971	12	271-80-90-24-10
Mississippi 2	3/30/06	38	DeKalb DK6972	12	271-80-90-24-10
Poinsett	4/1/06	38 (7.5 in Twin)	Pioneer 33R81	67	261-60-90-0-10
Randolph	4/21/06	30	Pioneer 32W86	128	246-76-76
<b>Grain Sorghum</b>					
Poinsett (Irrigated)	4/11/06	38	Pioneer 83G66	145	180-36-90
Poinsett (Non-irrig.)	4/11/06	38	Pioneer 83G66	37	150-36-90

**Table 2. General Soil Information, CGSRVP Fields 2006.**

<b>County</b>	<b>Soil Classification</b>
<b>Corn</b>	
Clay	Fountain silt loam
Crittenden	Sharkey silty clay/Forestdale silty clay loam
Desha	Tutwiler/Hebert silt loam
Greene	Hillemann/Calloway silt loam
Mississippi	Sharkey-Steele complex
Poinsett	Dundee/Mhoon silt loam
Randolph	Bosket fine sandy loam/Broseley loamy fine sand
<b>Grain Sorghum</b>	
Poinsett (Irrigated)	Dundee/Mhoon silt loam
Poinsett (Non-Irrigated)	Mhoon/Dundee silt loam

**Table 3. Irrigation, Hybrid, Field Size, Previous Crop, and Yield, CGSRVP 2006.**

<b>County</b>	<b>Irrigation</b>	<b>Hybrid</b>	<b>Field Size (Acres)</b>	<b>Previous Crop</b>	<b>Yield (bu/A)</b>
<b>Corn</b>					
Clay	Yes, Furrow	Pioneer 33M54	17	Soybean	168
Crittenden	Yes, Pivot	DeKalb DK6971 RR	79	Soybean	165
Desha	Yes, Furrow	Pioneer 31G96 RRHX	62	Cotton	208
Greene	Yes, Furrow	Pioneer 33R76	32	Soybean	174
Mississippi 1	Yes, Furrow	DeKalb DK6971	12	Cotton	149
Mississippi 2	Yes, Furrow	DeKalb DK6972	12	Cotton	102
Poinsett	Yes, Furrow	Pioneer 33R81	67	Soybean	200
Randolph	Yes, Pivot	Pioneer 32W86	128	Soybean	170
<b>Average</b>					<b>167</b>
<b>Grain Sorghum</b>					
Poinsett (Irrig.)	Yes, Pivot	Pioneer 83G66	145	Cotton	101
Poinsett (Non-Irrig.)	No	Pioneer 83G66	37	Cotton	104
<b>Average</b>					<b>103</b>

**Table 4. Estimated costs per acre for corn fields, CGSRVP 2006.**

	Clay	Crittenden	Desha	Greene	Mississippi # 1	Mississippi # 2	Poinsett	Randolph	Average
Acres	17	79	62	32	23	23	67	128	
<b>Direct Exp.</b>	(\$/acre)	(\$/acre)	(\$/acre)	(\$/acre)	(\$/acre)	(\$/acre)	(\$/acre)	(\$/acre)	(\$/acre)
<b>Custom Work</b>	34.95	29.75	41.70	31.10	27.35	20.30	44.75	40.00	36.52
<b>Fertilizer</b>	112.69	145.71	162.40	102.48	160.89	160.89	147.56	132.91	141.71
<b>Herbicides</b>	28.69	7.38	8.61	13.26	23.11	23.11	17.02	15.75	14.50
<b>Insecticides</b>		3.95							0.72
<b>Irrigation Supplies</b>	6.25		6.25	6.25	6.25	6.25	6.25		3.25
<b>Crop Seed</b>	45.76	61.76	63.30	60.22	44.62	44.62	65.62	44.62	54.92
<b>Operator Labor</b>	4.28	6.52	5.14	3.62	3.88	3.88	3.42	3.63	4.40
<b>Irrigation Labor</b>	4.69	1.90	5.36	6.70	7.37	7.37	6.03	1.54	3.98
<b>Hand Labor</b>	1.09	0.94	0.77	0.50	0.83	0.83	0.50	0.92	0.80
<b>Diesel Fuel<sup>1</sup></b>	58.25	62.98	68.54	76.99	84.56	84.56	69.62	46.69	63.13
<b>Repairs &amp; Maint.</b>	11.94	17.90	13.94	13.16	14.42	14.42	12.25	14.09	14.36
<b>Interest on Op. Cap.</b>	9.01	10.56	13.17	10.80	12.95	12.91	12.30	9.00	10.95

<sup>1</sup>Price of diesel was taken to be \$2.20 per gallon.

**Table 5. Estimated costs per acre for grain sorghum fields, CGSRVP 2006.**

	Poinsett Irrigated	Poinsett Non-irrigated	Average
Acres	145	37	
<b>Direct Exp.</b>	(\$/acre)	(\$/acre)	(\$/acre)
<b>Custom Work</b>	24.65	25.10	24.74
<b>Fertilizer</b>	98.55	87.09	96.22
<b>Herbicides</b>	31.98	31.98	31.98
<b>Crop Seed</b>	10.81	8.11	10.26
<b>Operator Labor</b>	1.60	2.69	1.82
<b>Irrigation Labor</b>	1.14		0.91
<b>Hand Labor</b>	0.50	0.50	0.50
<b>Diesel Fuel<sup>1</sup></b>	31.41	8.64	26.78
<b>Repairs &amp; Maint.</b>	9.19	5.08	8.35
<b>Interest on Op. Cap.</b>	6.59	5.52	6.37

<sup>1</sup>Price of diesel was taken to be \$2.20 per gallon.

**Table 6. Selected economic information for the 2006 CGSRVP.**

<b>County</b>	<b>Total Specified Operating Costs<sup>1</sup></b> <b>(\$/A)</b>	<b>Break-even Operating<sup>2</sup></b> <b>(\$/Bu)</b>	<b>Total Fixed Costs<sup>3</sup></b> <b>(\$/A)</b>	<b>Total Specified Operating and Ownership Costs<sup>4</sup></b> <b>(\$/A)</b>	<b>Break-even Price<sup>5</sup></b> <b>(\$/Bu)</b>	<b>Break-even Price With Land Costs<sup>6</sup></b> <b>(\$/Bu)</b>	<b>Returns Above Total Specified Costs<sup>7</sup></b> <b>(\$/A)</b>
<b>Corn</b>							
Clay	\$317.60	\$1.89	\$47.86	\$365.46	\$2.18	\$2.90	\$35.06
Crittenden	\$349.35	\$2.12	\$95.30	\$444.65	\$2.69	\$3.59	-\$51.28
Desha	\$389.18	\$1.87	\$54.76	\$443.94	\$2.13	\$2.85	\$51.94
Greene	\$325.08	\$1.87	\$45.65	\$370.73	\$2.13	\$2.84	\$44.10
Mississippi 1	\$386.23	\$2.59	\$46.97	\$433.20	\$2.91	\$3.88	-\$77.97
Mississippi 2	\$379.14	\$3.72	\$46.97	\$426.11	\$4.18	\$5.57	-\$182.94
Poinsett	\$385.32	\$1.93	\$44.64	\$429.96	\$2.15	\$2.87	\$46.85
Randolph	\$309.15	\$1.82	\$82.80	\$391.95	\$2.31	\$3.07	\$13.34
<b>Average</b>	<b>\$349.24</b>	<b>\$2.05</b>	<b>\$67.17</b>	<b>\$416.40</b>	<b>\$2.44</b>	<b>\$3.26</b>	<b>\$0.05</b>
<b>Grain Sorghum</b>							
Poinsett (Irrg.)	\$216.42	\$2.14	\$71.89	\$288.31	\$2.85	\$3.81	\$85.83
Poinsett (Non-Irrg.)	\$174.71	\$1.68	\$22.04	\$196.75	\$1.89	\$2.52	\$88.38
<b>Average</b>	<b>\$207.94</b>	<b>\$2.05</b>	<b>\$61.76</b>	<b>\$269.70</b>	<b>\$2.66</b>	<b>\$3.55</b>	<b>\$86.35</b>

<sup>1</sup> Specified out-of-pocket expenses, such as seed, fertilizer, irrigation, etc.

<sup>2</sup> Price per bushel required by the farmer to equal total specified operating costs. Does not include land, overhead, risk, and management costs.

<sup>3</sup> Total ownership costs which include charges for depreciation, taxes, and insurance.

<sup>4</sup> Total specified operating costs plus ownership costs which include charges for depreciation and interest on all machinery and irrigation equipment, taxes, and insurance.

<sup>5</sup> Price per bushel required by the farmer to equal total specified operating and ownership costs. Does not include land, overhead, risk, and management costs.

<sup>6</sup> Break-even price per bushel plus a 25 percent crop share rent. Does not include overhead, risk, and management costs.

<sup>7</sup> A 25 percent crop share rent was assumed as a land charge for a renter situation. No cost sharing was assumed.

Sales price is the greater of average Arkansas market price August through October and CCC Loan Price plus LDP.