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DIVISION OF AGRICULTURE

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Rice Research Verification Program

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University of Arkansas
Cooperative Extension Service
Agriculture Experiment Station
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And County Governments Cooperating

Conducted by:
Stewart Runsick, area agronomist – rice
Ralph Mazzanti, area agronomist – rice
Charles Wilson Jr., extension agronomist – eice
Brad Watkins, associate professor – agricultural economics
Jeffrey Hignight, program associate

Acknowledgments:
Cooperating Rice Producers
Frank Binkley John Jackson Jam ey Price
Mike Briggs Greg and Tim Johnson Jeffrey Reidher
Nolan Evans Keith Jones Brandon Stephens
John Hamilton Keith Lewis Chuck Stephens
Randy Haynes Larry Paul Lyerly Shannon Talkington
Derick Helms Michael McCarty Keith Woolverton
Stephen Hoskyn Curt Moore
Hula/Sabbatini Farms Bill and Beau Moss

Cooperating County Extension Agents
Grant Beckwith – Arkansas County
Kevin Norton – Ashley County
Gus Wilson – Chicot County
Jerry Clemons – Clark County
Ron Baker – Clay County
Jason Osborn – Crittenden County
Rick Wimberley – Cross County
Wes Kirkpatrick – Desha County
Chuck Capps – Drew County
Randy Chlapecka – Jackson County
Daniel Beasley – Jefferson County
Herb Ginn – Lawrence County
Lazaro English – Lee County
Chad Norton – Lincoln County
Jan Yingling – Lonoke County
Jenny Stacks– Mississippi County
Craig Allen – Poinsett County
Rick Thompson – Poinsett County
Brent Griffin – Prairie County
Tony Richards – Prairie County
Mike Andrews – Randolph County
Keith Martin – White County

Agriculture Experiment Station
Merle Anders, assistant professor – crop, soil, and environmental Science – RREC
Robert Bacon, professor and dept. head – crop, soil and environmental Science – UAF
John Bernhardt, assistant professor – entomology – RREC
Paul Counce, professor – crop, soil, and environmental science – RREC
Chris Deren, professor, experiment station director – RREC
Donna Frizzell, program associate – RREC
James Gibbons, assistant professor – crop, soil, and environmental science – RREC
Fleet Lee, professor – plant pathology – RREC
Karen Moldenhauer, professor – crop, soil, and environmental science – RREC
Richard Norman, professor – crop, soil, and environmental science – UAF
Terry Siebenmorgen, professor – food science – UAF
Nathan Slaton, professor – crop, soil, and environmental science – UAF

Cooperative Extension Service
Rick Cartwright, professor – plant pathologist – UAF
Leo Espinoza, extension soil scientist – Little Rock
Alberta James, Ouachita district director – Little Rock
Subodh Kulkarni, program associate – machinery – Little Rock
Scott Monfort, assistant professor – plant pathologist – RREC
Sharon Reynolds, Ozark district director – Little Rock
Martha Ray Sartor, Delta district director – Little Rock
Bob Scott, extension weed scientist – Little Rock
Ken Smith, extension weed scientist – SEREC

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INTRODUCTION

In 1983, the Cooperative Extension Service established an interdisciplinary rice educational program that stresses management intensity and integrated pest management to maximize returns. The purpose of the Rice Research Verification Program (RRVP) was to verify the profitability of University of Arkansas recommendations in fields with less than optimum yields or returns.

The goals of the RRVP are: 1) to educate producers on the benefits of utilizing University of Arkansas recommendations to improve yields and/or net returns, 2) to conduct on-farm field trials to verify research based recommendations, 3) to aid researchers in identifying areas of production that require further study, 4) to improve or refine existing recommendations which contribute to more profitable production, 5) to incorporate data from RRVP into extension educational programs at the county and state level. Since 1983, the RRVP has been conducted on 319 commercial rice fields in 33 rice-producing counties in Arkansas. The program has typically averaged about 20 bushels/acre better than the state average. This increase in yield over the state average can mainly be attributed to intensive cultural management and integrated pest management.

Rice was grown on 1.486 million acres in Arkansas in 2009. The distribution of varieties was: 'Wells' (18%), 'RT CL XL 729' (15%), 'Jupiter' (15%), 'Francis' (11%), 'CL 151' (9%), 'RT CL XL 745' (9%), 'Cheniere' (5%), 'RT XL 723' (4%), 'CL 171' (4%), 'CL 131' (3%), 'Bengal' (2%), 'CL 161' (1%), 'Cocodrie' (1%), others (3%). A wet spring and flooding resulted in a late planted crop. As of 20 April, farmers had planted about 45% of the rice acreage compared to the five-year average of over 60%. Record rainfall amounts and below average temperatures caused the crop to be delayed and many fields were re-planted. All of the verification fields were planted prior to 22 May, with the majority of the fields planted in mid to late April. Cool nighttime temperatures during the flowering period for much of the rice resulted in excellent yields and quality; however, in some locations blanking was reported. Heavy rains during the month of September delayed harvest and caused significant shattering in some locations. Fertilizer and fuel prices were lower in 2009 as compared to 2008. Specified variable costs for the 2009 RRVP fields averaged $101/acre less than the 2008 average. The average yield for the 2009 RRVP was the second-highest on record.

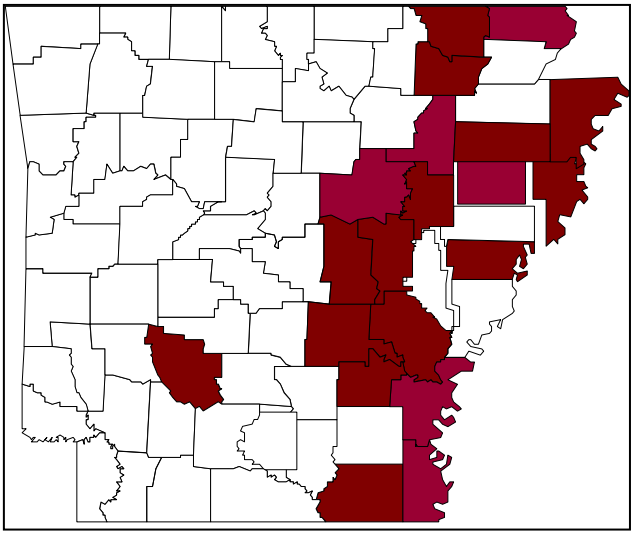
PROCEDURES

The RRVP fields and cooperators are selected prior to the beginning of the growing season. Cooperators agree to pay production expenses, provide expense data, and implement university recommendations in a timely manner from planting to harvest. A designated county agent from each county assists the RRVP coordinator in collecting data, scouting the field, and maintaining regular contact with the producer. Weekly visits by the coordinator and county agent were made to monitor the growth and development of the crop, determine what cultural practices needed to be implemented and to monitor type and level of weed, disease and insect infestation for possible pesticide applications.

An advisory committee consisting of extension specialists and university researchers with rice responsibility assists in decision-making, development of recommendations and program direction. Field inspections by committee members were utilized to assist in fine-tuning recommendations.

Counties participating in the program during 2009 included Arkansas, Ashley, Chicot, Clark, Clay, Crittenden, Cross, Desha, Drew, Jackson, Jefferson, Lawrence, Lee, Lincoln, Lonoke, Mississippi, Poinsett (two fields), Prairie (two fields), Randolph, and White (Figure 1). A total of 1,283 acres were enrolled in the program. Eight varieties were seeded ('Cheniere', 'CL 151', 'CL XL 729', 'CL XL 745', 'CL XL 746', 'Jupiter', 'Wells', and 'XL 723') in the 22 fields. University of Arkansas recommendations were used to manage the RRVP fields. Agronomic and pest management decisions were based on field history, soil test results, variety, and data collected from individual fields during the growing season. An integrated pest management philosophy was utilized based on University of Arkansas recommendations. Data collected included components such as stand density, weed populations, disease infestation levels, insect populations, plant dry matter accumulation, temperature, rainfall, irrigation amounts, dates for specific growth stages, grain yield, milling yield, and grain quality.

Figure 1. Locations of the 2009 RRVP Fields



RESULTS

Yield

The average RRVP yield was 180 bu/acre with a range of 145 to 216 bu/acre (Table 1). The RRVP average yield was 30 bu/acre more than the estimated state average yield of 150 bu/acre. This difference has been observed many times since the program began, and can be attributed in part to intensive management practices and utilization of University of Arkansas recommendations. The 2009 RRVP average was 9 bu/acre less than the program's highest average yield of 189 bu/acre set in 2007, and 9 bu/acre more than last year's average of 171 bu/acre. The highest yielding field yielded 216 bu/acre. The field was seeded with CL XL 729 in Chicot County. Six additional fields—Ashley, Clay, Cross, Jackson, Lee and Mississippi Counties—exceeded 200 bu/acre. Nine fields exceeded 190 bu/acre. The lowest yielding field yielded 145 bu/acre and was seeded with Wells in Crittenden County.

Milling data was also recorded on all of the RRVP fields. The average milling yield for the 22 fields was 61/70 (head rice/total white rice), with the highest milling yield of 69/73 occurring in Poinsett 1 County (Table 1). The milling yield of 55/70 is considered the standard used by the rice milling industry. The lowest milling yield was 50/66 and occurred in the Drew County field of CL XL 729.

Table 1. Variety, soil series, previous crop, acreage, yield, and milling for the 2009 RRVP

County	Variety	Soil series	Previous crop	Acres	Yield	Milling yield[z]	Harvest moisture
					(bu/acre)		(%)
Arkansas	XL 723	Dewitt Silt Loam	Soybean	42	192	59/70	19
Ashley	CL XL 729	Perry Clay	Soybean	44	201	55/67	16
Chicot	CL XL 729	Perry Clay	Soybean	41	216	57/70	13
Clark	CL XL 745	Gurdon Silt Loam	Corn	72	193	56/70	17
Clay	CL XL 745	Amagon Silt Loam	Soybean	56	209	66/72	19
Crittenden	Wells	Sharkey Silty Clay	Rice	87	145	55/72	16
Cross	Jupiter	Henry Silt Loam	Soybean	41	203	64/69	17
Desha	Wells	Desha Clay	Soybean	43	163	57/65	18
Drew	CL XL 729	Herbert Silt Loam	Soybean	34	160	50/66	20
Jackson	CL XL 745	Foley-Calhoun	Soybean	36	201	68/70	19
Jefferson	CL XL 746	Portland Clay	Soybean	41	172	61/69	13
Lawrence	CL XL 729	Crowley Silt Loam	Rice	25	172	64/72	15
Lee	Jupiter	Calloway Silt Loam	Soybean	72	214	68/72	17
Lincoln	CL XL 729	Herbert Silt Loam	Soybean	63	170	59/70	17
Lonoke	CL XL 729	Loring Silt Loam	Soybean	32	169	58/65	17
Mississippi	CL XL 745	Sharkey-Steele	Rice	57	200	62/73	19
Poinsett 1	Wells	Henry Silt Loam	Soybean	77	158	69/73	18
Poinsett 2	Jupiter	Henry Silt Loam	Soybean	50	155	62/65	18
Prairie 1	Jupiter	Kobel Silty Clay	Soybean	112	159	67/71	18
Prairie 2	Cheniere	Calloway Silt Loam	Soybean	88	188	67/72	18
Randolph	CL 151	Dundee Silt Loam	Rice	79	168	61/70	17
White	CL XL 729	Loring Silt Loam	Soybean	91	185	57/71	20
Average				58	180	61/70	17

[z]Head rice/total white rice

Planting and Emergence

Planting began with Cross and Jackson Counties on 7 April and ended with Clay, Drew and White Counties planted 22 May (Table 2). The majority of the verification fields were planted in mid-to-late April. An average of 55 lbs/acre was seeded in the RRVP fields (Table 2). Seeding rates were determined with the Cooperative Extension Service RICESEED program for all fields. An average of 13 days was required for emergence. Stand density ranged from 4 to 34 plants/ft^2, with an average of 13 plants/ft^2. The seeding rates in some fields were higher than average due to planting method and soil texture. Broadcast seeding and clay soils require elevated seeding rate.

Irrigation

Well water was used to irrigate 17 of the 22 fields in the 2009 RRVP. Arkansas, Clark, Poinsett (1), Randolph and White Counties were irrigated with surface water. The Lawrence County field was a zero grade field. The Jefferson County field was furrow irrigated. Twelve fields (Ashley, Chicot, Clark, Clay, Crittenden, Cross, Desha, Jackson, Lee, Lincoln, Mississippi and White Counties) used multiple inlet (MI) irrigation either by utilizing irrigation tubing or by having multiple risers or water sources. Flow meters were used in 13 of the fields to record water usage throughout the growing season. In fields where flow meters were not utilized, an average of 26 acre-inches was used.

An average of 26 acre-inches of water was used across all irrigation methods (Table 2). The zero grade field (15 acre-inches) and furrow irrigated field (15 acre-inches) used the least amount of water for irrigation. The fields with MI irrigation averaged 28 acre-inches of water; however, many of those fields did not have flow meters and the average was used. Difference in water used was due in part to rainfall amounts, which ranged from 14 to 39 inches. Typically a 25% reduction in water used is seen when using MI irrigation.

Table 2. Stand density, irrigation, seeding rate, and important dates in the 2009 RRVP season

County	Stand density (plants/ft^2)	Rainfall (inches)	Irrigation[z] (acre-in.)	Rainfall + Irrigation (inches)	Seeding rate (lb/acre)	Planting date	Emergence date	Harvest date
Arkansas	14	28	26	54	30	23-Apr	1-May	7-Sep
Ashley	10	15	38	53	40	1-May	14-May	10-Oct
Chicot	9	18	26	44	33	23-Apr	7-May	28-Sep
Clark	8	39	26	65	47	26-April	11-May	20-Sep
Clay	8	14	16	30	31	22-May	31-May	19-Oct
Crittenden	18	24	24	48	100	27-Apr	13-May	20-Oct
Cross	20	27	26	53	74	7-Apr	26-Apr	12-Sep
Desha	18	23	18	41	123	22-Apr	14-May	22-Sep
Drew	4	16	26	42	30	22-May	4-June	20-Oct
Jackson	5	35	38	73	30	7-Apr	27-Apr	6-Sep
Jefferson	12	25	14	39	30	26-Apr	10-May	1-Oct
Lawrence	8	14	15	29	30	20-May	31-May	21-Oct
Lee	34	31	46	77	101	9-Apr	17-Apr	23-Sep
Lincoln	9	27	33	60	30	24-Apr	1-May	21-Sep
Lonoke	13	33	33	66	35	10-Apr	26-Apr	22-Aug
Mississippi	9	27	23	50	30	27-Apr	12-May	12-Sep
Poinsett 1	11	32	26	58	50	26-Apr	13-May	26-Sep
Poinsett 2	16	34	18	52	80	25-Apr	10-May	28-Sep
Prairie 1	11	30	26	56	86	26-Apr	4-May	28-Sep
Prairie 2	22	39	30	69	90	25-Apr	8-May	16-Sep
Randolph	19	25	26	51	67	27-Apr	12-May	22-Sep
White	9	22	26	48	32	22-May	30-May	17-Oct
Average	13	26	26	53	55	27-Apr	10-May	26-Sep

[z]An average of 26 acre-inches was used for fields not utilizing flow meters.

Fertilization

Nitrogen recommendations were based on a combination of factors including soil texture, previous crop and variety requirements (Table 3). Nitrogen rates can appear high in some fields where rice was the previous crop and the soil texture is a clay soil type. These factors increase the nitrogen requirements significantly compared to a silt loam soil where soybeans were the previous crop.

Ammonium sulfate (21-0-24) was applied in some fields at the 2-3 leaf stage as a management tool to speed development and shorten the time required to get the rice to flood stage or to correct sulfur deficiencies (Table 3). Ammonium sulfate was applied at a rate of 100 lbs/acre in Chicot, Clark, Crittenden, Lincoln, Lonoke, and Poinsett (1) Counties and at a rate of 150lbs/acre in Jefferson County.

Phosphorus, potassium, and zinc were applied based on soil test results (Table 3). Phosphorus and/or potassium and zinc were applied pre-plant in most of the fields. Phosphorus was applied to Desha, Jackson, Jefferson, Lincoln, Prairie (1) and Prairie (2) Counties in the form of diammonium phosphate (DAP; 18-46-0). Zinc was applied as a seed treatment in fields with hybrid rice varieties at a rate of one-half pound of zinc per 60 pounds of seed. The average cost of fertilizer across all fields was $166.18 (Table 6), which was $37.30 less than 2008.

Table 3. Soil test results from RRVP fields and fertility recommendations.

County	Soil Test[z]				Split application rates of urea (45%)[y]	Total-N Rate	Preplant fertility N-P-K-Zn[x]
	pH	P	K	Zn			
	----------(lb/acre)----------						
Arkansas	6.1	48	266	16.0	200-0-70	122	0-0-0-.25
Ashley	5.8	58	639	13.5	270-0-100	167	0-0-0-.25
Chicot	6.4	58	630	10.1	200-0-70	143	21-0-0-.25-24[w]
Clark	5.4	40	120	6.3	270-0-70	192	39-86-60-.25-24[w]
Clay	6.2	40	172	11.3	265-0-70	151	0-30-90-.25
Crittenden	5.3	72	185	3.5	250-100-0	179	21-0-30-.5-24[w]
Cross	8.1	89	114	3.2	250-100-50	180	0-46-90-13
Desha	7.7	53	589	8.6	200-100-0	153	18-46-0-.5
Drew	5.8	26	740	10.0	200-0-75	124	0-0-0-.25
Jackson	6.8	52	250	6.2	240-0-75	160	18-46-60-.25
Jefferson	7.2	44	497	7.6	200-100-100	230	50-46-0-.25-36[w]
Lawrence	6.1	38	210	16.0	300-0-70	167	0-30-60-.25
Lee	7.2	30	146	6.8	240-100-0	153	0-60-90-10
Lincoln	6.9	59	515	7.1	175-0-70	150	39-46-0-.25-24[w]
Lonoke	6.6	64	234	6.2	200-75-100	190	21-30-60-.25-24[w]
Mississippi	7.0	82	358	9.2	300-21-70	176	0-0-0-.25
Poinsett 1	6.3	40	212	29.7	260-100-0	183	21-30-60-0-24[w]
Poinsett 2	7.4	48	166	27.5	230-100-0	149	0-60-90-0
Prairie 1	6.0	43	295	7.2	300-100-0	198	18-46-0-0
Prairie 2	7.2	45	136	28.0	200-100-0	153	18-60-90-10
Randolph	5.7	35	207	4.4	230-100-0	149	0-60-60-0
White	5.5	47	231	8.3	200-0-70	122	0-80-70-.25

[z] P=phosphorus, K=potassium, and Zn=zinc
[y] preflood-midseason-boot
[x] N-P_2O_5-K_2O-Zn includes seed treatments
[w] A.S. flushed in 2-3 leaf rice

Weed Control

In 2009, the herbicide costs ranged from $48.46/acre in Poinsett (2) County to $118.68/acre in Jefferson County with an average herbicide cost of $79.22/acre (Table 6). Command was utilized in 15 of the 22 fields for early-season grass control (Table 4). Facet was applied in two fields (Crittenden, and Jackson Counties) pre-emergence and in seven fields (Arkansas, Ashley, Chicot, Clark, Jefferson, Lee and Randolph Counties) early post-emergence. Four fields (Clark, Drew, Jackson, and Randolph Counties) did not utilize an herbicide for pre-emergence weed control. Thirteen fields, (Ashley, Chicot, Clark, Clay, Drew, Jackson, Jefferson, Lawrence, Lincoln, Lonoke, Mississippi, Randolph and White Counties) were seeded in Clearfield varieties and Newpath was applied for red rice and other weeds control. All of the fields required a post-emergence herbicide application for grass weed control.

Table 4. Herbicide rate and timings for 2009 RRVP fields.[z]

Arkansas	**PRE[y]:** Command (12.8 oz) **POST[x]:** Facet (.33 lb) Prowl (2.1 pt) fb RicePro (4 qt) Permit (.5 oz)
Ashley	**PRE:** Command (25.6 oz) **POST:** Newpath (4 oz) Facet (.33 lb) fb Newpath (4 oz) Aim (1 oz) fb Aim (.5 oz)
Chicot	**PRE:** Newpath (4 oz) **POST:** Newpath (4 oz) Facet (.33 lb) fb Facet (.5 lb) Aim (.5 oz)
Clark	**POST:** Newpath (4 oz) Facet (.5 lb) fb Newpath (4 oz)
Clay	**PRE:** Command (13 oz) **POST:** Newpath (4 oz) Permit (0.33 oz) fb Newpath (4 oz)
Crittenden	**PRE:** Glyphosate (1 qt) Facet (0.5 lb) Prowl (2.4 pt) **POST:** Propanil (4 qt) fb Ricestar (17 oz)
Cross	**PRE:** Glyphosate (2 pt) Command (12.8 oz) **POST:** Propanil (2 qt) Facet (.25 lb) Permit (0.5 oz)
Desha	**PRE:** Command (16 oz) **POST:** RicePro (4 qt)
Drew	**POST:** Newpath (4 oz) Strada (2 oz) fb Newpath (4 oz) Ricestar (24 oz) fb Grasp (2.3 oz) Regiment (.22 oz)
Jackson	**POST:** Newpath (4 oz) Facet (.5 lb) fb Newpath (4 oz)
Jefferson	**PRE:** Glyphosate (1.3 pt) **POST:** Facet (0.33 lb) Command (16 oz) fb Ultra Blazer (12.8 oz)
Lawrence	**PRE:** Glyphosate (1 qt) Command (13 oz) **POST:** Newpath (4 oz) fb Newpath (4 oz) Grandstand (10.5 oz) Propanil (1 qt)
Lee	**PRE:** Command (12.8 oz) **POST:** Prowl (2.1 pt) Permit (.5 oz) Facet (.25 lb) fb Ricestar (17 oz)
Lincoln	**PRE:** Glyphosate (1.5 pt) **POST:** Newpath (4 oz) fb Newpath (4 oz) fb Ultra Blazer (16 oz)
Lonoke	**PRE:** Command (12.8 oz) **POST:** Newpath (4 oz) fb Newpath (4 oz) Permit (.33 oz)
Mississippi	**PRE:** Command (20 oz) **POST:** Newpath (4 oz) Ricestar (20 oz) fb Newpath (4 oz) Permit (.5 oz) fb Clincher (15 oz)
Poinsett 1	**PRE:** Glyphosate (1 qt) Command (12.8 oz) Aim (.8 oz) **POST:** Regiment (.5 oz)
Poinsett 2	**PRE:** Command (12.8 oz) **POST:** Regiment (.6 oz)
Prairie 1	**PRE:** Glyphosate (1 qt) **POST:** Propanil (4 qt) Command (16 oz) fb Regiment (.5 oz)
Prairie 2	**PRE:** Command (12.8 oz)) **POST:** RiceBeau (4 qt)
Randolph	**POST:** Newpath (4 oz) Facet (.25 lb) fb Newpath (4 oz)
White	**PRE:** Command (10 oz) **POST:** Newpath (4 oz) fb Newpath (4 oz)

[z]All rates are on a per-acre basis
[y]PRE=pre-emergence
[x]POST=post-emergence

Disease Control

Fungicides were applied to five of the fields in 2009 for control of sheath blight and/or blast (Table 5). The average cost for fungicide was $9.05/acre (Table 6). The five fields treated were seeded in non-hybrid varieties. The Crittenden County field of Wells was treated for blast. The Poinsett (1) County field was treated with Bumper fungicide for the prevention of kernel smut, as the field has had a history of the disease. Quadris or Stratego was used to control sheath blight and blast and rates were determined based on variety, growth stage, climate, disease incidence/severity, and disease history (Table 5).

Insect Control

The Prairie (1) County field required treatment for rice water weevil (Table 5). Four fields, all of which were in south Arkansas, (Ashley, Chicot, Clark and Prairie (2) Counties) were treated for rice stink bug. Five fields (Arkansas, Cross, Lee, Prairie (2) and White counties) had Cruiser seed treatment applied to the seed, which provided excellent emergence, stand density and vigor. The average cost for insecticides was $2.41/acre.

Table 5. Fungicide and insecticides applications in 2009 RRVP fields

County	Sheath Blight	Blast	Rice Water Weevil	Rice Stink Bug
Arkansas	------	------	------	------
Ashley	------	------	------	Karate (1.6 oz)
Chicot	------	-----	------	Karate (1.6 oz)
Clark	------	------	------	Karate (2.1 oz)
Clay	------	------	------	------
Crittenden	------	Stratego (19 oz)	------	------
Cross	Quadris (6.5 oz)	------	------	------
Desha	------	------	------	------
Drew	------	------	------	------
Jackson	------	------	------	------
Jefferson	------	------	------	------
Lawrence	------	------	------	------
Lee	Stratego (19 oz)	------	------	------
Lincoln	------	------	------	------
Lonoke	------	------	------	------
Mississippi	------	------	------	------
Poinsett 1	------	------	------	------
Poinsett 2	------	------	------	------
Prairie 1	------	------	Mustang Max (3.2 oz)	------
Prairie 2	Stratego (19 oz)	------	------	Karate (1.6 oz)
Randolph	Stratego (17 oz)	------	------	------
White	------	------	------	------

Economic Analysis

This section provides information on the development of estimated production costs for the 2009 RRVP. Records of operations on each field provided the basis for estimating these costs. The field records were compiled by participating county extension faculty, the coordinator of the RRVP and the producers for each field. Presented in this analysis are specified variable costs, specified ownership costs and total costs for each of the fields. Break-even prices for the various cost components and returns above specified variable expenses at the average 2009 harvest price and adjusted for milling yield are also presented.

Specified variable costs are those expenditures that would generally require annual cash outlays and would be included on an annual operating loan application (Table 6). Actual quantities of all operating inputs were used in this analysis, along with input prices collected for use in the Arkansas Cooperative Extension Service 2009 Rice Budgets with updated urea, potash, phosphate, and diesel prices to match spring 2009 input prices. All selected variables presented in Table 6, other than seed cost, decreased from the previous year. This is mostly due to a drop in diesel and fertilizer prices. Seed cost increased from the previous year due to a larger share of CL Hybrids being planted in verification fields.

The producers' actual field operations were used as a basis for calculations and actual equipment sizes and types were matched as closely as possible. Fuel and repair costs were calculated by extension models based on the size or horsepower of the equipment. A diesel price of $2.00 per gallon was used for 2009 ($4.25 was used for 2008). Producers' actual machinery costs may vary from the machinery cost estimates that are presented in this report. Specified variable costs for the 2009 RRVP fields averaged $101/acre less than the 2008 average and ranged from $413/acre for Desha County to $739/acre for Lonoke County with an overall acre weighted average of $572/acre (Table 7).

Land costs incurred by producers participating in the RRVP 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 20% crop share rent was assumed to provide a consistent standard for comparison. 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 consistent measure to be used across all RRVP fields. The average break-even price needed to cover specified variable costs including the assumed 20% crop share rent was $3.87/bu, which is $1.02/bu less than the $4.89 price required in 2008. Furthermore, break-even prices to cover variable costs ranged from $3.05/bu in Desha County up to $5.17/bu in Lonoke County (Table 7).

Table 7 includes estimated net returns above specified variable costs and total costs. Net land costs and impacts of milling yields on gross returns are also included. Estimated landowner returns or net land costs were calculated assuming the landowner pays 20% of the drying expenses and all irrigation system fixed costs at $30.59/acre for a typical well or $24.95/acre for a re-lift system. Arkansas, Clark, Poinsett (1), Randolph, and White Counties used a re-lift irrigation system to pump surface water. Costs for risk, overhead, and management were not included in the analysis.

Arkansas average long-grain September cash price was estimated at $5.70/bu, which was $1.80/bu less than the 2008 estimated price of $7.50/bu. The verification program had four fields planted in medium grain varieties. It is estimated that the average medium-grain price contracted in Arkansas was $7.00/bu. A premium or discount was given to each farm based upon the milling yield. A standard milling of 55/70 would generate $5.70/bu for long grain and $7.00/bu for medium grain. Broken rice is assumed to have 70% of whole price value. If milling yield is higher than the standard, a premium is made, while a discount will be given for milling less than standard. The 2009 average premium per acre was greater than

the 2008 premium by $32.78/acre. Estimated long-grain prices adjusted for milling yield varied from $5.33/bu in Drew County to $6.25/bu in Poinsett (1) County. Medium-grain prices adjusted for milling yield varied from $6.85/bu in Poinsett (2) County to $7.57/bu in Lee County.

Returns above variable costs ranged from $41/acre in Lonoke County to $648/acre profit in Lee County. Profits averaged $37/acre or 10% less than 2008 due to a decrease in crop price of $1.33/bu, or 17.7%, but increased yields, higher-milling yields and decreased variable costs helped offset some of the price decline. Growing medium-grain helped profits due to the higher price relative to long grain. The top five fields with the highest returns above variable cost were Lee, Cross, Prairie (1), Mississippi, and Poinsett (2) County. Four of the five top fields were planted in medium grain. Figure 2 gives a visual representation of all fields in the 2009 RRVP from highest yield to lowest and presents returns above variable costs with an 80/20 share crop rental arrangement.

Table 6. Selected variable inputs costs from the 2009 RRVP fields.[z]

County	*Variety*	*Seed[y]*	*Fertilizer[x]*	*Herbicides[x]*	*Fungicides[x]*	*Insecticides[x]*	*Fuel[w]*	*Irrigation[v]*
Arkansas	XL723	106.88	187.34	98.99	0.00	0.00	17.63	35.09
Ashley	CLXL729	168.00	103.78	100.87	0.00	11.44	20.60	95.18
Chicot	CLXL729	146.58	101.49	106.22	0.00	11.44	19.94	69.76
Clark	CLXL745	155.24	221.41	74.21	0.00	12.99	22.68	40.11
Clay	CLXL745	150.86	186.91	53.74	0.00	0.00	17.50	44.70
Crittenden	Wells	42.93	152.36	116.84	29.64	0.00	16.12	61.50
Cross	Jupiter	47.91	235.83	80.34	20.74	0.00	16.09	77.31
Desha	Wells	39.90	116.90	59.03	0.00	0.00	17.58	48.81
Drew	CLXL729	126.00	78.89	124.43	0.00	0.00	17.78	63.14
Jackson	CLXL745	157.40	163.77	70.25	0.00	0.00	27.10	96.49
Jefferson	CLXL746	146.00	204.96	118.68	0.00	0.00	10.40	39.08
Lawrence	CLXL729	126.00	152.31	66.18	0.00	0.00	12.76	34.54
Lee	Jupiter	52.30	194.42	76.55	29.64	0.00	21.09	113.79
Lincoln	CLXL729	133.98	127.22	72.46	0.00	0.00	18.59	49.12
Lonoke	CLXL729	158.27	252.52	67.43	0.00	0.00	15.06	77.92
Mississippi	CLXL745	146.00	90.38	107.74	0.00	0.00	18.58	59.98
Poinsett (1)	Wells	19.47	187.30	56.76	20.40	0.00	11.72	34.11
Poinsett (2)	Jupiter	24.03	189.93	48.46	0.00	0.00	23.67	43.85
Prairie (1)	Jupiter	25.65	152.15	97.75	0.00	4.16	15.60	64.11
Prairie (2)	Cheniere	41.13	206.00	52.73	26.39	8.19	23.02	56.63
Randolph	CLXL151	47.88	178.09	63.68	27.21	0.00	18.23	36.06
White	CLXL729	150.34	143.57	57.92	0.00	0.00	25.47	49.40
Weighted Average 2009[u]		90.62	166.18	79.22	9.05	2.41	18.76	57.79
Weighted Average 2008[t]		65.83	203.48	83.14	10.23	7.48	35.34	108.78
Change[s]		24.79	**-37.30**	**-3.92**	**-1.18**	**-5.07**	**-16.58**	**-50.99**

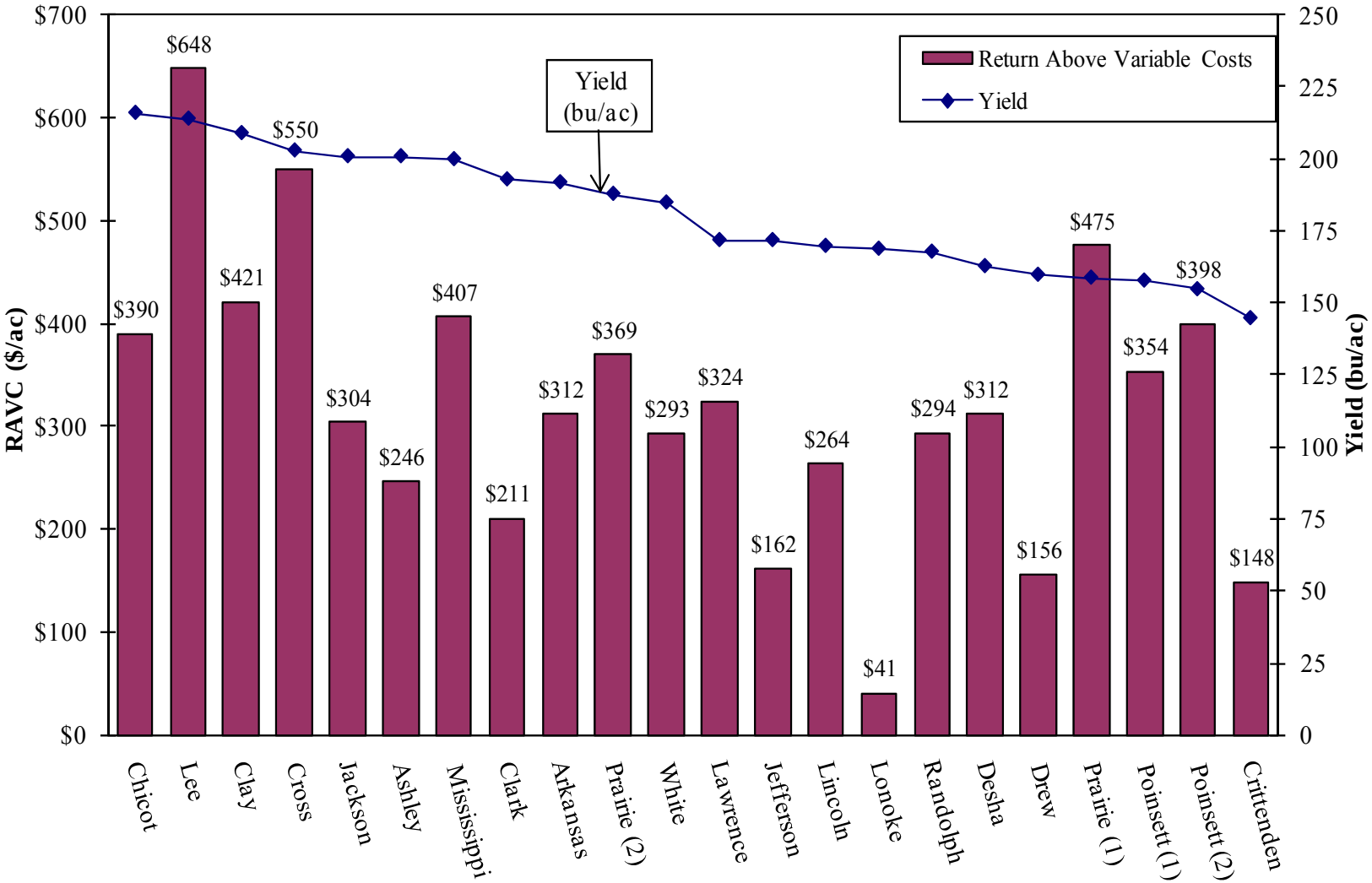
[z] Does not include all variable costs such as drying, hauling, equipment repair, etc.
[y] Includes seed cost and treatments.
[x] Includes material and application cost for each input.
[w] Fuel for tractors, combines, and self propelled equipment ($2.00/gal).
[v] Includes irrigation labor, irrigation supplies (levee gates & poly-pipe), irrigation repair and maintenance, and diesel fuel ($2.00/gal).
[u] Weighted by acres.
[t] Average costs from the 2008 RRVP fields using 2008 costs of production.
[s] Change in average costs from 2008 to 2009.

Table 7. Economic summary of the 2009 RRVP fields.

County	*Variety*	*Yield*	*Milling Yield*	*Crop Price*[y]	*Specified Variable Costs*[x]	*Specified Ownership Costs*[w]	*Land Costs*[v]	*Return above Variable Costs*	*Return above Total Costs*	*BEP*[u] *to Equal Variable Costs*	*BEP to Equal Total Costs*	*Milling Yield Premium or Discount*[t]
		bu/ac		*$/bu*	----------($/ac)----------					----------($/bu)----------		$/ac
Arkansas	XL723	192	59/70	5.80	597	27	180	312	285	3.77	3.97	20.05
Ashley	CLXL729	201	55/67	5.52	662	56	170	246	190	3.98	4.38	-36.73
Chicot	CLXL729	216	57/70	5.75	624	54	203	390	336	3.50	3.83	11.28
Clark	CLXL745	193	56/70	5.73	691	62	173	211	149	4.36	4.79	5.04
Clay	CLXL745	209	66/72	6.11	619	57	212	421	364	3.59	3.95	85.48
Crittenden	Wells	145	55/72	5.82	542	52	129	148	97	4.54	5.03	17.67
Cross	Jupiter	203	64/69	7.21	641	53	248	550	496	3.83	4.19	43.39
Desha	Wells	163	57/65	5.45	413	52	132	312	261	3.05	3.47	-41.14
Drew	CLXL729	160	50/66	5.33	542	53	124	156	103	4.11	4.55	-59.87
Jackson	CLXL745	201	68/70	6.04	688	78	196	304	226	4.15	4.67	68.22
Jefferson	CLXL746	172	61/69	5.80	651	36	154	162	126	4.62	4.90	16.46
Lawrence	CLXL729	172	64/72	6.06	524	45	168	324	279	3.70	4.05	61.37
Lee	Jupiter	214	68/72	7.57	671	62	270	648	586	3.78	4.19	121.21
Lincoln	CLXL729	170	59/70	5.80	541	55	151	264	209	3.87	4.29	17.75
Lonoke	CLXL729	169	58/65	5.47	717	50	142	41	-9	5.17	5.58	-38.24
Mississippi	CLXL745	200	62/73	6.07	582	56	199	407	351	3.52	3.90	73.10
Poinsett (1)	Wells	158	69/73	6.25	452	40	157	354	313	3.45	3.80	86.62
Poinsett (2)	Jupiter	155	62/65	6.85	466	66	172	398	332	3.64	4.20	-23.19
Prairie (1)	Jupiter	159	67/71	7.46	490	51	196	475	425	3.72	4.16	73.07
Prairie (2)	Cheniere	188	67/72	6.14	571	65	182	369	305	3.68	4.14	81.80
Randolph	CLXL151	168	61/70	5.86	509	55	156	294	239	3.67	4.11	26.32
White	CLXL729	185	57/71	5.81	585	71	173	293	222	3.83	4.34	20.93
Weighted Average 2009		180	61/70	6.18	572	55	178	334	279	3.86	4.28	36.38
Weighted Average 2008		171	57/69	7.51	673	48	216	371	323	4.89	5.27	3.60
Change[s]		9	---	-1.33	-101	7	-38	-37	-44	-1.03	-0.99	32.78

[z] 20% Crop-share rent was assumed.
[y] Based upon premium or discount above $5.70/bu long grain and $7.00/bu medium grain with a standard milling of 55/70.
[x] Includes all variable expenses for production, drying, hauling, check-off fee, interest, etc.
[w] Excludes ownership expenses of irrigation well, which are assumed to be paid by the landlord.
[v] Gross value of landlords 20% share of crop less drying charges check-off fee, and irrigation fixed expenses.
[u] BEP = break even price
[t] Impact of milling on gross returns. (Gross returns at milling yields minus gross returns at standard milling yield, i.e. 55/70)
[s] Change in averages from 2008 to 2009.

Figure 2. Yield and returns above variable costs for the 2009 RRVP fields.



DISCUSSION

Field Summaries

As you read the contents of this report, you will notice some extremely good yields—some exceeding 200 bu/acre. Success has to be measured on a field-by-field basis. Many of the producers experienced a yield increase of 10, 20 or more bushels per acre over the fields' historic yield. Some fields had problems related to weather, application errors, etc., which may have decreased yields. The following is a summary of all the fields in the 2009 Rice Research Verification Program (RRVP).

Northern Fields – Stewart Runsick

Clay

Clay County was one of the latest planted and highest yielding fields in the program. It was seeded 22 May in CL XL 745 at a rate of 31 lbs/acre and yielded 209 bu/acre. Everything was done by the book, with no problems. Two applications of Newpath and a little Permit for nutsedge is all it took to keep the field weed-free.

The stand was excellent and very uniform. The field looked good all year. The cool weather delayed maturing by a couple of weeks, as was the case in most of the fields.

Crittenden

This was the second year for this field to be in the program. The field was leveled two years ago. Part of this field was an old cotton field and is very poor. About half of the field grows good rice. It is easy to identify the cut areas. It is going to take some chicken litter and a few years to make it productive. The field was broadcast-seeded in Wells. As is the case a lot of times with broadcast-seeding, there were some holes and thin areas. It was dry in June and the field crusted over. Some areas were struggling to establish a stand. I recommended flushing the field, but it rained soon after.

The Facet applied pre-controlled the grass for a long time. The plan was to apply Propanil, then fertilize and flood. It rained following the Propanil application, and it was a couple of weeks before the fertilizer could be applied. Of course, another flush of barnyardgrass came up, and an application of Rice Star was required.

Leaf blast was present in the field and continued to worsen as weather conditions were favorable. The field was treated at 10% heading with Stratego. No significant yield loss occurred from the disease. The yield of 145 bu/acre was an improvement over last year's 138. I really expected it to be 20 bushels better than that, but the thin areas really dropped the average.

Cross

When I looked at the soil test results on this field back in the winter, I thought we were in trouble. The pH was 8.1 and the soil test zinc and potassium were very low—not a great combination for rice. A few weeks later, however, I had the field of Jupiter

picked to be the highest yielding field. The yield was excellent at 203 bu/acre. The seed was treated with zinc and Cruiser. The emergence and vigor were excellent. The only hiccup was that, after the flood was established, the rice exhibited zinc-deficiency symptoms. The flood was lowered and zinc applied quickly. After that, it never looked back. We pushed the nitrogen rate a little and I expected the sheath blight to be bad. It finally blew up just as the rice was beginning to head. A low rate of Quadris was applied.

Jackson

The Jackson County field was planted early with CL XL 745 into a loose seedbed. The seed was a little deep but should not have been a problem except for the rain, rain and more rain. Part of the field was underwater for a long time. I was beginning to get concerned, as it took a long time for emergence. Stand counts indicated a uniform 4.5 plants/ft^2, which we decided was adequate. Even the area under water recovered. It is amazing how the hybrid varieties have the ability to tiller and fill in. The field looked excellent the rest of the year. The false smut was probably worse in this field for whatever reason, but the yield was still very good at 201 bu/acre.

Lawrence

This was the only zero grade field in the program this year. The same field was also in the program last year. The field was planted the first time on 25 April and then again nearly a month later. This field has trouble drying out in the spring. The water from other fields above it drains into it. When planted the first time, it was still wet. A big rain came just after planting and pushed the seed deep. The re-plant decision was easy. Most of the seed rotted and hardly any came up. The second stand, however, was excellent. You may have noticed the low water use in this field. I don't think the power unit ran after the second week in July. In fact, the flood was deep the entire season just from rainfall. I was really disappointed in the yield of 172 bu/acre. The rice was really uniform and looked to be a 200 bu/acre-plus yield. I guess looks can be deceiving. The heads were small, with a lot of vegetative growth. The only thing I can come up with is that too much nitrogen was applied. The pre-flood N was applied with a spreader truck and was obviously applied much heavier around the outside of the field. It is a small, triangle-shaped field. I recommended 300 lb/acre of urea pre-flood, due to being rice following rice on a clay soil. It looked like it got more than 300 pounds. I am still a little puzzled about it.

Lonoke

The Lonoke County field got off to a good start, but suffered damage from two hailstorms. Significant yield loss occurred from the first storm just prior to heading. An additional application of urea was applied to try and promote some more growth. The second storm occurred after heading and caused minor shattering. I think the field would have been outstanding if it were not for the hail.

Mississippi

Amazon Sprangletop was the story in this field. Command was applied pre as we knew the field had a history of the weed. Even with the Command, it was still thick. Rice Star was added to the first Newpath application; however, the application was streaked and adequate control was not achieved. Clincher was applied and finally took it out.

The pre-flood urea application was also streaked from an air flow truck due to an equipment malfunction. The rice headed in nice straight little rows across the field. Nitrogen delays maturity, so the areas that were shorted headed first. The applicator provided an application of ammonium sulfate by air as a result. The yield was still excellent at 200 bu/acre.

Poinsett (1)

The producer in this field has been trying to increase the yield and has found that a lower seeding rate of Wells has provided positive results. This year the plan was to seed 50 lbs/acre. Two planters were used—one was planting about 55 lbs/acre and the other around 45 lbs/acre. The difference in stand was evident—45 pounds was too low.

The Command application controlled the grass for a long time and I thought we might be able to get by. There was some scattered red stem, smart weed, and other broadleaf weeds. Rainfall delayed the nitrogen application and some barnyardgrass did finally emerge. Propanil and Facet stopped controlling barnyardgrass in Poinsett County a long time ago. We decided the situation would be perfect for Regiment. The Regiment was applied pre-flood. As it turned out, we wished we had not applied it. The rice, especially in the thinner stand, was stunted for more than three weeks. The roots were pruned, not severely, and recovered pretty quickly. The rice just sat there and did not grow. I think it was the combination of cool weather, poor growing conditions and the thin stand. The double-drilled areas of the field did not seem to be affected nearly as bad. The result was a disappointing 158 bu/acre.

This field was treated with propiconazole in the boot stage for control of kernel smut, as the field has a history of the disease. The field was also ringed with Quadris for control of sheath blight.

Poinsett (2)

The Poinsett County (2) field was seeded in Jupiter. The weed control situation was similar to Poinsett County (1). Command controlled the grass for several weeks. Regiment was also applied pre-flood. The rice was also stunted for several weeks, especially in the areas with a thin stand. The yield in this field was also disappointing with 155 bu/acre.

Prairie (1)

This field was seeded in Jupiter. In part of the field, the previous crop was rice, the other part soybeans. The field was seeded no-till into the existing stubble. It started raining soon after the field was planted. This field was flooded for a long time early, and it took a long time to get a stand. The producer pumped water off the field for a couple

of weeks and was about ready to give up on it. The rice did finally emerge, but was very thin in some of the low areas.

Due to all of the rain, the Command did not get applied pre-emergence. The agent and I decided this would be an excellent field to test some of the new RiceCo herbicides tank mixed with Command. The field was divided into 30 acre strips and the following treatments were applied: RicePro + Command, RiceBeau + Command, SuperWham + Command and SuperWham + Facet. I never could tell much difference in the treatments; they all worked great. Coffeebean was worse in the RiceBeau treated area, but that may have just been where they were. A flush of barnyardgrass came up late, as the flood was delayed due to all the rain. Regiment was also used in this field pre-flood. Again, severe stunting and slow growth occurred. I am convinced that for whatever reason the herbicide caused some yield loss in the three fields it was used in. It has never been documented in research, but we have never had a year like this one, either.

Randolph

This field has been in rice for at least three consecutive years and has a history of red rice. The variety selected this year was CL 151. Facet was added to the first Newpath application to aid in control of barnyardgrass, coffeebean, and indigo. Following the second Newpath application, it was obvious a plane pass across the middle of the field was missed. Red rice was also present on the south end of the field. Beyond was applied in this area and killed most of the red rice. A small population of plants yellowed up, but did not die. I am not sure if they are resistant, or just came up late and were missed with the Newpath. The field was clean overall.

Sheath blight was very aggressive in this field, and a fungicide application was made for control. I expected to find blast in this field, but never did. The field yielded 168 bu/acre, which was actually pretty good for this field and variety.

White

This was a big field—91 acres—with a hillside on one end stacked with levees. The field was irrigated from a reservoir, but it still took two weeks to completely flood. The field was planted on 22 May, which makes it one of the last fields planted. The variety was CL XL729 treated with Cruiser. The emergence was very fast and uniform. The rice came out of the ground growing and never looked back. Two applications of Newpath are all it took to keep the field clean. I was impressed with how the rice looked all year, even with the delay from the cool weather.

To be honest, I did not expect the field to make 185bu/acre. It was late planted, hard to water and on a thin soil in White County. Anyway, we did something right—this was probably the highest yield ever made on this field.

Southern Fields – Ralph Mazzanti

Arkansas

The Arkansas County field was a 42-acre silty clay loam field. The chosen variety was RT XL 723 planted at 30 lbs/acre. Cruiser insecticide seed treatment was

applied by the seed dealer. The planting date was 23 April. The stand density was 14 plants/ ft^2.

Two tons of chicken litter were applied. Urea nitrogen was applied pre-flood at 200 lbs/acre, followed by 70 lbs/acre at late boot stage.

Command, Facet and Prowl herbicides were applied at 2-3 leaf stage, followed by RicePro and permit prior to flooding. The yield was 192 bu/acre.

Ashley

The Ashley County field was planted in the Overflow National Wildlife Refuge. The 44-acre field had historic yields of 130-160 bu/acre. The field was seeded in CL XL 729 on 1 May. The soil was clay, with a seeding rate of 40 lbs/acre. The plant density was 10 plants/ft^2.

There were numerous weed challenges in the wildlife refuge, yet the Newpath and Facet herbicides, followed by Newpath and Aim, kept the field clean. The levees were not seeded, and coffeebean escapes were prevalent and later taken out with Blazer herbicide.

Urea Nitrogen was applied pre-flood at 270 lbs/acre, followed by 100 lbs/acre at late boot stage. Stink bugs reached threshold levels and were controlled with Karate. The yield was a field record 201 bu/acre.

Chicot

The Chicot County field was a 41-acre clay field. The variety chosen was CL XL 729 seeded at 33 lbs/acre. The planting date was 23 April. The stand appeared very thin, but the plant density was 9 plants/ft^2.

No potassium or phosphorus fertilizer was necessary, according to the soil sample. Ammonium sulfate was applied at 100 lbs/acre. Nitrogen was applied at 200 pounds pre-flood, followed by 70 pounds at late boot stage. The field reached threshold levels for stink bugs and was sprayed with Karate. The Chicot County field was the highest yielding in the 2009 Rice Research Verification Program at 216 bu/acre.

Clark

Clark County was a 72-acre silty clay loam field. The row spacing was 10 inches and the previous crop was corn. The past rice yields had been from 130-165 bu/acre. The variety of choice was CL XL 745 planted on 26 April. The seeding rate was 30 lbs/acre, with a stand density of 8 plants/ft^2. There were areas where the drill went too deep and the stand was thin; vigor was low, resulting in delayed growth.

Fertilizer applied was 0-40-60 pre-plant, followed by DAP and ammonium sulfate at 100 lbs/acre applied at 2-3 leaf stage. Urea nitrogen was applied at 270 lbs/acre pre-flood and 100 lbs/acre in the late boot stage.

The herbicides Newpath and Facet kept the field clean. The insecticide used was Karate for late emerging stink bugs. Due to the weather in 2009, the field remained 7-10 days behind the DD50. Despite the planting and weather issues, the field yielded a record 193 bu/acre.

Desha

The Desha County field was 43 acres of clay soil. The variety of choice was Wells with zinc seed treatment applied. The planting date was 22 April, with a seeding rate of 123 lbs/acre. The stand density was 18 plants/ft^2.

The Herbicides Rice Pro and Command did a good job on the grass. Nutsedge was scattered, but didn't justify an application.

The fertilizer applied pre-flood was urea at 200 lbs/acre and DAP at 100 lbs/acre followed by urea 100 lbs/acre at mid-season. No insecticide or fungicide treatments were necessary.

The well struggled to keep up watering, especially during the two weeks of dry weather in July, but soon had relief from rainfall. The field looked good all year. The yield was little less than hoped for at 163 bu/acre.

Drew

The Drew County field was the last field planted on 22 May. The 34-acre clay soil field was a challenge all year. With the late planting, the variety of choice was CL XL 729. The plant density was thin at 4 plants/ft^2.

With cotton up on the west side and soybeans on the north, the first herbicide application of Newpath was delayed three weeks. No pre-emergence herbicide had been applied and grass was already in the 4-5 leaf stage. Newpath and Strada herbicide were first applied, followed by Ricestar and Newpath. We realized we were still in a salvage situation. With Regiment herbicide sold out, we found one bag equivalent to a half rate. Internode elongation was only days away. Grasp herbicide was tank-mixed with Regiment, and the grass was soon under control. We had some scattered sprangeltop. Since the field was late planted and cleaned up late the yield had been affected. The field yielded a disappointing 160 bu/acre.

Jefferson

The Jefferson County field was a row-watered, 41-acre clay soil. The variety was CL XL 746 planted 26 April. The stand density was 12 plants/ft^2.

Roundup Power Max herbicide was used for burndown. Newpath, Facet, Command and Permit were the standard herbicides used for contact and residual control, and did a good job keeping the stale soybean beds clean. The irrigation well went down for a short period, but was soon assisted by rainfall. Nitrogen loss is always a concern, but the applications were excessive. No insecticides or fungicides were used. After heading, the sheath blight, as well as false smut, moved in swiftly. This field had severe shattering, with an estimated 15-17 bu/acre on the ground. Harvest moisture was between 12 and 13 percent. The field yielded 172 bu/acre.

Lee

The Lee County field was a 72-acre silt loam soil. The variety of choice was Jupiter seeded at 101 lbs/acre. The stand density was 34 plants/ft^2.

The herbicide applications include Command, followed by Prowl, Permit and Facet. The excessive rainfall helped the residual effect of the herbicides yet delayed fertilizer application, resulting in an extra herbicide application of Ricestar. Stratego was used as a fungicide for early sheath blight control and false smut suppression.

Phosphorus, potassium and zinc fertilizer were applied according to the soil test recommendations. Urea nitrogen was applied at 240 lbs/acre pre-flood, followed by 100 lbs/acre at mid-season.

The Lee County field was the second-highest yielding field in the 2009 Rice Research Verification Program at 214 bu/acre. Due to the high yield and the medium-grain premium, the field economics were the highest in the program at a $648/acre return above variable costs.

Lincoln

The Lincoln County field was 63 acres of clay soil. The chosen variety was CL XL 729 with a seeding rate of 30 lbs/acre. The planting date was 24 April. The stand density averaged 9 plants/ft^2, with the north end having a thinner stand.

Roundup herbicide was used at burndown, while two standard applications of Newpath did a good job keeping the field clean. Blazer herbicide was used later for control of coffeebean.

Ammonium sulfate and DAP were applied early, while 175 lbs/acre urea was applied at pre-flood stage. The late boot application of urea at was 70 lbs/acre. The yield was a little disappointing at 170 bu/acre.

Prairie (2)

The Prairie (2) County field was an 88-acre silt loam field. The chosen variety was Cheniere, with a seeding rate of 90 lbs/acre. With a past history of Grape Colaspis, Cruiser seed treatment was used. The planting date was 25 April. The stand density was 22 plants/ft^2.

Pre-plant fertilizer was applied according to soil test results. Three hundred twenty pounds of 18-60-90 plus 10 lbs/acre zinc were applied by custom application. Ammonium sulfate was applied at 100 lbs/acre, with 50 lbs/acre urea followed by 125 lbs/acre urea. One hundred pounds per acre of urea was applied at mid-season. Stratego fungicide and Karate insecticide were applied for disease control and stink bug control. The field yielded 188 bu/acre, with a milling yield of 67/71.

On Farm Research

Research was conducted in three of the verification fields in 2009. Disease monitoring tests were planted in Lincoln and Desha Counties. A herbicide trial was done in Prairie (1) County. The trial consisted of the post-emergence herbicides RicePro, RiceBeau and Superwham tank-mixed with Command applied in the 2-3 leaf stage.

Summary

The 2009 Rice Research Verification Program was conducted on 22 commercial rice fields across the state. Grain yield in the 2009 RRVP averaged 180 bu/acre, with a range of 145 to 216 bu/acre. The 2009 RRVP average yield was 20 bushels/acre greater than the estimated Arkansas state average yield of 150 bu/acre. The highest yielding fields were in Chicot, Lee, Clay, Cross, Jackson, Ashley and Mississippi Counties, with grain yield of 216, 214, 209, 203, 201, 201 and 200 bu/acre. The lowest yielding field was in Crittenden County with grain yields of 145 bu/acre. Milling quality in the RRVP was comparable with milling from the Arkansas Rice Performance Trials and averaged 61/70.