

2007 ARKANSAS CORN AND GRAIN SORGHUM RESEARCH VERIFICATION PROGRAM

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ABSTRACT

The Corn and Grain Sorghum Research Verification Program (CGSRVP) was conducted on five corn and three grain sorghum fields in 2007 by the University of Arkansas Cooperative Extension Service. Grain yields ranged from 171 to 218 bushels per acre for corn with an average of 200.39 bushels per acre, and 95 to 128 bushels per acre for grain sorghum with an average of 110.5 bushels per acre. Arkansas farmers harvested 590,000 acres of corn and 215,000 acres of grain sorghum with an average yield of 168 and 94 bushels per acre, respectively. The 2007 state average corn and grain sorghum yields set new state records. 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 direct expenses ranged from \$304.43 to \$409.83 per acre for corn with an average of \$360.54 per acre, and \$152.77 to \$204.03 per acre for grain sorghum with an average of \$188.51 per acre. The average break-even prices needed to cover total specified operating costs averaged \$1.79 per bushel for corn and \$1.58 per bushel for grain sorghum. Total direct and fixed costs averaged \$441.47 and \$268.35 per acre with a break-even price of \$2.19 and \$2.23 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 2007 growing season was the eighth 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 2007, five corn and three grain sorghum fields. The fields were located on commercial farms ranging in size from 59.5 to 128 acres for corn fields, and 8 to 58 for grain sorghum fields. The average field size was 82.5 and 30.1 acres for the corn and grain sorghum fields, respectively.

The 2007 CGSRVP corn fields were conducted in Crittenden, Desha, Monroe, Pulaski and Randolph Counties; and three grain sorghum fields in Lawrence, Poinsett and Prairie Counties. Five different corn hybrids (Asgrow 715, DeKalb DK64-10, DeKalb DK66-23, Dyna-Gro 58P59 and Terral TV26BR61) and two grain sorghum varieties (FFR 318 and Pioneer 84G62) 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, total fertilizer and soil classification 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 45 pounds nitrogen as urea a week prior to tassel emergence. Total nitrogen applied averaged 255 lbs N/acre for corn and 141 lbs N/acre for grain sorghum.

Table 2 shows the herbicide usage, times irrigated, irrigation type, previous crop and yield for each CGSRVP field. Grain yields in the 2007 CGSRVP averaged 200.39 bu/acre with a range of 171 to 218 bu/acre for corn, and averaged 110.51 bu/acre with a range of 95.1 to 128 bu/acre for grain sorghum (Table 3). All of the corn fields and two of the three grain sorghum fields were irrigated.

ECONOMIC ANALYSIS

This section provides information on the development of estimated production costs for the 2007 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 2007 CGSRVP.

Using CGSRVP production data from the 8 fields (5 corn and 3 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.

Direct Expenses

Direct 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 operating inputs as reported by the cooperators were used in this analysis. The prices used for these inputs were, for the most part, the same as those reported in the “2007 Cost of Production Estimates” published by the Cooperative Extension Service. If an input were used that did not have a published price, a price quote for that input was obtained from a supply dealer.

Fuel and repair costs for machinery were calculated using a budget generator based on parameters and standards published in the American Society of Agricultural Engineers 1993 Handbook. Therefore, the producers' actual machinery costs will vary from the machinery cost estimates that are presented in this report. However, the producers' actual field operations were used as a basis for calculations and his equipment size and type were matched as closely as possible to the existing data set used in the annual set of state crop budgets.

Direct expenses, Table 3, for the CGSRVP corn fields ranged from \$304.43 per acre for Desha County to \$409.83 per acre for Pulaski County and averaged \$360.54 per acre. The grain sorghum fields ranged from \$152.77 per acre for Lawrence County to \$204.03 per acre for Poinsett County and averaged \$188.51 per acre. Direct expenses per bushel for the corn fields ranged from \$1.52 in Desha County to \$2.12 in Crittenden County and averaged \$1.79 per bushel. Direct expenses per bushel for the grain sorghum fields ranged from \$1.41 in Lawrence County to \$1.93 in Prairie County and averaged \$1.58 per bushel.

Fixed or 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. Fixed or ownership costs presented in Table 3 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.

Fixed costs ranged from \$51.08 to \$115.99 per acre for the corn fields and \$33.37 to \$100.46 per acre for the grain sorghum fields, with an average of \$80.93 and \$79.85 per acre for the corn and grain sorghum fields, respectively.

Total Costs (Direct and Fixed Costs)

Total direct and fixed costs presented in Table 3 are the summation of direct expenses and fixed or 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 direct costs plus ownership costs ranged from \$355.51 to \$477.91 per acre for the corn fields and \$186.14 to \$253.01 per acre for the grain sorghum fields, with an average of \$441.47 and \$268.35 per acre for the corn and grain sorghum fields, respectively.

Break-even prices needed to cover total direct costs plus fixed costs ranged from \$1.78 to \$2.79 per bushel for the corn fields and \$1.72 to \$2.66 per bushel for the grain sorghum fields, with an average of \$2.19 and \$2.23 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 3). 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 3 also presents estimated returns per acre above Total Costs plus a 25 percent crop share rent assuming a corn price of \$3.19 per bushel and a grain sorghum price of \$3.47 per bushel. The corn price used was obtained from the Grain Market Newsletter (August 1 – October 25, 2007). The grain sorghum price was the average cash price reported in the USDA, NASS reports from August, 2007 through October, 2007. Net returns ranged from -\$68.79 to \$122.99 per acre for corn and -\$5.77 to \$94.93 per acre for grain sorghum. Cost for risk, overhead, and management have also not been included. These costs must be accounted for in any further interpretation of this data.

Estimated Direct Costs

Tables 4 and 5 lists estimated direct costs per acre by field for corn and grain sorghum production. The largest specified operating cost for the corn and grain sorghum fields was the fertilization cost, averaging \$141.59 and \$81.84 per acre for the corn and grain sorghum fields, respectively. Seed, fertilizer, and diesel cost account for approximately 70% of input costs for corn, 63% for irrigated grain sorghum, and 67% of non-irrigated grain sorghum in the 2007 CGSRVP.

Table 1. County, Hybrid, Field Size, Total Fertilizer and Soil Information CGSRVP Fields 2007.

<i>County</i>	Planting Date	Row Spacing (inches)	Hybrid	Field Size (Acres)	Fertilizer (N-P-K-S-Zn pounds/acre)	Soil Classification
Corn						
Crittenden	3/15/07, 4/20/07	38	Asgrow 715 DeKalb 64-10	61.2	238-60-90	Dubbs Silt Loam/Bowdre Silty Clay
Desha	3/17/07	38	Terral 26BR61	71.5	230-0-0-0	Sharkey & Desha Clay
Monroe	4/16/07	30	Asgrow 715	92.3	274-0-0-24	Dubbs & Amagon Silt Loam
Pulaski	3/26/07	38	DeKalb 66-23	59.5	284-72-100-12	Perry Clay & Keo Silt Loam
Randolph	4/14/07	30	Dyna Gro 58P59	128	251-76-76	Bosket Fine Sandy Loam
Grain Sorghum						
Poinsett (Irrigated)	4/21/07	38	Pioneer 84G62	58	156-56-112	Mhoon Silt Loam & Sharkey Clay
Prairie (Irrigated)	4/24/07	30	Pioneer 84G62	8	158-92-60	Crowley & Calloway Silt Loam
Lawrence (Non-Irr.)	4/17/07	30	FFR 318	24.4	110-36-36-20	Beulah Sandy Loam & McCrory Fine Sandy Loam

Table 2. Herbicide Usage, Irrigation, Previous Crop and Yield, CGSRVP 2007.

County	Herbicide	Irrigation	Irrigation Type	Previous Crop	Yield (bu/a)
Corn					
Crittenden	22 oz Roundup + 1 qt Atrazine May 5 & May 21	5 times	Pivot	Cotton	171
Desha	1.5 pt Roundup + 1.5 pt Atrazine - April 27 1.5 pt Roundup + 6 oz Dicamba - May 15	3 times	Furrow	Soybeans	200
Monroe	1 qt Roundup + 1 qt Atrazine + ¾ oz Resolve - May 3 1 qt Roundup + 1 qt Atrazine May 10	7 times	Furrow	Cotton	197.2
Pulaski	1 qt Roundup + 2 qt Atrazine April 28	4 times	Furrow	Soybeans	215.7
Randolph	1 qt Roundup + 3 pt Atrazine – May 9	7 times	Pivot	Corn	218
Average Yield					200.39
Grain Sorghum					
Poinsett (Irrig.)	1.5 pt Dual at Planting, 1.6 qt Atrazine – May 5	6 times	Pivot	Cotton	128.04
Prairie (Irrig.)	1.5 pt Dual at Planting, 1.2 qt Atrazine – May 25	2 times	Flood	Soybeans	95.1
Lawrence (Non-Irr)	1 pt Parallel at Planting, 1.2 qt Atrazine – May 15	0 times	None	Soybeans	108.4
Average Yield					110.51

Table 3. Selected Economic Information for the 2007 CGSRVP.

<i>County</i>	Total Direct Expenses¹ (\$/A)	Break-even Price With Direct Costs² (\$/Bu)	Total Fixed Costs³ (\$/A)	Total Direct and Fixed Costs⁴ (\$/A)	Break-even Price With Total Costs⁵ (\$/Bu)	Break-even Price With Land Rent Costs⁶ (\$/Bu)	Returns Above Total Costs and Land Rent Costs⁷ (\$/A)
Corn							
Crittenden	\$361.92	\$2.14	\$115.99	\$477.91	\$2.79	\$3.73	-\$68.79
Desha	\$304.43	\$1.52	\$51.08	\$355.51	\$1.78	\$2.37	\$122.99
Monroe	\$370.07	\$1.88	\$63.74	\$433.81	\$2.20	\$2.94	\$37.51
Pulaski	\$409.83	\$1.91	\$56.97	\$466.80	\$2.17	\$2.89	\$47.59
Randolph	\$361.44	\$1.66	\$104.17	\$465.61	\$2.14	\$2.85	\$55.95
Average	\$360.54	\$1.79	\$80.93	\$441.47	\$2.19	\$2.92	\$43.69
Grain Sorghum							
Lawrence (Non-Irrig.)	\$152.77	\$1.41	\$33.37	\$186.14	\$1.72	\$2.30	\$94.93
Poinsett (Irrigated)	\$204.03	\$1.59	\$100.46	\$304.49	\$2.38	\$3.17	\$28.63
Prairie (Irrigated)	\$183.19	\$1.93	\$69.82	\$253.01	\$2.66	\$3.55	-\$5.77
Average	\$188.51	\$1.58	\$79.85	\$268.35	\$2.23	\$2.97	\$43.25

¹ Direct out-of-pocket, operating expenses, such as seed, fertilizer, irrigation, etc.

² Price per bushel required by the farmer to equal total direct costs. Does not include land, overhead, risk, and management costs.

³ Total fixed or ownership costs which include charges for depreciation, taxes, and insurance.

⁴ Total direct operating costs plus fixed costs which include charges for depreciation and interest on all machinery and irrigation equipment, taxes, and insurance.

⁵ Price per bushel required by the farmer to equal total direct operating and fixed costs. Does not include land, overhead, risk, and management costs.

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

⁷ 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 (CCC Loan Price plus LDP does not apply for this year).

Table 4. Estimated Costs per Acre for Corn Fields (all irrigated), CGSRVP 2007

	Crittenden	Desha	Monroe	Pulaski	Randolph	Weighted Average²
Acres	61	71	92	59	128	
Direct Exp.	(\$/acre)	(\$/acre)	(\$/acre)	(\$/acre)	(\$/acre)	(\$/acre)
Custom Work	31.65	43.75	48.58	55.90	53.20	47.72
Fertilizer	134.11	109.00	113.43	192.10	160.18	141.59
Herbicides	18.58	22.88	24.70	12.58	11.20	17.53
Fungicides			10.44			2.34
Irrigation Supplies		10.30	10.30	10.30		5.56
Crop Seed	97.28	61.80	63.86	65.92	61.80	68.12
Operator Labor	8.31	3.74	5.34	4.39	4.98	5.26
Irrigation Labor	0.25	1.86	4.34	2.48	0.35	1.79
Hand Labor	2.17	1.43	0.66	0.41	0.61	0.97
Diesel Fuel¹	38.71	30.61	64.08	40.69	41.14	44.03
Repairs & Maint.	17.40	8.23	12.81	10.11	16.11	13.34
Interest on Op. Cap.	13.46	10.83	11.53	14.95	11.87	12.29
					Total	360.54

¹Price of diesel was taken to be \$2.33 per gallon.

²Weighted average calculations based on 411 total acres.

Table 5. Estimated Costs per Acre for Grain Sorghum Fields, CGSRVP 2007

	Lawrence Non-Irrigated	Poinsett Irrigated	Prairie Irrigated	Weighted Average²
Acres	24	58	8	
Direct Exp.	(\$/acre)	(\$/acre)	(\$/acre)	(\$/acre)
Custom Work	16.20	19.20	24.28	18.85
Fertilizer	78.54	84.90	69.52	81.84
Herbicides	9.74	23.58	19.91	19.56
Crop Seed	8.04	10.72	12.60	10.17
Adjuvants	2.66	2.66	2.66	2.66
Operator Labor	6.85	5.03	5.55	5.56
Irrigation Labor		0.30	0.44	0.23
Hand Labor	1.63	1.10	0.87	1.22
Diesel Fuel¹	16.24	35.68	30.04	29.99
Repairs & Maint.	7.85	14.13	10.82	12.16
Interest on Op. Cap.	5.02	6.73	6.50	6.25
			Total	188.51

¹Price of diesel was taken to be \$2.33 per gallon.

²Weighted average calculations based on 90 total acres.