2013
University of Arkansas
Rice Research Verification Program

The Rice Research Verification Program is funded by Arkansas rice producers through check-off monies administered by the Arkansas Rice Research and Promotion Board.

University of Arkansas
Cooperative Extension Service
Agriculture Experiment Station
U.S. Department of Agriculture
And County Governments Cooperating

The Arkansas Cooperative Extension Service offers its programs to all eligible persons regardless of race, color, national origin, religion, gender, age, disability, marital or veteran status, or any other legally protected status, and is an Affirmative Action/Equal Opportunity Employer.

Table of Contents

RICE RESEARCH VERIFICATION PROGRAM, 2013

Conducted by:
Ralph Mazzanti, Program Associate
Lance Schmidt, Program Associate
Dr. Jarrod Hardke, Rice Extension Agronomist
Dr. Brad Watkins, Associate Professor – Agricultural Economics

Acknowledgments:

Cooperating Rice Producers:

Chris Ault	Joe Mencer	Shannon Rogers
Herbie Ault	Steven Myers	Jake Stacey
Lanny Bosnick	David Pankey	Sam Stacey
Jim Davis	R. J. Peacock	Derek Helms
Mike Dodson	David Penix, Jr.	Joe Steimel
Jody Houlazior	John & Heath Stephens	Johnny McGraw
David Edwards	Jackie Prince	John King
John Fender	Mathew Ralston	Jerry Wimpy
Jim Whitaker	Marco Robinson	Tom Wimpy

Cooperating County Extension Agents:

Grant Beckwith – Arkansas County	Anthony Whittington – Jefferson County
James Mahon – Arkansas County	Herb Ginn – Lawrence County
Chuck Capps – Arkansas County	Stan Baker– Lee County
Jerry Clemons – Clark County	Chad Norton – Lincoln County
Gus Wilson – Chicot County	Robert Goodson – Phillips County
Ron Baker – Clay County	Mike Hamilton – Poinsett County
Kevin Van Pelt – Conway County	Michael Paskewitz – Prairie County
Rick Wimberley – Cross County	Brent Griffin – Prairie County
Wes Kirkpatrick – Desha County	Mike Andrews – Randolph County
Nathan Reinhart – Independence County	Brian Haller – White County
Randy Chlapecka – Jackson County	Jack Clark – Yell County

Cooperative Extension Service:
Dr. Rick Cartwright, Associate Director, Agriculture and Natural Resources
Alberta James, Ouachita District Director
Dr. Martha Ray Sartor, Delta District Director
Dr. Tom Barber, Extension Weed Scientist
Dr. Leo Espinoza, Extension Soil Scientist
Dr. Gus Lorenz, Extension Entomologist
Dr. Bob Scott, Extension Weed Scientist
Dr. Yeshi Wamishe, Extension Plant Pathologist

Agricultural Experiment Station:
Dr. Merle Anders, Assistant Professor – Crop, Soil, and Environmental Sciences
Dr. Robert Bacon, Professor and Dept. Head – Crop, Soil, and Environmental Sciences
Dr. Paul Counce, Professor – Crop, Soil, and Environmental Sciences
Dr. Archie Flanders, Assistant Professor – Agricultural Economics
Donna Frizzell, Program Associate – Crop, Soil, and Environmental Sciences
Dr. Karen Moldenhauer, Professor – Crop, Soil, and Environmental Sciences
Dr. Richard Norman, Professor – Crop, Soil, and Environmental Sciences
Dr. Trenton Roberts, Assistant Professor – Crop, Soil, and Environmental Sciences
Dr. Raghu Sathyamurthy, Assistant Professor – Entomology
Dr. Terry Siebenmorgen, Professor – Food Science
Dr. Nathan Slaton, Professor – Crop, Soil, and Environmental Sciences

Arkansas Rice Research and Promotion Board:
Rich Hillman (Chairman)
Marvin Hare, Jr. (Vice-Chairman)
Brian Moery (Secretary/Treasurer)
Joe Christian
Bobby Hoard
Jay Coker
Roger Pohlner
Mike Sullivan
Wayne Wiggins

INTRODUCTION

The 2013 growing season was the thirtieth year for the Rice Research Verification Program (RRVP). The RRVP is an interdisciplinary effort between growers, county extension agents, extension specialists, and researchers. The RRVP is an on-farm demonstration of all the research-based recommendations developed by the University of Arkansas Division Of Agriculture for the purpose of increasing the profitability of rice production in Arkansas. The specific objectives of the program are:

1. To demonstrate and verify research-based recommendations for profitable rice production throughout the rice-producing areas of Arkansas.

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

3. To demonstrate the benefits of available technology and inputs for the economic production of consistently high rice yields.

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

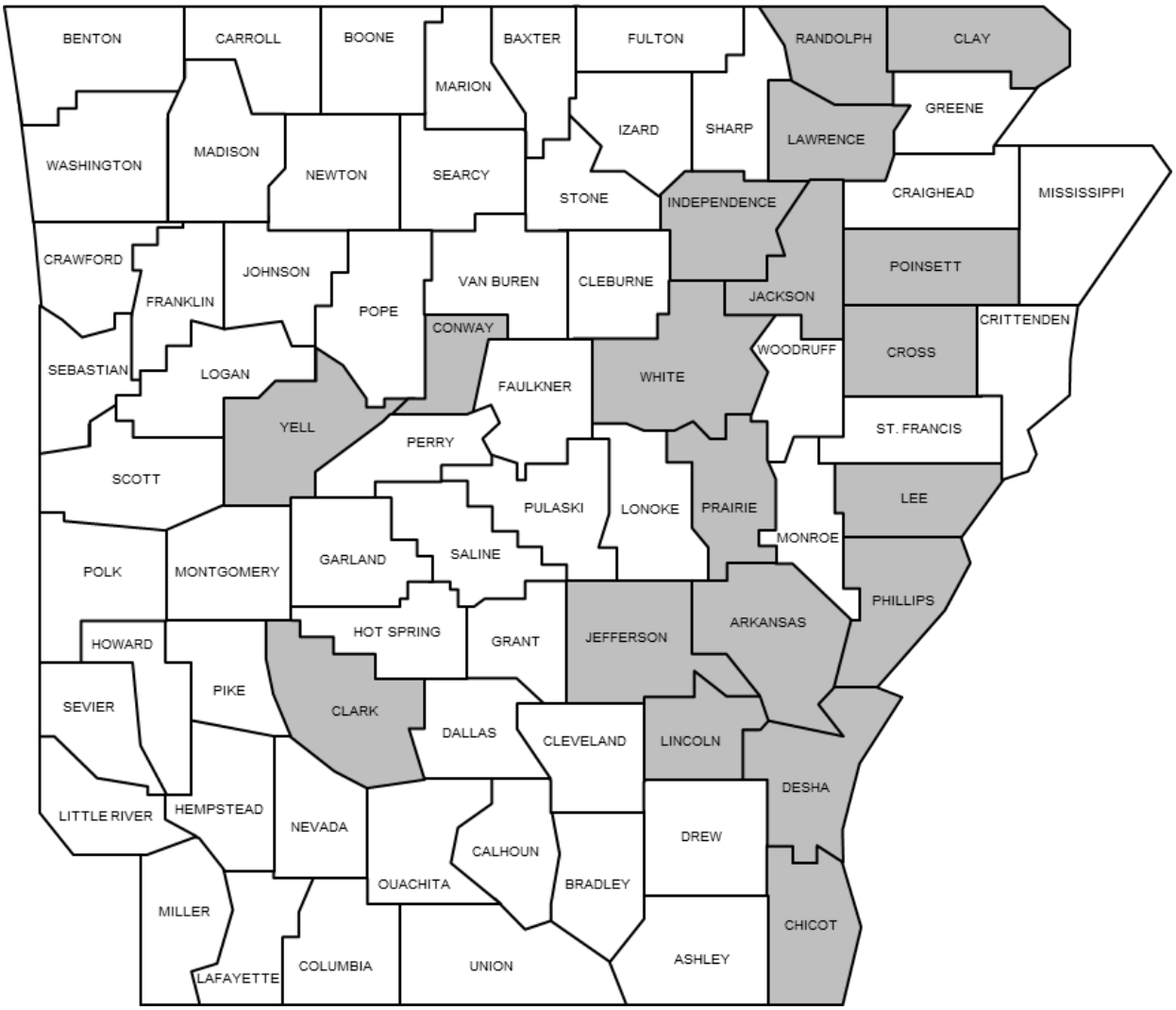
5. To promote timely implementation of management practices among rice growers.

6. To provide training and assistance to county agents and growers with limited expertise in rice production.

Each RRVP field and cooperator was selected prior to planting. Cooperators agreed to pay production expenses, provide crop expense data for economic analysis, and implement the recommended production practices in a timely manner from seedbed preparation to harvest. Twenty-two fields were enrolled in the RRVP in 2013. The fields were located on commercial farms ranging in size from 26 to 142 acres. The average field size was 54 acres.

The 2013 RRVP fields were located in Arkansas (3 fields), Chicot (2 fields), Clark, Clay, Conway, Cross, Desha, Independence, Jackson, Jefferson, Lawrence, Lee, Lincoln, Phillips, Poinsett, Prairie, Randolph, White, and Yell Counties. Eight different cultivars (CL111, CL151, CL152, RiceTec CL XL745, Francis, Jupiter, Roy J, and RiceTec XL753) were planted. Management decisions were based on field history, soil test results, cultivar, and data collected from each individual field during the growing season.

Figure 1. County Locations (shaded) of 2013 Rice Research Verification Program Fields.



FIELD REVIEWS

Northern Fields – Lance Schmidt

Clay County

The precision-graded Clay County field was located Southeast of Datto on a Crowley silt loam soil. The field was 29 acres and the previous crop grown on the field was soybean. In March, conventional tillage practices were used for field preparation and a pre-plant fertilizer based on soil test analysis was applied at a rate of 0-30-60 (N-P_2O_5-K_2O) lbs/acre. On May 20th, RiceTec XL745 with the company's standard seed treatment was drill-seeded at a rate of 23 lbs/acre. Rice emergence was observed on May 27th and consisted of 8 plants/ft^2. Clearpath and Command herbicides were tank-mixed and applied early post-emergence to the field, providing good pre- and post-emergence control of weeds. Using the N-STaR recommendation, pre-flood urea + NBPT was applied at a rate of 210 lbs/acre on June 23rd. Due to the extended time (>10 days) needed to establish the permanent flood on the lower portion of the field, the lower 8 acres of the field had an additional 100 lbs/acre of urea applied prior to flooding to supplement any nitrogen loss that could have potentially occurred. Once the permanent flood was established, flood levels were maintained well throughout the season. Prior to midseason, red rice and amazon sprangletop escapes were controlled with Beyond herbicide. Rain and cloudy weather were prevalent in August and the field received more than 12 inches of rain during this time which aggravated the sheath blight fungus. However, treatment thresholds were not met and fungicide applications were not required. On August 6th, the boot application of 70 lbs/acre of urea was applied. At rice heading, rice stink bug populations were at threshold levels and effectively controlled with a single application of Lambda Cy insecticide. Total rainfall for the season was 16.7 inches. Harvest began October 13th and the dry yield for the field was 175 bu/acre. This yield was above average for other fields in the area with this planting window and enduring the cloudy and rainy conditions during pollination. The milling yield was 60/70.

Conway County

The zero-graded Conway County field was 52 acres and located southwest of Morrilton on a Dardanelle silt loam soil. This was the second year in a row for this field to be in the RRVP. Conventional tillage was utilized on the field in late winter to early spring. Prior to planting, fertilizer was applied at a rate of 0-0-60 lbs/acre due to the field being in a rice-only rotation. RiceTec XL753 with the company's standard seed treatment was drill-seeded on May 11th at rate of 23 lbs/acre. Rice emergence was observed on May 20th and consisted of 8 plants/ft^2. Seedbed conditions at planting were cloddy and very rough which hampered rice emergence and increased growth stage variability. On May 18th a pre-emergence application of Facet, Permit, and Command for broadleaf and grass control was applied following planting. The field was flushed shortly after to activate the herbicides and to improve stand density. On June 19th, the field received 305 lbs/acre of urea + NBPT based on the N-STaR recommendation as a single pre-flood application and the permanent flood was started. A post-flood Clincher herbicide application was necessary for control of amazon sprangletop and barnyardgrass escaping the pre-emergence application. The field held a deep flood throughout the entire season following permanent flood establishment. Low disease incidence was observed in the field and no fungicide applications were recommended. Once rice reached the heading stage, the field was scouted for rice stink bugs. Populations were at 3X threshold levels at early heading and effectively controlled by a single application of Lambda Cy insecticide. Very sporadic heading was observed in the field, though this observation may have been influenced by the common presence of volunteer rice and variable rice emergence due to the cloddy seed-bed conditions. Total rainfall for the season was 8.2 inches. Harvest began

October 7th and the field yielded a new RRVP record 249 dry bu/acre. This was 38 bu/acre better than last year. The milling yield for the field was 54/70.

Cross County

The precision-graded field in Cross County was 82 acres and located east of Crowley's Ridge south of the community of Coldwater on an Earl clay soil. The field was in soybean production the previous year. Following conventional tillage in early May, the field was drill-seeded on May 15th with 91 lbs/acre of Francis seed-treated with Apron and Maxim. For pre-emergence grass control, Command was applied soon after planting. Measurable rainfall fell within a week of planting and activated the Command and helped with stand establishment. Rice emergence occurred on May 26th and consisted of an average of 30 plants/ft^2. The rice progressed well after emergence. Facet, Grandstand, and Aim were applied at the pre-flood timing for moderate patches of barnyardgrass and widespread black-seeded broadleaf weeds. Pre-flood urea + NBPT was applied on June 22nd based on the N-STaR recommendation at a rate 220 lbs/acre. After establishing the flood, barnyardgrass patches were observed that were not exhibiting Facet symptomology and Clincher was recommended for control. Facet was used instead and resulted in little if any activity. At the midseason timing, 100 lbs/acre of urea was applied on July 14th. An adequate flood depth was maintained throughout the season. Sheath blight and rice stink bugs were present during the season, but never reached action threshold levels. Herbicide drift was observed during the late-boot stage and glufosinate was suspected based on the symptomology. The field was pumped up at 100% heading at which time it was recommended to turn the well off for the year due to the clay soil type. The field was eventually drained on September 13th and harvest started on October 9th. Total rainfall for the growing season was 19.2 inches. The field yielded 182 bu/acre and the producer was pleased with the yield considering the planting date and the weather experienced in August. The milling yield for the field was 62/69.

Independence County

The 51-acre, precision-graded field in eastern Independence County was located near Oil Trough on an Egam silt loam soil. Soybean was planted in the field the previous year. Prior to planting, fertilizer at 0-50-90 lbs/acre was applied based on soil test analysis. Conventional tillage practices were used to prepare the field for planting. On April 22nd, Roy J rice seed, treated with Apron, Maxim, and Release, was drill-seeded at a rate of 80 lbs/acre. Soon after planting, Command was applied pre-emergence for grass control. The rice emerged to a stand of 26 plants/ft^2 on May 6th. At the three-leaf rice stage, 100 lbs/acre of ammonium sulfate was applied to increase the vigor and combat plant health issues resulting from the combination of Command and cool and wet conditions. Rice plants responded well to the application. Consistent rainfall at the pre-flood timing (June 3rd) delayed the urea application. Meanwhile, grass escapes were noticed in the field and an application of Stam M-4 and Prowl was applied. Pre-flood urea + NBPT was eventually applied on June 13th at the N-STaR recommended rate of 150 lbs/acre and the permanent flood was established in 48 hours using the multiple-inlet rice irrigation method. The producer said this was half the time it usually took to establish the flood on the field and the first time he had used the multiple-inlet irrigation method. The producer indicated that he would continue the practice on all his fields next year. At midseason, the N-STaR recommendation was to omit additional urea, but due to the late pre-flood application and the current plant health an additional 100 lbs/acre of urea was applied on July 9th. At the mid-boot stage Tilt fungicide was applied as a preventative for kernel and false smut due to the susceptibility of Roy J and a field history of these diseases. At heading, the field was scouted for rice stink bugs and threshold levels (Average >5 per 10 sweeps) were observed prompting an application of Lamda Cy for their control. Flood levels were well maintained throughout the growing season using the multiple inlet rice irrigation method. Total rainfall for the growing

season was 18.4 inches. The field was drained on September 2nd and harvest commenced on September 20th following an application of sodium chlorate for foliage desiccation. The field averaged 193 bu/acre and according to the producer significantly surpassed the previous highest yield produced on the field. Milling yield was a 59/71.

Jackson County

The precision-graded 36-acre Jackson County field was located west of Tuckerman on a Bosket fine sandy loam. The field was in the RRVP last year and this year was the third rice crop in a row produced there. Conventional tillage practices were utilized in late spring and 0-0-60 lbs/acre fertilizer application was made prior to planting. Roy J treated with CruiserMaxx Rice was planted on May 2nd at a rate of 72 lbs/acre. Emergence was documented on May 6th with an average stand density of 26 plants/ft^2. An early post-emergence application of Facet and Riceshot was made for grass and broadleaf weed control ten days following rice emergence. No additional weed control measures were needed for the remainder of the season. Urea + NBPT was applied pre-flood at 220 lbs/acre based on N-STaR recommendations and initiation of permanent flood began on June 16th. After the permanent flood was established, it was observed that the field sustained a drift application of glyphosate across the entire field. The field was then drained and fertilized with 100 lbs/acre of ammonium sulfate to stimulate growth and vigor following the drift event. It was estimated that the event delayed the maturity by 7-10 days. At the mid-season timing (July 13th), a single application of urea was applied at 100 lbs/acre. Low disease and insect pressure were observed throughout the year and treatment was not advised. The field was drained September 14th and harvest began October 2nd. The field yielded 149 bu/acre. This yield was 22 bushels less than last year and probably due to the drift event that occurred. The milling yield was a 58/72.

Lawrence County

The 86-acre Lawrence County field was located northwest of Light on a Foley-Calhoun Complex silt loam soil. Rice was the previous crop grown on the field. Conventional tillage practices were utilized in early spring and a 0-28-58 lbs/acre fertilizer blend was applied prior to planting according to the soil test recommendation. CL111 treated with CruiserMaxx Rice was planted at 86 lbs/acre on May 18th and emerged to an average density of 16 plants/ft^2 on May 25th. Pre-emergence applications could not be applied to the field due to excessive wind and rain, therefore an early post-emergence application of Clearpath was applied on June 5th. Clearpath provided good activity on the barnyardgrass and ten days later, Newpath was applied to complete the control of emerged barnyardgrass and provide further residual activity. On June 15th, the N-STaR recommended rate of 250 lbs/acre of urea + NBPT was applied pre-flood and the permanent flood was initiated soon after using the multiple-inlet rice irrigation method. Following permanent flood establishment, barnyardgrass was observed in several patches throughout the field and appeared to not be controlled by the Newpath application. Beyond was recommended as a post-flood application and provided no herbicide activity on the barnyardgrass. Due to the low performance of both Newpath and Beyond herbicides, it is possible these populations of barnyardgrass possess resistance to this family of herbicides and seed will be tested this winter for herbicide resistance. The producer has farmed this field for only a few years and only used Clearfield technology once, but had no history on the previous year's production practices which could have included extensive selection pressure from multiple years of use of this family of herbicides. A second post-flood application including Clincher and Facet provided partial control of the barnyardgrass. At the mid-season timing, 100 lbs/acre of urea was applied on July 6th. Quilt Xcel was applied at late boot for severe sheath blight pressure while also providing kernel and false smut prevention. The field was scouted weekly for rice stink bug populations, but threshold numbers were never detected. The field's rainfall total during the growing season was 17.3 inches. The field was drained on September 19th and harvest began October 8th following an application of sodium chlorate for foliage

desiccation. The field yielded 140 bu/acre. Season-long barnyardgrass competition in portions of the field likely caused some yield reduction. Milling yield was a 64/71.

Poinsett County

The 142-acre Poinsett County field was located in the north-central portion of the county on a Henry silt loam soil. Soybean was the previous crop grown on the field. Conventional tillage practices were used for field preparation in early spring. Based on soil test recommendations, a 0-45-60 lbs/acre fertilizer blend was applied prior to planting. Jupiter treated with CruiserMaxx Rice and zinc was drill-seeded on April 22nd at a rate of 78 lbs/acre. Command herbicide was applied pre-emergence two days after planting for grass control. Rice emerged to a uniform stand density of 24 plants/ft^2 on May 8th. Command controlled weeds for approximately three and a half weeks; but due to windy and rainy conditions experienced for 2 weeks, applicators could not treat the field timely with subsequent herbicide applications. A herbicide mixture of Facet, Regiment, and Permit Plus was eventually applied on June 5th to large weeds. Following the late post-emergence application, rainy and windy conditions again prevailed and pre-flood nitrogen was delayed another week. The N-STaR recommended pre-flood urea + NBPT was finally applied on June 12th at 260 lbs/acre. Permanent flood establishment began the following day and utilized the multiple-inlet rice irrigation method designed by the Poinsett county agent. The multiple-inlet method reduced the flood establishment time from what had typically been eight days to four days and kept the flood maintained well throughout the growing season. It should be noted that the 142-acre field contained a steep contour grade that fell several different directions which is typically difficult to water. On July 3rd, mid-season urea was applied. Barnyardgrass escapes were observed after the mid-season timing, but due to the sparse density and timing, herbicide was not applied. Disease and insect levels remained below threshold levels all season and no fungicide or insecticide applications were made. Water pumped from a local reservoir maintained the flood on the field for the duration of the season until pumping ceased on September 2nd and the field was drained eight days later. Rainfall during the growing season totaled 22.6 inches. Harvest began on October 19th and the field yielded 188 bu/acre with a milling yield of 62/70. The producer was very pleased with the yield considering the environmental issues that were experienced during the growing season.

Prairie County

The zero-grade Prairie County field was 36 acres located southeast of Biscoe on a Sharkey Clay soil. The previous crop grown on the field was soybean. No tillage practices were performed on the field following the previous soybean crop. Untreated Roy J seed was water-seeded into a 1-inch flood on April 22nd at a rate of 115 lbs/acre. Emergence was observed ten days later when the rice pegged down and consisted of 26 plants/ft^2. After pegging, a very shallow flood was established and the water level was brought up as the rice height increased. Flooding from the adjacent Cache River complicated flood maintenance during the early rice growth. At the mid post-emergence stage (3-4 lf rice), a tankmix of Duet, Stam M-4, and Londax was applied for control of grass and aquatic broadleaf weeds. At the tillering stage, 100 lbs/acre of urea was applied May 31st. Twelve days later, 100 lbs/acre of urea and 100 lbs/acre of DAP were applied. DAP was added because the soil test recommended phosphorus fertilization. Another 100 lbs/acre of urea was applied June 20th to complete the nitrogen fertility program on the field. Clincher herbicide was applied on June 12th to control fall panicum populations in the field. No significant disease issues were observed in the field and no fungicide applications were warranted. Rice stink bug populations at 75% heading were above threshold levels and were treated with Karate insecticide. The rainfall total for the growing season was 15.8 inches. The field was drained August 29th and harvest started on September 10th. The field yielded 185 bu/acre and milled 53/67. The producer was expecting 160 bu/acre. He was very happy with the performance.

Randolph County

The precision-graded, 30-acre field in Randolph County was located northeast of Pocahontas near the community of Engelberg on a Hontus silt loam soil. The previous crop grown on the field was rice. Conventional tillage practices were utilized and 0-60-90 lbs/acre of fertilizer was applied prior to planting according to soil test recommendations. The field was planted on May 13th with 24 lbs/acre of RiceTec CL XL745 seed treated with the company's standard seed treatment. Emergence was observed on May 28th and consisted of 7 plants/ft^2. A week following emergence the field was flooded for four days with water backing up from the Current and Black Rivers. After the flood waters receded, the rice was slightly stretched, but improved within a week. The N-STaR recommended pre-flood nitrogen was supplied with a 41-0-0-4S + NBPT at a rate of 300 lbs/acre on June 17th. On the next day, a tankmix of Facet, Newpath, and RiceShot was applied for grass, red rice, and hemp sesbania control. Permanent flood establishment started eight hours following the pre-flood herbicide application. Beyond herbicide was applied at the green-ring stage (July 17th) for control of red rice escaping the earlier Newpath application. Red rice control was good, but suspected Clearfield tolerant weedy rice populations remained in patches throughout the field. The boot application of urea was applied on August 1st at 70 lbs/acre. Sheath blight was very aggressive after several weeks of rainy and cloudy conditions and had to be treated with Quadris fungicide at 25% heading. Total rainfall during the growing season was 17.3 inches. On September 10th, the field was drained. Defol 5 (sodium chlorate) was applied as a foliage desiccant on September 30th and harvest began one week later. The field yielded 171 bu/acre and with a milling yield of 55/69.

White County

The 27-acre White County field was situated in the northern portion of the county near Russell on a Callaway silt loam soil. Soybean was planted previously on the field. Conventional tillage methods were utilized in early spring and a fertilizer blend of 0-40-60 lbs/acre was applied pre-plant in accordance with soil test recommendations. Roy J seed, treated with Release, was drill-seeded on April 24th directly followed by a tankmix application of Command and Roundup WeatherMax herbicides for pre- and post-emergence annual grass and broadleaf control. Rice emerged to a stand averaging 24 plants/ft^2 on May 10th. Grass and yellow nutsedge were present at the pre-flood timing (June 5th) and were controlled with Stam M-4, Bolero, and Permit. On the same day, the N-STaR recommended rate of 220 lbs/acre of urea + NBPT was applied. The permanent flood was initiated a day after the pre-flood urea application. Shortly after permanent flood establishment, rice water weevil pressure intensified and an application of Mustang Max was made to effectively control the populations. Mid-season urea at 100 lbs/acre was applied on July 6th. Tilt fungicide was applied at the mid-boot timing for kernel and false smut prevention. Rice stink bug pressure stayed below threshold levels during the heading stage. The field was drained on September 9th. The total rainfall during the growing season was 20.6 inches. The field yielded 174 bu/acre and milled a 57/71. The producer acknowledged this was the best rice he had ever harvested and learned a lot from the experience.

Yell County

The 34-acre Yell County field was located southeast of Dardanelle on a Roellen silty clay soil. The previous crop planted on the field was soybean. Conventional tillage methods were performed in early spring. Roy J, seed-treated with Apron and Maxim, was drill-seeded at 82 lbs/acre on May 15th. Three days later, a pre-emergence treatment of Obey herbicide was applied for broad-spectrum weed control. Stand emergence of 29 plants/ft^2 was noted on June 1st. A large field-wide flush of palmer amaranth emerged a few weeks after rice emergence and was controlled with a tankmix of Broadhead and Stam M-4 applied to early-tillering rice on June

18th. Pre-flood urea + NBPT was applied according to the N-STaR recommendation of 250 lbs/acre to the northern half of the field on June 24th. The aerial applicator couldn't finish the field that day because of personal issues. Five days passed before the application could be completed on the southern half of the field. The permanent flood was established in three days starting on June 29th. Mid-season urea was applied at rate of 100 lbs/acre on July 27th. On August 16th, Quilt Xcel fungicide was applied to boot-stage rice for sheath blight control as well as kernel and false smut prevention. The field was drained on October 2nd. During the growing season, the field received a total of 13.8 inches of rainfall. Harvest began Oct 13th and resulted in an average yield of 180 bu/acre. The milling yield was 53/69 and the average moisture was 15%.

Southern Fields – Ralph Mazzanti

Arkansas County #1

The precision-graded, 74-acre Arkansas County #1 field was located east of Stuttgart on a Dewitt silt loam soil and the previous crop was soybean. Conventional tillage practices were used for field preparation and a pre-plant fertilizer based on soil test was applied at a rate of 0-60-90-10 (N-P_2O_5-K_2O-Zn) lbs/acre. RiceTec CL XL745 was drill-seeded on April 22nd at 20 lbs/acre. NipsIt INSIDE insecticide seed treatment was used in addition to the company's standard seed treatment. Ammonium sulfate was used as a starter fertilizer at a rate of 100 lbs/acre applied May 5th. The rice emerged on May 10th with a stand density of 6 plants/ft^2. Newpath herbicide was applied pre-emergence. Due to extended high wind issues (>20 days) the post-emergence herbicide application was delayed. Clearpath was applied June 11th as a post-emergence herbicide and provided adequate weed control. Permit Plus was applied June 29th and provided sufficient control of barnyardgrass and dayflower. Using the N-STaR recommendation, pre-flood urea + NBPT was applied at a rate of 130 lbs/acre on June 12th. Multiple inlet irrigation was utilized for the field ensuring a more efficient permanent flood. On July 15th the urea was applied at late-boot at 70 lbs/acre. The field was clean throughout the year and a deep flood was maintained. Irrigation amounts were 22 acre-inches with rainfall amounts totaling 3.9 inches. No fungicides were needed for disease control and no rice stink bug applications were warranted. The field was harvested on September 4th and yielded 219 bu/acre and was 20 bushels better than the grower's 2012 RRVP yield. The average harvest moisture was 18%. The milling yield was 58/72. This was the third-highest yield this year in the RRVP.

Arkansas County #2

The 137-acre Arkansas County #2 field was located just northeast of Reydell on a Dewitt silt loam soil. The previous crop grown on the field was corn. Conventional tillage practices were used to prepare the field for planting. On March 29th, the field was drill-seeded in Roy J at a rate of 67 lbs/acre. Apron XL and zinc were used as seed treatments. Based on soil test recommendations, a pre-plant fertilizer blend of 0-60-120-10 (N-P_2O_5-K_2O-Zn) lbs/acre was applied on April 22nd. The rice emerged on April 7th with a stand density of 15 plants/ft^2. Command and League herbicides were applied pre-emergence on April 30th followed by Superwham, Facet, and League applied post-emergence on May 29th. Due to extensive spring rains the pre-emergence herbicides remained activated giving season-long control of both grasses and broadleaves. Pre-flood nitrogen as urea was applied according to N-STaR recommendations at 200 lbs/acre pre-flood on June 5th, followed by 100 lbs/acre urea at mid-season. The irrigation source was surface water which provided a deep flood throughout the growing season. Rice stink bugs were sporadic early but never reached threshold levels. Quilt Xcel fungicide was applied July 30th for sheath blight control and prevention of kernel smut. Total rainfall for the season was 8.9 inches. The field was harvested on September 25th and

yielded 215 bu/acre with a milling yield of 61/72. This is the second year the grower was well pleased with the variety, yield, and RRVP recommendations.

Arkansas County #3

The precision-graded, 37-acre Arkansas County #3 field was located just south of Gillette on a Stuttgart silt loam soil. Soybean was planted in the field the previous year and conventional tillage practices were used to prepare the field. Prior to planting, pre-plant fertilizer at 0-18-36 lbs/acre was applied based on soil test recommendations. On April 29th CL151 treated with NipsIt INSIDE was drill-seeded at a rate of 74 lbs/acre. Command herbicide was applied at planting as a pre-emergence herbicide. The rice emerged on May 8th with a very uniform stand. Stand densities averaged 15 plants/ft^2. Clearpath and Permit were tank mixed and applied as post-emergence herbicides. Due to a very clean field and early-season persistent rain patterns the field was brought to flood early at the 4-leaf stage. A shallow flood was maintained early then a deep flood was maintained the rest of the season. According to N-STaR recommendations 215 lbs/acre urea was applied at pre-flood followed by 100 lbs/acre at mid-season. At the 2nd week of heading, the field was scouted for rice stink bug and threshold levels reached (>10 rice stink bugs per 10 sweeps) prompting an application of Karate Z insecticide. After intense scouting no late-season diseases were detected. Irrigation totaled 26.1 inches with 6.1 inches of rainfall. The field was harvested on August 26th with a yield of 218 bu/acre. The milling yield was 64/70 with an average moisture of 19%. The 2013 yield was 38 bu/acre better than the 2012 RRVP field.

Chicot County #1

The no-till, precision-graded 26-acre Chicot County #1 field was located northeast of Lake Village on a Sharkey clay soil. The previous crop grown on the field was corn. Prior to corn the field was fallow in pasture for 50 years and then precision-graded. On May 12th, CL152, treated with CruiserMaxx Rice and zinc, was planted at 57 lbs/acre. Newpath was applied on May 15th as a pre-emergence herbicide. Field emergence was recorded on May 20th with a stand density of 20 plants/ft^2. Ammonium sulfate was applied May 30th as a starter fertilizer. On June 6th Command, Clearpath, and League were applied as post-emergence herbicides. An adequate flood was maintained throughout the year. Based on N-STaR recommendations, nitrogen was applied as urea pre-flood at 200 lbs/acre on July 5th with no mid-season application recommended. Rice stink bugs were scattered throughout the field but never reached treatment threshold levels. Rainfall amounts were 8.05 inches for the season. Tilt fungicide was applied for kernel smut prevention. The field was harvested Sept 15th with a yield of 191 bu/acre and milling yield of 62/68. Kernel smut was prevalent throughout the field but more severe in the fill areas. The harvest moisture averaged 15%.

Chicot County #2

The precision-graded, 45-acre Chicot County #2 field was located just north of Eudora on a Sharkey clay soil. The previous crop was soybean. The field had just been leveled and no tillage practices were performed prior to planting. The field was drill-seeded April 23rd with Roy J at 80 lbs/acre. The seed was treated with CruiserMaxx Rice seed treatment. Roundup and Aim herbicides were applied at planting as a burndown for existing vegetation. Emergence was observed on May 5th with a stand of 18 plants/ft^2. Command and League herbicides were applied post-emergence on May 6th. Barnyardgrass was very persistent each week. On May 13th Propanil and Facet herbicides were applied followed by Superwham and Facet on May 30th. Due to recent field leveling, the southern part of the field was more mature than the northern part. On June 1st urea was applied at 215 lbs/acre according to N-STaR recommendations. On June 23rd mid-season nitrogen was applied as urea at 100 lbs/acre. Rice stink bugs reached

treatment threshold levels first on the south end and later on the north end of the field. Karate Z insecticide was applied July 29th and Aug 8th on the south and north sections of the field, respectively. Season rainfall amounts were 16.8 inches. The field was harvested Sept 12th and yielded 186 bu/acre. The milling yield was 58/70. The harvest moisture averaged 19%.

Clark County

The zero-grade, 40-acre Clark County field was located northwest of Arkadelphia on the Quachita River on a Gurdon silt loam soil. The field had been fallow and recently leveled with conventional tillage practices utilized in the spring. On May 2nd, RiceTec standard-treated CL XL745 was drill-seeded at 24 lbs/acre. A 0-0-60 lbs/acre pre-plant fertilizer was applied according to soil test recommendations. Prowl H_20 was applied as a pre-emergence herbicide. Emergence was observed on May 17th averaging 9 plants/ft^2. On May 30th Clearpath and Facet herbicides were applied post-emergence followed by Newpath and propanil on June 21st. There was an extended time to flooding (<21 days) due to pump issues. Chicken litter was applied at 2 tons per acre on June 22nd. N-STaR recommended urea at 250 lbs/acre was applied June 22nd. Mid-season fertilizer was applied as urea at 100 lbs/acre on Aug 8th. The field was harvested late on Oct 12th with a yield of 200 bu/acre. The milling yield was 60/70. The average moisture was 15%. The rainfall amount for the growing season was 8.2 inches.

Desha County

The zero-grade, 48-acre Desha County field was located just southwest of McGehee on a Perry clay soil. No tillage practices were performed following the previous soybean crop. One ton of chicken litter was applied on May 10th. RiceTec CL XL745 was drill-seeded at a rate of 22 lbs/acre on May 13th. The seed was treated with the company's standard seed treatment. Facet and Command herbicides were tank mixed as pre-emergence herbicides providing excellent weed control. Rice emergence was observed on May 27th with 8 plants/ft^2. A post-emergence application of Newpath and League herbicides was tank mixed and applied on June 6th for grass and aquatic weed control. A post-emergence application of Beyond herbicide was applied on June 12th. On June 13th a single pre-flood application of urea was applied at 230 lbs/acre according to N-STaR recommendations. On August 20th rice stink bugs reached treatment threshold levels and Karate Z insecticide was applied. The field was harvested September 13th and yielded 183 bu/acre with a milling yield of 55/69. The average harvest moisture was 15%. The irrigation amount was 17.5 inches and the rainfall amount was 5.3 inches.

Jefferson County

The zero-grade, 67-acre, no-till Jefferson County field was located just off the Arkansas River between Pastoria and Altheimer on a Desha clay soil. The previous year half the field was soybeans and the other half was rice. Due to extreme rainfall in April the field was water-seeded with Roy J at 90 lbs/acre on April 27th. Emergence was recorded on May 5th with a stand density of 14 plants/ft^2. Regiment and Facet herbicides were applied post-emergence on May 29th and provided good control of grass, broadleaf, and aquatic weeds. Permit Plus was applied on June 10th for control of yellow nutsedge, flatsedge, and smartweed. Using the N-STaR recommendation urea + NBPT was applied at 300 lbs/acre. Within 5 days after flood adult rice water weevils were observed and scarring was prevalent throughout the field. On June 24th an application of Belay insecticide was made and by the next week the field was clean. On July 5th the mid-season nitrogen fertilizer was applied as urea at 100 lbs/acre. The flood was well maintained throughout the growing season. Irrigation amounts totaled 15.5 inches while rainfall totaled 4.7 inches. The field was harvested on Sept 26th with a yield of 186 bu/acre and a milling yield of 56/68. The average harvest moisture was 17%. The grower stated this is the second year he had good yields under adverse conditions.

Lee County

The 39-acre Lee County field was located just east of Moro on a Loring silt loam soil. Soybean was the previous crop grown on the field. Conventional tillage practices were used for field preparation in early spring. A pre-plant fertilizer blend of 0-60-90-10-10 (N-P_20_5-K_20-Zn-S) lbs/acre was applied in the spring according to soil test recommendations. Glyphosate herbicide was used on April 20th as a burndown for existing vegetation. On April 23rd, Roy J treated with CruiserMaxx Rice and zinc was drill-seeded at 75 lbs/acre. Facet and Command were applied as pre-emergence herbicides on April 26th. An established stand was observed on May 5th averaging 22 plants/ft^2. Superwham, Facet, and Permit Plus herbicides were applied post-emergence. Based on N-STaR recommendations, pre-flood urea + NBPT was applied at 210 lbs/acre on June 5th. An adequate permanent flood was maintained throughout the growing season. There were grass escapes along the power lines of the south side of the field. A 20-acre load of Clincher plus methylated seed oil was applied on June 24th and provided fair control. Mid-season urea was applied on July 1st at 100 lbs/acre. Rice stink bugs reached treatment threshold levels and on August 5th an application of Mustang Max insecticide was made. The field was harvested on September 18th yielding 226 bu/acre with a milling yield of 61/72. The average harvest moisture was 16%. The season-long rainfall total was 10 inches. The grower was pleased with the yield and RRVP recommendations. This was the second-highest yield in the RRVP in 2013.

Lincoln County

The precision-graded, 31-acre Lincoln County field was located near Fresno on a Perry clay soil. No tillage practices were performed following the previous crop of soybean. An 18-46-0 lbs/acre pre-plant fertilizer was applied according to soil test recommendations. In March, Roundup PowerMax and 2,4-D amine herbicides were used to control existing weedy vegetation. On April 30th, RiceTec standard seed-treated CL XL745 was drill-seeded at a rate of 28 lbs/acre. Rice emergence was observed on May 11th and consisted of 8 plants/ft^2. Clearpath and Permit Plus herbicides were applied on May 22nd to control heavy pressure from barnyardgrass, broadleaf signalgrass, and dayflower. On June 3rd, Newpath herbicide was applied and the field remained clean throughout the season. Nitrogen as urea was applied pre-flood on June 2nd at a rate of 350 lbs/acre according to N-STaR recommendations. An adequate flood level was maintained throughout the season. The late-boot nitrogen application was applied as urea on July 16th at 75 lbs/acre. The field had a history of kernel smut and on July 17th Quilt Xcel fungicide was applied for suppression of this disease. Once rice reached the heading stage, the field was scouted for rice stink bug. Rice stink bug populations were at 3X threshold levels and were effectively controlled with a single application of Proaxis insecticide. The field was harvested on September 9th and yielded 217 bu/acre. The milling yield was 47/69 and the average harvest moisture was 16%. Rainfall total for the growing season was 6.65 inches.

Phillips County

The zero-graded, 43-acre Phillips County field was located south of Helena along the Mississippi River on a Sharkey silty clay soil. The previous crop grown on the field was rice. In the spring, Roundup WeatherMax was applied as a burndown for existing vegetation. Due to extensive spring rainfall on May 13th, Roy J rice seed, treated with Apron fungicide seed treatment, was water-seeded at 100 lbs/acre. The rice emerged to a stand on May 20th with a stand density averaging 21 plants/ft^2. RicePro, Prowl, and Londax were applied as post-emergence herbicides for barnyardgrass, broadleaves, and aquatics. Based on soil test recommendations, 18-46-0 lbs/acre pre-plant fertilizer plus ammonium sulfate and zinc was

applied on May 28th. On June 5th, another post-emergence herbicide application of Facet and Superwham was made. Pre-flood nitrogen as urea + NBPT was applied on June 8th at the N-STaR recommended rate of 200 lbs/acre. The permanent flood was established within 48 hours. Mid-season fertilizer was applied as urea on June 28th at 100 lbs/acre. The field was harvested on September 26th and yielded 186 bu/acre with a milling yield of 58/69. The average harvest moisture was 15% and the total rainfall was 7.75 inches.

Table 1. Agronomic information for fields enrolled in the 2013 Rice Research Verification Program.

Field Location by County	Cultivar	Field size (acres)	Previous crop	Seeding rate (lbs/acre)	Stand density (plants/ft^2)	Planting date	Emergence date	Harvest date	Yield (bu/A)	Milling yield[z]	Harvest Moisture (%)
Arkansas #1	RT CL XL745	74	Soybean	20	6	22-April	6-May	4-Sept	219	58/72	18
Arkansas #2	Roy J	137	Corn	74	15	20-April	13-May	25-Sept	215	58/71	15
Arkansas #3	CL151	37	Soybean	74	15	29-April	8-May	26-Aug	218	64/70	19
Chicot #1	CL152	26	Corn	57	20	12-May	20-May	26-Aug	191	62/68	15
Chicot #2	Roy J	45	Soybean	80	18	23-April	2-May	12-Sept	186	58/70	19
Clark	RT CL XL745	40	Fallow	24	9	2-May	17-May	12-Oct	200	60/70	16
Clay	RT CL XL745	29	Soybean	23	8	20-May	27-May	13-Oct	175	60/72	18
Conway	RT XL753	52	Rice	22	8	11-May	20-May	7-Oct	249	54/70	16
Cross	Francis	82	Soybean	91	30	15-May	26-May	9-Oct	182	62/69	19
Desha	RT CL XL745	48	Soybean	22	8	13-May	27-May	13-Sept	183	54/68	15
Independence	Roy J	51	Soybean	80	26	22-April	6-May	20-Sept	193	59/71	18
Jackson	Roy J	36	Rice	72	36	2-May	14-May	2-Oct	149	58/72	16
Jefferson	Roy J	67	Rice	90	14	27-April	5-May	26-Sept	186	56/68	17
Lawrence	CL111	86	Rice	80	16	18-May	25-May	8-Oct	140	64/71	15
Lee	Roy J	39	Soybean	75	22	23-April	5-May	18-Sept	226	61/72	16
Lincoln	RT CL XL745	31	Soybean	28	8	30-April	11-May	9-Sept	217	47/69	16
Phillips	Roy J	43	Rice	100	21	13-May	20-May	26-Sept	186	58/69	15
Poinsett	Jupiter	142	Soybean	78	24	22-April	8-May	19-Oct	188	62/70	16
Prairie	Roy J	36	Soybean	115	26	22-April	2-May	10-Sept	185	53/68	15
Randolph	RT CL XL745	30	Rice	24	7	13-May	28-May	7-Oct	171	55/69	15
White	Roy J	27	Soybean	70	24	24-April	10-May	2-Oct	174	57/71	16
Yell	Roy J	34	Soybean	82	29	15-May	1-June	13-Oct	180	53/69	15
Average	**-----**	**54**	**-----**	[y]	[x]	**3-May**	**15-May**	**26-Sept**	**192**	**58/70**	**16**

[z] Head rice milling yield / Total rice milling yield.
[y] Seeding rates averaged 81 lbs/acre for pureline varieties and 23 lbs/acre for hybrids.
[x] Stand density averaged 22 plants/ft^2 for pureline varieties and 8 plants/ft^2 for hybrids.

Table 2. Soil test results, fertilization program, and soil classification for fields enrolled in the 2013 Rice Research Verification Program.

Field Location by County	Soil Test				Applied Fertilizer (lbs/acre)			Soil Classification
	pH	lbs/acre			Pre-flood[y] N-P-K-Zn-S[z]	Urea (46% N) rates applied by timing[x]	Total N rate (lbs N/acre)[w]	
		P[z]	K[z]	Zn[z]				
Arkansas #1	6.3	22	184	5.2	0-60-90-10	130-0-70	92	Dewitt Silt Loam
Arkansas #2	6.9	30	140	4.2	0-60-120-10	200-100-0	138	Dewitt Silt Loam
Arkansas #3	7.2	47	201	9.1	0-18-36-0-0	215-100-0	145	Dewitt Silt Loam
Chicot #1	5.4	64	660	7.4	24-0-0-0-21	200-0-0	103	Sharkey Clay
Chicot #2	6.1	54	628	8.3	0-0-0-0-0	215-100-0	145	Perry Clay
Clark	5.3	14	71	3.9	60-90-120-0-0[v]	250-0-75	177	Gurdon Silt Loam
Clay	6.0	37	221	4.1	0-40-60-1-0	210-0-70	129	Crowley Silt Loam
Conway	5.9	88	372	6.0	0-0-60-1-0	305-0-0	140	Dardanelle Silt Loam
Cross	6.5	54	286	6.0	0-0-0-1-0	220-100-0	147	Earle Clay
Desha	6.3	38	580	9.8	60-50-74-0-0[u]	230-0-0	133	Sharkey/Desha Clay
Independence	6.5	12	168	7.2	24-50-90-0-21	150-100-0	139	Egam Silt Loam
Jackson	6.0	80	195	2.4	24-0-60-10-21	220-100-0	171	Bosket Fine Sandy Loam
Jefferson	6.8	52	980	9.2	0-0-0-0-0	300-100-0	184	Perry Clay
Lawrence	7.0	38	122	8.7	0-60-120-1-0	250-100-0	161	Foley-Calhoun Complex Silt Loam
Lee	7.0	48	197	4.3	12-60-90-1-10	210-100-0	148	Foley-Bonn Complex
Lincoln	6.7	28	725	5.2	18-46-0-0-0	350-0-70	201	Perry Clay
Phillips	7.0	89	716	7.9	42-46-0-10-21	200-100-0	157	Foley Silt Loam
Poinsett	7.4	28	114	6.1	0-45-60-1-0	260-100-0	165	Henry Silt Loam
Prairie	6.0	36	276	4.6	18-46-0-0-0	200-100-0	156	Sharkey Soils Clay
Randolph	6.7	34	150	4.2	0-60-90-1-12	267-0-70	155	Hontus Silt Loam
White	5.7	38	198	5.2	0-40-60-0-0	220-100-0	147	Callaway Silt Loam
Yell	6.3	36	667	5.5	0-0-0-1-0	250-100-0	160	Roellen Silty Clay

[z] N = nitrogen, P = phosphorus, K = potassium, Zn = zinc, and S = sulfur.
[y] N-P_2O_5-K_2O-Zn-S (includes seed treatments and pre-plant applications).
[x] Timing: preflood–midseason–boot.
[w] Column values followed by an asterisk (*) were fertilized according to N-STaR recommendations.
[v] Analysis established from two tons of chicken litter per acre.
[u] Analysis established from one ton of chicken litter per acre.

Table 3. Herbicide rates and timings for fields enrolled in the 2013 Rice Research Verification Program.

Field Location by County	Pre-emergence Herbicide Applications (Trade name & product rate/acre)[x]	Post-emergence Herbicide Applications (Trade name & product rate/acre)[z]
Arkansas #1	Newpath (6 oz)	Clearpath (0.5 lb) fb Permit Plus (0.75 oz)
Arkansas #2	Command (12 oz) + League (3.2 oz)	Facet (0.5 lb) + League (3.2 oz) + Superwham (3 qts)
Arkansas #3	Command (13 oz)	Clearpath (0.5 lb) fb Permit (1 oz)
Chicot #1	Newpath (4 oz)	Command (11 oz) + Clearpath (0.5 lb) + League (6.4 oz)
Chicot #2	Glyphosate (32 oz) fb Command (11 oz) + League (3.2 oz)	Propanil (4 qts) + Facet (0.33 lb) fb Superwham (4 qts) + Facet (0.33 lb)
Clark	Prowl H2O (1.6 pts)	Clearpath (0.5 lb) + Facet (.10 lb) fb Newpath (4 oz) + Propanil (1 qt)
Clay	------[y]	Clearpath (0.5 lb) + Command (12 oz) fb Beyond (5 oz)
Conway	Command (12 oz) + Facet L (32 oz) + Permit (0.67 oz)	Clincher (15 oz)
Cross	Command (20 oz)	Facet (32 oz) + Grandstand (0.67 pt) + Aim (1 oz) fb Facet (32 oz)
Desha	Facet (0.5 lb) + Command (21 oz)	Newpath (5 oz) + League (6.4 oz) fb Beyond (5 oz)
Independence	Command (12 oz)	Stam M-4 (4 qts) + Prowl H2O (2 pts)
Jackson	------[y]	Facet (0.33 lb) + Riceshot (4 qts)
Jefferson	------[y]	Regiment (0.5 oz) + Facet (0.5 lb) fb Permit Plus (0.75 oz)
Lawrence	------[y]	Clearpath (0.5 lb) fb Newpath (6 oz) fb Beyond (6 oz) fb Facet L (16 oz) + Clincher (15 oz)
Lee	Glyphosate (32 oz) fb Facet (0.5 lb) + Command (11 oz)	Superwham (3 qts) + Facet (0.6 lb) + Permit Plus (0.75 oz)
Lincoln	Roundup (1 qt) + 2,4-D (1 qt)	Clearpath (0.5 lb) + Permit Plus (0.75 oz) fb Newpath (6 oz)
Phillips	Prowl (2.1 pts) + RicePro (4 qts)	Londax (1 oz) + Facet (0.4 lb) + Superwham (4 qts)
Poinsett	Command (12 oz)	Facet (32 oz) + Regiment (0.5 oz) + Permit Plus (0.75 oz)
Prairie	------[y]	Duet (4 qts) + Londax (0.25 oz) + Stam (1 qt) fb Clincher (15 oz)
Randolph	------[y]	Facet (32 oz) + Newpath (4 oz) + Riceshot (2 qts) fb Beyond (5 oz)
White	Roundup PowerMax (32 oz) + Command (16 oz)	RiceShot (4 qts) + Bolero (2 pts) + Permit (0.5 oz)
Yell	Obey (30 oz)	Broadhead (5 oz) + Stam (2 qts)

[z] The abbreviation 'fb' stands for 'followed by' and is used to separate herbicide application events.

[y] Field did not receive pre-emergence herbicide applications due to either historical field issues with these applications or field/environmental conditions.

Table 4. Seed treatments and foliar fungicides and insecticides used on fields enrolled in the 2013 Rice Research Verification Program.

Field Location by County[z]	Seed treatments (trade name and product rate/cwt seed)	Foliar fungicide and insecticide applications (trade name and product rate/acre)			
	Fungicide and/or Insecticide Seed Treatment for Control of Diseases and Insects Attacking Seedling Rice	Fungicide Applications for Control of Sheath Blight/Kernel Smut/False Smut	Fungicide Applications for Control of Rice Blast	Insecticide Applications for Control of Rice Water Weevil	Insecticide Applications for Control of Rice Stink Bug/Chinch Bug
Arkansas #1	RTST + NipsIt INSIDE (1.92 fl oz)	------	------	-------	------
Arkansas #2	Apron XL (0.64 fl oz) + Maxim 4 FS (0.12 fl oz)+ Zinc (8 oz cwt)	Quilt Xcel (14 oz)	------	------	------
Arkansas #3	NipsIt INSIDE (1.92 fl oz)	------	------	------	Karate (2.1 oz)
Chicot #1	CruiserMaxx Rice (7 fl oz) + Zinc (8 oz cwt)	Tilt (6 oz)	------	------	------
Chicot #2	CruiserMaxx Rice (7 fl oz)	------	------	------	Karate (1.8 oz)
Clark	RTST	------	------	------	
Clay	RTST	------	------	------	Lambda Cy (4 oz)
Conway	RTST	------	------	------	Lambda Cy (4 oz)
Cross	Apron XL (0.64 fl oz) + Maxim 4 FS (0.12 fl oz)	------	------	------	------
Desha	RTST	------	------	------	Karate (2.1 oz)
Independence	Apron XL (0.64 fl oz) + Maxim 4 FS (0.12 fl oz) + Release LC (2 fl oz)	Tilt (6 oz)	------	------	Lambda Cy (4 oz)
Jackson	CruiserMaxx Rice (7 fl oz)	------	------	------	------
Jefferson	-------	------	------	Belay (4.5 oz)	------
Lawrence	CruiserMaxx Rice (7 fl oz)	Quilt Xcel (21 oz)	------	------	------
Lee	CruiserMaxx Rice(7 fl oz) + Zinc (8 oz cwt)	------	------	------	Mustang Max(3.65 oz)
Lincoln	RTST	Quilt Xcel (16 oz)	------	------	Pro Axis (5.1 oz)
Phillips	Apron XL (0.64 fl oz) + Maxim 4 FS (0.12 fl oz)		------	------	------
Poinsett	CruiserMaxx Rice (7 fl oz)	------	------	------	-------
Prairie	------	------	------	------	Karate (2.1 oz)
Randolph	RTST	Quadris (8 oz)	------	------	-------
White	Release LC (2 fl oz)	Tilt (6 oz)	------	Mustang Max (3.5 oz)	-------
Yell	Apron XL (0.64 fl oz) + Maxim 4 FS (0.12 fl oz)	Quilt Xcel (21 oz)	-------	-------	-------

[z] RTST refers to 'RiceTec Seed Treatment' and is used to define those fields whose seed was treated by RiceTec, Inc. prior to seed purchase. Seed was treated with compounds intended to enhance germination and early-season plant growth.

Table 5. Rainfall and irrigation information for fields enrolled in the 2013 Rice Research Verification Program.

Field Location by County	Rainfall (inches)	Irrigation[z] (acre-inches)	Rainfall + Irrigation (inches)
Arkansas #1	3.90	22.00	25.9
Arkansas #2	6.10	30.00*	36.10
Arkansas #3	8.90	26.10	25.00
Chicot #1	8.05	30.00*	38.05
Chicot #2	16.80	30.00*	46.80
Clark	8.20	30.00*	38.20
Clay	16.73	40.06	56.79
Conway	8.17	30.00*	38.17
Cross	19.20	30.00*	49.20
Desha	5.30	17.50	22.80
Independence	18.37	27.17	45.54
Jackson	20.00	30.00*	50.00
Jefferson	4.70	15.50	20.20
Lawrence	17.26	30.00*	47.26
Lee	10.00	30.00	40.00
Lincoln	6.65	30.00	36.65
Phillips	7.75	30.00	37.75
Poinsett	22.61	30.00*	52.61
Prairie	15.76	30.00*	45.76
Randolph	17.30	30.12	47.42
White	20.61	30.00*	50.61
Yell	13.83	20.95	34.78
Average	**12.56**	**26.79**	**39.35**

[z] Not all fields were equipped with flow meters to monitor water use for irrigation. Therefore, the average irrigation amount used in fields with flow meters was calculated and this average was used for fields with no irrigation data. Irrigation amounts using this calculated average are followed by an asterisk (*).

ECONOMIC ANALYSIS

This section provides information on production costs and returns for the 2013 Rice Research Verification Program (RRVP). Records of field operations on each field provided the basis for estimating production costs. The field records were compiled by the RRVP coordinators, county Extension agents, and cooperators. Production data from the 22 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 cost 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 2013 Crop Enterprise Budgets published by the Cooperative Extension Service and information provided by the cooperating producers. 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, costs per bushel, and returns above operating and total specified costs are presented in Table 6. Costs in this report do not include land costs, management, or other expenses and fees not associated with production. Operating costs ranged from $453.49/acre for Jefferson County to $842.87/acre for Lawrence County, while operating costs per bushel range from $2.26/bu for Arkansas County #3 to $6.02/bu for Lawrence County. Total costs per acre (operating plus fixed) ranged from $519.97/acre for Jefferson County to $943.53/acre for Lawrence County, and total costs per bushel ranged from $2.71/bu for Arkansas County #3 to $6.74/bu for Lawrence County. Returns above operating costs ranged from $77.30/acre for Lawrence County to $964.97/acre for Arkansas County #3, and returns above total costs ranged from -$23.36/acre for Lawrence County to $868.30/acre for Arkansas County #3.

A summary of yield, rice price, revenues, and expenses by expense type for each RRVP field is presented in Table 7. The average rice yield for the 2013 RRVP was 191 bushels/acre but ranged from 140 bushels/acre for Lawrence County to 249 bushels/acre for Conway County. The Arkansas average long-grain cash price for the 2013 RRVP was estimated from August 1 through October 31 daily price quotes to be $6.43/bu. The RRVP had one field planted to a medium-grain cultivar (Poinsett County). The average medium-grain price contracted in Arkansas was estimated to be $6.41/bu and represented the average long-grain price plus an average medium-grain discount of -$0.011/bu. The average medium-grain discount was estimated based on the average difference in Arkansas milled rice value between medium- and long-grain rice obtained from the Arkansas Weekly Grain Review for the period August 9 through October 25, converted to a rough rice equivalent. A premium or discount was given to each field based on the milling yield observed for each field and standard milling yields of 55/70 for long-grain rice and 58/69 for medium-grain rice. Broken rice was assumed to have 60% of whole grain price value. If milling yield was higher than the standard, a premium was made while a discount was given for milling less than the standard. Estimated long-grain prices adjusted for milling yield varied from $6.12/bu in Lincoln County to $6.74/bu in Arkansas County #2. The medium-grain price adjusted

for milling yield for Poinsett County (the one RRVP field growing medium grain rice) was $6.60/bu (Table 7).

The average operating expense for the 22 RRVP fields was $627.65/acre (Table 7). Fertilizers and nutrients accounted for the largest share of operating expenses on average (23.8%) followed by post-harvest expenses (17.8%), chemicals (15.5%), seed (12.4%), and irrigation energy costs (9.7%). Although seed's share of operating expenses was 12.4% across the 22 fields, it's average cost and share of operating expenses varied depending on whether a Clearfield hybrid was used ($158.09/acre; 22.8% of operating expenses), a non-Clearfield hybrid was used ($126.72/acre; 19.7% of operating expenses), a Clearfield non-hybrid (pureline) variety was used ($72.40/acre; 11.6% of operating expenses) or a non-Clearfield non-hybrid (pureline) variety was used ($35.31/acre; 5.9% of operating expenses).

The average return above operating expenses for the 22 fields was $612.09/acre and ranged from $77.30/acre for Lawrence County to $964.97/acre for Arkansas County #3. The average return above total specified expenses for the 22 fields was $525.84/acre and ranged from -$23.36/acre for Lawrence County to $868.30/acre for Arkansas County #3. Table 8 provides select variable input costs for each field and includes a further breakdown of chemical costs into herbicides, insecticides, and fungicides. Table 8 also lists the specific rice cultivars grown on each RRVP field.

Table 6. Operating Costs, Total Costs, and Returns for fields enrolled in the 2013 Rice Research Verification Program.

County	Operating Costs ($/acre)	Operating Costs ($/bushel)	Returns to Operating Costs ($/acre)	Fixed Costs ($/acre)	Total Costs ($/acre)	Returns to Total Costs ($/acre)	Total Costs ($/bushel)
Arkansas #1	651.36	2.97	805.24	85.71	737.07	719.53	3.37
Arkansas #2	711.32	3.31	737.65	99.09	810.41	638.56	3.77
Arkansas #3	493.53	2.26	964.97	96.66	590.19	868.30	2.71
Chicot #1	542.48	2.84	697.90	80.19	622.67	617.71	3.26
Chicot #2	508.16	2.73	703.40	69.40	577.56	634.00	3.11
Clark	671.00	3.35	643.53	91.72	762.72	551.81	3.81
Clay	692.52	3.96	481.72	90.03	782.55	391.69	4.47
Conway	642.78	2.58	905.87	103.23	746.00	802.65	3.00
Cross	469.54	2.58	724.89	77.38	546.92	647.51	3.01
Desha	564.85	3.49	494.95	55.09	619.94	439.86	3.83
Independence	658.15	3.41	617.94	89.21	747.36	528.74	3.87
Jackson	504.74	3.39	486.27	84.86	589.61	401.41	3.96
Jefferson	453.49	2.44	721.58	66.48	519.97	655.10	2.80
Lawrence	842.87	6.02	77.30	100.66	943.53	-23.36	6.74
Lee	688.64	3.05	834.47	89.66	778.30	744.80	3.44
Lincoln	765.85	3.53	562.49	97.57	863.42	464.91	3.98
Phillips	553.44	2.98	645.35	51.64	605.07	593.71	3.25
Poinsett	659.64	3.51	581.08	101.84	761.48	479.24	4.05
Prairie	597.60	3.23	554.82	76.45	674.05	478.37	3.64
Randolph	812.09	4.75	274.93	103.95	916.04	170.98	5.36
White	607.58	3.49	532.65	95.47	703.04	437.18	4.04
Yell	716.65	3.98	416.98	91.19	807.84	325.79	4.49
Average	**627.65**	**3.36**	**612.09**	**86.25**	**713.90**	**525.84**	**3.82**

Table 7. Summary of Revenue and Expenses per Acre for fields enrolled in the 2013 Rice Research Verification Program.

Receipts	Arkansas#1	Arkansas#2	Arkansas#3	Chicot#1	Chicot#2	Clark	Clay	Conway	Cross	Desha	Independence
Yield (bu.)	219	215	218	191	186	200	175	249	182	162	193
Price Received	6.65	6.74	6.69	6.49	6.51	6.57	6.71	6.22	6.56	6.54	6.61
Total Crop Revenue	**1,456.59**	**1,448.97**	**1,458.50**	**1,240.38**	**1,211.56**	**1,314.53**	**1,174.25**	**1,548.65**	**1,194.43**	**1,059.80**	**1,276.09**
Operating Expenses											
Seed	126.60	29.67	62.90	64.47	45.04	160.32	153.64	126.72	32.94	152.97	36.56
Fertilizers & Nutrients	186.58	197.92	86.47	84.12	88.39	210.96	140.03	121.70	95.07	116.54	169.47
Chemicals	61.54	93.50	68.08	97.51	117.70	61.32	77.17	105.76	74.23	82.25	77.02
Custom Applications	42.00	41.00	43.05	28.00	29.05	24.50	62.70	35.35	29.40	21.00	57.50
Diesel Fuel	28.93	33.74	29.64	22.12	24.82	23.33	35.66	30.86	30.12	22.37	31.66
Repairs & Maintenance	27.98	31.68	31.27	26.09	24.48	29.59	29.45	33.20	26.69	19.84	28.99
Irrigation Energy Costs	18.48	127.56	21.84	91.68	47.42	25.20	62.12	25.20	51.94	26.87	110.98
Labor, Field Activities	8.46	10.45	9.04	7.56	7.96	6.89	10.67	7.75	8.97	6.16	9.86
Other Inputs & Fees, Pre-harvest	23.00	20.34	14.04	9.48	14.77	12.20	18.97	10.95	13.98	10.08	23.48
Post-harvest Expenses	127.79	125.45	127.20	111.45	108.53	116.70	102.11	145.29	106.20	106.78	112.62
Total Operating Expenses	**651.36**	**711.32**	**493.53**	**542.48**	**508.16**	**671.00**	**692.52**	**642.78**	**469.54**	**564.85**	**658.15**
Returns to Operating Expenses	**805.24**	**737.65**	**964.97**	**697.90**	**703.40**	**643.53**	**481.72**	**905.87**	**724.89**	**494.95**	**617.94**
Capital Recovery & Fixed Costs	85.71	99.09	96.66	80.19	69.40	91.72	90.03	103.23	77.38	55.09	89.21
Total Specified Expenses[z]	**737.07**	**810.41**	**590.19**	**622.67**	**577.56**	**762.72**	**782.55**	**746.00**	**546.92**	**619.94**	**747.36**
Returns to Specified Expenses	**719.53**	**638.56**	**868.30**	**617.71**	**634.00**	**551.81**	**391.69**	**802.65**	**647.51**	**439.86**	**528.74**
Operating Expenses/Yield Unit	2.97	3.31	2.26	2.84	2.73	3.35	3.96	2.58	2.58	3.49	3.41
Total Expenses/Yield Unit	3.37	3.77	2.71	3.26	3.11	3.81	4.47	3.00	3.01	3.83	3.87

[z] Does not include land costs, management, or other expenses and fees not associated with production.

Table 7. Summary of Revenue and Expenses per Acre for fields enrolled in the 2013 Rice Research Verification Program (Continued).

Receipts	Jackson	Jefferson	Lawrence	Lee	Lincoln	Philips	Poinsett	Prairie	Randolph	White	Yell	Average
Yield (bu.)	149	186	140	226	217	186	188	185	171	174	180	191
Price Received	6.65	6.32	6.57	6.74	6.12	6.45	6.60	6.23	6.36	6.55	6.30	6.51
Total Crop Revenue	**991.02**	**1,175.07**	**920.17**	**1,523.10**	**1,328.34**	**1,198.79**	**1,240.72**	**1,152.42**	**1,087.02**	**1,140.22**	**1,133.63**	**1,239.74**
Operating Expenses												
Seed	40.54	26.10	89.84	42.83	194.68	40.10	43.91	33.35	160.32	23.03	29.68	78.01
Fertilizers & Nutrients	144.39	119.44	200.21	201.49	159.68	138.70	179.26	124.60	186.83	149.47	182.76	149.28
Chemicals	52.59	60.05	167.58	115.40	106.75	116.07	143.19	94.20	92.58	118.94	159.89	97.42
Custom Applications	42.40	63.00	72.50	49.70	73.50	56.00	59.20	49.00	40.00	56.40	56.00	46.88
Diesel Fuel	35.89	21.05	31.61	39.03	25.85	15.33	32.67	19.79	37.82	39.75	32.25	29.29
Repairs & Maintenance	27.56	22.56	32.27	29.83	31.71	16.81	32.25	24.08	33.40	33.70	30.99	28.38
Irrigation Energy Costs	47.42	12.60	127.56	47.42	25.20	47.42	25.20	127.56	128.07	51.94	89.08	60.85
Labor, Field Activities	11.84	6.59	11.37	11.38	7.80	4.69	9.18	6.30	11.63	14.20	11.53	9.10
Other Inputs & Fees, Pre-harvest	15.17	13.57	28.23	19.70	14.07	9.79	25.08	10.77	21.65	18.62	19.44	16.70
Post-harvest Expenses	86.94	108.53	81.69	131.87	126.62	108.53	109.70	107.95	99.78	101.53	105.03	111.74
Total Operating Expenses	**504.74**	**453.49**	**842.87**	**688.64**	**765.85**	**553.44**	**659.64**	**597.60**	**812.09**	**607.58**	**716.65**	**627.65**
Returns to Operating Expenses	**486.27**	**721.58**	**77.30**	**834.47**	**562.49**	**645.35**	**581.08**	**554.82**	**274.93**	**532.65**	**416.98**	**612.09**
Capital Recovery & Fixed Costs	84.86	66.48	100.66	89.66	97.57	51.64	101.84	76.45	103.95	95.47	91.19	86.25
Total Specified Expenses [z]	**589.61**	**519.97**	**943.53**	**778.30**	**863.42**	**605.07**	**761.48**	**674.05**	**916.04**	**703.04**	**807.84**	**713.90**
Returns to Specified Expenses	**401.41**	**655.10**	**-23.36**	**744.80**	**464.91**	**593.71**	**479.24**	**478.37**	**170.98**	**437.18**	**325.79**	**525.84**
Operating Expenses/Yield Unit	3.39	2.44	6.02	3.05	3.53	2.98	3.51	3.23	4.75	3.49	3.98	3.36
Total Expenses/Yield Unit	3.96	2.80	6.74	3.44	3.98	3.25	4.05	3.64	5.36	4.04	4.49	3.82

[z] Does not include land costs, management, or other expenses and fees not associated with production.

Table 8. Selected Variable Input Costs per Acre for fields enrolled in the 2013 Rice Research Verification Program.

County	Rice Type	Seed	Fertilizers & Nutrients	Herbicides	Insecticides	Fungicides and Other	Machinery Fuel & Lube	Irrigation Energy Costs
Arkansas #1	CL XL745	126.60	186.58	61.54	-----	-----	28.93	18.48
Arkansas #2	Roy J	29.67	197.92	70.30	-----	23.21	33.74	127.56
Arkansas #3	CL 151	62.90	86.47	61.46	6.62	-----	29.64	21.84
Chicot #1	CL 152	64.47	84.12	90.49	-----	7.02	22.12	91.68
Chicot #2	Roy J	45.04	88.39	112.03	5.67	-----	24.82	47.42
Clark	CL XL745	160.32	210.96	61.32	-----	-----	23.33	25.20
Clay	CL XL745	153.64	140.03	64.57	12.60	-----	35.66	62.12
Conway	RT XL753	126.72	121.70	94.42	11.34	-----	30.86	25.20
Cross	Francis	32.94	95.07	74.23	-----	-----	30.12	51.94
Desha	CL XL745	152.97	116.54	75.63	6.62	-----	22.37	26.87
Independence	Roy J	36.56	169.47	57.40	12.60	7.02	31.66	110.98
Jackson	Roy J	40.54	144.39	52.59	-----	-----	35.89	47.42
Jefferson	Roy J	26.10	119.44	49.50	10.55	-----	21.05	12.60
Lawrence	CL111	89.84	200.21	126.67	-----	40.92	31.61	127.56
Lee	Roy J	42.83	201.49	109.63	5.77	-----	39.03	47.42
Lincoln	CL XL745	194.68	159.68	66.87	13.36	26.52	25.85	25.20
Phillips	Roy J	40.10	138.70	116.07	-----	-----	15.33	47.42
Poinsett	Jupiter	43.91	179.26	137.08	-----	6.11	32.67	25.20
Prairie	Roy J	33.35	124.60	88.44	5.76	-----	19.79	127.56
Randolph	CL XL745	160.32	186.83	66.71	-----	25.87	37.82	128.07
White	Roy J	23.03	149.47	100.28	5.53	13.13	39.75	51.94
Yell	Roy J	29.68	182.76	125.08	-----	34.81	32.25	89.08
Average	**-----**	**78.01**	**149.28**	**84.65**	**8.76**	**20.51**	**29.29**	**60.85**