DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

2012
University of Arkansas
Rice Research Verification Program

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

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RICE RESEARCH VERIFICATION PROGRAM, 2012

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INTRODUCTION

The 2012 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.

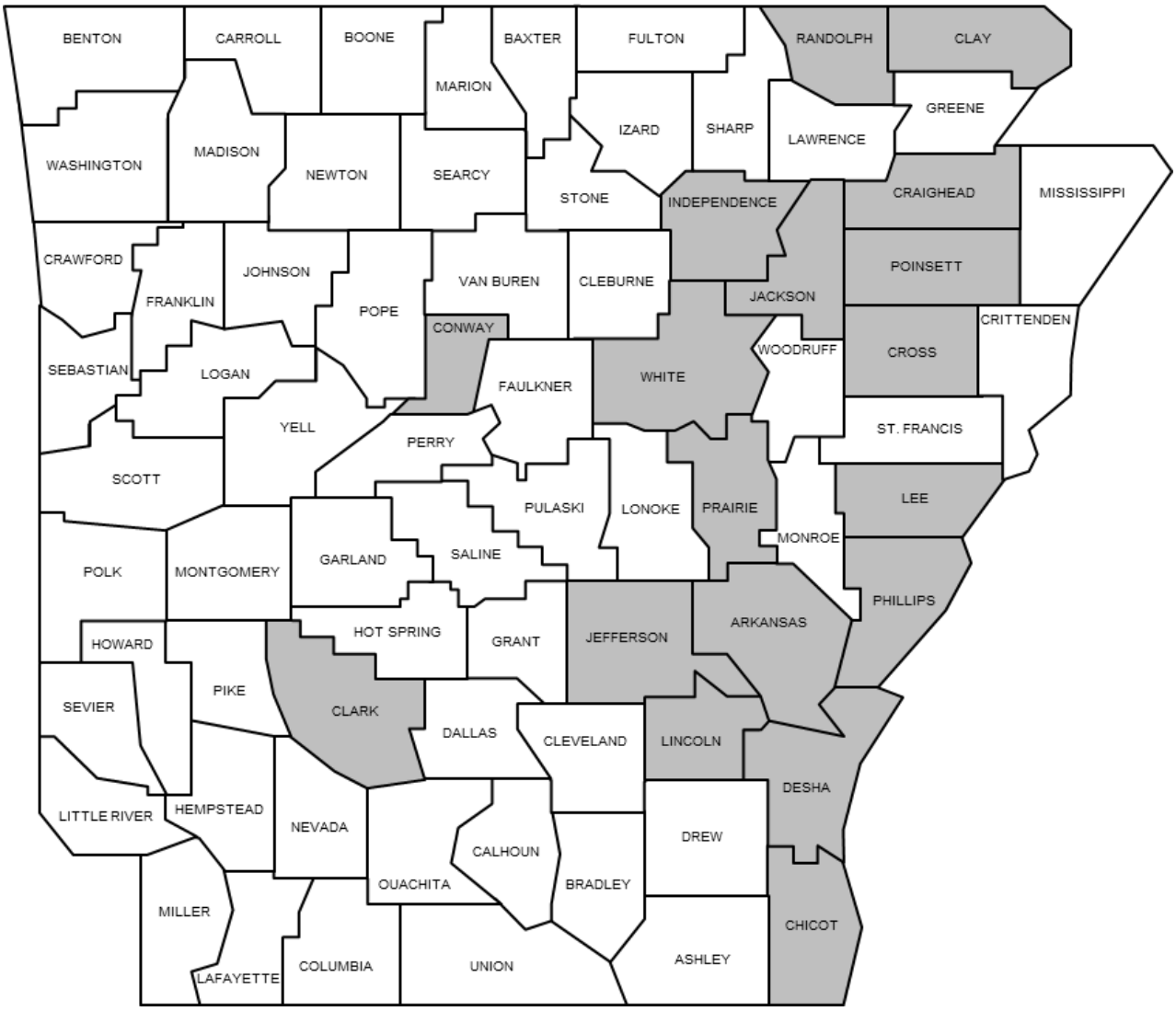
5. To promote timely implementation of management practices among rice growers.

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-one fields were enrolled in the RRVP in 2012. The fields were located on commercial farms ranging in size from 25 to 127 acres. The average field size was 64 acres.

The 2012 RRVP fields were conducted in Arkansas (3 fields), Chicot (2 fields), Clark, Clay, Conway, Craighead, Cross, Desha, Independence, Jackson, Jefferson, Lee, Lincoln, Phillips, Poinsett, Prairie, Randolph, and White Counties; nine different cultivars (CL111, CL151, RiceTec CL XL745, Francis, Jupiter, Roy J, RiceTec XL723, RiceTec XL753, and Taggart) 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 2012 Rice Research Verification Program Fields.



FIELD REVIEWS

Northern Fields – Lance Schmidt

Clay County

The precision-graded Clay County field was located west of Corning on a Knobel silt loam soil. The field was 79 acres and the previous crop produced on the field was soybeans. 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 April 10th, CruiserMaxx Rice-treated RiceTec XL753 rice seed was drill-seeded at a rate of 24 lbs/acre. Command herbicide was applied pre-emergence following planting. Emergence of the rice in the field was observed on April 22nd and consisted of 8 plants/ft^2. Prior to the tillering stage, a suspected Newpath herbicide drift affected approximately 1/3 of the field. Recovery was slow and once Newpath symptoms began to cease, 100 lbs/acre of ammonium sulfate was applied and the field was flushed to help the rice that had been set back. Weeds not controlled or breaking through the Command herbicide application were treated with a combination of Facet and Riceshot, which resulted in good overall weed control for the remainder of the season. Pre-flood urea at 200 lbs/acre was applied June 13th and multiple-inlet flood irrigation was started the same day to initiate permanent flood. Flood levels were maintained well throughout the year despite the hot and dry conditions that were experienced. Below threshold levels of rice diseases and rice stink bugs were observed throughout the season, therefore, neither fungicides nor insecticides were recommended on the field. The recommended boot application of 67 lbs/acre of urea for hybrid rice was applied on July 8th. The field endured several rain systems following maturity, but less than approximately 1% of the field experienced any lodging. Harvest began September 20th and the dry yield for the field was 196 bu/acre and the milling yield was 49/70 (% head rice yield / % total milling yield).

Conway County

The zero-graded Conway County field was 53 acres and located southwest of Morrilton on a Dardanelle silt loam soil. The previous crop planted in the field was rice. Conventional tillage was practiced on the field in late winter to early spring. RiceTec XL753 with CruiserMaxx Rice seed treatment was drill-seeded on April 23rd at rate of 19.5 lbs/acre (target was 22lbs/acre). Field emergence was observed on May 5th and consisted of 8 plants/ft^2. A post-emergence application of Facet, Permit, and Command for broadleaf and grass control was applied May 12th. Weed control and crop growth were good throughout the tillering stage due to the above average temperatures experienced in the region. Pre-flood urea (150 lbs/acre) and ammonium sulfate (100 lbs/acre) were applied May 17th and a permanent flood was established May 20th. The field held a deep flood throughout the entire season following permanent flood establishment. A Clincher herbicide application was applied to approximately 17 acres after flood establishment for control of barnyardgrass in areas where herbicide application was difficult, such as under highline electric wires running through the field and along the field edge. On June 22nd, a single mid-season urea application (100 lbs/acre) replaced the boot application for hybrid rice due to the appearance of nitrogen deficiency symptoms in the rice at that time. Low disease incidence was observed in the field and no fungicide was recommended. A few panicles were confirmed to have bacterial panicle blight later in the season. Once rice reached the heading stage, the field was scouted routinely for rice stink bugs. Populations reached threshold levels by the second week of scouting, and an early-morning application of Kendo (lambda-cyhalothrin) was applied three days later on July 27th and provided good control of the rice stink bug population. Very sporadic heading was observed in the field, though this observation may have been influenced by the common presence of volunteer rice from the previous season. Pumping ceased August 15th and the field was drained August 22nd. Harvest

began September 4th and the field yielded 211 dry bu/acre despite the high population of later maturing volunteer rice present. The milling yield for the field was 51/69.

Craighead County

The precision-graded, 58-acre field in Craighead County was located on the western edge of Lake City on a Sharkey clay soil. Soybean was planted the previous year at this location. Field preparation involved conventional tillage techniques and blended fertilizer at a rate of 10-60-120 lbs/acre was applied in March prior to planting based on soil test analysis. On March 28th, Roy J rice, treated with CruiserMaxx Rice and Release, was drill-seeded at a 100 lbs/acre rate. League and Roundup herbicides were applied to the field following planting to control newly emerged weeds and to provide broadleaf residual control. Emergence of Roy J rice was observed on April 2nd with stand counts of 21 rice plants/ft^2. To address the grass and broadleaf weed emergence in the field, Prowl and RiceBeaux were applied April 13th. Pre-flood urea at a rate of 200 lbs/acre was applied May 11th with a permanent flood being established shortly afterward. Maintaining an adequate flood level was a challenge due to the hot and dry conditions experienced this year, but the use of multiple inlet irrigation helped address this issue. Barnyardgrass remained present in the field after the flood was established, but a herbicide treatment was not utilized due to the low density of barnyardgrass and the field's proximity to Lake City. No fungicide or insecticide treatments were recommended on the field due to low rice disease and insect incidence. Mid-season urea at 100 lbs/acre was applied June 4th in a single application and the rice continued to develop normally throughout the remainder of season. The field was drained August 8th. Sodium chlorate was applied August 22nd to desiccate green foliage and harvest was started a day later due to summer heat enhancing sodium chlorate activity. The field yielded 196 dry bu/acre and was one of the highest field yields in the program. The milling yield was a 52/69.

Cross County

The precision-graded field in Cross County was 127 acres and located east of Crowley's Ridge near the community of Coldwater. The soil type for this location was an Alligator clay. The field had rice planted the previous year. Conventional tillage was practiced in early April and was then drill-seeded on April 20th at a rate of 50 lbs/acre with CL151 seed treated with Apron, Maxim, and Release. The grain drill spacing was 10 inches and was not recommended but had to be used due to farm equipment logistics. Past research has indicated this drill spacing is not optimum for rice performance. Stand establishment was very inconsistent throughout the field and was attributed to the use of an ultra-low seeding rate, droughty conditions, and clay soil type (ultra-low seeding rate was not recommended). Initial emergence occurred 14 days after planting. The field was flushed twice in order to achieve an average stand of 11 plants/ft^2 at 28 days after planting. Despite the low average stand count for this variety, it was determined that the field had a sufficient stand to continue production. Clearpath herbicide was applied post-emergence on May 11th for control of barnyardgrass and broadleaf weeds. An additional herbicide application was required to achieve adequate grass control; therefore, Newpath and Command herbicides were applied pre-flood on June 6th. Command was included for improved residual control of sprangletop species. One day later, 300 lbs/acre of pre-flood urea was applied and a permanent flood was initiated on June 10th. On June 23rd, around mid-season, Blazer herbicide was applied to 40 acres of the field to control a large population of hemp sesbania. Two days later, on June 25th, a single mid-season application of 100 lbs/acre of urea was applied to the field with rice ranging in growth stage from late tillering to one-half inch internode elongation. The variability in rice plant development throughout the field was due to an elongated period of emergence after planting. While disease pressure was initially low, later in the season treatment levels of sheath blight were detected resulting in an application of Stratego fungicide on July 11th. Rice stink bugs were observed prior to heading

on escaped barnyardgrass plants. After the field reached the heading stage, scouting indicated rice stink bug populations to be above threshold; therefore, Mustang Max was applied on August 8th for their control. Adequate flood levels were maintained throughout the season. On August 30th, the field was drained in preparation for Tropical Storm Isaac. Harvest was initiated on September 19th and ran into early October due to harsh field conditions created by frequent rainfall following Tropical Storm Isaac. However, the field experienced only minor lodging during this period. The yield was 162 dry bu/acre. The producer and Division of Agriculture personnel were pleased with the yield in light of stand establishment issues and harvest delays. The milling yield for the field was one of the program's best at 60/72.

Independence County

The 29-acre, precision-graded field in eastern Independence County was located near Oil Trough on an Egan silt loam soil. Rice was planted in the field the previous year. Prior to planting, a fertilizer blend of 10-28-54 lbs/acre was applied based on soil test analysis. Conventional tillage practices were used to prepare the field for planting. On April 5th, Jupiter rice seed, treated with CruiserMaxx Rice, was drill-seeded at a rate of 72 lbs/acre. This planting date was considered early for the region. Two days after planting, Roundup PowerMax and Command were applied for pre-emergence control of annual grasses and post-emergence control of existing weedy vegetation. Ten days after planting, rice emerged to a uniform stand of 15 plants/ft^2. Prior to flooding, 220 lbs/acre of urea and 30 lbs/acre of ammonium sulfate were applied. Permanent flood was initiated on May 10th immediately following the pre-flood fertilizer application. The flood was well-maintained throughout the year and surface irrigation water was provided from the White River. Barnyardgrass not controlled by early season herbicide applications were controlled with a post-flood mixture of Clincher and Facet on May 18th. The rice remained short in areas of the field during the season which was attributed to the field being leveled within the past few years. The rice responded well to a single mid-season urea application of 100 lbs/acre and the uneven portions appeared to have leveled out across the field by the time rice reached the boot stage. Rice disease and insect pressure was low throughout the season, and no fungicide or insecticide applications were warranted. The field was drained August 30th, and a harvest application of sodium chlorate was applied September 10th. Harvest began September 12th with moisture levels at approximately 20%. The yield was the second highest in the verification program this year at 221 dry bu/acre and one of the best milling yields of 60/70. This yield was considerably more than the producer had ever produced on this farm.

Jackson County

The precision-graded 36-acre Jackson county field was located west of Tuckerman on a Bosket fine sandy loam. The field has been in rice production since it was precision-leveled two years ago. To continue to restore the productivity of the leveled soil, one and a half tons of chicken litter, as well as potash, were applied mid-March according to soil test recommendations. Conventional tillage practices were utilized in late winter and a pre-plant burndown herbicide application of Roundup PowerMax and 2,4-D was made in early March. The planting date of March 31st was early for the area and Taggart seed treated with CruiserMaxx Rice was drill-seeded at a rate of 90 lbs/acre. Emergence was documented on April 8th with an average stand density of 21 plants/ft^2. An early post-emergence application of Facet and Riceshot was made for grass and broadleaf weed control a week following rice emergence. A subsequent herbicide application of SuperWham and Permit applied was applied pre-flood 32 days after rice emergence to control later emerging grass, broadleaves, and yellow nutsedge. No additional weed control measures were needed for the remainder of the season. Urea was applied pre-flood at 230 lbs/acre and initiation of permanent flood began on May 11th. A single mid-season application of urea (100 lbs/acre) was made on June 13th. Very low disease and insect pressure were observed throughout the year and treatment was not advised.

The field was drained August 15th and harvest began twelve days later and extended into the September due to Tropical Storm Isaac and mechanical failures. The field's final yield of 171 dry bu/acre represented greater than a 25% yield improvement compared to the rice yield in this field the previous year. However, the milling yield was of 41/71 was one of the lowest for the verification program this year.

Poinsett County

The 107-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 that was grown on the field. A burndown herbicide mixture of Roundup PowerMax and 2,4-D amine was applied during the winter and conventional tillage practices were used for field preparation in early spring. Based on soil test recommendations, a 0-28-58 lb/acre fertilizer blend was incorporated during the field tillage operation. Another burndown herbicide mixture of Roundup and Firstshot was used prior to planting for control of newly emerged weeds. Jupiter was drill-seeded on April 10th 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 of 18 plants/ft^2 seven days after planting. To control emerging grasses and broadleaf weeds, a herbicide mixture of SuperWham, Prowl H_2O, Permit, and Facet was applied 18 days after rice emergence. On May 21st, urea was applied pre-flood at 225 lbs/acre and initiation of a permanent flood was started. After flood establishment, Clincher herbicide was applied to approximately 15 acres, primarily on field edges, for control of barnyardgrass. Prior to mid-season nitrogen applications, reports in the surrounding area suggested that splitting the mid-season application was needed to offset suspected widespread nitrogen deficiency symptoms. To evaluate these reports, the verification field was divided in half to compare the contrasting methodologies. On June 25th, one half of the field received 100 lbs/acre of urea, while the other half received 75 lbs/acre followed by another 75 lbs/acre one week later. Throughout the remainder of the season following the mid-season fertilizer applications, no differences were observed for plant response or yield. This supports past research state on this topic which suggests that a single mid-season fertilizer application is equal to two split mid-season applications. Disease and insect levels remained below threshold 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 August 22nd and the field drained eight days later. Harvest began on September 22nd and the field yielded 197 dry bu/acre with a milling yield of 59/69.

Prairie County

The Prairie County field was 82 acres located immediately west of Des Arc on a Callaway silt loam soil. The previous crop grown on the field was soybean. In March, a burndown application of Makazie (glyphosate) was used to control existing weedy vegetation. Conventional tillage practices were used on the field and a fertilizer blend of 0-60-90 lbs/acre was applied to the field prior to planting according to soil test recommendations. RiceTec CL XL745 with the company's standard seed treatment was drill-seeded at 20 lbs/acre on April 10th. Uniform rice stand emergence was observed ten days later and consisted of 5 plants/ft^2. Newpath herbicide was applied six days after rice emergence. Ammonium sulfate was applied at 150 lbs/acre one day later to enhance growth of pre-tillering rice. A second application of Newpath herbicide was applied May 11th and included Aim herbicide for improved broadleaf weed control. Pre-flood urea treated with Agrotain was applied at 200 lbs/acre on May 13th just prior to establishment of a permanent flood. Flood level on the field was maintained throughout the season utilizing the multiple inlet system. The recommended 65 lbs/acre boot application of urea was applied July 9th. No fungicide or insecticide applications were made due to low pest pressure throughout the season. The field was drained August 15th and harvest began on August 28th. The final grain yield was 193 dry bu/acre with a milling yield of 56/72.

Randolph County

The precision-graded, 68-acre field in Randolph County was located between Pocahontas and Delaplaine near the community of Sharum. The previous crop grown on the field was soybean and the soil type was a McCrory silt loam. Conventional tillage practices were utilized prior to planting. The field was planted on April 30th with 28 lbs/acre of RiceTec XL723 seed treated with CruiserMaxx Rice in addition to the company's standard seed treatment. Two days following planting, a pre-emergence treatment of Command herbicide was applied for early grass control. Rice emergence was documented on May 11th with a uniform stand of 10 plants/ft^2. The rice grew actively during the warm temperatures experienced between emergence and flood establishment. The field received a pre-flood treatment of RiceBeaux and Facet herbicides to control grass and broadleaf weeds. Agrotain-coated urea at 250 lbs/acre was applied pre-flood. Permanent flood establishment began on June 1st utilizing the multiple-inlet irrigation. Adequate flood levels on the field were achieved and successfully maintained using the multiple-inlet system. On July 5th, urea was applied at 65 lbs/acre to rice in the boot stage. Approximately one week later, portions of the field began to experience negative growth and symptomology indicative of phenoxy herbicide injury. Upon further investigation, it was determined those areas were experiencing delayed phytotoxicity syndrome (DPS), which can occur from anaerobic conditions coupled with many of the herbicides used in rice. To correct this disorder, the field was drained until only a thin layer of water remained to permit oxygen back into the soil. The permanent flood was re-established after one week and plants began to improve and develop grain. No threshold levels of rice disease or insect incidence were noticed during weekly inspections. On August 22nd, irrigation ceased and the field was drained a week later. Due to some minimal lodging from late summer storms, the grower wanted to harvest the field as soon as it reached 20% moisture; therefore, a gallon of Defol 5 (sodium chlorate) was applied as a desiccant on September 6th. Harvest began on September 10th and the field resulted produced an average grain yield of 184 bu/acre and a milling yield of 54/70.

White County

The 25-acre White County RRVP field was situated in the northern portion of the county near Russell. Soybean was planted previously on the field and the soil type was a Calhoun-Callaway silt loam. The field had not been precision graded. This past spring a burndown application of Roundup PowerMax herbicide was applied to minimize existing weedy vegetation and the field was tilled using conventional practices. A fertilizer blend of 0-30-90 lbs/acre was applied pre-plant in accordance with soil test analysis recommendations. Taggart seed, treated with Release and Apron XL, was drill-seeded on May 1st directly followed by an application of Command herbicide for pre-emergence annual grass control. Rice emerged uniformly to a stand averaging 28 plants/ft^2 on May 5th. On May 30th, at the pre-flood timing or tillering rice stage, the field was treated with Ricestar HT for annual grasses and urea at 230 lbs/acre was applied as well. A permanent flood was initiated the following day. Once the rice reached panicle initiation on June 22nd, the field was treated with 2,4-D herbicide for broadleaf weed control and was followed three days later with a 100 lbs/acre mid-season urea application. While sheath blight was observed at moderate levels prior to mid-season, it was not until after the mid-season urea application that the disease reached treatment threshold and began to approach the upper rice foliage. Subsequently, Quadris and Tide Propiconazole fungicides were applied in a tank mixture for suppression of the sheath blight fungus and as a preventative measure for a field history of kernel smut, respectively. Following field draining on August 30th, rainy and windy weather conditions caused lodging throughout the field. Complications caused by lodging resulted in a prolonged harvest extending from early October into December. This field's yield potential was promising before the storms, but likely due to lodged and sprouted rice, the average of the field was 146 dry bu/acre. The milling yield was a 50/72.

Southern Fields – Ralph Mazzanti

Arkansas County #1

The Arkansas County #1 field was located across from the Rice Research and Extension Center on Hwy 130 E. near Stuttgart, AR. The 51-acre field was a Dewitt silt loam soil and the previous crop was soybean. RiceTec CL XL745 seed was planted March 30th at 22 lbs/acre. The seed was treated with Nipsit Inside insecticide seed treatment in addition to the company's standard seed treatment. The rice emerged on April 10th with a stand density of 8 plants/ft^2. A pre-plant fertilizer rate of 21-30-60-10-24 (N-P-K-Zn-S) lbs/acre was applied according to soil sample recommendations. Newpath herbicide was applied pre-emergence. Clearpath and Permit were applied as post-emergence herbicides. Both herbicide applications provided adequate weed control. The field was clean throughout the year and a deep flood was maintained. Irrigation amounts were 20 acre inches with rainfall amounts totaling 10 inches. Urea was applied based on N-Star soil test recommendations at 270 lbs/acre pre-flood followed by 70 lbs/acre at the late boot stage. Stratego fungicide was applied for control of sheath blight and for prevention of kernel smut and false smut. Karate insecticide was applied for control of above threshold levels of rice stink bug. The field was harvested on August 10th and yielded 199 bu/acre. The average harvest moisture was 19%. The milling yield was 51/70.

Arkansas County #2

The Arkansas County #2 field was located just northeast of Reydell. The field was 96 acres of Dewitt silt loam. Conventional tillage practices were used to prepare the field for planting. On March 29th, the field was planted in Roy J at a seeding rate of 67 lbs/acre. The rice emerged on April 7th with a stand density of 14 plants/ft^2. Command and League herbicides were used pre-emergence followed by SuperWham, Facet, and Aim applied post-emergence. Favorable spring rains properly activated the pre-emergence herbicides which provided long-lasting control of early season grasses and broadleaves. Pre-flood fertilizer was applied at 0-50-120-10-0 lbs/acre. Nitrogen was applied according to N-Star recommendations at 200 lbs/acre pre-flood followed by 100 lbs/acre at mid-season. The contour field had several levees throughout the field. The irrigation source was surface water which provided a deep flood throughout the growing season. Tilt fungicide was applied for prevention of kernel smut and false smut. Although sheath blight was detected in the field, a fungicide was never applied for control of this disease because it failed to reach treatment threshold levels. The field was harvested on August 29th and yielded 197 bu/acre with a milling yield of 55/72.

Arkansas County #3

The Arkansas County #3 field was located just south of De Witt. The field was 120 acres of Dewitt silt loam. The field was seeded with 56 lbs/acre of CL 151 on April 10th. Glyphosate and Command herbicides were used for burndown and pre-emergence weed control. The field emerged on April 23rd with 14 plants/ft^2. Clearpath and Permit Plus herbicides, followed by an application of Beyond herbicide, were used for post-emergence weed control. The herbicide applications provided good control of both grasses and broadleaves. Pre-flood fertilizer applied was 18-46-90-10 lbs/acre. Ammonium sulfate was applied at 100 lbs/acre to ensure uniform stand establishment. Multiple inlet irrigation was used with 6 risers on the east side of the field. The field maintained an adequate flood throughout the season. Results from soil samples analyzed using the N-Star system recommended 200 lbs/acre of pre-flood urea followed by 100 lbs/acre applied mid-season. Quilt Xcel and Tilt fungicides were used for sheath blight control and kernel smut prevention. The field was harvested August 28th and yielded 180 bu/acre milling 51/72.

Chicot County #1

The Chicot County #1 field was located northeast of Lake Village. The field was 50 acres of Sharkey clay that had been left fallow for 50 years while used as a cow pasture. On March 28th, CL151 seed, treated with CruiserMaxx Rice, was planted at 55 lbs/acre. Field emergence was recorded on April 12th with a stand density of 16 plants/ft^2. Two sequential applications of Touchdown herbicide were used as a burndown. Clearpath and League herbicides followed by Facet and Newpath herbicides were used for post-emergence weed control. Despite ALS-resistant barnyardgrass in neighboring fields, herbicide treatments were effective throughout the season. Pre-flood fertilizer was applied at 21-18-46-0-24 lbs/acre. The N-Star program played a crucial role in determining nitrogen fertilization for this field since it had been left fallow for 50 years. N-Star recommendations were to apply 130 lbs/acre of urea pre-flood (half the standard recommended rate) followed by a mid-season urea application of 100 lbs/acre. The straight levee field utilized 43.5 irrigated inches of water which is about 10 inches above average. Rainfall amounts in this field were one of the highest in the state at 14.7 inches for the season. Quilt Xcel and Bumper fungicides were used for sheath blight control and kernel smut prevention. The field was harvested August 21st with a record yield of 242 bu/acre and milling yield of 51/70. Sooty mold was detected on one end of the field which may have been an indication that the nitrogen rate used was still greater than needed for that area of the field. However, no lodging occurred in this field, which was one of the grower's main concerns.

Chicot County #2

The Chicot County #2 field was located between Eudora and Parkdale off Hwy. 8. The field was 47 acres of zero grade Perry clay and the previous crop was soybean. The variety was CL111 planted on April 1st at a rate of 50 lbs/acre. No insecticide seed treatments was used, so rice water weevil traps were spread throughout the field to monitor for this pest. After checking traps every few days throughout the early season there was no infestation of rice water weevil detected. Emergence date was April 12th with a stand density of 12 plants/ft^2. Newpath and glyphosate herbicides were applied as a pre-emergence burndown application. Newpath followed by Facet and Permit herbicides were applied post-emergence. The field was free from grass and broadleaf weeds throughout the season. Pre-flood fertilizer applied was at 21-18-46-0-24 lbs/acre. The irrigation source was surface water with 18 acre inches recorded. Rainfall amounts in this field were well above normal at 15.3 inches for the season. An adequate flood was maintained throughout the year. Based on standard fertilizer recommendations, urea was applied pre-flood at 300 lbs/acre with 100 lbs/acre applied at mid-season. Quilt Xcel fungicide was applied for sheath blight control. The field was harvested August 21st with a yield of 183 bu/acre milling 53/71.

Clark County

Clark County was one of the later planted fields in the Rice Research Verification Program. The zero-grade field was located northwest of Arkadelphia on the Ouachita River. Chicken litter was applied in early spring at 1 ton (60-60-70) per acre. The field was conventionally tilled with a previous crop of corn. The field was 73 acres and the soil type was Gurdon silt loam. The field was seeded with Francis on April 12th at a rate of 70 lbs/acre. The rice emerged on April 27th with an average stand count of 9 plants/ft^2. Glyphosate and Command herbicides were used as burndown and pre-emergence applications, respectively. Facet and Permit Plus herbicides applied post-emergence provided good weed control. Karate insecticide was applied for chinch bug control while neighboring fields were being replanted. Urea fertilizer was applied pre-flood according to N-Star recommendations at 240 lbs/acre followed by a mid-season application of 100 lbs/acre. This field utilized surface water irrigation from the Ouachita River. Unfortunately, extreme heat and drought conditions led to record-low water levels on the river and eventually water levels became so low that the producer was no

longer able to irrigate. This occurred at the same time rice reached the heading stage, causing severe yield loss and poor milling quality. The field was harvested on October 6th. The yield was 146 bu/acre milling 24/61.

Desha County

The Desha County field was located between McGehee and Rohwer. The zero-grade field was 50 acres and the soil type was part Sharkey clay and part Desha clay. Precision-leveled four years ago, the only crop grown in this field has been rice. The field was planted with RiceTec CL XL745 seed, treated with CruiserMaxx Rice in addition to the company's standard seed treatment, on April 28th at a rate of 23 lbs/acre. Glyphosate and Command herbicides were used for burndown and pre-emergence weed control, respectively. Rice emerged on May 10th with stand counts of 4 plants/ft^2. Ammonium sulfate was applied at a rate of 100 lbs/acre on May 17th. The field was flushed twice in an unsuccessful attempt to improve plant stand. Clearpath herbicide followed by Newpath herbicide was applied for post-emergence weed control. The irrigation source was surface water. The field maintained an adequate flood throughout the year. Following N-Star recommendations, urea fertilizer was applied at 170 lbs/acre pre-flood with 70 lbs/acre applied at the late boot stage. The field was treated with Karate insecticide for control of above-threshold levels of rice stink bug. The field was harvested September 18th. The yield was 172 bu/acre and the milling was 45/70.

Jefferson County

The Jefferson County field was located just off the Arkansas River between Pastoria and Altheimer. The field was 28 acres and the soil type was Perry clay. The previous year the field was planted to soybean. RiceTec XL753 seed at 23 lbs/acre was planted on April 9th. Emergence was recorded on April 30th. A tank mix of Command and glyphosate herbicides was used for pre-emergence and burndown weed control, respectively. Propanil, Permit Plus, and Aim herbicides provided good weed control on the west side of the field, followed by an application of Facet and Permit Plus. Due to a miscommunication with the aerial applicator, the east side of the field was treated with both a ground and aerial application of herbicides equal to a 2x rate which caused severe rice stunting. As a result, only the west side of the field was used for verification. Ammonium sulfate was applied at 100 lbs/acre on April 23rd to help bring uniformity to the field. Urea was applied pre-flood at 270 lbs/acre followed by 70 lbs/acre at late boot. The irrigation source was from a diesel-powered well. An adequate flood was maintained throughout the summer. The west side of the field was harvested on September 10th yielding 198 bu/acre and the milling was 60/70.

Lee County

The Lee County field was located just south of Moro. The field was 83 acres with soybean being the previous crop. The soil type was a Foley-Bonn complex. Roy J, treated with CruiserMaxx Rice seed treatment, was seeded at 65 lbs/acre on March 30th. The field emerged on April 9th with 15 plants/ft^2. Command was used as a pre-emergence herbicide. Crabgrass, morningglory, and broadleaf signalgrass were the main weed species. Facet and Aim herbicides were used post-emergence providing excellent weed control. Some pigweed escapes were prevalent but the flood soon controlled them within a few weeks. Pre-plant fertilizer was applied at a rate of 0-60-90 lbs/acre. Urea was applied according to N-Star recommendations at 270 lbs/acre pre-flood and 100 lbs/acre at mid-season. Multiple inlet irrigation was utilized to help maintain water levels in this large field. An adequate flood was maintained using an electric well. Quilt XL fungicide was applied for prevention of sheath blight, kernel smut, and false smut. No additional fungicide or insecticide treatments were warranted based on regular fielding scouting. The field was harvested September 16th. The yield was an exceptional 196 bu/acre with a milling yield of 49/70.

Lincoln County

The Lincoln County field was located between Star City and Gould. The 40-acre field was a Perry clay and the previous crop was soybean. RiceTec XL753 was seeded on April 2nd at a rate of 24 lbs/acre. Roundup PowerMax and Command herbicides were applied pre-emergence. A problem with the ground application equipment of pre-emergence and burndown herbicide resulted in an area of barnyardgrass that was never fully controlled. Rice emerged on April 16th. Stand counts averaged 7 plants/ft^2 overall, but some areas of the field had thin stands (4-5 plants/ft^2). Post-emergence herbicides were Facet, Permit Plus, and propanil. Herbicide efficiency overall was fair at best. Flood levels were maintained by well water throughout the year with 40 acre inches recorded. Urea fertilizer was applied pre-flood at 270 lbs/acre followed by 75 lbs/acre at the late boot stage. Quilt Xcel fungicide was used for sheath blight control and as a kernel smut and false smut preventative. Rice stink bugs were present in the field but failed to reach threshold levels required to initiate an insecticide treatment. The field was harvested on August 27th. The final grain yield was 176 bu/acre with a milling yield of 43/67.

Phillips County

The Phillips County field was located just south of Barton. The field was 40 acres of Foley silt loam. The previous crop was soybean. The cultivar was RiceTec CL XL745 treated with CruiserMaxx Rice in addition to the company's standard seed treatment. Roundup WeatherMax and 2,4-D were applied as early burndown herbicides. Glyphosate and Command herbicides were used for burndown and pre-emergence weed control, respectively. The seeding date was April 6th at a rate of 24 lbs/acre. Rice emerged on April 24th with a stand density of 7 plants/ft^2. Chinch bugs were a threat from neighboring wheat fields yet never reached threshold levels for a field application. Clearpath and League herbicides followed by Newpath herbicide were used for post-emergence weed control providing excellent weed control. Pre-flood fertilizer was applied by ground at 0-60-60 lbs/acre. Ammonium sulfate was applied at 100 lbs/acre on April 24th. Following N-STaR recommendations, 280 lbs/acre urea was applied pre-flood followed by 75 lbs/acre at late boot. Flood levels were adequate with an electric well. No fungicide or insecticide applications were required for treatment of disease or insects. The field was harvested August 29th. The grain yield was 178 bu/acre with a milling yield of 56/72. The grain yield in this field represented a 10-15 bu/acre improvement for hybrid performance on this farm.

Table 1. Agronomic information for fields enrolled in the 2012 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	51	Soybean	22	8	30 Mar	10 Apr	10 Aug	199	51/70	19
Arkansas #2	Roy J	96	Soybean	67	14	29 Mar	7 Apr	29 Aug	197	55/72	17
Arkansas #3	CL151	120	Corn	56	14	10 Apr	23 Apr	28 Aug	180	51/72	19
Chicot #1	CL151	50	Fallow	55	16	28 Mar	12 Apr	21 Aug	242	51/70	17
Chicot #2	CL111	47	Soybean	50	12	1 Apr	12 Apr	21 Aug	182	53/71	18
Clark	Francis	73	Corn	70	9	12 Apr	27 Apr	6 Oct	146	24/61	15
Clay	RT XL753	79	Soybean	24	8	10 Apr	22 Apr	20 Sept	196	49/70	16
Conway	RT XL753	53	Rice	20	8	23 Apr	5 May	4 Sept	211	51/69	15
Craighead	Roy J	58	Soybean	100	21	28 Mar	2 Apr	23 Aug	196	52/69	15
Cross	CL151	127	Rice	50	11	20 Apr	4 May	19 Sept	162	60/72	16
Desha	RT CL XL745	50	Rice	23	4	28 Apr	10 May	18 Sept	172	45/70	19
Independence	Jupiter	29	Rice	72	15	5 Apr	15 Apr	12 Sept	221	60/70	20
Jackson	Taggart	36	Rice	90	21	31 Mar	8 Apr	27 Aug	171	41/71	16
Jefferson	RT XL753	28	Soybean	23	8	9 Apr	30 Apr	10 Sept	198	60/70	16
Lee	Roy J	83	Soybean	65	15	30 Mar	9 Apr	16 Sept	196	49/70	15
Lincoln	RT XL753	40	Soybean	23	6	2 Apr	16 Apr	27 Aug	176	43/67	17
Phillips	RT CL XL745	40	Soybean	24	7	6 Apr	24 Apr	29 Aug	178	51/72	18
Poinsett	Jupiter	107	Soybean	78	28	10 Apr	17 Apr	22 Sept	197	59/69	18
Prairie	RT CL XL745	82	Soybean	20	5	10 Apr	20 Apr	28 Aug	193	56/72	17
Randolph	RT XL723	68	Soybean	28	10	30 Apr	11 May	10 Sept	184	54/70	17
White	Taggart	25	Soybean	84	28	1 May	5 May	1 Dec	146	50/72	17
Average	**-----**	**64**	**-----**	**50[y]**	**13[x]**	**9 Apr**	**20 Apr**	**7 Sept**	**188**	**51/70**	**17**

[z] Head rice milling yield / Total rice milling yield.
[y] Seeding rates averaged 70 lbs/acre for conventional cultivars and 23 lbs/acre for hybrid cultivars.
[x] Stand density averaged 17 plants/ft^2 for conventional cultivars and 7 plants/ft^2 for hybrid cultivars.

Table 2. Soil test results, fertilization program, and soil classification for fields enrolled in the 2012 Rice Research Verification Program.

Field Location by County	Soil Test				Applied Fertilizer (lbs/acre)			Soil Classification
		lbs/acre						
	pH	P[z]	K[z]	Zn[z]	Pre-flood[y] N-P-K-Zn-S[z]	Urea (45% N) rates applied by timing[x]	Total N rate (lbs N/acre)[w]	
Arkansas #1	6.1	40	246	6.8	21-30-60-10-24	270-0-70	153	Dewitt Silt Loam
Arkansas #2	6.2	15	115	7.0	0-50-120-10-0	200-100-0	135*	Dewitt Silt Loam
Arkansas #3	7.6	89	116	3.4	36-46-90-10-24	200-100-0	135*	Dewitt Silt Loam
Chicot #1	5.8	30	834	6.2	21-18-46-0-24	130-100-0	103*	Sharkey Clay
Chicot #2	6.4	30	558	3.6	21-18-46-0-24	300-100-0	180	Perry Clay
Clark	5.2	21	98	3.2	60-60-70-0-0[v]	240-100-100	198	Gurdon Silt Loam
Clay	6.2	45	149	3.7	21-30-60-0-24	200-0-67	141	Knobel Silty Clay
Conway	6.1	70	368	3.6	21-0-0-0-24	150-100-0	134	Dardanelle Silt Loam
Craighead	6.4	94	298	6.0	10-60-120-0-0	200-100-0	145	Sharkey Clay
Cross	6.9	54	642	7.6	0-0-0-0-0	300-100-0	180	Alligator Clay
Desha	7.2	48	653	7.7	21-0-0-0-24	170-0-70	108*	Sharkey/Desha Clay
Independence	6.7	48	318	15.2	16-28-54-0-7	220-100-0	160	Egam Silt Loam
Jackson	5.9	86	133	3.2	40-50-120-0-0[u]	230-100-0	189	Bosket Fine Sandy Loam
Jefferson	7.0	54	740	8.0	21-0-0-0-24	270-0-70	153	Perry Clay
Lee	6.9	93	197	7.6	0-60-90-0-0	270-100-0	166*	Foley- Bonn Complex
Lincoln	7.1	44	342	2.1	18-46-0-10-0	270-0-75	173	Perry Clay
Phillips	8.2	92	252	9.2	0-60-60-0-0	280-0-75	160*	Foley Silt Loam
Poinsett	7.6	62	220	14.5	0-28-58-0-0	225-100-0	146	Henry Silt Loam
Prairie	7.1	34	108	6.6	32-60-90-0-36	200-0-67	152	Callaway Silt Loam
Randolph	6.8	54	456	8.7	0-0-0-0-0	250-0-67	143	McCrory Fine Sandy Loam
White	5.6	44	150	13.8	0-30-60-0-0	230-100-0	149	Callaway Silt Loam

[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 with an (*) beside them were fertilized according to N-star recommendations

[v] Analysis established from one ton of chicken litter per acre.

[u] Analysis established from one and one half ton of chicken litter and 100 lb/acre of Potash fertilizer.

Table 3. Herbicide rates and timings for fields enrolled in the 2012 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)[x]
Arkansas #1	Newpath (6 oz)	Clearpath (0.5 lb) + Permit (1 oz)
Arkansas #2	Command (12.8 oz) + League (4 oz)	Superwham (4 qt) + Facet (0.5 lb) + Aim (1 oz)
Arkansas #3	Command (16 oz) + Glyphosate (32 oz)	Clearpath (0.5 lb) + Permit Plus (0.75 oz) fb Beyond (5 oz)
Chicot #1	Touchdown (32 oz) fb Touchdown (32 oz)	Clearpath (0.5 lb) + League (3.2 oz) fb Facet (0.25 lb) + Newpath (6 oz)
Chicot #2	Glyphosate (32 oz) + Newpath (4 oz)	Newpath (4 oz) fb Facet (0.5 lb) + Permit (1 oz)
Clark	Command (18 oz) + Glyphosate (32 oz)	Facet (0.5 lb) + Permit Plus (0.75 oz)
Clay[z]	Command (10 oz)	Facet (0.33 lb) + Riceshot (3 qts)
Conway	------[y]	Facet (0.5 lb) + Permit (0.67oz) + Command (16 oz) fb Clincher (15 oz)
Craighead	League (3.2 oz) + Roundup PowerMax (32 oz)	Prowl (2 pt) + RiceBeaux (4 qt)
Cross[z]	------[y]	Clearpath (0.5 lb) fb Newpath (5 oz) + Command (8 oz) fb Ultra Blazer (16 oz)
Desha[z]	Glyphosate (32 oz) + Command (8 oz)	Clearpath (0.5 lb) fb Newpath (4 oz)
Independence	Roundup PowerMax (32 oz) + Command (16 oz)	Clincher (15 oz) + Facet (0.33 lb)
Jackson	Roundup PowerMax (32 oz) + 2,4-D (1 pt)	Facet (0.33 lb) + Riceshot (4 qt) fb Superwham (4 qt) + Permit (0.75 oz)
Jefferson	Glyphosate (32 oz) + Command (18 oz)	Propanil (4 qt) + Permit Plus (0.75 oz) + Aim (1 oz) fb Facet (0.33 lb) + Permit Plus (0.75 lb)
Lee	Command (12.8 oz)	Facet (0.67 lb) + Aim (1 oz)
Lincoln	Roundup PowerMax (32 oz) + Command (21 oz)	Facet (0.5 lb) + Permit Plus (0.75 oz) + Propanil (4 qt)
Phillips	Glyphosate (32 oz) + 2,4-D (16 oz) fb Gramoxone (32 oz)	Clearpath (0.5 lb) + League (3.2 oz) fb Newpath (6 oz)
Poinsett[z]	Roundup PowerMax (22 oz) + 2,4-D amine (16 oz) fb Roundup PowerMax (32 oz) + Firstshot (0.5 oz) fb Command (10 oz)	SuperWham (4 qt) + Prowl (2 pt) + Permit (0.67 oz) + Facet (0.33 lb) fb Clincher (15 oz)
Prairie	Glyphosate (32 oz)	Newpath (4 oz) fb Newpath (4 oz) + Aim (1 oz)
Randolph	Command (12.8 oz)	RiceBeaux (3 qt) + Facet (0.33 lb)
White[z]	Roundup PowerMax (32 oz) fb Command (10 oz)	Ricestar HT (24 oz) fb 2,4-D (16 oz)

[z] Field received applications of Command herbicide at rates which provided effective weed control, but were below the current manufacturer's labeled rate. Due to the more frequent occurrence of herbicide-resistant weeds, the University of Arkansas Division of Agriculture does not recommend the use of any herbicides at reduced rates.

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

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

Table 4. Seed treatments used and foliar fungicide and insecticide applications made on fields enrolled in the 2012 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[z] + Nipsit Inside (1.92 fl oz)	Stratego (19 oz)	------	------	Karate (2.1 oz)
Arkansas #2	------	Tilt (6 oz)	------	------	------
Arkansas #3	------	Quilt Xcel (14 oz) + Tilt (6 oz)	------	------	------
Chicot #1	CruiserMaxx Rice (7 fl oz)	Quilt Xcel (17.5 oz) + Bumper (1.5 oz)	------	------	------
Chicot #2	------	Quilt Xcel (21 oz)	------	------	------
Clark	------	------	------	------	Mustang Max (3.2 oz)
Clay	CruiserMaxx Rice (7 fl oz)	------	------	------	-----
Conway	CruiserMaxx Rice (7 fl oz)	------	------	------	Kendo (5 oz)
Craighead	CruiserMaxx Rice (7 fl oz) + Release LC (2 fl oz)	------	------	------	------
Cross	Apron XL (0.64 fl oz) + Maxim 4 FS (0.12 fl oz) + Release LC (2 fl oz)	Stratego (19 oz)	------	------	Mustang Max (3.6 oz)
Desha	RTST + CruiserMaxx Rice (7 fl oz)	------	------	------	Karate (2.1 oz)
Independence	CruiserMaxx Rice (7 fl oz)	------	------	------	------
Jackson	CruiserMaxx Rice (7 fl oz)	------	------	------	------
Jefferson	RTST	------	------	------	------
Lee	CruiserMaxx Rice (7 fl oz)	Quilt Xcel (21 oz)	------	------	------
Lincoln	RTST	Quilt Xcel (14 oz)	------	------	------
Phillips	RTST + CruiserMaxx Rice (7 fl oz)	------	------	------	------
Poinsett	------	------	------	------	-------
Prairie	RTST	------	------	------	-------
Randolph	CruiserMaxx Rice (7 fl oz)	------	------	------	-------
White	Apron XL (0.64 fl oz) + Release LC (2 fl oz)	Tide Propiconazole (6 oz) + Quadris (10 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 2012 Rice Research Verification Program.

Field Location by County	Rainfall (inches)	Irrigation[z] (acre inches)	Rainfall + Irrigation (inches)
Arkansas #1	6.60	20.00	26.60
Arkansas #2	10.00	30.00*	40.00
Arkansas #3	5.45	30.00*	35.45
Chicot #1	14.70	43.50	58.20
Chicot #2	15.30	18.00	33.30
Clark	5.25	30.00*	35.25
Clay	8.35	30.00*	38.35
Conway	3.88	30.00*	33.88
Craighead	5.74	30.00*	35.74
Cross	7.29	24.26	31.55
Desha	13.40	30.00*	43.40
Independence	7.95	30.00*	37.95
Jackson	9.07	30.00*	39.07
Jefferson	18.30	17.50	35.80
Lee	10.40	32.00	42.40
Lincoln	7.85	40.00	47.85
Phillips	3.00	30.00*	33.00
Poinsett	7.77	30.00*	37.77
Prairie	9.48	30.00*	39.48
Randolph	8.19	30.00*	38.19
White	10.65	45.32	55.97
Average	**8.98**	**30.02**	**39.00**

[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 2012 Rice Research and Verification Program. 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 21 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 2012 Crop Enterprise Budgets published by the Cooperative Extension Service and information provided by the producer cooperators. Fuel and repair costs for machinery are calculated using a budget calculator based on parameters and standards established by the American Society of Agricultural and Biological Engineers. Machinery repair costs should be regarded as estimated values for full service repairs, and actual cash outlays could differ as producers provide unpaid labor for equipment maintenance.

Fixed costs of machinery are determined by a capital recovery method which determines the amount of money that should be set aside each year to replace the value of equipment used in production. Machinery costs are estimated by applying engineering formulas to representative prices of new equipment. This measure differs from typical depreciation methods, as well as actual annual cash expenses for machinery.

Operating costs, fixed costs, 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 $495.29/acre for Cross County to $801.97/acre for Lincoln County, while operating costs per bushel ranged from $2.42/bu for Conway County to $4.56/bu for Lincoln County. Total costs per acre (operating plus fixed) ranged from $565.42/acre for Cross County to $908.77/acre for Lincoln County, and total costs per bushel ranged from $2.92/bu for Conway County to $5.16/bu for Lincoln County. Returns above operating costs ranged from $177.71/acre for Clark County to $1,239.21/acre for Independence County, and returns above total costs ranged from $84.25/acre for Clark County to $1,141.64/acre for Independence County.

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 2012 RRVP was 188 bushels/acre but ranged from 146 bushels/acre for Clark and White Counties to 242 bushels/acre for Chicot County #1. The Arkansas average long grain cash price for the 2012 RRVP was estimated from August 22nd through October 26th daily price quotes to be $6.26/bu. The verification program had two fields planted in medium grain varieties (Independence and Poinsett). The average medium grain price contracted in Arkansas was estimated to be $6.40/bu and represented the average long grain price plus an average medium grain premium of $0.13/bu. The average medium grain premium 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 28th through October 30th 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 70% of whole price value. If milling yield was higher than the standard, a premium was made while a discount was given for milling less than standard. Estimated long grain prices adjusted for milling yield varied from $4.77/bu in Clark County to $6.94/bu in Jefferson County. Medium grain prices adjusted for milling yield were $6.43/bu in Poinsett County to $6.66/bu in Independence County (Table 7).

The average operating expense for the 21 RRVP fields was $637.61/acre (Table 7). Fertilizers and nutrients accounted for the largest share of operating expenses on average (26.3%), followed by post-harvest expenses (17.8%), chemicals (12.9%), seed (12.2%), and irrigation energy costs (10.3%). Although seed's share of operating expenses was 12.2% across the 21 fields, its average cost and share of operating expenses varied depending on whether a Clearfield hybrid was used ($148.47/acre; 23.9% of operating expenses), a non-Clearfield hybrid was used ($110.28/acre; 17.4% of operating expenses), a Clearfield variety was used ($53.59/acre; 7.7% of operating expenses) or a non-Clearfield variety was used ($34.75/acre; 5.6% of operating expenses). Arkansas County #1 was the only field in which new panicles emerged after harvest to produce a second crop (ratoon). After harvesting the regular rice crop in August, the ratoon crop was harvested in early October and yielded 30 bushels/acre. The only costs associated with the ratoon crop were harvesting costs amounting to $90.38/acre or $3.01/bu (operating plus fixed). Returns above total costs to the ratoon rice were $112.19/acre.

The average return above operating expenses for the 21 fields was $556.56/acre and ranged from $177.71/acre for Clark County to $1,239.21/acre for Independence County. The average return above total specified expenses for the 21 fields was $464.22/acre and ranged from $84.25/acre for Clark County to $1,141.64/acre for Independence County. 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 the 2012 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	689.53	3.46	654.19	81.41	770.94	572.79	3.87
Arkansas #2	606.73	3.08	653.77	89.06	695.80	564.71	3.53
Arkansas #3	750.31	4.17	380.77	103.67	853.97	277.10	4.74
Chicot #1	726.63	3.00	761.63	113.80	840.43	647.83	3.47
Chicot #2	597.88	3.29	544.02	84.79	682.68	459.22	3.75
Clark	519.09	3.56	177.71	93.46	612.54	84.25	4.20
Clay	689.09	3.52	505.03	100.47	789.56	404.56	4.03
Conway	511.65	2.42	771.84	104.29	615.93	667.55	2.92
Craighead	701.27	3.58	496.51	105.75	807.11	390.76	4.12
Cross	495.29	3.06	564.51	70.12	565.42	494.38	3.49
Desha	573.82	3.34	360.14	90.12	663.94	270.02	3.86
Independence	554.82	2.51	1,239.21	97.57	652.39	1,141.64	2.95
Jackson	660.19	3.86	353.82	86.30	746.49	267.51	4.37
Jefferson	665.45	3.36	709.40	88.21	753.66	621.18	3.81
Lee	607.84	3.10	586.28	76.63	684.47	509.65	3.49
Lincoln	801.97	4.56	204.65	106.81	908.77	97.85	5.16
Phillips	759.36	4.27	359.14	72.07	831.43	287.08	4.67
Poinsett	563.45	2.86	979.64	99.55	663.00	880.09	3.37
Prairie	687.56	3.56	552.89	70.84	758.40	482.05	3.93
Randolph	617.33	3.36	530.08	98.50	715.83	431.57	3.89
White	610.65	4.18	302.58	105.87	716.52	196.72	4.91
Average	**637.61**	**3.43**	**556.56**	**92.35**	**729.97**	**464.22**	**3.93**

Table 7. Summary of revenue and expenses per acre for the 2012 Rice Research Verification Program.

Receipts	Arkansas #1	Arkansas #2	Arkansas #3	Chicot #1	Chicot #2	Clark	Clay	Conway	Craighead	Cross	Desha
Yield (bu.)	199	197	180	242	182	146	196	211	196	162	172
Price Received	6.75	6.40	6.28	6.15	6.27	4.77	6.09	6.08	6.11	6.54	5.43
Total Crop Revenue	**1,343.72**	**1,260.51**	**1,131.07**	**1,488.26**	**1,141.90**	**696.80**	**1,194.12**	**1,283.49**	**1,197.87**	**1,059.80**	**933.96**
Operating Expenses											
Seed	145.98	37.72	49.84	63.97	47.70	20.30	121.75	98.92	60.20	52.85	149.04
Fertilizers & Nutrients	185.71	203.24	211.02	131.12	191.50	191.39	150.27	92.48	214.33	93.84	89.35
Chemicals	93.90	113.98	102.42	102.79	98.83	70.43	43.90	65.86	48.54	89.54	81.56
Custom Applications	57.80	42.00	63.00	23.10	63.00	51.80	47.00	33.00	35.00	56.00	64.80
Fuel & Lube	28.62	29.86	34.53	28.35	28.99	24.75	28.14	28.09	33.85	24.60	22.07
Repairs & Maintenance	23.63	27.11	28.92	29.92	26.95	25.67	27.49	28.37	29.93	22.25	24.88
Irrigation Energy Costs	16.15	9.37	122.60	177.77	14.53	24.22	120.48	24.22	122.60	38.35	24.22
Labor, Field Activities	7.91	8.81	10.06	8.41	8.16	7.50	9.61	8.29	10.58	7.77	6.21
Other Inputs & Fees, Pre-harvest	13.71	19.69	22.88	19.98	12.03	17.83	26.07	9.29	31.87	15.56	11.32
Post-harvest Expenses	116.12	114.95	105.03	141.21	106.20	85.19	114.37	123.12	114.37	94.53	100.36
Total Operating Expenses	**689.53**	**606.73**	**750.31**	**726.63**	**597.88**	**519.09**	**689.09**	**511.65**	**701.27**	**495.29**	**573.82**
Returns to Operating Expenses	**654.19**	**653.77**	**380.77**	**761.63**	**544.02**	**177.71**	**505.03**	**771.84**	**496.60**	**564.51**	**360.14**
Capital Recovery & Fixed Costs	81.41	89.06	103.67	113.80	84.79	93.46	100.47	104.29	105.75	70.12	90.12
Total Specified Expenses[z]	**770.94**	**695.80**	**853.97**	**840.43**	**682.68**	**612.54**	**789.56**	**615.93**	**807.03**	**565.42**	**663.94**
Returns to Specified Expenses	**572.79**	**564.71**	**277.10**	**647.83**	**459.22**	**84.25**	**404.56**	**667.55**	**390.84**	**494.38**	**270.02**
Operating Expenses/Yield Unit	3.46	3.08	4.17	3.00	3.29	3.56	3.52	2.42	3.58	3.06	3.34
Total Expenses/Yield Unit	3.87	3.53	4.74	3.47	3.75	4.20	4.03	2.92	4.12	3.49	3.86

[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 the 2012 Rice Research Verification Program (continued).

Receipts	Independence	Jackson	Jefferson	Lee	Lincoln	Philips	Poinsett	Prairie	Randolph	White	Average
Yield (bu.)	221	171	198	196	176	178	197	193	184	146	188
Price Received	8.12	5.93	6.94	6.09	5.72	6.28	7.83	6.43	6.24	6.26	6.32
Total Crop Revenue	**1,794.03**	**1,014.01**	**1,374.85**	**1,194.12**	**1,006.62**	**1,118.50**	**1,543.09**	**1,240.45**	**1,147.41**	**913.24**	**1,194**
Operating Expenses											
Seed	40.54	50.67	110.40	12.95	111.87	162.55	22.62	135.34	108.44	33.01	77.94
Fertilizers & Nutrients	159.68	214.06	127.11	212.52	175.80	244.62	160.03	199.41	104.53	172.22	167.82
Chemicals	72.85	91.82	100.27	84.42	106.81	71.83	98.12	59.07	39.59	87.61	82.10
Custom Applications	50.50	63.10	50.90	52.90	52.90	53.60	60.00	54.00	44.50	56.10	51.19
Fuel & Lube	25.75	32.81	31.26	24.31	28.02	24.53	28.85	22.18	29.30	35.94	28.32
Repairs & Maintenance	27.82	25.96	27.12	23.23	28.05	21.77	27.97	21.39	27.56	28.79	26.42
Irrigation Energy Costs	24.22	51.94	71.52	50.58	163.47	47.42	24.22	47.42	122.60	78.46	65.54
Labor, Field Activities	7.69	10.67	10.74	7.82	8.18	7.22	7.79	7.53	9.77	11.38	8.67
Other Inputs & Fees, Pre-harvest	16.83	19.38	20.60	24.75	24.17	21.96	18.90	28.60	23.68	21.95	20.05
Post-harvest Expenses	128.95	99.78	115.53	114.37	102.70	103.86	114.95	112.62	107.36	85.19	109.56
Total Operating Expenses	**554.82**	**660.19**	**665.45**	**607.84**	**801.97**	**759.36**	**563.45**	**687.56**	**617.33**	**610.65**	**637.61**
Returns to Operating Expenses	**1,239.21**	**353.82**	**709.40**	**586.28**	**204.65**	**359.14**	**979.64**	**552.89**	**530.08**	**302.58**	**556.57**
Capital Recovery & Fixed Costs	97.57	86.30	88.21	76.63	106.81	72.07	99.55	70.84	98.50	105.87	92.35
Total Specified Expenses[z]	**652.39**	**746.49**	**753.66**	**684.47**	**908.77**	**831.43**	**663.00**	**758.40**	**715.83**	**716.52**	**729.96**
Returns to Specified Expenses	**1,141.64**	**267.51**	**621.18**	**509.65**	**97.85**	**287.08**	**880.09**	**482.05**	**431.57**	**196.72**	**464.22**
Operating Expenses/Yield Unit	2.51	3.86	3.36	3.10	4.56	4.27	2.86	3.56	3.36	4.18	3.43
Total Expenses/Yield Unit	2.95	4.37	3.81	3.49	5.16	4.67	3.37	3.93	3.89	4.91	3.93

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

Table 8. Selected variable input costs per acre from fields in the 2012 Rice Research Verification Program.

County	Rice Type	Seed	Fertilizers & Nutrients	Herbicides	Insecticides	Fungicides & Other	Machinery Fuel & Lube	Irrigation Energy Costs
Arkansas #1	CL XL745	145.98	185.71	65.24	5.73	22.93	28.62	16.15
Arkansas #2	Roy J	37.72	203.24	106.48		7.50	29.86	9.37
Arkansas #3	CL151	49.84	211.02	80.15		22.27	34.53	122.60
Chicot #1	CL151	63.97	131.12	82.46		20.34	28.35	177.77
Chicot #2	CL111	47.70	191.50	76.67		22.16	28.99	14.53
Clark	Francis	20.30	191.39	62.86	4.58	3.00	24.75	24.22
Clay	RT XL753	121.75	150.27	43.90			28.14	120.48
Conway	RT XL753	98.92	92.48	62.93	2.93		28.09	24.22
Craighead	Roy J	60.20	214.42	45.54		3.00	33.85	122.60
Cross	CL151	52.85	93.84	61.46	5.15	22.93	24.60	38.35
Desha	CL XL745	150.00	93.43	75.83	5.73		22.07	24.22
Independence	Jupiter	40.54	159.68	66.90		5.95	25.75	24.22
Jackson	Taggart	50.67	214.06	91.82			32.81	51.94
Jefferson	RT XL753	110.40	127.11	100.27			31.26	71.52
Lee	Roy J	12.95	212.52	55.47		28.95	24.31	50.58
Lincoln	RT XL753	111.87	175.80	87.51		19.30	28.02	163.47
Phillips	CL XL745	162.55	244.62	71.83			24.53	47.42
Poinsett	Jupiter	22.62	160.03	98.12			28.85	24.22
Prairie	CL XL745	135.34	199.41	59.07			22.18	47.42
Randolph	RT XL723	108.44	104.53	33.64		5.95	29.30	122.60
White	Taggart	33.01	172.22	48.71		38.90	35.94	78.46
Average	**----**	**77.98**	**168.02**	**70.33**	**4.82**	**17.17**	**28.32**	**65.54**