UNIVERSITY OF ARKANSAS
DIVISION OF AGRICULTURE
Cooperative Extension Service

# 2004
# University of Arkansas
# Rice Research Verification Program

## AG 845

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

ARKANSAS Rice CHECK-OFF

**Conducted by:**
Mr. Jeff Branson, Program Associate, RRVP coordinator
Dr. Charles Wilson Jr., Extension Agronomist – Rice
Mr. Stewart Runsick, Program Associate, RRVP coordinator
Dr. Tony Windham, Extension Economist-Management
Mr. James Marshall, Extension Associate

**Acknowledgments:**
Cooperating Rice Producers

Mr. Danny Hall- Arkansas County
Mr. Clay Pool- Chicot County
Mr. Mickey Dement- Craighead County
Mr. Martin Henry-Desha-County
Mr. Eddie McClure-Independence County
Mr. James Young- Jackson County
Mr. Wink Phillips-Lawrence County
Mr. Johnny McGraw-Lincoln County
Mr. Mike Sullivan-Mississippi County
Mr. Fred Stuckey- Poinsett County

Cooperating County Extension Agents

Mr. Ken Adams- Arkansas County
Ms. Fran Tomerlin- Chicot County
Mr. Branon Thiesse - Craighead County
Mr. Wes Kirkpatrick- Desha County
Mr. Stan Carter- Independence County
Mr. Randy Chlapecka- Jackson County
Mr. Stewart Runsick- Lawrence County
Mr. Chad Norton- Lincoln County
Ms. Susan Matthews- Mississippi County
Mr. Rick Thompson- Poinsett County

Agriculture Experiment Station

Dr. John Bernhardt, Assistant Professor, Entomology- RREC
Dr. Paul Counce, Professor – Crop, soil, and Environmental Science - RREC
Dr. James Gibbons, Assistant Professor – Crop, soil, and Environmental Science - RREC
Dr. Fleet Lee, Professor, Plant Pathology -RREC
Dr. Karen Moldenhauer, Professor – Crop, soil, and Environmental Science - RREC
Dr. Richard Norman, Professor – Crop, soil, and Environmental Science - UAF
Dr. Nathan Slaton, Professor – Crop, soil, and Environmental Science - UAF
Dr. Chris Deren, Professor, Experiment Station Director - RREC
Dr. Merle Anders, Assistant Professor – Crop, soil, and Environmental Science - RREC
Mr. Tony Richards, Program Assistant- RREC
Dr. Terry Siebenmorgen, Professor, Food Science – UAF
Dr. Brad Watkins, Assistant Professor – RREC

Cooperative Extension Service

Dr. Bob Scott, Extension Weed Scientist – Little Rock
Dr. Rick Cartwright, Extension Plant Pathologist – Little Rock
Dr. Dennis Gardisser, Extension Agriculture Engineer – Little Rock
Mr. Kent Rorie, Delta District Director – Little Rock
Mr. Phil Tacker, Extension Agriculture Engineer – Little Rock
Dr. Ken Smith, Extension Weed Scientist – SEREC

# Table of Contents

## List of Tables

## List of Figures

# Introduction

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

The goals of the RRVP are: (1) To educate producers on the benefits of utilizing University of Arkansas recommendations to improve yields and/or net returns, (2) To conduct on-farm field trials to verify research based recommendations, (3) To aid researchers in identifying areas of production that require further study, (4) To improve or refine existing recommendations which contribute to more profitable production, (5) Incorporate data from RRVP into Extension educational programs at the county and state level. Since 1983, the RRVP has been conducted on 221 commercial rice fields in 33 rice-producing counties in Arkansas. The program has typically averaged about 20 bushels/acre better than the state average. In 2004, the RRVP recorded an average yield of 171 bu/acre (Table 1). This increase in yields over the state average can mainly be attributed to intensive cultural management and integrated pest management.

# Procedures

The RRVP fields and cooperators are selected prior to the beginning of the growing season. Cooperators agree to pay production expenses, provide expense data, and implement university recommendations in a timely manner from planting to harvest. A designated county agent from each county assists the RRVP coordinator in collecting data, scouting the field, and maintaining regular contact with the producer. Management decisions are made utilizing integrated pest management philosophy based on current University of Arkansas recommendations. An advisory committee consisting of Extension specialists and university researchers with rice responsibility assists in decision-making, development of recommendations, and program direction.

Counties participating in the program during 2004 included Arkansas, Craighead, Chicot, Desha, Independence, Lawrence, Lincoln, Jackson, Mississippi, and Poinsett, with a total of 608 acres enrolled in the program. Five varieties were seeded (Wells, Cocodrie, Francis, CL161 and Cheniere) in the 11 fields. University of Arkansas recommendations were used to manage the RRVP fields. Management decisions were based on field history, soil test results, variety, and data collected from individual fields during the growing season. Data collected included components such as stand density, weed populations, disease infestation levels, insect populations, plant dry matter accumulation, temperature, rainfall, irrigation amounts, dates for specific growth stages, grain yield, milling yield, and grain quality.

## Results and Discussion

### Yield

The average RRVP yield was 171 bu/A with a range of 142 to 192 bu/A (Table 1). The RRVP average yield was 20 bushels higher than the estimated state yield of 151 bu/A. The 2004 RRVP average was one bushel less than the programs highest yield of 172 bu/A set in 2003 (Table 1). The highest yielding field was seeded with Wells in Mississippi County and yielded 192 bu/A. Two fields, Mississippi and Craighead Counties, exceeded 190 bu/A. The lowest yielding field was also seeded with Wells in Independence County. A significant amount of the preflood nitrogen in Independence County was lost due to inadequate flood conditions. Field size, soil type and irrigation capacity resulted in parts of the field losing the flood and nitrogen escaping the soil. Plant analysis at ½ internode elongation showed that parts of the field were significantly deficient in nitrogen. Rice Panicle Blast was also present in this field and attributed to the low yield.

Milling data was recorded on all of the RRVP fields. The average milling yield for the 11 fields was 63/71 with the highest milling yield of 68/74 occurring in Chicot County. All fields milled greater than 55/70, which is considered the standard used by the rice milling industry. The lowest milling field was seeded with Wells in Independence County and milled 56/68 (Table 1). Part of the reason for low head rice yield in Independence County was due to Rice Panicle Blast. The average milling in 2004 was 6% higher than the 2003 average of 57/70. The increase of head rice in 2004 may be attributed to the mild temperatures experienced during grain fill.

**Table 1. Variety, soil series, previous crop, acreage, yield, and milling for 2004 RRVP**

| County | Variety | Soil Series | Previous Crop | Acres | Yield Bu/A | Milling Yield |
|---|---|---|---|---|---|---|
| Arkansas | Wells | Dewitt silt loam | Soybean | 90 | 180 | 68/73 |
| Chicot | Cocodrie | Perry clay | Corn | 53 | 176 | 68/74 |
| Craighead 1 | Francis | Fountain silt loam | Soybean | 14 | 191 | 56/71 |
| Craighead 2 | Cheniere | Fountain silt loam | Soybean | 14 | 178 | 63/72 |
| Desha | Wells | Sharkey clay | Soybean | 45 | 177 | 65/72 |
| Independence | Wells | Dundee silt loam | Corn | 67 | 142 | 56/68 |
| Jackson | Wells | Dundee silt loam | Soybean | 33 | 175 | 61/70 |
| Lawrence | Wells | Hillemann silt loam | Soybean | 156 | 167 | 65/73 |
| Lincoln | Francis | Sharkey clay | Soybean | 32 | 172 | 62/71 |
| Mississippi | Wells | Sharkey clay | Soybean | 68 | 192 | 64/75 |
| Poinsett | CL161 | Sharkey clay | Soybean | 36 | 150 | 60/67 |
| Average | | | | 58 | 171 | 63/71 |

## Planting and Emergence

Dry weather in March and April allowed all RRVP fields to be planted in the optimum time frame. All of the fields were planted from April 6th through May 5th (Table 2). Eighty percent of the Poinsett County had to be replanted due to a poor stand following an 8-inch rain received four days after planting. An average of 101 lbs./A was seeded in the RRVP fields (Table 2). Seeding rates were determined with the Cooperative Extension Service RICESEED program for all fields. Rainfall in late April and early May allowed all of the fields to emerge without flushing for germination or herbicide activation. An average of 12 days was required for emergence. Stand density ranged from 9 to 26 plants/$ft^2$, with an average of 19 plants/$ft^2$.

## Irrigation

Well water was used to irrigate nine of the eleven fields in the 2004 RRVP. Chicot and Independence Counties were irrigated with surface water. Four of the eleven fields used multiple inlet (MI) irrigation (Arkansas, Independence, Mississippi and Poinsett). Flow meters were used in all of the fields (except Lawrence County) to record water usage throughout the growing season, and compare MI to conventional flooding. An average of 23.8 acre-inches of water was used across both irrigation methods (Table 2). The fields with MI irrigation averaged 21.2 acre-inches of water compared to 26.5 acre-inches for fields using conventional flooding. Research suggests MI reduces water usage by approximately 25 %; however, in 2004 only a 20 % reduction was observed. The average water usage from the conventional method was less in 2004 compared to RRVP records over the last few years. This reduction in irrigation may be attributed to the above average rainfall received in May through July. Chicot, Desha and Jackson counties received an average of 18 inches of rainfall during this period (Table 2).

**Table 2. Stand density, irrigation, seeding rate, and important dates during the 2004 season.**

| County | Stand Density | Rainfall | Irrigation | Total Acre-in | Seeding Rate | Planting Date | Emergence Date | Harvest Date |
|---|---|---|---|---|---|---|---|---|
| | Plants/$ft^2$ | Inches | Acre inc. | Rain+Irr | Lbs/A | | | |
| Arkansas | 13 | 11.7 | 25.2 | 36.9 | 103 | 4-14 | 4-28 | 9-10 |
| Chicot | 18 | 18 | 22.3 | 40.3 | 78 | 5-1 | 5-12 | 9-12 |
| Craighead 1 | 17 | 14 | 35 | 49 | 100 | 4-6 | 4-21 | 9-15 |
| Craighead 2 | 9 | 14 | 35 | 49 | 100 | 4-6 | 4-20 | 9-17 |
| Desha | 20 | 20 | 21 | 41 | 112 | 4-20 | 5-10 | 9-16 |
| Independence | 23 | 18 | 22 | 40 | 104 | 4-15 | 4-23 | 8-24 |
| Jackson | 26 | 16 | 21.4 | 37.4 | 103 | 4-15 | 4-24 | 8-24 |
| Lawrence | 21 | 21 | NA | NA | 99 | 4-8 | 4-23 | 9-6 |
| Lincoln | 21 | 13.5 | 25.2 | 38.7 | 110 | 4-23 | 5-3 | 9-17 |
| Mississippi | 15 | 24.5 | 18.1 | 42.6 | 112 | 4-16 | 4-25 | 9-2 |
| Poinsett | 21 | 17.2 | 19.2 | 36.4 | 95 | 5-5 | 5-20 | 9-21 |
| Average | 19 | 17.1 | 24.4 | 41.1 | 101 | ------- | ------- | ------- |

## Fertilization

Nitrogen recommendations were based on a combination of factors including soil texture and variety requirements. Mid season nitrogen was applied at 100 lbs of urea/A across all varieties with the exception of Poinsett County (Table 3). Poinsett County received an additional 75 lbs./A of urea at mid-season due to varying plant growth stages following replanting.

Phosphorus (P) was applied in all of the RRVP fields based on soil test results (Table 3). DAP (18-46-0) was blended with preflood nitrogen in Desha, Jackson and Lincoln counties. DAP was blended with preflood nitrogen to allow as much P uptake as possible. Potassium and P were blended and applied in Arkansas, Craighead, Independence and Lawrence counties as a pre-plant application. DAP was inadvertently applied in Mississippi County. Soil test results did not recommend a P application.

Zinc (Zn) was applied in Arkansas, Craighead and Lawrence Counties. The soil test in Craighead County did not call for a Zn treatment; however, the Zn levels were marginal and the field did have a history of Zn problems. A seed treatment was applied and no Zn deficiency was observed during the growing season. Granular Zn was applied to the four fields and no Zn deficiency was observed during the year (Table 3). The average cost of fertilize across all fields was $57.49 which does not include application costs (Table 6).

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

| County | Soil pH | P | K | Zn | Nitrogen Rate Urea (45%)[1] | Total N Rate/A | Fertilizer P-K-Zn[2] |
|---|---|---|---|---|---|---|---|
| | | LB/A | LB/A | LB/A | | | |
| Arkansas | 7.5 | 27 | 99 | 1.4 | 23-230-100 | 158 | 60-90-20 |
| Chicot | 6.1 | 20 | 605 | 4.4 | 300-100 | 180 | 60-0-0 |
| Craighead 1 | 7.2 | 49 | 199 | 5.6 | 23-230-100 | 158 | 40-60-5 |
| Craighead 2 | 6.8 | 44 | 221 | 5.3 | 23-230-100 | 158 | 40-60-5 |
| Desha | 7.4 | 18 | 358 | 4.8 | 300-100 | 180 | 46-0-0 |
| Independence | 5.3 | 72 | 204 | 4.9 | 260-100 | 162 | 74-111-0 |
| Jackson | 6.0 | 20 | 266 | 17.2 | 230-100 | 149 | 23-0-0 |
| Lawrence | 5.7 | 16 | 124 | 3.6 | 230-100 | 149 | 20-90-5 |
| Lincoln | 7.1 | 20 | 452 | 4.9 | 300-100 | 180 | 46-0-0 |
| Mississippi | 5.8 | 67 | 322 | 7.2 | 27-300-100 | 192 | 69-0-0 |
| Poinsett | 6.6 | 39 | 293 | 6.5 | 300-150 | 202 | 60-0-0 |

[1] Flushed in 2 leaf-preflood-midseason

[2] $P_2O_5$-$K_2O$-Zn includes seed treatments

## Weed Control

In 2004, the average herbicide cost was $48.09 (Table 6). All fields utilized Command for early season grass control with the exception of Chicot County (Table 4). Heavy rain immediately following planting in Chicot County delayed the Command application and resulted in Stam and Facet being applied postemergence. Two fields (Desha and Jackson Counties) did not require a postemergence herbicide application for grass weed control. In both fields, weed pressure was light and Command was activated in a timely manner resulting in excellent and very inexpensive grass weed control.

Jackson County had the most inexpensive weed control program at $23.77 an acre (Table 6). Command was applied preemergence and provided excellent control of grass species. The main broadleaf weed was yellow nutsedge and was controlled using Permit at 1 oz/A applied preflood.

Lincoln and Mississippi Counties had the most expensive weed control programs at $63.18 and $55.59, respectively. Command at 1.5 pt/A was applied to both fields, but failed to provide season long control of grass. Clincher was applied at 15 oz/A in both fields for the control of grass weed species. Permit was applied in Mississippi County for the control of yellow nutsedge, which in part explains the higher than average herbicide cost. Storm was applied at 1.5 pt/A in Lincoln County for the control of hemp sesbania and morningglory species. Aim controls these weeds equally as well as Storm for less money per acre, but windy conditions and adjacent soybean fields prevented an Aim application.

**Table 4. Herbicide rate and timings for 2004 RRVP fields.**

| | |
|---|---|
| Arkansas | **PRE:** Command (0.8 pt) **POST:** Facet (.38 LB) Aim (1.6 oz) |
| Chicot | **POST:** Facet (0.5 LB) Stam (4 qts) |
| Craighead 1 | **PRE:** Glyphosate (1 qt) Command (0.8 pt) **POST:** Facet (0.5 LB) Permit (1oz) |
| Craighead 2 | **PRE:** Glyphosate (1 qt) Command (0.8 pt) **POST:** Facet (0.5 LB) Permit (1oz) |
| Desha | **PRE:** Command (1.5 pt) **POST:** Aim (1.6 oz) Permit (1 oz) |
| Independence | **PRE:** Command (0.8 pt) **POST:** Facet (0.5 LB) Stam (4 qts) |
| Jackson | **PRE:** Command (0.8 pt) **POST:** Permit (1 oz) |
| Lawrence | **PRE:** Command (0.8 pt) **POST:** Aim (1.6 oz) Stam (4 qts) Permit (1 oz) |
| Lincoln | **PRE:** Command (1.5 pt) **POST:** Clincher (15 oz) |
| Mississippi | **PRE:** Command (1.5 pt) **POST:** Clincher (15 oz) |
| Poinsett | **PRE:** Command (0.8 pt) Newpath (4 oz) **POST:** Newpath (4 oz) Blazer (0.5pt) |

## Disease Control

Summers in Arkansas are usually defined by hot and dry weather. This was not the case in most of the RRVP fields in 2004. A prolonged wet and cool June and July in

many areas resulted in 7 of the 11 fields being treated for sheath blight. In some cases sheath blight was a problem late when the rice was starting to head. Quadris was used in Craighead and Lawrence Counties due to the problem occurring so late in the season and a reduced rate of 6.4 oz/A was used and provided excellent control of the disease. Stratego was used in Lincoln County due to sheath blight and a field history of kernel smut. The field was seeded in Francis, which is susceptible to kernel smut. In Mississippi County the full label rate of Stratego (19 oz/A) was used because the treatment had to be applied early in the season because of the aggressive movement of the disease. In both cases Stratego provided excellent control of both diseases. Disease monitoring studies were established in 5 of the RRVP fields to evaluate various varieties across the state.

## Insect control

One of the RRVP fields was treated for rice water weevil in 2004 (Desha County). Weevil traps were placed in the RRVP in cooperation with Dr. John Bernhardt and Tony Richards. The traps and thresholds are being developed as a more accurate way of scouting for weevils as compared to the leaf scaring method. Most of the varieties being grown in Arkansas today would require an average of 40 weevils per trap to require treatment. Desha County was treated with Karate at 1.8 oz/A seven days following flood establishment. Weevil numbers were as high as 150 per trap. Karate provided excellent weevil control and no root damage was observed during the year. Rice stinkbug levels never reached treatment thresholds in any of the RRVP fields. This is in contrast to at least 50% of the RRVP being treated for stinkbugs in 2002 and 2003.

**Table 5. Fungicide and insecticides applications in 2004 RRVP fields.**

| County | Fungicide | Rice Water Weevil | Rice Stink Bug |
|---|---|---|---|
| Arkansas | ------ | ------ | ------ |
| Chicot | 4 oz/A Tilt | ------ | ------ |
| Craighead 1 | 6.4 oz/A Quadris | ------ | ------ |
| Craighead 2 | 9 oz/A Quadris | ------ | ------ |
| Desha | ------ | 1.85 oz/A Karate | ------ |
| Independence | ------ | ------ | ------ |
| Jackson | ------ | ------ | ------ |
| Lawrence | 6.4 oz/A Quadris | ------ | ------ |
| Lincoln | 16 oz/A Stratego | ------ | ------ |
| Mississippi | 19 oz/A Stratego | ------ | ------ |
| Poinsett | 34 oz/A Quilt | ------ | ------ |

## Economic Analysis

This section provides information on the development of estimated production costs for the 2004 RRVP. Records of operations on each field provided the basis for estimating

these costs. The field records were compiled by participating county Extension faculty, the coordinator of the RRVP, and the producers for each field.

Presented in this analysis are specified operating costs, specified ownership costs and total specified costs for each field. Break-even prices for the various cost components and returns above specified expenses at the average 2004 price are also presented.

**Table 6. Selected variable input expense from 2004 RRVP fields[1]**

| County | Variety/Hybrid | Fertilizer[2] | Herbicides | Fungicides | Insecticides | Irrigation |
|---|---|---|---|---|---|---|
| | | ----------Input cost $/acre---------- | | | | |
| Arkansas | Wells | 60.80 | 33.53 | 1.50 | 0 | 40.57 |
| Chicot | Cocodrie | 59.80 | 45.12 | 13.07 | 0 | 35.90 |
| Craighead 1 | Francis | 57.42 | 54.13 | 12.28 | 0 | 56.35 |
| Craighead 2 | Cheniere | 57.42 | 54.13 | 17.28 | 0 | 56.35 |
| Desha | Wells | 55.20 | 43.54 | 0.00 | 6.08 | 33.81 |
| Independence | Wells | 59.38 | 53.59 | 0.00 | 0 | 35.42 |
| Jackson | Wells | 44.40 | 23.77 | 0.00 | 0 | 34.45 |
| Lawrence | Wells | 51.4 | 51.15 | 12.28 | 0 | 57.96 |
| Lincoln | Francis | 55.20 | 63.18 | 19.00 | 0 | 40.57 |
| Mississippi | Wells | 66.00 | 55.59 | 20.90 | 0 | 29.14 |
| Poinsett | CL161 | 65.00 | 51.34 | 29.56 | 0 | 30.91 |
| Average | | 57.45 | 48.09 | 11.44 | 0.55 | 41.33 |

[1]Does not include all variable costs, such as drying, hauling equipment repair, ect.
[2] Includes cost for material and application costs for each variable.

## Specified Operating Costs

Specified operating costs are those expenditures that would generally require annual cash outlays and would be included on an annual operating loan application (Table 6). Actual quantities of all operating inputs were used in this analysis. The average of the actual per unit prices paid by cooperating producers was used to calculate costs.

Fuel and repair costs for both machinery and irrigation equipment were calculated by Extension models based on averages. Therefore, the producers' actual machinery costs may vary from the machinery cost estimates that are presented in this report (Table 6). However, the producers' actual field operations were used as a basis for calculations and his equipment size and type were matched as closely as possible. Specified operating costs for the 11 RRVP fields ranged from $186.63/A for Jackson County to $347.69/A for Poinsett County with an overall average of $260.41/A (Table 6).

## Land Costs

Land costs incurred by producers participating in the RRVP would likely vary from land ownership, cash rent, or some form of crop share arrangement. Therefore, a comparison of these divergent cost structures would contribute little to this analysis. For

this reason, a 25% crop share rent was assumed to provide a consistent standard for comparison. This is not meant to imply that this arrangement is normal or that it should be used in place of existing arrangements. It is simply a consistent measure to be used across all RRVP fields. The average break-even price needed to cover total specified costs including an assumed 25% crop share was $1.83/bu (Table 7).

## Returns

Table 6 includes estimated returns per acre above Total Specified Operating Costs and Total Specified Costs. Costs for risk, overhead and management are not included. Since land agreements are so variable, it is difficult to figure land costs. However, a break-even price that takes land in consideration is included and ranged from $70.54/A in Poinsett County to $315.08/A in Jackson County with an average of $237.70/A.

**Table 7. Selected economic information from 2004 RRVP.**

| County | Specified Operating Costs[1] | Specified Ownership Costs | Land Costs[3] | Total specified Costs | Return Above Specified Operating Cost[2] | Returns Above Total Specified Cost | Break-even price w/land[4] |
|---|---|---|---|---|---|---|---|
| | ----------$/Acre---------- | | | | | | -$/Bu-- |
| Arkansas | 241.66 | 58.06 | 144.00 | 299.72 | 334.34 | 276.33 | 1.66 |
| Chicot | 241.69 | 46.38 | 140.00 | 288.07 | 321.51 | 275.13 | 1.64 |
| Craighead 1 | 288.24 | 58.19 | 152.80 | 346.43 | 322.96 | 264.77 | 1.81 |
| Craighead 2 | 291.88 | 58.19 | 142.40 | 350.07 | 277.72 | 219.53 | 1.97 |
| Desha | 240.69 | 58.92 | 141.60 | 299.61 | 352.71 | 266.79 | 1.69 |
| Independence | 233.91 | 54.15 | 113.60 | 288.06 | 220.49 | 166.34 | 2.03 |
| Jackson | 186.63 | 58.29 | 140.00 | 244.92 | 373.37 | 315.08 | 1.40 |
| Lawrence | 245.93 | 47.56 | 133.60 | 293.49 | 288.47 | 240.91 | 1.76 |
| Lincoln | 277.56 | 52.79 | 137.60 | 330.35 | 272.84 | 220.05 | 1.92 |
| Mississippi | 268.69 | 46.42 | 153.60 | 315.11 | 345.71 | 299.29 | 1.64 |
| Poinsett | 347.69 | 61.77 | 120.00 | 409.46 | 132.31 | 70.54 | 2.72 |
| Average | 260.41 | 54.61 | 138.18 | 315.02 | 292.31 | 237.70 | 1.83 |

[1] Specified variable costs of production (See Table 6 for details)
[2] $3.20/bu settlement price for rough rice
[3] 25% crop share rent was assumed
[4] Price/bu required by producer to equal total costs

## On Farm Research

Research was conducted in many of the verification fields in 2004. Disease monitoring tests were planted in five fields across the state. This provides researchers with information on how varieties perform under various environmental conditions and different soil types. Hybrid yields ranged from 243 to 177 bushels/acre. Wells and Francis also performed well with yields ranging from 207 to 168 bushels/acre. Seeding rate studies were also planted in one of the verification fields. These studies are established to determine the optimum seeding rate for various varieties. Data from this study suggests that seeding rates may be reduced to as little as 67.5 lbs./A without sacrificing yield (Table 13). Wells was reduced when the seeding rate was dropped to 45 lbs./A. Zinc studies were conducted in 3 RRVP fields to determine the need for Zn on clay soils (Table 14). No responses were observed in 2004.

## Infrared Photography

Infrared photographs were taken during the growing season of each field in the program (Fig. 1-10). While several patterns were observed that could be related to certain field conditions (e.g. water management problems and cold water areas), it is still necessary to "ground-check" what is observed in the photographs. While the photos may indicate a potential problem and how widespread it is in the field, the ability to diagnose a specific problem is not possible. However, there may be potential uses for this new technology in the future.

## Summary

The 2004 Rice Research Verification Program was conducted on 11 commercial rice fields across the state. Counties participating in the program during 2004 included Arkansas, Craighead, Chicot, Desha, Independence, Lawrence, Lincoln, Jackson, Mississippi, and Poinsett for a total of 608 acres. Grain yield in the 2003 RRVP averaged 171 bu/acre with a range of 142 to 192 bu/acre. All fields were planted in April and emerged without flushing. The 2004 RRVP average yield was 20 bushels/acre greater than the estimated Arkansas state average of 151 bu/acre. The highest yielding field was in Mississippi County with a grain yield of 192 bu/acre. The lowest yielding field was in Independence County and produced 142 bu/acre. Milling quality in the RRVP was comparable with milling from the Arkansas Rice Performance Trials and averaged 63/71.

**Table 8. 2004 Rice DMP Desha County.**

| Variety | Grain Yield |
|---|---|
| AB8198 | 173.0 |
| AB8649 | 174.4 |
| AB8684 | 193.7 |
| Ahrent | 162.2 |
| AMS114-109 | 152.9 |
| AMS114-33 | 165.5 |
| AR0101093 | 152.7 |
| Banks | 176.9 |
| Bengal | 190.9 |
| Cheniere | 182.5 |
| CL161 | 175.1 |
| Cocodrie | 174.2 |
| CyBonnet | 186.8 |
| Cypress | 175.1 |
| Francis | 179.2 |
| LaGrue | 188.4 |
| Medark | 184.4 |
| Rice Tec CL XL8 | 196.9 |
| Rice Tec XP 710 | 218.3 |
| Rice Tec XP 712 | 204.9 |
| Rice Tec XP 716 | 216.2 |
| Rice Tec XP 723 | 217.1 |
| RU0104055 | 147.1 |
| Wells | 176.0 |
| Wells IMI | 163.5 |
| | |
| Mean | 181 |
| LSD | 19.8 |
| C.V.% | 6.5 |

**Table 9. 2004 Rice DMP Lawrence County.**

| Variety | Grain Yield |
|---|---|
| AB8198 | 192.3 |
| AB8649 | 168.4 |
| AB8684 | 166.4 |
| Ahrent | 154.7 |
| AMS114-109 | 164.3 |
| AMS114-33 | 145.5 |
| AR0101093 | 128.8 |
| Banks | 175.4 |
| Bengal | 151.3 |
| Cheniere | 181.5 |
| CL161 | 168.3 |
| Cocodrie | 184.6 |
| CyBonnet | 189.9 |
| Cypress | 157.1 |
| Francis | 168.6 |
| LaGrue | 165.6 |
| Medark | 156.7 |
| Rice Tec CL XL8 | 198.1 |
| Rice Tec XP 710 | 190.7 |
| Rice Tec XP 712 | 207.9 |
| Rice Tec XP 716 | 183.5 |
| Rice Tec XP 723 | 216.1 |
| RU0104055 | 159.1 |
| Wells | 170.7 |
| Wells IMI | 153.1 |
| Mean | 172 |
| LSD | 31.0 |
| C.V.% | 11.0 |

**Table 10. 2004 Rice DMP Lincoln County.**

| Variety | Grain Yield |
|---|---|
| AB8198 | 212.3 |
| AB8649 | 201.2 |
| AB8684 | 199.0 |
| Ahrent | 202.2 |
| AMS114-109 | 148.5 |
| AMS114-33 | 182.6 |
| AR0101093 | 167.2 |
| Banks | 191.8 |
| Bengal | 191.7 |
| Cheniere | 176.5 |
| CL161 | 164.4 |
| Cocodrie | 146.3 |
| CyBonnet | 165.6 |
| Cypress | 165.9 |
| Francis | 189.5 |
| LaGrue | 193.8 |
| Medark | 199.0 |
| Rice Tec CL XL8 | 214.7 |
| Rice Tec XP 710 | 243.6 |
| Rice Tec XP 712 | 193.8 |
| Rice Tec XP 716 | 202.0 |
| Rice Tec XP 723 | 224.8 |
| RU0104055 | 181.9 |
| Wells | 189.4 |
| Wells IMI | 155.8 |
| | |
| Mean | 188 |
| LSD | 26.8 |
| C.V.% | 8.5 |

**Table 11. 2004 Rice DMP Mississippi County.**

| Variety | Grain Yield |
|---|---|
| AB8198 | 148.3 |
| AB8649 | 167.0 |
| AB8684 | 177.6 |
| Ahrent | 155.1 |
| AMS114-109 | 129.7 |
| AMS114-33 | 146.0 |
| AR0101093 | 146.1 |
| Banks | 186.7 |
| Bengal | 168.6 |
| Cheniere | 166.1 |
| CL161 | 149.7 |
| Cocodrie | 163.7 |
| CyBonnet | 171.7 |
| Cypress | 138.1 |
| Francis | 176.2 |
| LaGrue | 209.3 |
| Medark | 147.5 |
| Rice Tec CL XL8 | 198.8 |
| Rice Tec XP 710 | 197.0 |
| Rice Tec XP 712 | 212.8 |
| Rice Tec XP 716 | 199.1 |
| Rice Tec XP 723 | 177.8 |
| RU0104055 | 138.3 |
| Wells | 180.1 |
| Wells IMI | 145.9 |
| | |
| Mean | 168 |
| LSD | 26.0 |
| C.V.% | 9.6 |

**Table 12. 2004 Rice DMP Chicot County.**

| Variety | Grain Yield |
|---|---|
| AB8198 | 174.1 |
| AB8649 | 180.4 |
| AB8684 | 193.1 |
| Ahrent | 165.2 |
| AMS114-109 | 192.7 |
| AMS114-33 | 182.4 |
| AR0101093 | 186.0 |
| Banks | 193.1 |
| Bengal | 198.3 |
| Cheniere | 198.0 |
| CL161 | 181.9 |
| Cocodrie | 200.5 |
| CyBonnet | 185.5 |
| Cypress | 174.3 |
| Francis | 199.6 |
| LaGrue | 194.8 |
| Medark | 196.1 |
| Rice Tec CL XL8 | 227.9 |
| Rice Tec XP 710 | 226.3 |
| Rice Tec XP 712 | 217.7 |
| Rice Tec XP 716 | 236.9 |
| Rice Tec XP 723 | 238.6 |
| RU0104055 | 172.8 |
| Wells | 207.9 |
| Wells IMI | 171.6 |
| | |
| Mean | 196 |
| LSD | 13.4 |
| C.V.% | 4.2 |

**Table 13. 2004 Seeding Rate Study Chicot County.**

| Cultivar | Grain Yield |
|---|---|
| Bengal | 207.6 |
| CL 161 | 183.5 |
| Francis | 204.8 |
| Medark | 208.0 |
| Wells | 200.6 |
| LSD | 7.6 |

| Seeding Rate | Grain Yield |
|---|---|
| 45 | 198.0 |
| 67.5 | 202.6 |
| 90 | 201.0 |
| 112.5 | 202.9 |
| 135.0 | 200.0 |
| LSD | 7.6 |

| Seeding Rate | Grain Yield | | | | |
|---|---|---|---|---|---|
| | Francis | Wells | Bengal | CL 161 | Medark |
| 45 | 205.4 | 181.0 | 205.6 | 187.9 | 210.3 |
| 67.5 | 210.7 | 203.7 | 203.9 | 181.8 | 212.9 |
| 90 | 198.7 | 208.3 | 209.6 | 183.8 | 204.8 |
| 112 | 207.2 | 210.1 | 202.6 | 186.4 | 208.0 |
| 135 | 202.1 | 200.0 | 216.2 | 177.5 | 204.2 |
| LSD | | | 17.1 | | |
| C.V. | | | 5.2 | | |

**Table 14. Selected soil-test means and influence of Zn application rate on yields of rice grown on clay soils at five sites in Arkansas during 2004. Data are the mean of four replicates.**

| Site ( Zn conc. of check) | Soil pH | Soil Test Zn | Zn Application Rate (lbs Zn/acre) | | | | LSD(0.05) |
|---|---|---|---|---|---|---|---|
| | | | 0 | 5 | 10 | 20 | |
| | | lbs/acre | bushels/acre | | | | |
| NEREC (30 ppm) | 7.4 | 3.1 | 213 | 238 | 207 | 213 | NS |
| SEREC (25 ppm) | 8 | 49 | 176 | 151 | 169 | 175 | NS |
| Miss-RRVP (42 ppm) | 6.7 | 3.9 | 162 | 175 | 171 | 164 | NS |
| Lincoln-RRVP (41 ppm) | 7.3 | 2.3 | 161 | 172 | 184 | 173 | NS |
| Desha-RRVP (22 ppm) | 7.9 | 1.2 | 218 | 199 | 204 | 197 | NS |

**Figure 1.** Infrared photograph of Arkansas County.

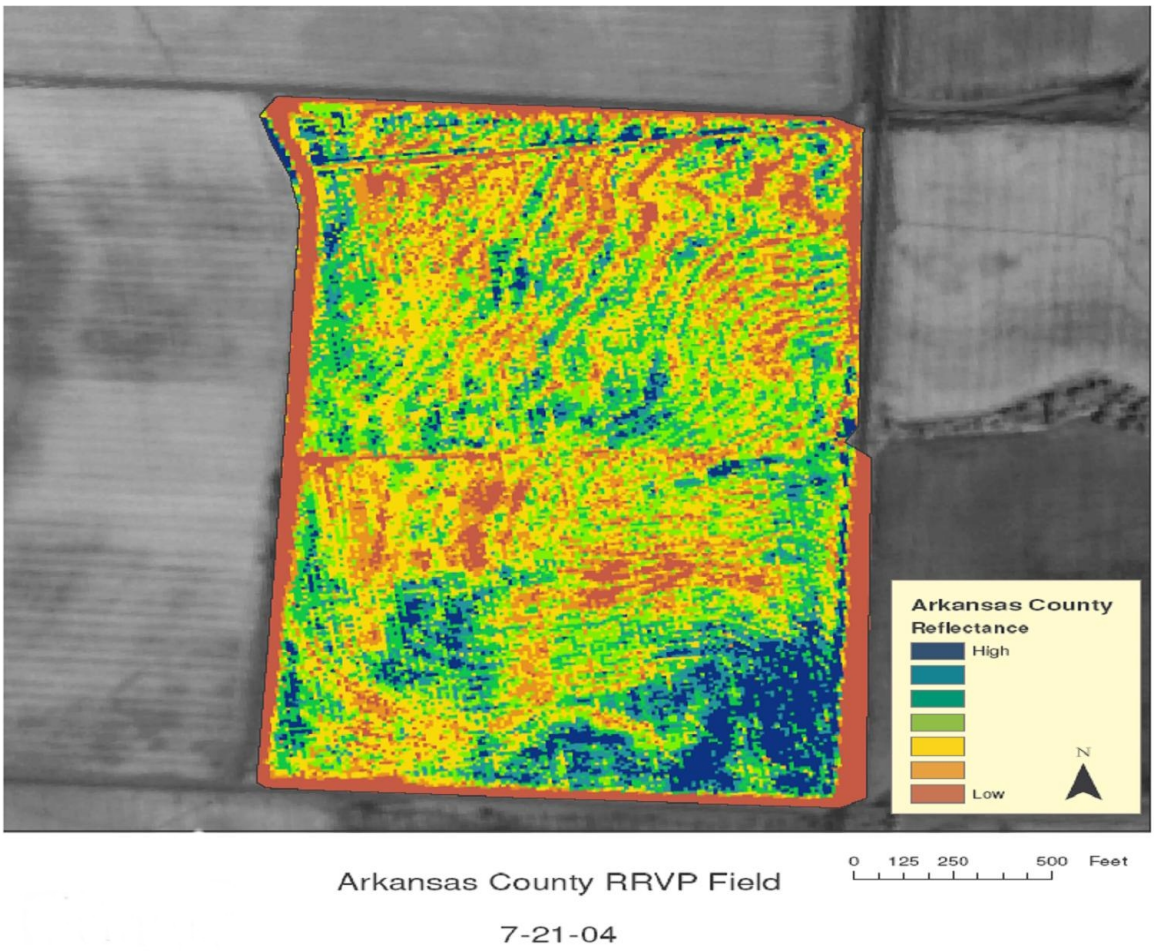

**Figure 2.** Infrared photograph of Chicot County.

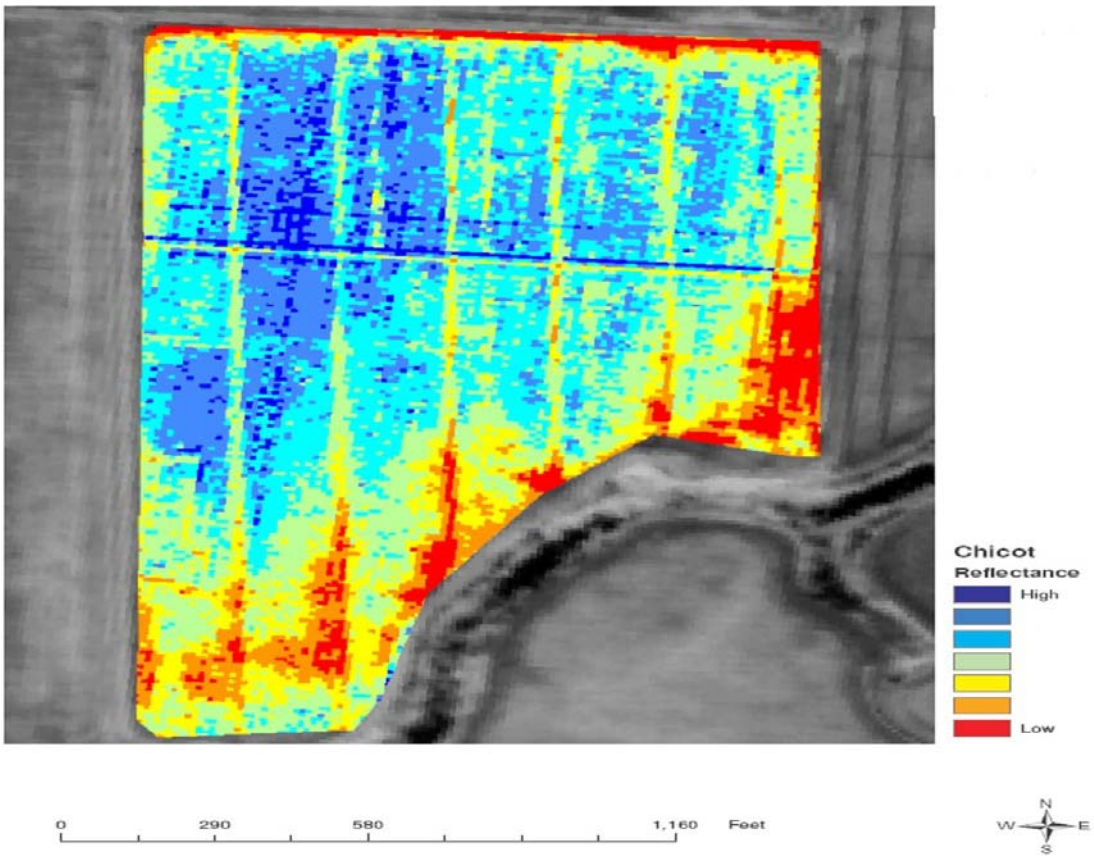

**Figure 3.** Infrared photograph of Craighead County.

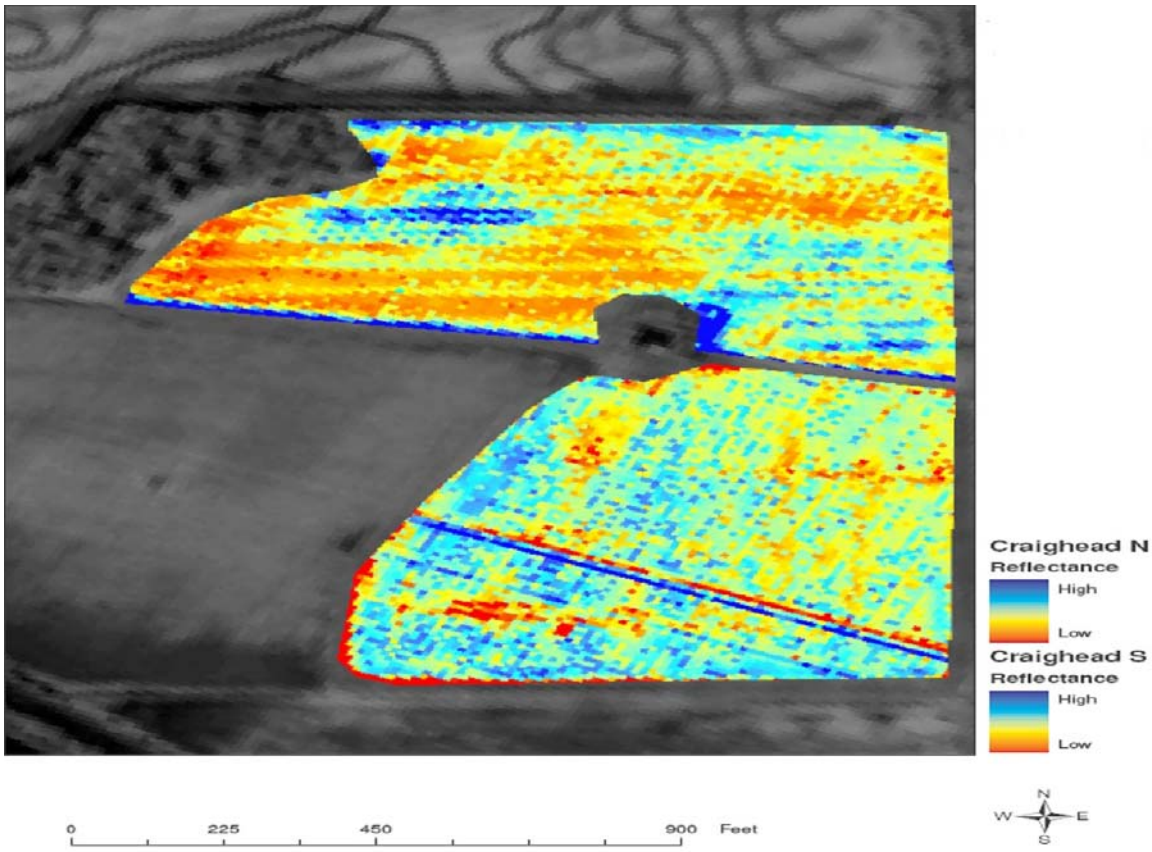

**Figure 4.** Infrared photograph of Desha County.

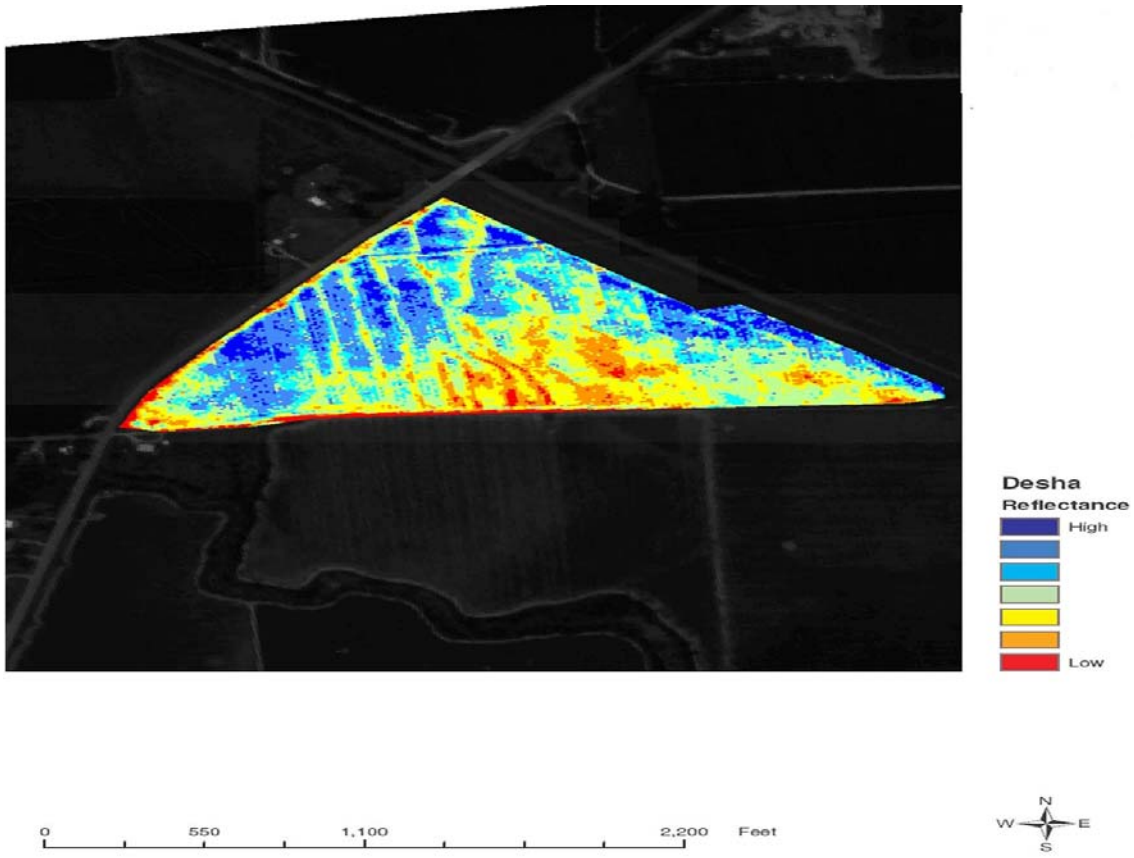

**Figure 5.** Infrared photograph of Independence County.

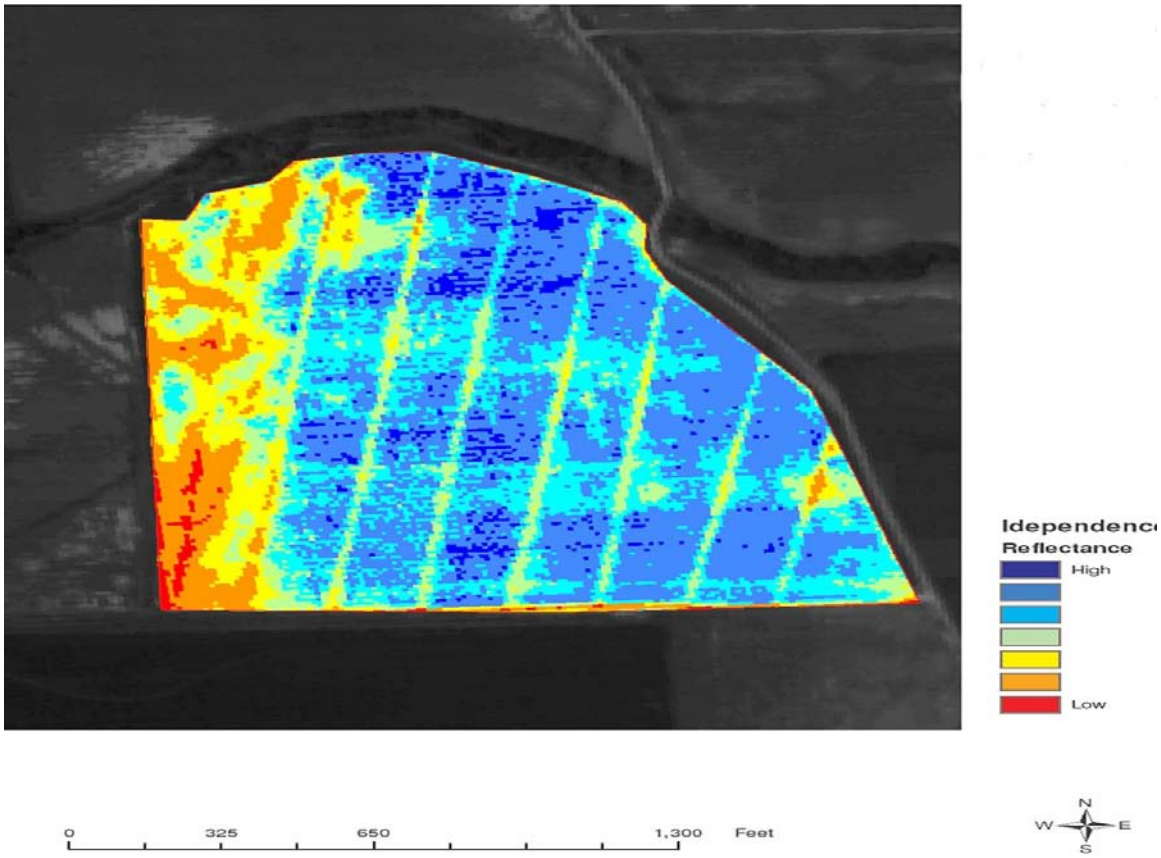

**Figure 6.** Infrared photograph of Jackson County.

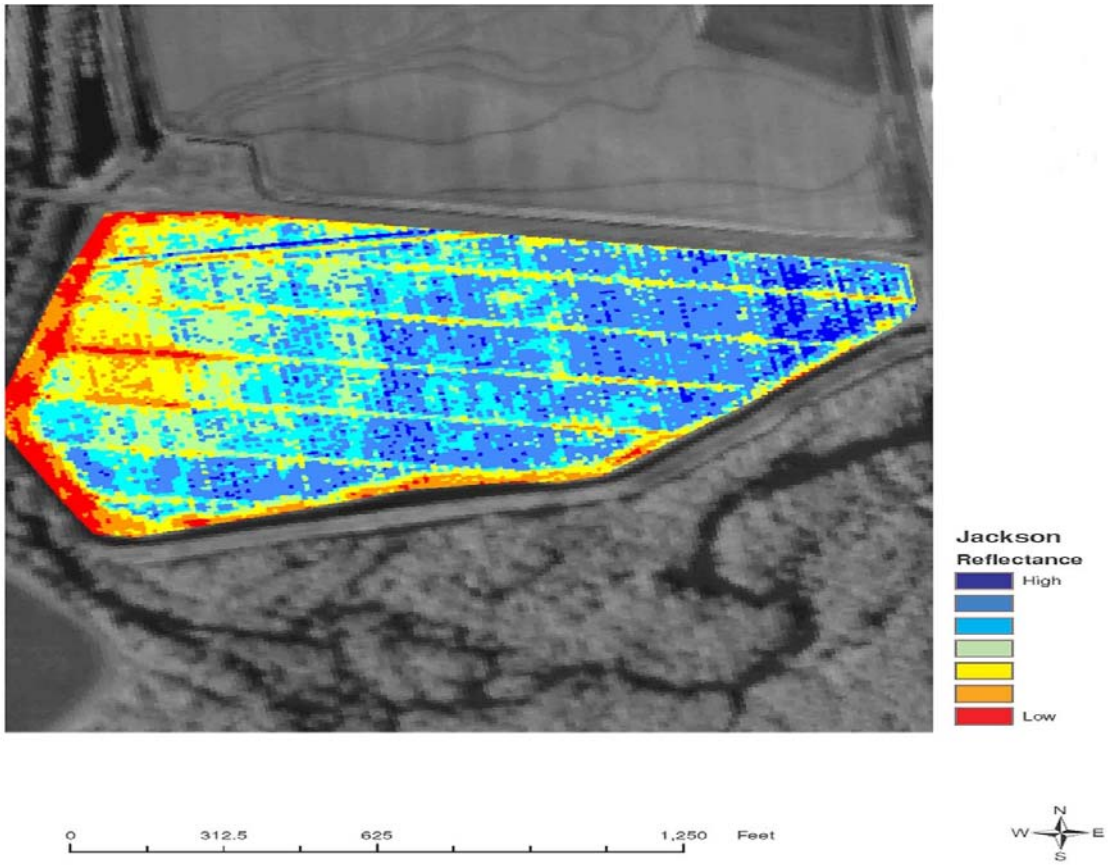

**Figure 7.** Infrared photograph of Lawrence County.

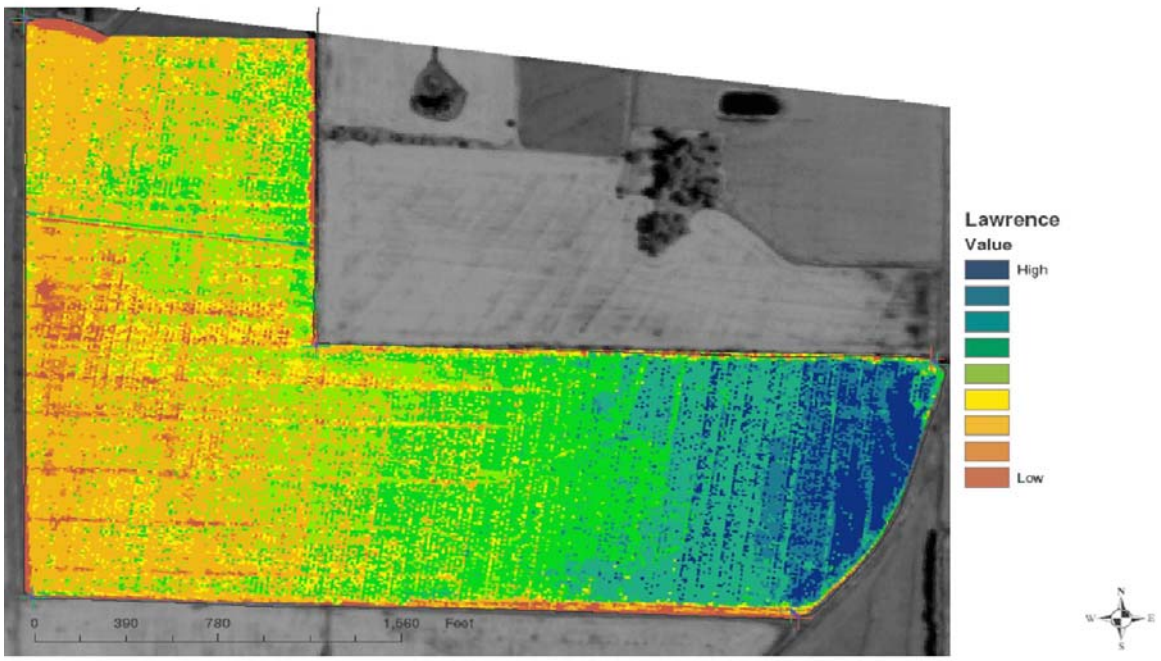

**Figure 8.** Infrared photograph of Lincoln County.

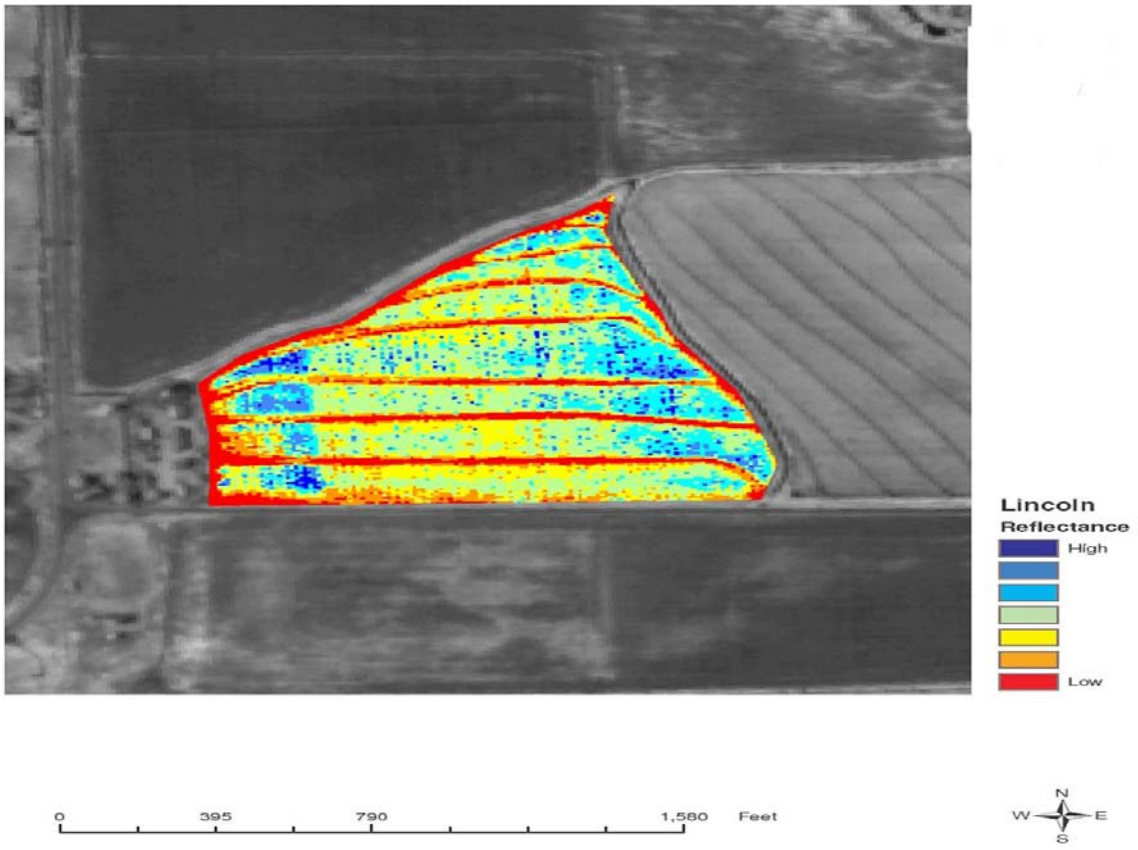

**Figure 9.** Infrared photograph of Mississippi County.

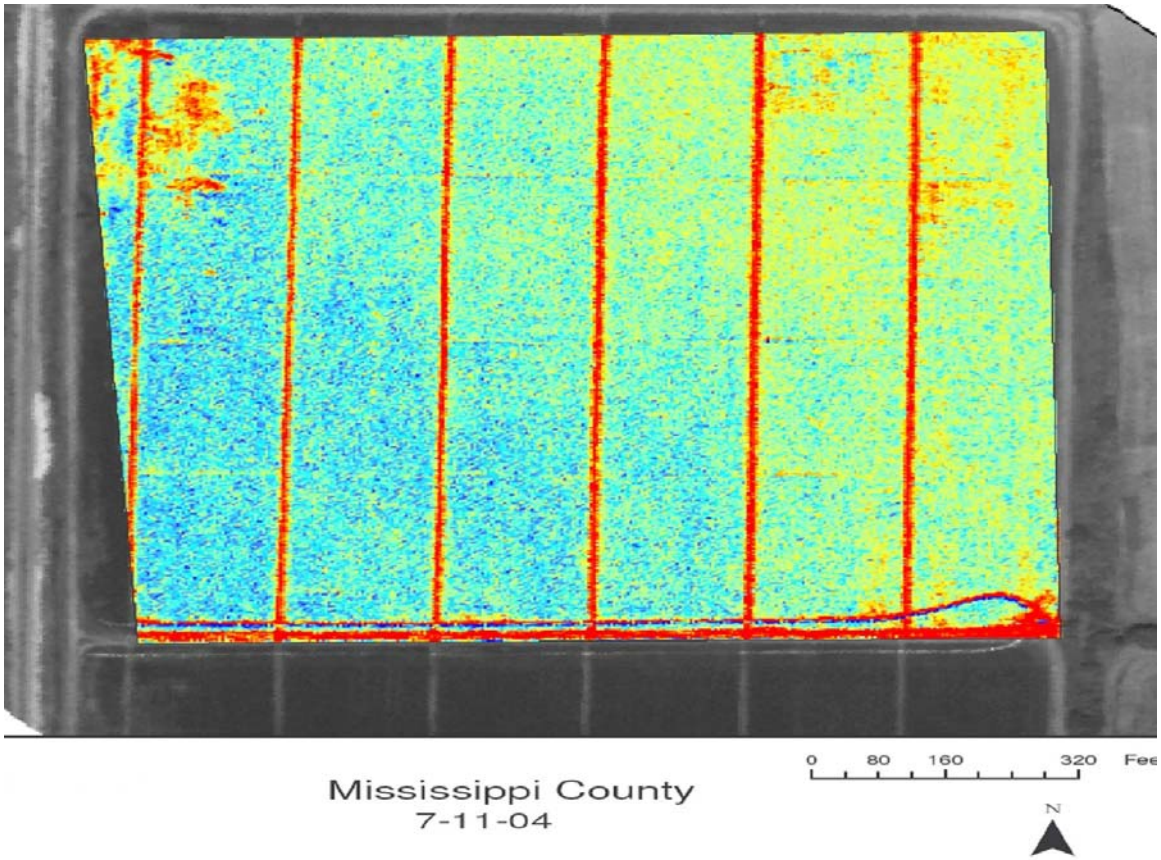

**Figure 10.** Infrared photograph of Poinsett County.