2004 CORN & GRAIN SORGHUM RESEARCH VERIFICATION PROGRAM SUMMARY
ARKANSAS CORN AND GRAIN SORGHUM PROMOTION BOARD

Project Title: Corn and Grain Sorghum Research Verification

Investigators:

Mr. Jeremy Ross, Area Extension Agronomist
Dr Jason Kelley, Extension Agronomist
Dr. Tony Windham, Extension Economist – Management, Section Leader – Agricultural Economics

Cooperators:

County Agent	Cooperators	County	Crop
Ms. Sunny Bottoms	Mr. John Freeman	Lincoln	Grain Sorghum
Mr. Hank Chaney	Mr. Kent Smith	Prairie	Grain Sorghum
Mr. Carl Hayden	Mr. Roger Hensley	Chicot	Corn
Mr. Steve Kelley	Lee Walt	Desha	Corn
Mr. Doug Petty	Queens Plantation	Miller	Corn
Mr. Joe Paul Stuart	Matteson Farms	Little River	Corn
Mr. Reggie Talley	Mr. Gary Bock	Monroe	Corn
Mr. Eugene Terhune	Mr. Mike Chappell	Woodruff	Corn
Mr. Joe Vestal	Mr. Denny Peterson	Lafayette	Corn

Extension Service Specialists:

Dr. Leo Espinoza, Extension Soils Specialist
Dr. Terry Kirkpatrick, Extension Plant Pathologist
Mr. Phil Tacker, Extension Agricultural Engineer
Dr. Rick Cartwright, Extension Plant Pathologist
Mr. Gary Huitink, Extension Agricultural Engineer
Dr. Dennis Gardisser, Extension Agricultural Engineer
Dr. Glen Studebaker, Extension Entomologist
Dr. Ken Smith, Extension Weed Scientist
Mr. James Marshall, Extension Associate

Agricultural Experiment Station, Fayetteville
Dr. Paul McLeod, Department of Entomology

ABSTRACT

The Corn and Grain Sorghum Research Verification Program (CGSRVP) was conducted on seven corn and two grain sorghum fields in 2004 by the University of Arkansas Cooperative Extension Service. Grain yields ranged from 135 to 182 bushels per acre for corn with an average of 158 bushels per acre, and 99 to 130 bushels per acre for grain sorghum with an average of 114 bushels per acre. Arkansas farmers harvested 305,000 acres of corn and 56,000 acres of grain sorghum with an average yield of 140 and 84 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 specified operating costs ranged from $221.38 to $279.62 per acre for corn with an average of $249.63 per acre, and $170.11 to $174.58 per acre for grain sorghum with an average of $172.35 per acre. The average break-even prices needed to cover specified operating costs averaged $1.60 and $1.53 per bushel for corn and grain sorghum respectively. Specified operating and ownership costs averaged $289.79 and $231.20 per acre with a break-even price of $1.85 and $2.04 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 2004 growing season was the fifth 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 were 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. Nine growers were enrolled in the CGSRVP in the spring of 2004, seven corn and two grain sorghum fields. The fields were located on commercial farms ranging in size from 34 to 60 acres for corn fields, and 76 and 85 for grain sorghum fields. The average field size was 42 and 81 acres for the corn and grain sorghum fields, respectively.

The 2004 CGSRVP corn fields were conducted in Chicot, Desha, Lafayette, Little River, Monroe, Miller, and Woodruff Counties; with the grain sorghum fields in Lincoln and Prairie Counties. Six different corn hybrids (DeKalb DK 697, Pioneer 31R88, Pioneer 32P76, Pioneer 33J57, Pioneer 3394, and Terral TV2140RR) and one grain sorghum (Pioneer 84G62) were planted. Management decisions were based on field history, soil test results, hybrids, and data collected form each individual field during the growing season.

RESULTS AND DISCUSSION

The hybrid, field size, and preplant 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.

The 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.

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

Grain yields in the 2004 CGSRVP averaged 158 bu/acre with a range of 135 to 182 bu/acre for corn, and averaged 114 bu/acre with a range of 99 to 130 bu/acre for grain sorghum (Table 3). The 2004 CGSRVP corn yield was 11% greater, and the grain sorghum yield was 26% greater than the estimated Arkansas state average of 140 bu/acre and 84 bu/acre for corn and grain sorghum, respectively. The highest corn yield (182 bu/acre) was in Monroe County. The lowest corn yield (135 bu/acre) was in Little River and Miller Counties. Five of the corn fields and both of the grain sorghum fields were irrigated in the 2004 CGSRVP. The Lafayette and Miller County corn fields were non-irrigated.

ECONOMIC ANALYSIS

This section provides information on the development of estimated production costs for the 2004 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 2004 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 4 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 verity 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 $221.38 to $279.62 per acre, with an average of $249.63 per acre. The 2 grain sorghum fields had specified operation costs of $170.11 and $174.58 per acre, with an average of $172.35 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 4 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 ace 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 $22.17 to $47.02 per acre for the corn fields and $44.20 to $73.50 per acre for the grain sorghum fields, with an average of $40.15 and $58.85 per acre for the corn and grain sorghum fields, respectively.

Total Specified Costs

Total specified costs presented in Table 4 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 ranged from $243.55 to $324.50 per acre for the corn fields and $214.31 to $248.08 per acre for the grain sorghum fields, with an average of $289.79 and $231.20 per acre for the corn and grain sorghum fields, respectively.

Break-even prices needed to cover total specified costs ranged from $1.43 to $2.18 per bushel for the corn fields and $1.91 to $2.17 per bushel for the grain sorghum fields, with an average of $1.85 and $2.04 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. This is not meant to imply that this arrangement is normal or that is 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 4 also presents estimated returns per acre above Total Specified Costs plus a 25 percent crop share rent assuming a corn price of $2.01 per bushel and a grain sorghum price of $1.98 per bushel. The corn price used was obtained from the Grain Market Newsletter (August 1 – October 25, 2004). The grain sorghum price was the average cash price reported in the Grain Market News from August, 2004 through October, 2004. These prices were average loan rate for eastern Arkansas corn and grain sorghum in 2004 . Net returns ranged from $(91.08) to $12.73 per acre for corn and $(67.19) to $(54.80) 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.

Various Specified Operating Costs

Table 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 $100.66 and $68.82 per acre for the corn and grain sorghum fields, respectively.

Table 1. County, Hybrid, Field Size, and Preplant Fertilizer, CGSRVP Fields 2004.

County	Hybrid	Field Size (Acres)	Preplant Fertilizer (N-P-K-S-Zn pounds/acre)
Corn			
Chicot	Pioneer 31R88	40	0-60-60
Desha	Pioneer 33J57	40	77-60-60
Lafayette	Terral TV2140RR	42	94-0-0
Little River	DeKalb DK697	36	92-75-0
Miller	Pioneer 3394	60	47-0-60-12
Monroe	Pioneer 32P76	34	93-92-90-12-10
Woodruff	Pioneer 33J57	39	34-60-60-12-10
Grain Sorghum			
Lincoln	Pioneer 84G62	76	90-60-90
Prairie	Pioneer 84G62	85	76-60-20-24

Table 2. General Soil Information, CGSRVP Fields 2004.

County	Soil Classification
Corn	
Chicot	Sharkey clay
Desha	Hebert/Rilla silt loam
Lafayette	Billyhaw clay
Little River	Billyhaw clay loam
Miller	Rilla/Caspiana silt loam
Monroe	Stuttgart/Crowley silt loam
Woodruff	Grenada/Calloway silt loam
Grain Sorghum	
Lincoln	Perry clay
Prairie	Dubbs silt loam

Table 3. Hybrid, Field Size, Previous Crop, and Yield, CGSRVP 2004.

County	Irrigation	Hybrid	Field Size (Acres)	Previous Crop	Yield (bu/A)
Corn	Yes				
Chicot	Yes	Pioneer 31R88	40	Cotton	145
Desha	Yes	Pioneer 33J57	40	Cotton	182
Lafayette	No	Terral TV2140RR	42	Corn	170
Little River	Yes	DeKalb DK697	36	Soybean	135
Miller	No	Pioneer 3394	60	Soybean	135
Monroe	Yes	Pioneer 32P76	34	Soybean	175
Woodruff	Yes	Pioneer 33J57	39	Soybean	162
		Average	**42**		**158**
Grain Sorghum					
Lincoln	Yes	Pioneer 84G62	76	Soybean	99
Prairie	Yes	Pioneer 84G62	85	Soybean	130
		Average	**81**		**114**

Table 5. Selected variable input expenses, CGSRVP 2004.

County	Fertilization	Seed	Herbicide	Irrigation
	----------$/A----------			
Corn				
Chicot	$107.74	$31.44	$6.66	$11.52
Desha	$93.64	$40.61	$21.62	$11.52
Lafayette	$81.40	$32.75	$34.54	$0.00
Little River	$94.54	$41.92	$37.02	$3.84
Miller	$98.38	$41.92	$10.76	$0.00
Monroe	$110.14	$43.23	$19.40	$19.20
Woodruff	$118.75	$43.23	$16.30	$11.52
Average	**$100.66**	**$39.30**	**$20.90**	**$8.23**
Grain Sorghum				
Lincoln	$72.40	$10.50	$22.30	$7.68
Prairie	$65.24	$8.02	$20.12	$16.28
Average	**$68.82**	**$9.26**	**$21.21**	**$11.98**

Table 4. Selected economic information for the 2004 CGSRVP.

County	Total Specified Operating Costs[1] ($/A)	Break-even Operating[2] ($/Bu)	Total Specified Operating and Ownership Costs[3] ($/A)	Break-even Price[4] ($/Bu)	Break-even Price With Land Costs[5] ($/Bu)	Returns Above Total Specified Costs[6] ($/A)
Corn						
Chicot	$229.69	$1.58	$275.50	$1.90	$2.53	($56.91)
Desha	$261.81	$1.44	$307.19	$1.69	$2.25	($32.83)
Lafayette	$221.38	$1.30	$243.55	$1.43	$1.91	$12.73
Little River	$249.38	$1.85	$294.59	$2.18	$2.91	($91.08)
Miller	$234.87	$1.74	$265.47	$1.97	$2.62	($61.96)
Monroe	$279.62	$1.60	$324.50	$1.85	$2.47	($60.69)
Woodruff	$270.68	$1.67	$317.70	$1.96	$2.61	($73.49)
Average	**$249.63**	**$1.60**	**$289.79**	**$1.85**	**$2.47**	**($52.03)**
Grain Sorghum						
Lincoln	$170.11	$1.72	$214.31	$2.17	$2.89	($67.19)
Prairie	$174.58	$1.34	$248.08	$1.91	$2.54	($54.80)
Average	**$172.35**	**$1.53**	**$231.20**	**$2.04**	**$2.72**	**($60.99)**

[1] Specified out-of-pocket expenses, such as seed, fertilizer, irrigation, etc.
[2] Price per bushel required by the farmer to equal total specified operating costs. Does not include land, overhead, risk, and management costs.
[3] Total specified operating costs plus ownership costs which include charges for depreciation and interest on all machinery and irrigation equipment, taxes, and insurance.
[4] Price per bushel required by the farmer to equal total specified operating and ownership costs. Does not include land, overhead, risk, and management costs.
[5] Break-even price per bushel plus a 25 percent crop share rent. Does not include overhead, risk, and management costs.
[6] A 25 percent crop share rent was assumed as a land charge for a renter situation. No cost sharing was assumed.

Average cash price of $3.54/cwt ($1.98/bu) as reported in Grain Market News from August, 2004 through October, 2004.
Cash corn prices ($2.01/bu) as reported in the Grain Market Newsletter from August 1 – October 25, 2004.

The "full" report for the corn and grain sorghum verification will be found at the following link
http://www.aragriculture.org/cropsoilwtr/corn/default.asp