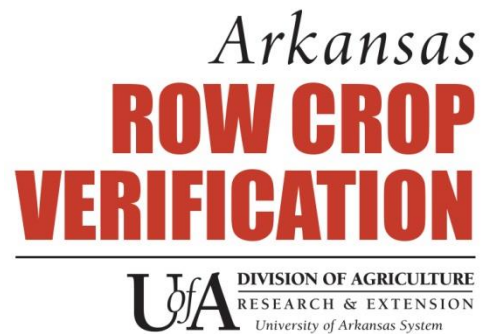




2019 University of Arkansas Soybean Research Verification Program

The Soybean Research Verification Program is funded by Arkansas soybean producers through check-off monies administered by the Arkansas Soybean Promotion Board.

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SOYBEAN RESEARCH VERIFICATION PROGRAM, 2019

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INTRODUCTION

The 2019 growing season was the thirty fifth year for the Soybean Research Verification Program (SRVP). The SRVP is an interdisciplinary effort between growers, county Extension agents, Extension specialists, and researchers. The SRVP is an on-farm demonstration of all the research-based recommendations required to grow soybeans profitably in Arkansas. The specific objectives of the program are:

To verify research-based recommendations for profitable soybean production in all soybean producing areas of Arkansas.

To develop a database for economic analysis of all aspects of soybean production.

To demonstrate that consistently high yields of soybeans can be produced economically with the use of available technology and inputs.

To identify specific problems and opportunities in Arkansas soybeans for further investigation.

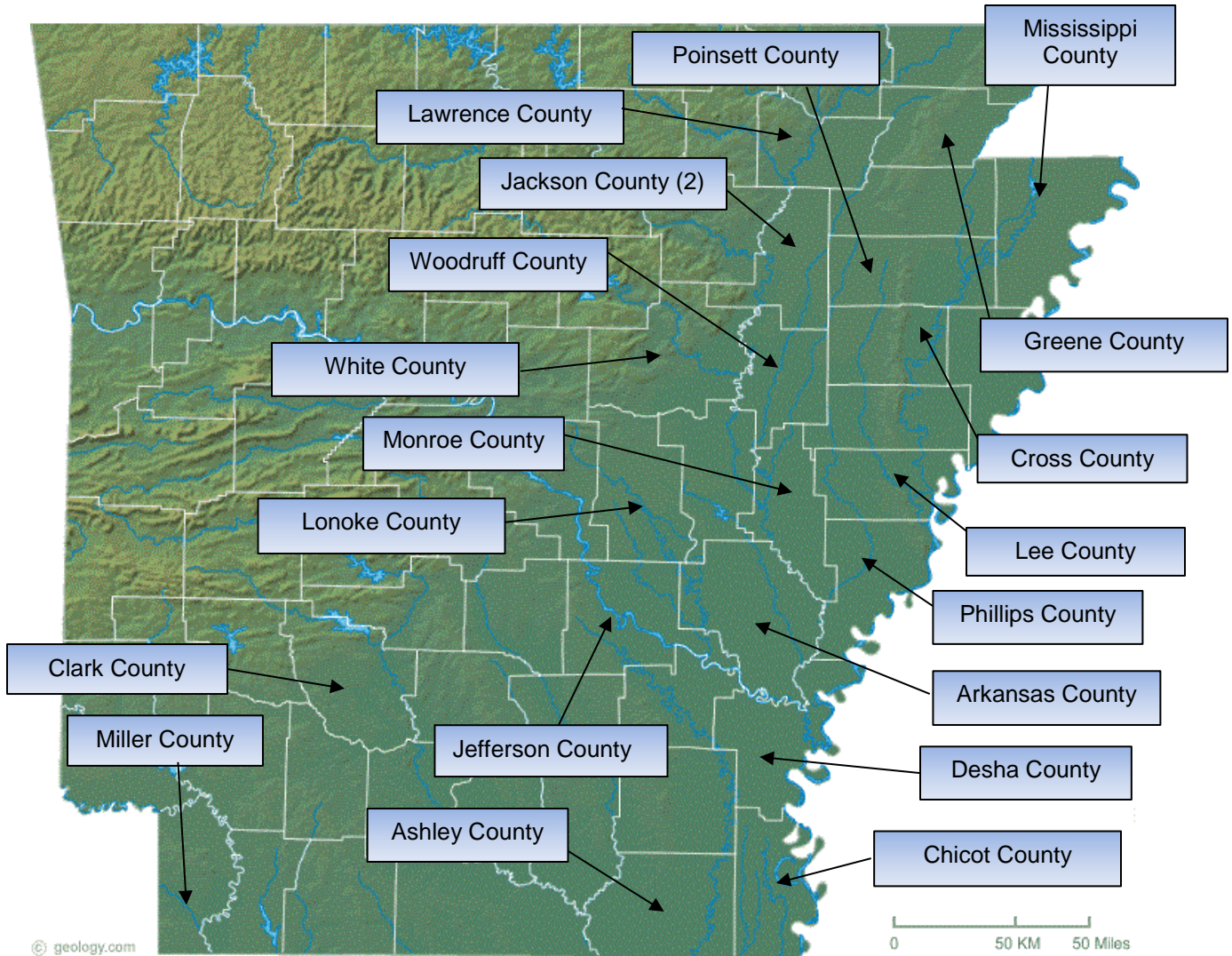
To promote timely implementation of cultural and management practices among soybean growers.

To provide training and assistance to county agents with limited expertise in soybean production.

Each SRVP 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. Twenty farms were enrolled in the SRVP in 2019. The fields were located on commercial farms ranging in size from 28 to 140 acres. The average field size was 59 acres.

The 2019 SRVP fields were conducted in Arkansas, Ashley, Chicot, Clark, Cross, Desha, Greene, Jackson (2), Jefferson, Lawrence, Lee, Lonoke, Miller, Mississippi, Monroe, Phillips, Poinsett, White, and Woodruff counties. Three different Roundup Ready® varieties (Pioneer P47T36R, Terral REV 48A26, and UA 5414RR), five different Roundup Ready 2 Xtend® varieties (Armor 46-D08, Armor 48-D24, Asgrow AG46X6, Pioneer P42A43X and Pioneer P48A32X), nine LibertyLink® varieties (Bayer CZ 4918LL, Merschman Miami 1949 LL, Pioneer P45A29L, Pioneer P47A76L, Progeny 5414LLS, Stine 49LD02, Stine 49LH02, Stine 51LI32 and Terral REV 47L38) and one conventional variety (NSGA DrewSoy 5.0) were planted. Management decisions were based on field history, soil test results, variety, and data collected from each individual field during the growing season.

Figure 1. Location of 2019 Soybean Research Verification Fields



FIELD REVIEWS

Northern Fields – Christopher Elkins

Cross County

The 85 acre field, soil type Alligator and Earle clay, was located south of Parkin and followed the previous year soybean crop. A fertilizer application of 0-50-0 was applied prior to planting, according to soil test recommendation. A burndown application of 40 ounces/acre Gramoxone was applied prior to planting. The field was planted on May 18 with Armor 48D24, Cruiser Maxx seed treatment, at 160,000 seed/acre on 15” seed spacing, a pre-emerge application of 1.75 pints/acre Boundary was applied for residual weed control. The field emerged on May 25 to a plant population of 139,000 plants/acre. On June 5, 32 ounces/acre glyphosate plus 2 pints/acre Prefix plus 6 ounces/acre Flexstar was applied residual and post emerge weed control. A second herbicide application of 32 ounces/acre glyphosate was applied on July 1. Disease and Insect pressure remained below treatment threshold and no application was warranted. The field was pivot irrigated 3 times and harvested on October 3 yielding 59.6 bushels/acre adjusted to 13% moisture.

Greene County

The 33 acre field, soil type Foley-Bonn complex, was located west of Light and followed the previous year rice crop. Following spring tillage and fertilizer application of 0-60-120, according to soil test recommendations, the field was planted on June 14 with Stine 49LD02, Cruiser Maxx seed treatment, at 140,000 plants/acre on 30” seed spacing and 1.25 pints/acre S-metolachlor was applied for residual weed control. The field emerged on June 20 to a plant population of 90,000 seed/acre. On July 4, 32 ounces/acre Liberty plus 1.25 pints/acre metolachlor and on July 24, 32 ounces/acre Liberty was applied for weed control. Disease and insect pressure remained below threshold and no treatment was recommended. The field was furrow irrigated 5 times and harvested on October 25 yielding 59.1 bushels/acre adjusted to 13% moisture.

Jackson County 1

The 45 acre field, soil type Egam silt loam, was located south of Oil Trough and followed the previous year soybean crop. Following fall tillage and spring burndown of 32 ounces/acre Roundup PowerMax plus 1 ounce/acre Sharpen and an application of 32 ounces/acre metolachlor was applied pre plant incorporated. The field was broadcasted on June 4, with UA5414RR, ApronMaxx and Inoculant, at 2.05 bushels/acre. The field emerged on June 19 to a plant population of 176,000 plants/acre. On July 4, 22 ounces/acre Roundup Power Maxx plus 1 pint/acre Flexstar was applied for weed control. Bollworm pressure reached economic threshold and an application of 14 ounces/acre Prevethon on August 22 was applied. Disease pressure remained below threshold and did not warrant treatment. The field was flood irrigated 2 times and harvested on October 23 yielding 37 bushels/acre adjusted to 13% moisture.

Jackson County 2

The 46 acre field, soil type Egam silt loam, was located west of Newport and followed the previous year corn crop. Fertilizer application of 1 ton poultry litter was applied and followed by fall land preparation. The field was planted on May 24 with Pioneer 47A76L treated seed at 140,000 seed/acre on 30" seed spacing, along with 32 ounces/acre paraquat plus 1 quart/acre Moccasin MTZ. The field emerged on May 31 to a plant stand of 114,000 seed/acre. First post herbicide was applied on June 3 consisting of 1 quart/acre Liberty followed by 1 quart/acre Liberty and 1 pint/acre S-metolachlor on June 19. A third application was required to control emerged weeds on July 3 of 1 pint/acre Flexstar. Neither insect nor disease pressure reached treatment threshold, so no insecticide or fungicide applications were made. The field was furrow irrigated 2 time harvested October 24 yielding 64.3 bushels/acre adjusted to 13% moisture.

Lawrence County

The 30 acre field, soil types Bosket fine sandy loam and Patterson fine sandy loam, was located west of Minturn and followed the previous year corn crop. A fertilizer application of 0-50-120 was applied prior to planting, according to soil test recommendations. Following fall and spring land preparation, the field was planted on April 28 with Asgrow 46X6, Cruiser Maxx seed treatment, at 133,000 seed/acre on 30" beds, along with a pre-emerge application of 1 pint/acre Prowl plus 2 ounces/acre Valor plus .3 pounds/acre metribuzin. The field emerged on May 5 to a plant population of 112,000 plants/acre. First post herbicide was applied on May 25 consisting of 1 quart/acre Cornerstone plus 1 quart/acre Prefix followed by 1 quart/acre Cornerstone on June 20. Disease and insect pressure remained below threshold and did not warrant treatment. The field was furrow irrigated 4 times and harvest on October 5 yielding 54.2 bushels/acre.

Poinsett County

The 132 acre field, soil type Hillemann and Henry silt loam, was located north of Fisher and followed the previous year rice crop. After land preparation and fertilizer application of 0-60-120-.5B, according to soil test recommendations, the field was planted June 5 with Drewsoy 5.0 at 160,000 seed/acre drilled on 7.5" seed spacing. Field did not have adequate stand following heavy rains after planting. The field was re-planted on June 13 with Drewsoy 5.0 at 155,000 seed/acre. Prior to emergence 32 ounces/acre boundary and 1 ounce/acre Zidua were used for pre-emerge weed control. The field emerged on June 19 to a plant population of 122,000 plants/acre. On July 11, 8 ounces/acre Intensity plus 1 pint/acre S-metolachlor plus 1% COC was applied for residual and post emerge weed control. Bollworm pressure reached threshold and an application 1.28 ounces/acre Heligen plus 1% COC was applied for control. Disease pressure did not reach threshold and did not warrant treatment. The field was flood irrigated 1 time and harvested on October 18 yielding 51.5 bushels/acre adjusted to 13% moisture.

Mississippi County

The 65 acre field, soil type Sharkey- Steele complex, was located south of Keiser and followed the previous year rice crop. No fertilizer was applied, according to soil test recommendations. Following land preparation, the field was planted on June 2 with Asgrow 46X6, CruiserMaxx seed treatment, at 140,000 seed/acre on 38" beds and a pre-emerge application of 22 ounces/acre Galvan plus 1 ounce/acre Valor plus 48 ounces/acre Gramoxone was applied. The field emerged on June 11 to a plant population 115,000 plants/acre. On July 2 a post emerge application of 32 ounces/acre Roundup PowerMax plus 48 ounces/acre Warrant Ultra was applied for weed control. Disease and insect pressure remained below threshold and treatment was not recommended. The field was furrow irrigated 3 times and harvested on November 15 yielding 70.7 bushels/acre adjusted to 13% moisture.

White County

The 28 acre field, soil type Calhoun silt loam, was located east of Russell and followed the previous year soybean crop. Following spring land preparation and fertilizer application of 0-60-120, according to soil test recommendations, the field was planted June 4 with Terral Rev 47L38, CruiserMaxx seed treatment, at 140,000 seed/acre along with an application of 32 ounces/acre Headwin for residual weed control. The field emerged on June 12 to a plant population of 109,000 plants/acre. A post-emerge application of 32 ounces/acre Interline plus 16 ounces/acre Me-Too-Lachlor was utilized for weed control. Disease and insect pressure remained below treatment thresholds and no application was warranted. The field was furrow irrigated 4 times and harvested on October 13 yielding 48.4 bushels/acre adjusted to 13% moisture.

Woodruff County

The 150 acre field, soil types Jackport silty clay loam and Grubbs silt loam, was located north of McCory and followed the previous year rice crop. Following land preparation, spring fertilizer application of 0-80-50, according to soil test recommendations, the field was planted June 18 with Stine 51LI32, Apron Maxx plus inoculant, at 175,000 seed/acre along with an application of 3 pints/acre Warrant. The field emerged June 26 to a plant population of 144,000 plants/acre. Post-emergence application of 40 ounces/acre Cheetah on July 10 and 40 ounces/acres Cheetah plus 8 ounces/acre Clethodim 2E on August 2 for post emerge weed control. Bollworm pressure reached threshold and an application of 1.28 ounces/acre Heligen was applied on August 16. Disease remained below treatment thresholds so fungicide applications were unwarranted. The field was pivot irrigated 3 times and harvested on November 5 yielding 50.4 bushels/acre adjusted to 13% moisture.

Southern Fields – Chad Norton

Arkansas County

The 28 acre field, soil types Hebert and Rilla silt loam, was located southwest of Lodge Corner and followed the previous year rice crop. After fall and spring land preparation and fertilizer application of 0-0-60, according to soil test recommendations, the field was planted May 1 with Pioneer P45A29L, Cruiser Maxx seed treatment, at 130,000 seeds/acre on 30" beds. A pre-emergence application of 1.5 pints/acre Boundary was applied May 2 for weed control. The field emerged May 8 to a plant population of 82,000 plants/acre. Post-emergence applications of 1 quart/acre Liberty plus 2 ounces/acre Zidua on May 30 and 1 quart/acre Liberty plus 1.5 pints/acre Me-Too-Lachlor on June 25 were also utilized for weed control. Neither insects nor diseases reached treatment thresholds so insecticide and fungicide applications were unwarranted. The field was furrow irrigated 4 times and harvested October 1 yielding 74.6 bushels/acre adjusted to 13% moisture.

Ashley County

The 51 acre field, soil type Calhoun silt loam, was located west of Hamburg and followed the previous year corn crop. After fall disking, spring fertilizer application of 0-50-70, according to soil test recommendation, and bedding the field was planted May 7 with Terral REV 48A26, Cruiser Maxx seed treatment, at 140,000 seeds/acre on 38" twin row beds. A pre-emergence application of 1.33 pints/acre Dual Magnum was applied May 8 for weed control. The field emerged May 17 to a plant population of 124,000 plants/acre. Post-emergence applications of 1 quart/acre Cornerstone on June 3 and 1 quart/acre Cornerstone plus 1 quart/acre Prefix plus 6 ounces/acre Flexstar on June 28 were also utilized for weed control. The field required a 5.12 ounces/acre Tundra plus 1% COC application August 30 for stink bug control. Diseases did not reach treatment thresholds so fungicide application was unwarranted. The field was furrow irrigated five times and harvested September 17 yielding 67.9 bushels/acre adjusted to 13% moisture.

Chicot County

The 55 acre field, soil type Perry clay, was located east of Jerome and followed the previous year rice crop. Following spring disking, fertilizer application of 0-0-60, according to soil test recommendations and bedding the field was planted June 12 with Armor 46D08, Cruiser Maxx seed treatment, at 146,000 seeds/acre. A pre-emergence application of 22 ounces/acre RoundUp PowerMax plus 5 ounces/acre Verdict June 13 was used for weed control. The field emerged June 20 to a plant population of 85,000 plants/acre. A post-emergence application of 1 quart/acre Cornerstone plus 1 pint/acre Dual Magnum was also utilized for weed control. The field required insecticide applications of 1.5 ounces/acre Heligen plus 1% COC August 3 and 5.12 ounces/acre Brigade plus 1% NIS September 26 for corn earworm and stink bug control, respectfully. Disease remained below treatment threshold so fungicide application was unwarranted. Gramoxone at 1 pint/acre plus 1% NIS applied October 9 was utilized as a harvest aid. The field was furrow irrigated 3 times and harvested November 3 yielding 41 bushels/acre adjusted to 13% moisture.

Clark County

The 67 acre field, soil types Tuscumbia silty clay and Marietta fine sandy loam, was located south of Arkadelphia and followed the previous year corn crop. After spring tillage and fertilizer application of 0-0-50, according to soil test recommendations, the field was planted June 11 with Pioneer P48A32X, Cruiser Maxx seed treatment, at 140,000 seeds/acre on 38" twin rows. A pre-emergence application of 1 quart/acre Cornerstone plus 1.5 pints/acre Me-Too-Lachlor June 12 was used for weed control. Due to poor emergence the field was replanted June 20 at the same seeding rate with the same variety. It emerged June 26 to a plant population of 95,000 plants/acre. Due to emerged pigweeds, an application of 1 quart/acre Cornerstone plus 1 pint/acre Ultra Blazer June 22 was utilized. In addition, post-emergence applications of 24 ounces Envy 6 Max plus 2 ounces/acre Zidua July 1 and 1 quart/acre Cornerstone plus 1 pint/acre Ultra Blazer June 24 were also used for weed control. The field required a 1.5 ounces/acre Heligen plus 1% COC application August 5 for corn earworm control. The field was furrow irrigated 5 times and harvested October 19 yielding 40.1 bushels/acre adjusted to 13% moisture.

Desha County

The 80 acre field, soil type Sharkey and Desha clays, was located south of Rohwer and followed the previous year soybean crop. According to soil test recommendation the field required no fertilizer application. After spring bedding the field was planted April 27 with Armor 48D24, Cruiser Maxx seed treatment, at 140,000 seeds/acre. A pre-emergence application of 1 quart/acre Cornerstone plus 5 ounces/acre Verdict April 28 was used for weed control. The field emerged May 6 to a plant population of 83,000 plants/acre. Post-emergence applications of 22 ounces/acre RoundUp PowerMax plus 1.3 pints/acre Dual Magnum June 4 and, with the use of a layby rig, 1 quart/acre Cornerstone plus 1 quart/acre Prefix July 8 were also utilized for weed control. Neither insects nor diseases reached treatment thresholds so insecticide and fungicide applications were unwarranted. The field was furrow irrigated 3 times and harvested September 28 yielding 66.1 bushels/acre adjusted to 13% moisture.

Jefferson County

The 46 acre field, soil types Perry clay and Coushatta silt loam, was located south of Pastoria and followed the previous year corn crop. Following spring fertilizer application of 0-0-120, according to soil test recommendations, and land preparation, the field was planted May 27 with Pioneer P42A43X, Cruiser Maxx seed treatment, at 140,000 seeds/acre on 30" beds along with an application of 1 quart/acre Boundary for residual weed control. The field emerged June 3 to a plant population of 120,000 plants/acre. A post-emergence application of 37 ounces/acre Prefix plus 1 quart/acre Cornerstone June 14 was also utilized for weed control. The field required a 13.7 ounces/acre Miravis Top application for Frog-eye Leaf Spot control. Insects did not reach treatment threshold so insecticide application was unwarranted. Gramoxone at 1 pint/acre plus 1% NIS applied September 10 was utilized as a harvest aid. The field was furrow irrigated 7 times and harvested September 26 yielding 70.3 bushels/acre adjusted to 13% moisture.

Lee County

The 39 acre field, soil types Calloway and Hilleman silt loam, was located in New Salem and followed the previous year corn crop. Following fall diamond harrowing, spring fertilizer application of 0-54-108, according to soil test recommendations, and land preparation, the field

was planted May 17 with Pioneer P47T36R, Cruiser Maxx seed treatment, at 135,000 seeds/acre on 38" twin row beds along with an application of 1.33 pints/acre Boundary for residual weed control. The field emerged May 24 to a plant population of 120,000 plants/acre. A post-emergence application of 1 quart/acre RoundUp PowerMax plus 1 quart/acre Prefix plus 10 ounces/acre Section III June 11 was also utilized for weed control. Neither insects nor diseases reached treatment thresholds so insecticide and fungicide applications were unwarranted. The field was furrow irrigated 4 times and harvested October 1 yielding 75 bushels/acre adjusted to 13% moisture.

Lonoke County

The 40 acre field, soil types Calloway and Calhoun silt loam, was located northeast of Lonoke and followed the previous year corn crop. Following fall and spring disking, fertilizer application of 0-50-120, according to soil test recommendations, and bedding, the field was planted June 2 with Bayer CZ 4918 LL, Cruiser Maxx seed treatment, at 137,000 seeds/acre on 30" rows. A pre-emergence application of 1 quart/acre Prefix was utilized to residual weed control. The field emerged June 9 to a plant population of 115,000 plants/acre. Post-emergence applications of 1 quart/acre Interline June 14 and 1 quart/acre Interline plus 1.2 pints/acre Charger Basic June 28 were also utilized for weed control. The field required a 5.12 ounces/acre Tundra plus 1% COC application September 11 for stink bug control. Diseases remained below treatment thresholds so fungicide application was unwarranted. The field was furrow irrigated 4 times and harvested October 3 yielding 67.8 bushels/acre adjusted to 13% moisture.

Miller County

The 76 acre dryland field, soil type Bossier clay, was located south of Garland and followed the previous year soybean crop. After spring burndown application of 1 pint/acre 2,4-D plus 2 ounces/acre Valor, the field was flat planted May 25 with Merschman Miami 1949 LL, Cruiser Maxx seed treatment, at 140,000 seeds/acre on 20" centers. According to soil test recommendations the field required no fertilizer application. Post-emergence applications of 1 quart/acre Interline plus 8 ounces/acre Section III plus 3 pounds/acre AMS June 12 and 1.5 pints/acre Flexstar plus 10 ounces/acre Section III plus 1% COC June 28 were also utilized for weed control. The field required a 6.4 ounces/acre Brigade plus .5 pounds/acre acephate application August 19 for stink bug control that included some red banded stink bugs. Diseases remained below treatment thresholds so fungicide application was unwarranted. The field was harvested October 20 yielding 25.7 bushels/acre adjusted to 13% moisture.

Monroe County

The 40 acre field, soil type Foley-Calhoun-Bonn Complex, was located northwest of Blackton and followed the previous year corn crop. After spring disking, fertilizer application of 0-100-80, according to soil test recommendations, bedding and pre-plant application of 1 quart/acre Cornerstone plus 1 ounce/acre Sharpen May 30, the field was planted June 2 with Progeny 5414 LLS, Cruiser Maxx seed treatment, at 155,000 seeds/acre on 30" rows. The field emerged June 10 to a plant population of 100,000 plants/acre. Post-emergence applications of 1 quart/acre Liberty plus 8 ounces/acre Select Max plus 1 pint/acre Dual Magnum June 17 and 1 quart/acre Liberty plus 8 ounces/acre Select Max July 9 were also utilized for weed control. The field required a 1.28 ounces/acre Heligen plus 1% COC application August 15 for corn earworm control. The field was furrow irrigated 5 times and harvested October 29 yielding 56 bushels/acre adjusted to 13% moisture.

Phillips County

The 30 acre dryland field, soil types Loring and Grenada silt loam, was located north of Marvell and followed the previous year soybean crop. After spring disking and fertilizer application of 0-0-75, according to soil test recommendations, the field was flat planted June 1 with Stine 49LH02, Cruiser Maxx seed treatment, at 140,000 seeds/acre on 20" centers along with an application of 1 pint/acre Dual Magnum for residual weed control. The field emerged June 9 to a plant population of 80,000 plants/acre. Post-emergence applications of 1 quart/acre Liberty June 14 and 1 quart Liberty plus 1.2 pints/acre Dual Magnum July 9 were also utilized for weed control. Insecticide application of 10 ounces/acre Besiege August 14 and 5 ounces/acre Brigade September 10 were required for corn earworm and stink bug control, respectfully. The field was harvested October 7 yielding 23.9 bushels/acre adjusted to 13% moisture.

Table 1. Agronomic information for the 2019 Soybean Research Verification Fields.

County	Variety	Field size (ac)	Previous crop	Production system ¹	Seeding rate (seeds/acre)	Stand density (plants/ac)	Planting date	Emergence date	Harvest date	Yield adj. to 13% moisture (bu/ac)
Arkansas	Pioneer P45A29L	28	Rice	FSI	130K	82K	5/1	5/8	10/1	74.6
Ashley	Terral REV 48A26	51	Corn	FSI	140K	124K	5/8	5/17	9/17	67.9
Chicot	Armor 46D08	55	Rice	LSI	146K	85K	6/12	6/19	11/3	41
Clark	Pioneer P48A32X	60	Corn	LSI	140K	95K	6/20	6/26	10/18	40.1
Cross	Armor 48D24	90	Soybean	FSI	160K	139K	5/18	5/25	10/3	59.6
Desha	Armor 48D24	80	Soybeans	FSI	140K	83K	4/27	5/6	9/28	66.1
Greene	Stine 49LD02	35	Rice	LSI	140K	90K	6/14	6/20	10/25	59.1
Jackson 1	UA 5414RR	45	Soybean	LSI	2.05bu	176K	6/4	6/15	10/23	37.0
Jackson 2	Pioneer P47A76L	46	Corn	FSI	140K	114K	5/24	5/31	10/24	64.3
Jefferson	Pioneer P42A43X	46	Corn	FSI	140K	120K	5/27	6/3	9/26	70.3
Lawrence	Asgrow AG46X6	30	Corn	FSI	133K	112K	4/28	5/3	10/5	54.2
Lee	Pioneer P47T36R	39	Corn	FSI	135K	120K	5/17	5/24	10/3	75
Lonoke	Bayer CZ 4918 LL	40	Corn	LSI	137K	115K	6/2	6/9	10/3	67.8
Miller	Merschman Miami 1949 LL	76	Soybeans	FSNI	140K	120K	5/25	6/1	10/20	25.7
Mississippi	Asgrow AG46X6	65	Rice	LSI	140K	115K	6/2	6/11	11/15	70.7
Monroe	Progeny 5414 LLS	40	Corn	LSI	155K	100K	6/2	6/10	10/29	56
Phillips	Stine 49LH02	30	Soybeans	LSNI	140K	80K	6/1	6/9	10/7	23.9
Poinsett	NSGA DrewSoy 5.0	132	Rice	LSI	150K	122K	6/13	6/19	10/18	51.5
White	Terral REV 47L38	28	Soybean	LSI	140K	109K	6/4	6/12	10/13	48.4
Woodruff	Stine 51LI32	150	Rice	LSI	175K	144K	6/18	6/26	11/5	50.4
Average		58			149K	112K	5/27	6/4	10/14	55.2

¹Production Systems: FSI = Full Season Irrigated; FSNI = Full Season Non-irrigated; LSI = Late Season Irrigated; LSNI = Late Season Non-irrigated

State Avg. – 50 bu/ac

Table 2. Soil tests results, applied fertilizer and soil classification for the 2019 Soybean Research Verification Fields

County	Soil Test Results (ppm)			Applied Fertilize N-P-K (lb/acre)	Soil Classification
	pH	P	K	Pre-plant	
Arkansas	6.2	30	112	0-0-60	Hebert, Rilla silt loam, Portland clay
Ashley	7.2	28	54	0-50-70	Calhoun, Calloway silt loam
Chicot	6.7	38	144	0-0-60	Perry clay
Clark	6.4	30	133	0-0-50	Tuscumbia silty clay, Marietta fine sandy loam
Cross	6.5	22	252	0-50-0	Alligator and Earle clay
Desha	7.4	37	337	0-0-0	Sharkey and Desha clays
Greene	6.6	12	86	0-60-120	Jackport silty clay loam
Jackson 1	6.3	13	112	0-0-0	Egam silt loam
Jackson 2	6.6	78	156	1 ton poultry litter	Egam silt loam
Jefferson	7.1	45	78	0-0-120	Perry clay, Coushatta silt loam
Lawrence	6.5	25	85	0-50-120	Bosket fine sandy loam
Lee	7.8	45	134	0-54-108	Calloway, Hillemann silt loam
Lonoke	6.2	26	82	0-50-120	Calloway, Calhoun silt loam
Miller	6.1	31	197	0-0-0	Bossier clay
Mississippi	7.5	28	330	0-0-0	Sharkey-Steele complex
Monroe	7.3	16	121	0-100-80	Foley-Calhoun-Bonn Complex
Phillips	5.4	26	94	0-0-75	Loring, Grenada silt loam
Poinsett	7.1	11	59	0-60-160-.5B	Henry, Hillemann silt loam
White	6.1	16	62	0-60-120	Calhoun silt loam
Woodruff	6.7	5	151	0-80-50	Jackport silty clay loam

Table 3. Herbicide rates and timings for 2019 Soybean Research Verification Program fields by county.

County	Herbicide	
	Burndown/Pre-emergence	Post-emergence
Arkansas	Pre-emerge; 1.5 pt. Boundary	1 st ; 1 qt. Liberty + 2 oz. Zidua 2 nd ; 1 qt. Liberty + 1.5 pt. Me-Too-Lachlor
Ashley	Pre-emerge; 1 pt. Charger Basic	1 st ; 1 qt. Cornerstone 2 nd ; 1 qt. Cornerstone + 1 qt. Prefix + 6 oz. Flexstar
Chicot	Pre-emerge; 22 oz. RoundUp PowerMax + 5oz. Verdict	1 qt. Cornerstone + 1 pt. Dual Magnum Harvest aid; 1 pt Gramoxone + 1% NIS
Clark	Pre-emerge; 1 qt. Cornerstone + 1.5 pt. Me-Too-Lachlor	1 st ; 1 pt. Ultra Blazer + 1 qt. Cornerstone 2 nd ; 24 oz. Envy 6 Max + 2 oz. Zidua 3 rd ; 1 pt Ultra Blazer + 1 qt. Cornerstone
Cross	Burndown; 40 oz. paraquat Pre-emerge; 1.75 pts. Boundary	1 st ; 1 qt. glyphosate + 1 qt. Prefix + 6 oz. Flexstar 2 nd ; 1 qt. glyphosate
Desha	Pre-emerge; 1 qt. Cornerstone + 5 oz. Verdict	1 st ; 22 oz. RoundUp PowerMax + 1.3 pt. Dual Magnum 2 nd ; 1 qt. Cornerstone + 1 qt. Prefix
Greene	Pre-emerge; 1.25 pt. S-metolachlor	1 st ; 1 qt. Liberty + 1.25pt S-metolachlor 2 nd ; 1 qt. Liberty
Jackson 1	Burndown; 32 oz. RoundUp PowerMax + 1 oz. Sharpen Pre-emerge: 1 qt. metolachlor	1 st ; 22 oz. RoundUp PowerMax + 1 pt. Flexstar
Jackson 2	Pre-emerge; 1 qt. Paraquat + 1 qt. Moccasin MTZ	1 st ; 1 qt. Liberty 2 nd ; 1 qt. Liberty + 1 pt. S-metolachlor 3 rd ; 1 pt. Flexstar
Jefferson	Pre-emerge; 1 qt. Boundary	36 oz. Prefix + 1 qt. Cornerstone
Lawrence	Pre-emerge; 2 oz. Valor + 1 pt. Prowl + .3 lbs. Metribuzin	1 st ; 1 qt. Cornerstone + 1 qt. Prefix 2 nd ; 1 qt. Cornerstone
Lee	Pre-emerge; 1.3 pt. Boundary	1 qt. RoundUp PowerMax + 1 qt. Prefix + 10 oz. Section III
Lonoke	Pre-emerge; 1 qt. Prefix	1 st ; 1 qt. Interline 2 nd ; 1 pt. Ultra Blazer + .25% NIS + 2 oz. Zidua
Miller	Burndown; 1pt. 2,4-D + 2 oz. Valor Pre-emerge; 1.3 pt. Dual Magnum	1 st ; 1 qt. Interline + 8 oz. Section III + 3 lbs. AMS 2 nd ; 1.5 pt. Flexstar + 8 oz. Section III
Mississippi	Pre-emerge; 22 oz. Galavant +1oz valor + 48 oz. Gramoxone	1 st ; 1 qt. RoundUp PowerMax + 48 oz. Warrant Ultra
Monroe	Pre-emerge; 1 qt. Cornerstone + 1 oz. Sharpen	1 st ; 1 qt. Liberty + 1 pt. Dual Magnum + 8 oz. Select Max 2 nd ; 1 qt. Liberty + 8 oz. Select Max
Phillips	Pre-emerge; 1 pt. Dual Magnum	1 st ; 1 qt. Liberty 2 nd ; 1 qt. Liberty + 1.2 pt. Dual Magnum
Poinsett	Pre-emerge; 1 qt. Boundary; 1 oz. Zidua	1 st ; 8 oz. Intensity + 1 pt. S-metolachlor
White	Pre-emerge; 1 qt. Headwin	1 st ; 32 oz. Interline + 16 oz. Me to Lachlor
Woodruff	Pre-emerge; 3 pts. Warrant	1 st ; 40 oz. Cheetah 2 nd 40 oz. Cheetah + 8 oz. Clethodim 2E

Table 4. Fungicide and insecticides applications in 2019 Soybean Research Verification fields by county.

County	Aerial Web Blight	Frogeye	Bollworm/Defoliators	Stink Bug
Arkansas				
Ashley				5.12 oz. Tundra + 1% COC
Chicot			1.3 oz. Heligen + 1% COC	5.12 oz. Brigade + 1% NIS
Clark			1.5 oz. Heligen + 1% COC	
Cross				
Desha				
Greene				
Jackson 1			14 oz. Prevathon	
Jackson 2				
Jefferson		13.7 oz. Miravis Top		
Lawrence				
Lee				
Lonoke				5.12 oz. Tundra + 1% COC
Miller				6.4 oz. Brigade + .5 lbs. acephate
Mississippi				
Monroe			1.28 oz. Heligen + 1 % COC	
Phillips			10 oz. Besiege	5 oz. Brigade
Poinsett			1.28 oz. Heligen + 1% COC	
White				
Woodruff			1.28 oz. Heligen	

Table 5. Irrigation and rainfall information for the 2019 Soybean Research Verification Fields.

County	Irrigation Type	Number of Irrigations	Irrigation Water Used (acre inches/acre)*	Rainfall (in)
Arkansas	Furrow	4	12.89	25.0
Ashley	Furrow	5	13.84	25.8
Chicot	Furrow	3		12.1
Clark	Furrow	5		12.0
Cross	Pivot	3	3.00	14.6
Desha	Furrow	3		15.7
Greene	Furrow	5	6.73	18.9
Jackson 1	Flood	2		12.4
Jackson 2	Furrow	2	4.30	14.2
Jefferson	Furrow	7		18.5
Lawrence	Furrow	4		21.7
Lee	Furrow	4	11.48	20.3
Lonoke	Furrow	4	13.66	20.3
Miller	Dryland	N/A		9.0
Mississippi	Furrow	3		11.5
Monroe	Furrow	5	13.41	15.4
Phillips	Dryland	N/A		16.2
Poinsett	Flood	1		20.25
White	Furrow	4	6.63	15.0
Woodruff	Pivot	3		11.4

*Irrigation water use determined using flow meters installed for entire season. Not all fields had flow meters.

ECONOMIC ANALYSIS

This section provides information on production costs and returns for the 2019 SRVP. Records of field operations on each field provided the basis for estimating production costs. The field records were compiled by the SRVP coordinators, county extension agents, and cooperators. Production data from the 20 fields were applied to determine costs and returns above operating costs, as well as total specified costs. Operating costs and total costs per bushel indicate the commodity price needed to meet each costs type.

Operating costs 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 are used in this analysis. Input prices are determined by data from the 2019 Crop Enterprise Budgets published by the Cooperative Extension Service, a Southeast Arkansas input provider survey, and information provided by producer cooperators. 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 costs should be regarded as estimated values for full service repairs, and actual cash outlays could differ as producers provide unpaid labor for equipment maintenance.

Fixed 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, fixed costs, total costs, operating and total costs per bushel, and returns above operating and total specified costs are presented, by field, region, and statewide in Table 6. Costs in this report do not include management, land costs, or other expenses and fees not associated with production. Averages in the final row of Table 6 are simple averages across all SRVP fields in the state program. Operating costs per acre range from \$184.30/acre for Miller County to \$318.33/acre for Clark County, while operating costs per bushel range from \$2.97/bu. for Lee County to \$9.03/bu. for Phillips County. Total costs per acre (operating plus fixed) range from \$244.97/acre for Miller County to \$442.71/acre for Clark County, and total costs per bushel range from \$3.90/bu. for Lee County to \$11.67/bu. for Phillips County. Returns to operating costs range from -\$7.03/acre for Phillips County to \$432.91/acre for Lee County, and returns to total costs range from -\$92.24 for Clark County to \$362.77/acre for Lee County.

A statewide summary of yield, soybean price, revenues, and expenses by expense type across all SRVP fields is presented in Table 7. Averages by North and South geographic areas are also provided in Table 7. Averages in the final three columns of the table are simple averages for the SRVP fields represented in that table. The average soybean yield for the 2019 SRVP was 55.18 bushels, but ranged from 23.9 bushels/acre for Phillips County to 75.0 bushels/acre for Lee County. Arkansas County followed closely at 74.6 bushels/acre. The Arkansas average cash price for the 2019 SRVP was estimated from January through October 31 daily price quotes of the cash market price or cash booking price to be \$8.74/bu., 62 cents less than for the same period in 2018 and 92 cents under the 2017 average for the same period. Arkansas producers set the price for portions of their crop throughout the year. The Little Rock office of the National Agriculture Statistics Service began reporting 2019 Arkansas crop booking prices on January 2 and switched to cash market quotes for the 2019 crop on October 1.

The average operating expense for the 20 SRVP fields in 2019 was \$253.87/acre (Table 7). Seed accounted for the largest share of operating expenses on average (28.58%) followed by herbicides (17.82%), and fertilizers & nutrients (9.05%). All other categories were less than 7.00% headed by post-harvest expenses (6.82%). Other notable categories and their percentages of operating expenses were repairs & maintenance (6.26%), diesel fuel for non-irrigation activities (5.79%), irrigation energy costs (5.65%), and custom applications (4.70%). The average return to operating expenses for the 20 fields was \$228.41/acre and ranged from a -\$7.03/acre for Phillips County to \$432.91/acre for Lee County. The average return to total specified expenses (Total Costs) for the 20 fields was \$142.39/acre, and ranged from -\$69.98 for Phillips County to \$362.77/acre for Lee County.

Table 6. Operating Costs, Total Costs, and Returns for Soybean Research Verification Program, 2019

County	Operating Costs (\$/acre)	Operating Costs (\$/bushel)	Returns to Operating (\$/acre)	Fixed Costs (\$/acre)	Total Costs (\$/acre)	Returns to Total Costs (\$/acre)	Total Costs per Bushel (\$/bushel)
Cross	249.71	4.19	271.19	75.65	325.36	195.54	5.46
Greene	247.91	4.19	268.63	81.28	329.18	187.35	5.57
Jackson-1	239.38	6.47	84.00	91.10	330.47	-7.09	8.93
Jackson-2	252.89	3.93	309.09	66.23	319.12	242.86	4.96
Lawrence	254.90	4.70	218.81	82.73	337.63	136.08	6.23
Mississippi	230.35	3.26	387.57	86.75	317.10	300.82	4.49
Poinsett	264.33	5.13	185.78	75.50	339.83	110.28	6.60
White	234.11	4.84	188.90	78.65	312.77	110.25	6.46
Woodruff	295.52	5.86	144.97	98.25	393.77	46.73	7.81
North Avrg.	252.12	4.73	228.77	81.79	333.91	146.98	6.28
Arkansas	283.89	3.81	368.12	91.02	374.91	277.10	5.03
Ashley	242.03	3.56	351.42	101.65	343.68	249.76	5.06
Chicot	248.49	6.06	109.85	96.66	345.14	13.20	8.42
Clark	318.33	7.94	32.14	124.38	442.71	-92.24	11.04
Desha	200.12	3.03	377.60	87.50	287.62	290.10	4.35
Jefferson	289.78	4.12	324.64	97.49	387.27	227.15	5.51
Lee	222.59	2.97	432.91	70.14	292.73	362.77	3.90
Lonoke	288.59	4.26	303.98	95.43	384.02	208.55	5.66
Miller	184.30	7.17	40.32	60.67	244.97	-20.35	9.53
Monroe	314.17	5.61	175.27	96.44	410.61	78.83	7.33
Phillips	215.91	9.03	-7.03	62.95	278.86	-69.98	11.67
South Avrg.	255.29	5.23	228.11	89.48	344.77	138.63	7.05
Statewide Average	253.87	5.01	228.41	86.02	339.89	142.39	6.70

Table 7. Summary of Revenue and Expenses per Acre, Soybean Research Verification Program, 2019 (1)							
	Arkansas	Ashley	Chicot	Clark	Cross	Desha	Greene
Receipts							
Yield (bu.)	74.6	67.9	41.0	40.1	59.6	66.1	59.1
Price	8.74	8.74	8.74	8.74	8.74	8.74	8.74
Total Crop Revenue	652.00	593.45	358.34	350.47	520.90	577.71	516.53
Seed	62.67	60.49	63.09	120.99	88.35	60.49	67.49
Fertilizers & Nutrients	11.55	25.48	11.55	9.63	12.14	0.00	37.45
Herbicides (2)	69.30	37.65	29.18	56.23	49.08	36.82	41.81
Insecticides (2)	0.00	3.40	9.55	6.15	0.00	0.00	0.00
Fungicides (2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Chemicals (2)	0.00	1.20	11.30	3.60	0.00	0.00	0.00
Custom Applications	22.50	8.00	24.00	0.00	7.50	0.00	7.50
Diesel Fuel (3)	16.89	17.56	18.24	16.25	11.46	16.70	13.84
Repairs & Maintenance	16.12	19.54	18.09	25.13	14.33	15.33	14.87
Irrigation Energy Costs	23.62	13.17	17.72	29.53	17.72	17.72	13.17
Labor, Field Activities	12.77	10.24	8.52	11.98	7.82	9.43	9.00
Interest	6.97	5.91	6.31	8.18	4.53	4.80	6.14
Other Inputs & Fee, Pre-harvest	18.09	18.09	18.09	18.09	18.09	18.09	18.09
Post-harvest Expenses	23.40	21.30	12.86	12.58	18.70	20.74	18.54
Custom Harvest	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Operating Expenses	283.89	242.03	248.49	318.33	249.72	200.12	247.90
Returns to Operating Expenses	368.12	351.42	109.85	32.14	271.18	377.60	268.63
Capital Recovery & Fixed Costs	91.02	101.65	96.66	124.38	75.65	87.50	81.28
Total Specified Expenses	374.91	343.68	345.14	442.71	325.36	287.62	329.18
Returns to Specified Expenses	277.10	249.76	13.12	-92.24	195.54	290.10	187.35
Operating Expenses/Yield Unit	3.81	3.56	6.06	7.94	4.19	3.03	4.19
Total Expenses/Yield Unit	5.03	5.06	8.42	11.04	5.46	4.35	5.57
1. Does not include land costs, management, or other expenses and fees not associated with production.							
2. Combined as Chemicals in some previous year reports							
3. Listed as Fuel & Lube in previous year reports							

Table 7. Summary of Revenue and Expenses per Acre, Soybean Research Verification Program, 2019 (2) - CONTINUED							
	Jackson-1	Jackson-2	Jefferson	Lawrence	Lee	Lonoke	Miller
Receipts							
Yield (bu.)	37.0	64.3	70.3	54.2	75.0	67.8	25.7
Price	8.74	8.74	8.74	8.74	8.74	8.74	8.74
Total Crop Revenue	323.38	561.98	614.42	473.71	655.50	592.57	224.62
Seed	83.03	67.49	60.49	57.47	58.33	66.05	67.49
Fertilizers & Nutrients	0.00	35.00	23.10	35.24	33.75	35.10	0.46
Herbicides (2)	34.03	66.50	32.98	52.41	35.24	36.80	53.97
Insecticides (2)	15.68	0.00	0.00	0.00	0.00	3.40	7.25
Fungicides (2)	0.00	0.00	16.70	0.00	0.00	0.00	0.00
Other Chemicals (2)	0.00	0.00	8.15	0.00	0.00	1.20	3.60
Custom Applications	30.50	7.50	16.00	7.50	7.50	38.00	0.00
Diesel Fuel (3)	14.42	10.12	16.14	13.24	11.76	21.23	7.92
Repairs & Maintenance	14.95	11.64	17.81	15.25	16.57	17.64	11.85
Irrigation Energy Costs	4.29	4.29	41.34	23.62	4.67	10.54	0.00
Labor, Field Activities	9.86	5.85	9.76	8.70	7.82	12.12	4.77
Interest	6.10	6.23	7.17	6.37	5.33	7.15	4.72
Other Inputs & Fee, Pre-harvest	14.91	18.09	18.09	18.09	18.09	18.09	14.21
Post-harvest Expenses	11.61	20.17	22.05	17.00	23.53	21.27	8.06
Custom Harvest	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Operating Expenses	239.38	252.89	289.78	254.89	222.59	288.59	184.30
Returns to Operating Expenses	84.00	309.09	324.64	218.82	432.91	303.98	40.32
Capital Recovery & Fixed Costs	91.10	66.23	97.49	82.73	70.14	95.43	60.67
Total Specified Expenses	330.47	319.12	387.27	337.63	292.73	384.02	244.97
Returns to Specified Expenses	-7.09	242.86	227.15	136.08	362.77	208.55	-20.35
Operating Expenses/Yield Unit	6.47	3.93	4.12	4.70	2.97	4.26	7.17
Total Expenses/Yield Unit	8.93	4.96	5.51	6.23	3.90	5.66	9.53
1. Does not include land costs, management, or other expenses and fees not associated with production.							
2. Combined as Chemicals in some previous year reports							
3. Listed as Fuel & Lube in previous year reports							

Table 7. Summary of Revenue and Expenses per Acre, Soybean Research Verification Program, 2019 (3) - CONTINUED									
	Mississippi	Monroe	Phillips	Poinsett	White	Woodruff	North	South	State Average
Receipts									
Yield (bu.)	70.7	56.0	23.9	51.5	48.4	50.4	55.02	55.31	55.18
Price	8.74	8.74	8.74	8.74	8.74	8.74	8.74	8.74	8.74
Total Crop Revenue	617.92	489.44	208.89	450.11	423.02	440.50	480.89	483.40	482.27
Seed	77.50	74.73	67.49	90.72	72.22	84.37	76.52	69.30	72.55
Fertilizers & Nutrients	0.00	39.40	14.44	39.29	37.45	58.36	28.33	18.59	22.97
Herbicides (2)	50.30	63.14	29.00	36.10	28.75	65.61	47.18	43.66	45.25
Insecticides (2)	0.00	5.25	22.42	5.25	0.00	5.25	2.91	5.22	4.18
Fungicides (2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.52	0.84
Other Chemicals (2)	0.00	1.20	3.00	0.00	1.20	0.00	0.13	3.08	1.75
Custom Applications	0.00	15.50	23.50	15.50	7.50	0.00	9.28	14.09	11.93
Diesel Fuel (3)	15.99	16.74	11.01	14.51	14.39	15.61	13.73	15.49	14.70
Repairs & Maintenance	16.24	16.75	11.81	14.92	13.38	15.65	14.58	16.97	15.89
Irrigation Energy Costs	17.72	29.53	0.00	2.63	10.54	4.89	10.99	17.08	14.34
Labor, Field Activities	8.26	8.34	5.36	7.70	9.55	8.27	8.33	9.19	8.81
Interest	4.08	7.94	5.58	6.64	5.86	7.49	5.94	6.37	6.18
Other Inputs & Fee, Pre-harvest	18.09	18.09	14.21	14.91	18.09	14.21	16.95	17.38	17.19
Post-harvest Expenses	22.18	17.57	7.50	16.16	15.18	15.81	17.26	17.35	17.31
Custom Harvest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Operating Expenses	230.35	314.17	215.91	264.33	234.11	295.52	252.12	255.29	253.87
Returns to Operating Expenses	387.57	175.27	-7.03	185.78	188.91	144.98	228.77	228.11	228.41
Capital Recovery & Fixed Costs	86.75	96.44	62.95	75.50	78.65	98.25	81.79	89.48	86.02
Total Specified Expenses	317.10	410.61	278.86	339.83	312.77	393.77	333.91	344.77	339.89
Returns to Specified Expenses	300.82	78.83	-69.98	110.28	110.25	46.73	146.98	138.63	142.39
Operating Expenses/Yield Unit	3.26	5.61	9.03	5.13	4.84	5.86	4.73	5.23	5.01
Total Expenses/Yield Unit	4.49	7.33	11.67	6.60	6.46	7.81	6.28	7.05	6.70
1. Does not include land costs, management, or other expenses and fees not associated with production.									
2. Combined as Chemicals in some previous year reports									
3. Listed as Fuel & Lube in previous year reports									