32nd Rice Technical Working Group Meeting

Westin San Diego
400 West Broadway
San Diego, CA
February 18-21, 2008

Hosted by:

University of California, Davis
University of California Cooperative Extension
University of California Agricultural Experiment Station
Committees for 2008

Executive:
Chair: Garry McCauley, Texas
Secretary/Program Chair: Randall (Cass) Mutters, California

Geographical Representatives:
Rick Cartwright, Arkansas
Chris Greer, California
Ronald Rice, Florida
Steve Linscombe, Louisiana
Tim Walker, Mississippi
Gene Stevens, Missouri
Lee Tarpley, Texas

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Don Groth, Louisiana

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David Boethel, Louisiana Experiment Station
Mike French, Extension Service
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Proceedings Coordinators:
Don Groth, Louisiana
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Industry Representative:
Dave Jones, California

2008 Local Arrangements:
Randall (Cass) Mutters, Chair, California
Janice Corner, UC Davis
Luis Espino, UCCE
Larry Godfrey, California
Angela Oates, UC Davis
Location of 2010 Meeting:
Tim Walker Mississippi

Nominations:
Rick Cartwright, Chair Arkansas
Chris Greer California
Ronald Rice Florida
Steve Linscombe Louisiana
Tim Walker Mississippi
Gene Stevens Missouri
Lee Tarpley Texas
Dave Jones Industry

Rice Crop Germplasm:
Karen Moldenhauer, Chair Arkansas
Jim Correll Arkansas
Georgia Eizenga Arkansas
Bob Fjellstrom Texas
James Gibbons Arkansas
Farman Jodari California
Dwight Kanter Mississippi
Jim Oard Louisiana
Mo Way Texas
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Ex Officio:
Harold Bockleman USDA-ARS
Mark Bohning USDA-ARS
David Marshall USDA-ARS
J. Neil Rutger USDA-ARS
Kay Simmons USDA-ARS
Allan Stoner USDA-ARS

National Germplasm Resources Laboratory:
Mark Bohning USDA-ARS
Allan Stoner USDA-ARS
**Resolutions:**
Carl Johnson California
Richard Dunand Louisiana

**Rice Variety Acreage:**
Johnny Saichuk, Chair Louisiana
Chuck Wilson Arkansas
Kent McKenzie California
Curtis Rainbolt Florida
Tim Walker Mississippi
Bruce Beck Missouri
Jim Stansel Texas

**2008 RTWG Panel Chairs:**

**General Session**
Randall (Cass) Mutters California

**Symposium**
James Hill California

**Breeding & Genetics**
Kent McKenzie California

**Economics & Marketing**
Daniel Sumner California

**Plant Protection**
Larry Godfrey California

**Processing, Storage & Quality**
Jim Thompson California

**Rice Culture**
Richard Plant California

**Rice Weed Control & Growth Regulation**
Albert J. Fischer California
RTWG 2008 Program Summary

Sunday, February 17, 2008

8:00 a.m.–4:00 p.m.  S1029 Project Meeting—Pearl
2:00 p.m.–6:00 p.m.  USDA Statistics Workshop—Opal
4:00 p.m.–6:00 p.m.  Plant Pathology Forum—Ivory

Monday, February 18, 2008

Noon–5:00 p.m.  RTWG Registration & Speaker Preparation Area—Mezzanine Foyer
7:00 a.m.–6:30 p.m.  RiceCap Project Meeting—Opal
11:00 a.m.–Noon  Executive Committee—Ivory
Noon–1:30 p.m.  Crop Germplasm Committee—Pearl
1:00 p.m.–2:00 p.m.  Acreage Committee—Ivory
2:00 p.m.–3:00 p.m.  Panel Chairs Meeting—Ivory
Noon–5:00 p.m.  Sponsor Display & Poster Setup—Mezzanine Foyer

3:00 p.m.–5:00 p.m.  General Session—Emerald Room
3:00 p.m.–3:20 p.m.  Welcome & Business
Session Moderator: Randall (Cass) Mutters

3:20 p.m.–4:10 p.m.  California Agriculture: Managing the Political Landscape.
George H. Soares, Legal Counsel, Governmental Affairs Advisor

4:10 p.m.–5:00 p.m.  Farm Bill in Progress: A Look at the End-game.
Reece Langley, Vice President Government Affairs, USA Rice Federation

6:00 p.m.–8:00 p.m.  Welcome Reception—Crystal Ballroom & Foyer

8:00 p.m.–10:00 p.m.  Rice Breeding and Genetics Meeting—Diamond 1

Tuesday Morning, February 19, 2008

7:00 a.m.–5:00 p.m.  RTWG Registration & Speaker Preparation Area—Mezzanine Foyer
7:00 a.m.–5:00 p.m.  Sponsor Display & Poster Setup—Mezzanine Foyer
7:30 a.m.–9:40 a.m.  Technical Sessions—Various Locations (See Concurrent Technical Sessions.)
9:40 a.m.–10:00 a.m.  Break—Foyer
10:00 a.m.–11:30 p.m.  Technical Sessions—Various Locations
11:30 a.m.–1:00 p.m.  Industry Luncheon—Emerald Room (lunch served at 11:45 a.m.).
Moderator: Dave Jones.

California Rice: An Industry as Unique as Its State
Luncheon Speaker: Tim Johnson, President & CEO, California Rice Commission (CRC)
Tuesday Afternoon, February 19, 2008

1:00 p.m.–3:00 p.m. Technical Sessions—Various Locations
3:00 p.m.–3:20 p.m. Break—Foyer
3:20 p.m.–5:20 p.m. Technical Sessions—Various Locations
5:30 p.m.–7:30 p.m. Poster Viewing & Discussion Session—Mezzanine Foyer

Wednesday Morning, February 20, 2008

7:00 a.m.–Noon RTWG Registration & Speaker Preparation Area—Mezzanine Foyer
8:00 a.m.–Noon Symposium: Yield Barriers, Environment, and World Market: Contemporary Challenges to Research, Production, and Trade—Crystal 1 & 2
8:10 a.m.–9:00 a.m. Imitation and Invention: C4 Rice, Crop Production and Poverty Alleviation
John E. Sheehy, Senior Scientist, International Rice Research Institute, IRRI
9:00 a.m.–9:50 a.m. Future Vision: New Challenges for Agriculture, Food Security and Water Resources
Mark Rosegrant, Division Director, International Food Policy Research Institute
9:50 a.m.–10:20 a.m. BREAK—Foyer
William R. Horwath, Professor of Soil Biogeochemistry, Department of Land, Air, and Water Resources, University of California, Davis
11:10 a.m.–Noon Putting China in the World Rice Equation: Technology, Market, and Policy
Scott Rozelle, Senior Fellow, Freeman Spogli Institute for International Studies, Stanford University
Noon–1:30 p.m. Awards Luncheon—Emerald Room. Moderator: Garry McCauley

Wednesday Afternoon, February 20, 2008

1:30 p.m.–3:00 p.m. Rice Culture Technical Session—Crystal 1
3:00 p.m.–3:20 p.m. Break—Foyer
3:20 p.m.–5:00 p.m. Rice Culture Technical Session—Crystal 1

Thursday Morning, February 21, 2008

7:00 a.m.–8:30 a.m. Executive Committee—Diamond 1
8:30 a.m.–10:00 a.m. Closing Business Meeting—Diamond 2
10:00 a.m. Adjourn 32nd RTWG
Panel Business

7:40–8:00  **Expensive Lessons Created by Unassuming Biological Facts, Johnson, C.W.**
The evolution of biotechnology has created a revolution that can overlook basic principles for an efficient dynamic breeding program.

8:00–8:20  **Yield and Agronomic Performance of Variety and Hybrid Rice Blends in Louisiana, Blanche, S.B., Linscombe, S.D., and Sha, X.**
Seed blends of different varieties and hybrids at different ratios were mixed prior to planting and compared with monoculture planting. Plant height, maturity, grain yield, and whole and total milling percentages were evaluated. Data were analyzed as a percentage of the expected based on the performance of the component cultivars in monoculture.

8:20–8:40  **Hybrid Rice Research and Development in the Americas. Chu, Q.R., Cuevas, F. and Nelsen, J.**
A discussion will be presented of RiceTec’s research, development and commercialization of heterosis in large highly-mechanized farming operations in the United States.

8:40–9:00  **Characterization of Very High Tillering and Dwarf Rice Mutant Lines. Mani, D., Tabien, R.E., Harper, C.L. and Frank, P.M.**
Mutants are the potential sources for new gene discovery and functional characterization. A very high tillering and dwarf phenotype was selected from an early generation of L202 x Saber cross. The identified mutants had mean height of 52 cm in field conditions and produced 105 tillers per plant at maturity.

The rc pseudo gene eliminates red pigmentation of the bran in cultivated rice. A functional allele arose by natural mutation within rc in the cultivar ‘Wells’ that restored the reading frame of the gene. This mutation produced a new, dominant,
wild-type allele conferring red pericarp in an elite genetic background.

The Oryza Map Alignment Project (OMAP) has developed a genus-wide model system for the study of rice that will ultimately provide a complete understanding of the genus. The current status of Arizona Genomics Institute and OMAP participants efforts to continuously provide useful and previously unexplored germplasm materials to increase rice genetic diversity and initiate new cultivar development will be presented.

9:40–10:00 Break—Foyer

Panel Moderator: V.C. Andaya
Session Theme: Mapping and Markers

10:00–10:20 SNP Discovery and Utilization: Are We Finally Looking at the Holy Grail of Blending Plant Breeding and Molecular Biology? Scheffler, B.E.
SNPs (Single Nucleotide Polymorphisms) represent a way that DNA markers can be quickly and inexpensively associated with desired traits and cheaper for breeding programs than current marker technology. This talk deals with current efforts to develop SNPs for rice RiceCAP and will hopefully lead to discussions for their proper implementation and utilization.

A diverse collection of 400 rice (O. sativa) accessions representing the five rice sub-populations was genotyped with 30 SSR markers and evaluated for plant, panicle, and seed traits over two years. These traits were compared across sub-populations and to those of the rice ancestral species, O. rufipogon.

10:40–11:00 Using Molecular Markers SSR to search Wild Introgressions from a Relative tetraploid Species in the Diploid Oryza sativa L. Sanabria, Y., Carabalí, J., Olaya, C., Martínez, C.P. and Tohme, J.
A summary will be presented of the breeding and cytogenetic work done to develop fertile interspecific lines from crosses between O.sativa and O.latifolia, an allotetraploid (CCDD)
wild rice species from Latin America.

11:00–11:20 **Characterization of the USDA Rice World Genebank Using a Core Collection Strategy.** Yan, W.G., Agrama, H., Fjellstrom, R.G. and McClung, A.M.
Progress on the characterization of the USDA Rice World Genebank using a core collection strategy will be presented.

11:30–1:00 Industry Luncheon—Emerald Room

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**Tuesday Afternoon, February 19, 2008**
Concurrent Technical Sessions

**Breeding and Genetics—Crystal 1**

Panel Moderator: J. Lage
Session Theme: Core Collection, Mapping, and Disease Resistance

1:00–1:20 **Development of a Mini-core Subset from the USDA Rice Core Collection, Agrama, H, Yan, W.G., Fjellstrom, R.G., and McClung, A.M.**
A mini-core subset derived from the core collection is necessary for extensive study on phenotypic descriptors and associated genetic properties in the current collection. Based on 18 traits and 45 SSR markers for 1,790 accessions, M strategy algorithm will be applied to capture the maximum variability in a reasonable size.

A set of backcross introgression lines containing portions of the TeQing genome now introgressed into a Lemont genetic background allows us to fine map rice QTL, and measure their breeding value within U.S. rice genetic and field environments.

1:40–2:00 **Field Performance Of Marker-Assisted Derived Elite Blast Lines,** Utomo, H.S., Linscombe, S.D., Groth, D.E., and Sha, X.
A preliminary field performance of blast elite lines derived from marker-assisted breeding will be presented. Marker-assisted breeding involved accumulation and fixation of target genes that include succession of crosses (pedigree) to produce intermediate genotypes followed by fixation steps through selfing or double haploidization. Agronomic selection
for traits other than blast resistance was conducted during the fixation steps.

2:00–2:20  **Mechanisms of Rice Blast Resistance and Its Implication for Breeding for Improved Resistance, Jia, Y.**
Detailed analysis of structural and functional relationship of a rice blast resistance gene Pi-ta resulted in a better understanding of co-evolutionary relationship between resistance genes in hosts and avirulence genes in pathogens. The strategic plan for crop protection will be presented.

We are currently investigating the loss of blast resistance in a rice mutant line 2354 derived from a US cv. Katy. The various approaches to identify and physically localize within the rice genome the genetic factor responsible for the loss of resistance will be presented.

2:40–3:00  **Developing a Bengal/O. nivara Advanced Backcross Population to Identify Sheath Blight QTL. Prasad, B. and Eizenga, G.C.**
*Oryza nivara* (IRGC 100898) was identified as moderately resistant to rice sheath blight using three different screening techniques. To explore sheath blight QTL, 279 BC2F2 families were developed using Bengal and this accession. Phenotyping for sheath blight reaction is being conducted with the micro-chamber method and genotyping with 200 SSR markers.

3:00–3:20  Break—Foyer
Panel Moderator: F. Jodari
Session Theme: Disease Resistance, Milling, Jasmine-type breeding, Nutritional Components

The disease reactions of 250 recombinant inbred lines (RILs) of the Lemont with Jasmine 85 F₃ population to the sheath blight pathogen were evaluated using a micro-chamber method. The RIL population was genotyped using 200 simple sequence repeat (SSR) markers. The quantitative trait loci (QTLs) in controlling sheath blight resistance will be presented.

A unique California long grain milling population is being phenotyped for milling and fissuring characteristics within the RiceCAP project. Low milling parent of this population has differences in grain shape, degree of chalkiness, and amylose content, as compared to the high milling parent. Contribution of each factor will be evaluated and the usefulness of this population in the development of genetic markers for each factor will be discussed.

Flowering and Maturity Related Traits as Potential Indirect Selection Index for Milling Qualities in Rice. Tabien, R.E., Samonte, S.O., Harper, C.L., and Tiongco, E.R.

Some flowering and maturity related traits had significant relationship with high whole and total milled grain percentages after evaluating more than 100 rice lines for two years in replicated plots. These could be potential traits for indirect selection while DNA markers for these traits are being developed.

Parental Selection and Cross Combination in Breeding for Jasmine-Type Aromatic Rice Cultivars, Sha, X. and Linscombe, S.D.

Taxonomical, physiochemical, and genetic difference between Thai Jasmine and the U.S. long-grain rice poses a great challenge for the development of adapted Jasmine-type rice cultivars. Different germplasm and cross combinations are compared to maximize the chance of creation and identification of ideal recombinants with very limited resources.

Amino Acid Profiles of High Protein Rice and Development of Mixed Sister Lines For Optimum Composition of Essential Amino Acids. Wenefrida, I., Linscombe, S.D. and Utomo, H.S.

Amino acid profiles of high protein lines will be discussed along with their preliminary yield and other related agronomic traits. It includes development of mixed populations composed of sister lines that have unique amino acids composition.

Discussion and Panel Recommendations
Participants, Panel Moderators and Panel Chair
1:00–1:30 Economic Analysis of Water Conserving Irrigation Methods in Arkansas Rice Production. Watkins, K.B., Hignight, J.A. and Anders, M.M.
Most Arkansas rice acres are irrigated using water intensive contour levee systems. Multiple inlet irrigation and precision leveling result in water savings of 11 to 60 percent when compared with conventional contour levee systems. This study compares the costs and returns of water conserving irrigation methods in Arkansas rice production.

1:30–2:00 Comparative Farm Financial Characteristics, Rice and Other Selected Crops, 2005. Chavez, Eddie, Wailes, Eric, Ahrendsen, Bruce and Dixon, Bruce.
This paper presents the financial characteristics of rice farmers and farmers of other selected crops in the U.S. in 2005. Data are generated from the 2005 Agricultural Resources Management Survey jointly conducted by USDA’s National Agricultural Statistics Service and the Economic Research Service.

2:00–2:30 Evaluation of Optimal Share Rental Arrangements for Rice Production in Louisiana. Salassi, Michael E. and Deliberto, Michael A.
Increased fuel and fertilizer costs in recent years have resulted in many changes in rice rental arrangements. Survey results along with evaluation of factors impacting rice production returns are presented for a variety of share rental arrangements.

3:00–3:20 Break—Foyer

USDA’s 2008 long-term annual supply and use projections for the U.S. rice industry are presented. Emphasis is placed on area response, yield growth, season-average price movements, trade levels, and domestic use. Economic
factors behind these projections are explained, including expectations regarding global trade, international prices, and prices for competing crops.

This paper provides baseline projections of rice production, consumption, trade, and prices for key rice economies, and a preliminary analysis of the 2007 Farm Bill. Estimates are generated from the Arkansas Global Rice Model (AGRM), a non-spatial econometric model developed in the Department of Agricultural Economics and Agribusiness at the University of Arkansas in Fayetteville.

4:20–4:50  How Much Did We Miss? The Potential of including Rice in the FTA with Korea. Sumner, Daniel A.
We model the lost opportunity of a potential free trade agreements options with Korea that include some liberalization of the rice trade. The results suggest that the implications for Korea would have been moderate losses and the gains for U.S. producers would have also been moderate given the potential trade diversion. We also discuss implications in the context of the WTO deal still under negotiation.

Current House and Senate farm bill proposals provide for enrollment in a countercyclical revenue program. Variability in state level prices and yields will create winners and losers under both the House (national revenue trigger) and Senate (state revenue trigger) plans. This study evaluates the economic impact of each proposal on U.S. rice producers.

Tuesday Morning, February 19, 2008
Concurrent Technical Sessions
Plant Protection—Diamond 1
(presenter in italics if known)

Panel Moderator: Larry Godfrey

8:00–8:20  Rice Water Weevil Populations, Damage, and Insecticidal Efficacy Relative to Planting Date. Way,
Experiments were conducted at the Beaumont Center from 2005-2007; treatments were registered insecticides applied at recommended rates and times. Planting dates extended from early March through early June. Rice water weevil populations were monitored about three weeks after flood and 10 days later on the main crop and yields recorded.

8:20–8:40  
**Evaluation of Insecticides for Management of the Rice Water Weevil in Louisiana.** Stout, M.J., Lanka, S., Barbee, G. and Riggio, M.R.

Several granular and seed treatment formulations of insecticides have been evaluated in recent years as replacements for the pyrethroid insecticides currently registered for use against the rice water weevil. Key results of these evaluations will be presented.

8:40–9:00  
**Induced Resistance in Rice to the Rice Water Weevil (Lissorhoptrus oryzophilus) Using Jasmonic Acid.** Hamm, J.C., Stout, M.J., Riggio, R.M., and Pourian, S.

Treating rice plants at the two-three leaf stage with exogenous applications of JA reduced the number of eggs oviposited as well as densities of first and late instar larvae in greenhouse experiments. Similar experiments were undertaken in field plots using different varieties. Our field data did not show any significant effect of JA on *L. oryzophilus* oviposition or larval densities; however, our data indicates a significant variety effect.

9:00–9:20  
**Response of Water-seeded Rice to Insecticidal Control of Target and Non-target Aquatic Insects.** Pearson, R.A., Way, M.O., Nunez, M.S. Espino, L. and Weiss, M.

The objectives of this research were: 1) to determine if selected non-target, aquatic insects are responsible for uprooting rice seedlings, 2) determine if these insects are affected by the insecticides fipronil (Icon 6.2FS) and lambda-cyhalothrin (Karate Z) applied in different planting regimes to control rice water weevil, and 3) evaluate the effectiveness of these insecticides against the rice water weevil.

9:20–9:40  

Registered and experimental insecticides were evaluated for their efficacy against rice water weevil as well as their effects...
on populations of non-target invertebrate organisms in rice fields. Both pre-plant applications and post-flood treatments were utilized and compared.

9:40–10:00 Break—Foyer

Panel Moderator: Larry Godfrey
Plant Protection

10:00–10:20 The Panicle Rice Mite, a New Pest of Rice in the United States. Hummel, Natalie.
The panicle rice mite (PRM), Steneotarsonemus spinki, was found in breeding greenhouses and a few rice fields in Arkansas, Louisiana, Texas, and New York in summer of 2007. Including five commercial fields in Louisiana. This talk will summarize the areas infested, regulatory action initiated, educational programs, and survey efforts underway.

Rice stink bug injury to rice was determined in field experiments by caging male and female insects with panicles at different stages of development for 48 h. Percentage peck was determined and this information used to review current economic injury levels and propose new ones.

10:40–11:00 Influence on Germination and Growth of Rice Seedlings from Seed Damaged by Rice Stink Bug. Bernhardt, J. and Moss, T.
The influence on germination and seedling growth on rice seeds from different amounts of rice stink bug damage was investigated in three rice cultivars, Bengal, Cocodrie and Wells. Evaluations of response differences between cultivars for germination, vegetative and root growth will be presented.

11:00–11:20 Panel Business—Entomology

11:30–1:00 Industry Luncheon—Emerald Room

Tuesday Afternoon, February 19, 2008
Concurrent Technical Sessions
Plant Protection—Diamond 1

Panel Moderator: Larry Godfrey

1:00–1:20 Oviposition Preference of the Sugarcane Borer, Diatraea saccharalis (F.) among Previously Infested
Plants and Different Rice Varieties. Hamm, J.C., Stout, M.J., and Riggio, R.M.
The oviposition preference of the sugarcane borer, Diatraea saccharalis (F.), was investigated using five different varieties at the late boot stage. Although no significant differences were found between varieties, the hybrid variety XP744 contained more than twice as many egg masses as Priscilla. In another experiment, females were presented with plants infested with conspecifics and uninfested plants. Females chose to oviposit on clean, uninfested plants. Results and implications will be discussed.

1:20–1:40

Tolerance and Compensatory Response of Rice to Sugarcane Borer (Lepidoptera: Crambidae) Injury. Lv, J. and Wilson, L.T.
The presented research evaluated the compensatory response of rice to sugarcane borer injury on three rice cultivars at three crop growth stages. Two mechanisms of plant compensation were observed. Stem injured plants produced more tillers than uninjured plants, while tillers with leaf and leaf sheath injury produced larger panicles.

1:40–2:00

DuPont™ Dermacor™ X-100 seed treatment for rice is a new insecticide from DuPont, in a new chemical class, the Anthranilic diamides. Results from a three-year research program indicate that Dermacor™ X-100 is very effective in protecting the roots from rice water weevil (Lissorhoptrus oryzophilus) larval damage, providing increased yield. Recent data indicate Dermacor™ X-100 can control other important insect pests of rice, including the Mexican rice borer (Eoreuma loftini), the sugarcane borer (Diatraea saccharalis), and the South American rice miner (Hydrellia wirthii).

Panel Moderator: Chris Greer
Plant Protection

2:00–2:20

An Epidemic of Narrow Brown Leaf Spot on Rice in 2006 in Louisiana and Its Control. Groth, D.E.
Narrow brown leaf spot, caused by the fungus Cercospora oryzae, developed to epidemic levels in 2006 causing significant yield losses. Fungicides and varietal resistance provide good control in 2007.

2:20–2:40

Resistance to Stem Rot from Oryza rufipogon and
Oryza nivara and O. rufipogon have resistance to stem rot. Results from introgression of this resistance into California varieties will be presented (significance of level of resistance, segregating population distributions, breeding strategy, yield improvement, molecular markers).

2:40–3:00 Sheath Blight Control Using a Fungicide with and without a Spray Adjuvant. Allen, T.W. and Walker, T.W.
The oral presentation will discuss fungicide trials in both small plot and on farm (strip trial) experiments to control sheath blight in rice. Fungicide trials addressed the issue of whether or not to include a spray adjuvant.

3:00–3:20 Break—Foyer

Varieties differ to their susceptibility to sheath blight and also differ to the level of loss within the same susceptibility rating. Disease nurseries and yield loss trials are needed to accurately characterize varietal response to sheath blight.

3:40–4:00 Compare and Contrast Invasive Growths and Global Gene Expressions of Rice after Infections with Rice Blast and Sheath Blight Pathogens. Jia, Y. and Valent, B.
Comparative studies were performed on invasive growth of rice blast and sheath blight pathogens on global gene expressions after the pathogen inoculation. Results impacting on rice crop protection will be presented.

4:00–4:20 Field Resistance as a Primary Rice Blast Control Strategy. Lee, F.N.
Modern and historical data defines field resistance as a primary blast control mechanism. New blast resistant varieties typically are overwhelmed, usually within two or three years, by either previously minor contemporary races or new races of M. grisea. Growers grow culturally desirable compromised varieties with significant field resistance but discard others.

4:20–4:40 Panel Business—Plant Pathology
7:30–7:40 Panel Business

7:40–8:00 AM Draft Beer Using Black Rice As Malt Adjunct. Andrade, C.M, Almeida e Silva, J.B.
Draft beer was made from a black variety of rice recently established in Brazil. This beverage was prepared using a standard industrial technological process in the University of São Paulo’s Pilot Plant. The beer had a 4.70±0.12% alcohol content, a dark color and strong flavor.

Eleven samples of short, medium, and long grain milled rice representing scented and non-scented rice and a wide range of amylose contents were cooked with or without presoaking. Although presoaking caused varying effects on flavor for individual rice types, it resulted in significant increases in summed negative flavor attributes and significant decreases in summed positive flavor attributes for all rice samples grouped.

As the degree of milling increased, there was an increase in whiteness, cooked rice expansion volume, and water uptake. As milling time increased there was a decrease in total milled rice yield, head rice yield, protein, and surface lipids, and cooked rice hardness. Rice cooked using the optimum-water method was harder, less sticky, and staled faster than rice cooked with the excess-water method.

8:40–9:00 Functional Properties as Affected by Laboratory-Scale Parboiling of Rough Rice and Brown Rice. Patindol, James, Newton, Jumaane and Wang, Ya-Jane.
This work studied the functional properties of parboiled rice samples prepared from rough rice and brown rice. Samples from cultivars Bolivar, Cheniere, Dixiebelle, and Wells were parboiled under mild and severe laboratory-scale conditions.
Functionality was evaluated in terms of milling yield, color, thermal, pasting, cooking, and textural properties.

9:00–9:20 The Use of Silica Gel in Drying Small Samples of Rough Rice. Owira, G.O., and Siebenmorgen, T.J.
Small samples of rice with various moisture contents were dried to desired moisture contents within an average of seven days by using silica gel packets. The adsorptive capacity of one and five g silica gel packets in rice placed in plastic bags was determined to be approximately 25%.

Rough rice drying data were generated in a laboratory system using air temperatures ranging from 60°C to 90°C and relative humidity levels to simulate drying at various regions of the state diagram for rice. Air flow rates were adjusted to fluidize a 5-cm drying bed.

9:40–10:00 Break—Foyer

The sample preparation procedures of rough rice are closely related to the accuracy of rice milling quality appraisal. The objective of this research was to investigate the effect of the drying procedures and storage duration on rice milling quality. The results provided guidance for determining appropriate drying temperature and minimum storage duration before milling.

10:20–10:40 Optimal Harvest Moisture Contents For Maximizing Milling Quality of Long- and Medium-Grain Rice Cultivars. Bautista, R.C., Siebenmorgen, T.J. and Counce, P.A.
Multiple samples per field of several cultivars were harvested in AR, MS, and MO in 1999 through 2006 to determine the harvest moisture contents (HMCs) at which rice milling quality peaked. Generally, the relationships between head rice yields and HMCs were quadratic; the various trends will be presented.

10:40–11:00 Factors Affecting Rice Sample Milling. Pan, Zhongli, Khir, Ragab and Thompson, James F.
Rice milling quality is normally appraised by milling a small amount of rough rice sample. This research studied the effect of milling temperature, pressure and time on the results of
milling quality. Appropriate milling conditions are suggested for obtaining representative milling quality from rice sample milling.

11:00–11:20 **Milled Rice Fissure Occurrence Kinetics.** Siebenmorgen, T.J., Estorninos, L.E. Jr., and Bautista, R.C.

A system was assembled to measure the rate at which fissures appeared in milled rice kernels. The data indicates that fissures can occur within minutes if kernels are exposed to severe moisture adsorbing or desorbing environments. Trends in fissure occurrence will be presented with effects due to several variables.

11:30–1:00 Industry Luncheon—Emerald Room

**Tuesday Afternoon, February 19, 2008**

Concurrent Technical Sessions

**Processing, Storage & Quality**

Panel Moderator: Melissa Fitzgerald
Session Theme: Quality

1:00–1:20 **Amylose Content—Rice Chemists of the World Unite to Make It a Useful Predictor of Quality.** Fitzgerald, Melissa.

Amylose content contributes to variability in the sensory properties of rice. The International Network for Quality Rice (INQR) is bringing new science to the old trait of amylose content to determine global consistency in amylose assays, with the longer term aim of moving beyond apparent amylose to real amylose and to its fractions.

1:20–1:40 **Exploring the Use of Oryza Species to Enhance the Lipid Fraction of Cultivated Rice.** Bergman, C., Goffman, F. and Chen, M.H.

This study evaluated Oryza species as a genepool for improving the lipids of rice grain. Greenhouse grown accessions of eleven Oryza species, and eight rice (Oryza sativa L.) species, demonstrated the lipid fraction of cultivated rice can be improved for the production of margarine, shortening and frying oils using Oryza wild species in targeted breeding efforts.

1:40–2:00 **Rice Property Characterization Database.** Bautista, R.C., Siebenmorgen, T.J., Meullenet, J.F., Counce, P., Gibbons, J., Moldenhauer, K., Morawicki, R. and
Mauromoustakos, A.
A database is being developed with the goal of correlating rice milling and functional properties to growing location, cultivar, harvest moisture content and environmental conditions (nighttime air temperatures and relative humidities). Part of this study involves an ongoing economic analysis of rice harvest timing and development of multiple NIR calibrations of rice functional properties.

2:00–2:20 Progress Made on the Development of High Iron and Zinc Rice for Latin America and the Caribbean Region. Martínez, César, Borrero, Jaime, Carabalí, James, Pereira, Almeida, Jose, Neves, Pericles and Tohme, Joe.
Landraces and breeding lines conserved in germplasm banks were first screened for mineral content to identify products that could have immediate utility as varieties or donors for a second phase to combine high-iron and zinc with high yield potential, tolerance to main biotic and abiotic stresses, and good grain quality.

Field studies were conducted in 2004-2007 with selected rice varieties to evaluate arsenic concentration and speciation (methyl-arsenic: inorganic-arsenic ratio) in the rice grain. There were substantial differences between rice varieties for each of these traits, which demonstrate the potential to select and breed rice varieties for negligible potential arsenic hazard.

2:40–3:00 Effect of Nitrogen Application and Crop Rotation on Rice Grain Quality. Bryant, R.J., Anders, M.M., and McClung, A.M.
Nitrogen is used by farmers to increase rice yields. However, it also affects the quality of the rice grain. One of the known effects is an increase in protein content. This increase in protein means a decrease in the starch content and a change in the RVA profile.

3:00–3:20 Break—Foyer

Rice can yellow during storage. Although postharvest yellowed (stackburn) rice is reduced in value, no study
has tested diverse rice varieties to identify non-yellowing varieties. A number of southern U.S. varieties were tested under laboratory conditions and all showed some level of yellowing. The range of yellowing was relatively high and narrow indicating that a more diverse group of rice should be investigated.

3:40–4:00 **Processing Efficiency and Quality of Paddy Rice Dried with Infrared Radiation Heating.** Pan, Zhongli, Khir, Ragab, Thompson, James, Godfrey, Larry D. and Champagne, Elaine.
Infrared radiation heating has been studied for drying paddy rice and disinfestation. The results showed that infrared drying had high drying rate and produced high quality milled rice with similar sensory quality as conventional heated air drying. The drying method can also be used for paddy rice disinfestation without compromising the milling quality.

4:00–4:20 **Head Rice and Weather Relationships at The Field Scale.** Marchesi, C.E., Thompson, J.F., Mutters, R.G. and Plant, R.E.
Variability in weather conditions prior to harvest affects final grain quality, measured as head rice. We tested the model of Thompson and Mutters (2006) at the field scale to determine its applicability in the Sacramento Valley, taking into account regional differences in fissuring susceptibility based on historical weather data.

Two seasons of field-testing have demonstrated that variety M206, and to a lesser extent M205, are much more resistant to fissuring and low harvest moisture contents compared with the older M202 variety. Earlier than normal draining does not reduce the yield of M206.

**Tuesday Morning, February 19, 2008**

Concurrent Technical Sessions
**Rice Culture—Crystal 2**
(presenter in italics if known)

Moderator: Richard Plant
Session Theme: Rice Culture

7:30–7:40 Panel Business
7:40–8:00  Influence of Poultry Litter on Rice Yields in Missouri. Aide, Michael, Beighley, Donn, Mueller, Wesley, Braden, Indi and Dillivan, Kim.
A two year Missouri trial using rice amended with poultry litter, urea and concentrated superphosphate. Yields increased with increasing urea and superphosphate. Poultry litter did not increase yields, because anaerobic soil conditions inhibited poultry litter mineralization. Soil tests indicated a substantial increase in soil phosphorus because of poultry litter.

8:00–8:20  Soil Quality Changes in Rice Rotations. Anders, Merle.
Soil samples were collected from a long-term rice rotation study that contained seven rotations managed as no- and conventional-till. Results indicated that water stable aggregates were significantly affected by rotation and tillage. No-till and increasing the frequency of rice in the rotation resulted in more soil aggregates and carbon.

The results of a state-wide survey of silica content of rice, flood water and soils in Louisiana rice fields will be presented.

8:40–9:00  Impact of land forming and cultural management on rice irrigation input requirements. McCauley, Garry N.
Water accounts for about 20 percent of the production cost. This study characterized the main and ratoon crop water budgets for rice fields over a two year period. Water requirements were compared for conventions fields, zero and precision graded fields and multiple inlet fields.

Experiments were done to identify key processes which might limit rice production under high nighttime temperature. Three protective chemical treatments were used to negate effects of high nighttime temperature on rice production. Application of the preventive chemicals negated the negative effects of high nighttime temperature by affecting key processes.

9:20–9:40  Comparison of Selected Irrigation Methods and Water use for RiceTec Hybrid Rice Production in Poinsett County Arkansas and Brazoria County,
Field studies were conducted in 2006 and 2007 in Poinsett County, Arkansas at the RiceTec Arkansas Business Center near Harrisburg, Arkansas, and at the Gary Sitzer Farm near Weiner, Arkansas to compare water use for selected irrigation methods and RiceTec rice hybrids and locally recommended rice cultivars.

9:40–10:00 Break—Foyer

Session Moderator: Richard Plant
Session Theme: Hybrid Rice

10:00–10:20 Nutrient Uptake Comparison between RiceTec XL723 and Trenasse. Frizzell, D.L., Dawson, V., Norman, R.J., Wilson, C.E., Jr., Branson, J.D., Roberts, T.L. and Slaton, N.A.
The nutrient uptake of RiceTec Hybrid XL723 and ‘Trenasse’ will be compared over several N rates.

Hybrid rice was grown in research plots with either the recommended N fertility or with a regime typical for inbred rice cultivars in Texas. To counter the increased tendency of the hybrid rice to lodge with the higher N rate, the use of a plant growth retardant was evaluated.

10:40–11:00 The Potential for Maximizing Nitrogen Use Efficiency in Hybrid Rice Using a Plant Growth Regulator. Walker, Timothy W., Tarpley, Lee and Bond, J.A.
The effect of a plant growth regulator on yield and yield components under recommended and above recommended nitrogen rates will be shown.

11:00–11:20 The Physiology of Hybrid Vigor. Wilson, L.T., Medley, J., and Samonte, P.B.
Hybrid rice is produced by crossing inbred genotypes, which usually results in increased leaf- and canopy-level rates of photosynthesis, and often increased yield. The basis for elevated rates of photosynthesis is only partially understood. The research presented herein focuses on identifying the underlying physiological basis for rice hybrid vigor.

11:30–1:00 Industry Luncheon—Emerald Room
Tuesday Afternoon, February 19, 2008
Concurrent Technical Sessions
Rice Culture—Crystal 2

Moderator: Richard Plant
Session Theme: Management & Modeling

1:00–1:20 Utilization of On-Farm Testing to Evaluate Performance of Rice Cultivars. Branson, J.D., Frizzell, D.L., Yingling, J.A., Parsons, C.E., Wilson, C.E., Jr., Cartwright, R.D. and Runswick, S.K. Commerciyavailable cultivars and advanced experimental lines are evaluated annually at several on-farm locations to determine performance in various environments. Performance characteristics such as grain yield, milling yield, lodging, disease resistance, and insect resistance are measured.

1:20–1:40 Spatial Estimations of Water Use in Sacramento Valley Rice Cultivation. Hauselt, Peggy and Plant, Richard. A spatial water-balance model was developed for rice production in the Glenn- Colusa Irrigation District with a geographic information system (GIS). Monthly precipitation, irrigation, percolation, evapotranspiration, and surface runoff were estimated. The multi-scale model was run at various spatial resolutions: fields, sub-districts, and district.

1:40–2:00 Nutrient Management Challenges with Changing Water Management Practices in California Rice Systems. Linquist, Bruce, Lundy, Mark, Ruark, Matt, Koffler, Kaden and van Kessel, Chris. We will discuss developing nutrient management challenges as related to changes in water and herbicide management.

2:00–2:20 A Model to Predict Safe Rice Field Draining Dates and Field Tests of the Model Predictions in the Arkansas Grand Prairie. Counce, P.A., Watkins, K.B., Brye, K.R. and Siebenmorgen, T.J. A computer program has been developed to predict the stage of development for draining rice at which the risk of reduced grain yield or milling quality from insufficient water is considered to be near zero. The parameters of the model are predictions of (1) temperature projections during rice reproductive growth stages (RRGS) starting at R3, (2) timing of various RRGS, (3) maximum amounts of water used by the rice crop at each growth stage and (4) the water held in the soil profile after draining which is available to the rice crop. Draining at stages of development predicted by the model did
not affect yield or milling quality relative to the control for any year or location.

Input Costs and net returns from fields in the Arkansas Rice Research Verification Program will be compared to state average input costs and net returns. Production management practices that result in reduced input costs will be highlighted.

2:40–3:00  A Twenty-Five Year Summary of the University of Arkansas Rice Research Verification Program. Runsick, S.K., Wilson, C.E., Jr., and Watkins, K.B.
Since 1983, the Rice Research Verification Program has been conducted on 275 commercial rice fields in 33 rice-producing counties in Arkansas. Producers that have participated in the program have typically increased their yields and have reduced their production expenses.

3:00–3:20  Break—Foyer

The most common means used by rice farmers to determine whether their rice is ready to harvest is to harvest a small area of their field with a combine then measure the moisture in that sample. The time and expense involved can be avoided by taking hand samples, measuring the moisture then adding a factor to obtain an accurate estimate of harvest moisture.

A rice study was conducted to develop thresholds for deciding when midseason nitrogen is needed using visual measurements and digital-photography. Observations were made by floating a yardstick in floodwater between rows. Inch numbers were counted that were not obstructed by overhanging leaves. Digital images were recorded from above the canopy.

4:00–4:20  Production Progress Resulting from Thirty Years of The Rice Check-Off Program in Arkansas. Wilson,
C.E., Jr., Moldenhauer, K.A.K, Norman, R.J., Cartwright, R.D., Frizzell, D.L. and Branson, J.D. The Rice Check-off program has been implemented in Arkansas for approximately 30 years. As the result of the funding from the program, the development of improved technology has been made possible. This improved technology has resulted in greater yields and greater production efficiency.


Wednesday Afternoon, February 20, 2008 Concurrent Technical Sessions Rice Culture—Crystal 1

Moderator: Richard Plant
Session Theme: Mineral Nutrient Management

1:30–1:50 Rate Effect of HM9754A on Rice Production in Two P & K Soil Fertility Regimes. Dunn, D.J., Stevens, G., Kenty, M.M. and Alford, B.
A three-year rate evaluation of HM9754A, an organic soil amendment, was conducted in Missouri. This evaluation was conducted on two research areas. On one area the P & K soil test levels were maintained at optimum levels. On the second level P & K soil test levels were below optimum.

1:50–2:10 Evaluation of Conventional and Reduced Tillage Practices on Optimum Seeding Rate, Nitrogen Fertilization Rate and Yield Components. Harrell, D.L.
Optimum seeding and nitrogen fertilization rates will be determined and compared when rice cultivars are drill seeded to a conventional or stale seedbed tillage system. A semi-dwarf long grain and a medium grain rice variety were evaluated in independent studies.

2:10–2:30 Evaluation of First Crop Cutting Height on Ratoon Crop Yield and Panicle Origin in Drill Seeded Rice. Harrell. D.L. and Dunand, R.T.
Main crop cutting heights of 9 and 18 inches were evaluated for their effect on ratoon crop yield, maturity, panicle density, panicle weight and origin of panicle growth.
2:30–2:50 Rice Seeding Rate and Row Spacing Revisited. **Buehring, Nathan W., Walker, Timothy W., and Bond, Jason A.**

Two rice cultivars were planted at equal seeds per foot of row for 8” and 10” spacing on two contrasting soil types. Yield and Yield component data will be presented.

2:50–3:20 Break—Foyer


Rice grain yield and N uptake data from multiple site-years will be presented. Comparisons between preplant applied polymer coated and preflood applied urea will be discussed.

3:40–4:00 Potassium Fertilization Influences Growth, Yield, and Stem Rot Severity of Rice. **Maschmann, E.T., Slaton, N.A., Cartwright, R.D., Norman, R.J., DeLong, R.E., Wilson, C.E., Jr., and Micheri, P.H.**

Rice grain yield, tissue K concentrations and stem rot severity of rice as affected by K fertilization will be discussed.


Urease inhibitors have been promoted as a means to significantly slow ammonia volatilization losses from urea. Laboratory and field studies were conducted comparing the ammonia volatilization and influence on rice grain yield of urea, ammonium sulfate, Agrotain coated urea or Nutrisphere coated urea applied at different times prior to flooding.


Evaluating the effectiveness of three soil-based nitrogen tests (Illinois Soil Nitrogen Test, Direct Steam Distillation and Total Nitrogen by Combustion) in predicting nitrogen fertilizer needs for Arkansas rice.

4:40–5:00 Annual Potassium Fertilization Influences Rice and Soybean Yields and Soil-Test Potassium. **Slaton, N.A., DeLong, R.E., Norman, R.J., Wilson, C.E., Jr.,**
and Golden, B.R.
The presentation will discuss rice and soybean yield responses to annual K-fertilizer rate across time for a study initiated in 2000 on an alkaline Calhoun silt loam. Data will be presented on annual rice and soybean yield, tissue K concentrations, and soil-test K.

Tuesday Morning, February 19, 2008

Concurrent Technical Sessions
Weed Control & Growth Regulators—Opal
(presenter in italics if known)

Panel Moderator: A.J. Fischer
Session Theme: Herbicide Options and New Chemicals

7:30–7:40 Panel Business

Volunteer glyphosate-tolerant soybean has been a problem in Mississippi rice production for a number of years, and this weed is becoming increasingly troublesome. Herbicide programs for managing glyphosate-tolerant soybean will be presented.

Permit (halosulfuron) and Strada (orthosulfamuron) provided good to excellent control of barnyardgrass, hemp sesbania, and morningglory, when tank-mixed with propanil in conventional rice or imazethapyr in Clearfield rice.

When applied PRE at rates of 17.5 and 26.3 g ai ha⁻¹, aminopyralid provided 19 wk control of hemp sesbania. Conventional patty rice grown on a clay soil exhibited adequate crop safety at these rates.

8:40–9:00 Weed Control in Drill-Seeded Rice with Halosulfuron. Williams, B.J., Godara, R.K., Burns, A.B.
Preplant and preemergence weed control with halosulfuron in drill-seeded rice will be discussed.
9:00–9:20  **Annual Weed Control in Drill-Seeded Rice with V-10142. Williams, B.J., Godara, R.K., Burns, A.B.**
Programs utilizing V-10142 for barnyardgrass, Amazon sprangletop, hemp sesbania and annual sedge control in drill-seeded rice will be discussed.

9:20–9:40  **Evaluation of V-10142 for Weed Management in Drill-Seeded Rice. Godara, R.**
Field experiments were conducted at LSU AgCenter’s Northeast Research Station near St. Joseph, LA on a Sharkey Clay soil in 2005, 2006 and 2007 to evaluate preemergence and postemergence activity of V-10142 against annual weeds in drill-seeded rice.

9:40–10:00  Break—Foyer

Panel Moderator: H. Yasuor
Session Theme: Weed Management, Drift and Herbicide Interactions

10:00–10:20  **Effects of Simulated Glyphosate and Imazethapyr Drift on Rice. Hensley, J.B.**
Two studies were conducted at the LSU AgCenter Rice Research Station near Crowley, Louisiana in 2005, 2006, and 2007 to evaluate the effects of simulated herbicide drift on rice.

Research evaluating rice response to postflood applications of bispyribac, quinclorac, penoxsulam, and cyhalofop will be presented.

10:40–11:00  **Penoxsulam and Propanil Interaction on Alligatorweed (Alternanthera philoxeroides) Control as Influenced by Temperature. Willingham, S.D., McCauley, G.N., and Chandler, J.M.**
In field and greenhouse studies, alligatorweed control is reduced from penoxsulam plus propanil tank mixes compared to penoxsulam alone. Lower temperatures resulted with increased control compared to higher temperatures. Propanil application 10 days after penoxsulam at 30˚C and 3 days after at 27 or 21˚C is suggested for alligatorweed control.

11:00–11:20  **Weed Management in Louisiana Rice. Webster. E.P., Bottoms, S. L., Hensley, J.B., and Atwal, J.S.**
Several weed management trials were conducted at the
Louisiana State University Agricultural Center Rice Research Station in 2006 and 2007. Results indicate that management of grass, broadleaf, and aquatic weeds may be controlled with products not considered to be broad spectrum herbicide.

11:30–1:00 Industry Luncheon—Emerald Room

Tuesday Afternoon, February 19, 2008
Concurrent Technical Sessions
Weed Control & Growth Regulators—Opal
Panel Moderator: J.W. Eckert
Session Theme: Weed Biology, Herbicide Resistance and Ecophysiology

1:00–1:20 Competitiveness of Creeping Rivergrass in Louisiana Rice Production. Bottoms, S.L., Webster, E.P., Hensley, J.B. and Atwal, J.
Two field studies were conducted evaluating the competitiveness of creeping rivergrass in rice production. One study evaluated the growth, development and yield of rice in response to different creeping rivergrass densities. The second study evaluated creeping rivergrass biomass production in response to different rice densities.

Whole plant and pigments content after clomazone and 5-keto clomazone application in resistant and susceptible biotypes in the presence of cytochrome P450s inhibitors. Metabolic profiling of late watergrass biotypes using LC-MS and its response to clomazone. 14C-clomazone absorption, translocation and metabolism in late watergrass. R biotype is also resistant to paraquat.

1:40–2:00 Gene Flow from Weedy Rice Populations to Cultivated Rice Varies by Plant Type. Shivrain, V.K., Burgos, N.R., Smith, K.L., and Gealy, D.R.
To determine rates of gene flow from red rice to rice, seeds of rice cultivar grown amid 12 red rice biotypes were field-planted. Putative hybrid plants distinguished by morphology were confirmed hybrids by genetic assays and characterized. Significant differences in rate of outcrossing to rice were observed between red rice types.

2:00–2:20 Rising Carbon Dioxide As a Selection Factor in Rice/Red Rice Competition. Ziska, L.H. and McClung, A.
To determine if increases in atmospheric carbon dioxide differentially affected crops and weeds, six different varieties of cultivated and wild (weedy) rice were examined at CO$_2$ concentrations corresponding roughly to the 1950s, current level, and predicted by 2050. This data and its inference for food security will be of interest for policy makers, scientists, agronomists and plant breeders.

Rice cutgrass interference with rice and herbicide management options for controlling rice cutgrass will be presented.

2:40–3:00  **Encouraging Rice Recovery from Glyphosate Drift Using Fertilizer. Scott, R.C., Wilson, Jr., C.E., and Bond, J.**
Although two- to three-leaf rice can recover from significant injury caused by glyphosate drift and yield a relatively normal yield, some grower cost will likely occur. Treatments or recommendations that could shorten this recovery time would be valuable to producers and to those responsible for the drift injury. Studies were conducted at three locations in 2007 to evaluate the use of ammonium sulfate (AS) and di-ammonium phosphate (DAP) to aid in rice recovery following a glyphosate drift event.

Tank-mix combinations of cyhalofop-butyl and quinclorac applied seven days prior to permanent flood provided 91 to 100% control of barnyardgrass and Amazon sprangletop. Combinations of the herbicides provided greater control of both species than either herbicide applied alone at the same rate.

3:20–3:40  Break—Foyer
Tuesday Evening, February 19, 2008
Poster Viewing & Discussion Session—Foyer/Mezzanine Area
Authors Present from 5:30–7:30 p.m. (presenter in italics, if known)
Cash Bar from 5:30–7:30 p.m.

Breeding & Genetics

1. **The Straighthead Susceptibility Trait is Not Related to Grain Arsenic Concentration.** Raghvan, T., Yan, G.W., Agrama, H. A., James, W. D., Gentry, T. J., and Loeppert, R. H.
   Field studies with selected rice varieties from the USDA world germplasm collection were conducted in MSMA-amended and native high As plots in 2004 and 2005 to determine the relationships between straighthead susceptibility, rice yield, and grain-As concentration. Results have indicated that straighthead susceptibility and grain arsenic concentration are independent traits.

2. **Analysis of the Effectiveness of the Rice Blast Resistance Gene Pi-ta.** Costanzo, S., Wang, X., and Jia, Y.
   The alternative splicing event of plant genes is a relatively frequent event. We are currently investigating the occurrence of alternative splicing in a major blast resistance gene Pi-ta. The biological significance of this important mechanism in a gene controlling blast resistance will be presented.

3. **Enhancement of Yield through Chromosomal Introgressions from Oryza rufipogon.** McClung, A.M., Moon, S., Eizenga, G. and McCouch, S.
   Putative chromosomal regions associated with yield enhancement were identified in a Jefferson/O. rufipogon backcross population. Additional backcrossing resulted in isolated introgressions incorporated into Jefferson. Replicated yield trials conducted at four southern locations in 2007 confirmed that some of these introgressions improved overall yield of the commercial cultivar.

4. **Genotype x Trait Interaction in U.S. Rice Cultivars.** Samonte, O.S. PB, Tabien, R. E., and Wilson, L.T.
   U.S. rice cultivars that served as checks in the URRN in 2005 and 2006 were analyzed for genotype x trait interaction and significant relationships among traits were determined. Rice cultivars that performed well in certain traits (e.g. tillering, leaf area, milling quality, panicle weight, and grain yield) were also identified.

5. **Spatial Yield Variability in the URRN.** Samonte, S.O., Tabien, R. E., and Wilson, L.T.
   In the analysis of grain yield data from the URRN, coefficients of
variation (CV) and determination (R2) were improved using the ANACOVA, with nearest neighbor estimates of position effect as covariates, instead of the traditional ANOVA. Effects of plot arrangement in rows and columns on grain yield were also estimated.

Transgressive variation in quantitative traits is observed when the descendents of a sexual cross segregate with a range of phenotypes more extreme than that of their parents. The phenomenon of transgressive variation, coupled with selection, drives much of the continued progress achieved through plant breeding.

7. **DNA Markers to Assist in Breeding Louisiana Special Purpose Rice Varieties.** Zhang W., Sha, X., Ordonez, S. and Oard, J.
This poster describes the evaluation of four DNA markers corresponding to genes that govern cooking quality and blast resistance in Louisiana special purpose breeding lines.

This poster describes the evaluation of two statistical models to identify molecular markers associated with complex agronomic traits among elite U.S. inbred lines of rice.

RiceCAP, the CSREES-funded Coordinated Agricultural Project for Rice, involves 15 participating institutions and is in its fourth year. This poster will provide information on the approach to extension and education that were undertaken to inform end users about the research objectives and progress of the project.

This poster describes a mapping population consisting of 325 double haploid (DH) lines developed from a cross of Cocodrie (susceptible) and MCR01–0277 (partial resistance) (Chu et al 2006) to identify QTL regions associated with sheath blight resistance.

11. **Refining Induced Fissuring Procedures Used in Characterization of ‘RiceCAP’ milling populations.** Roughton, A.I., Jodari, F., Moldenhauer, K., Linscombe, S.D. and
McClung, A.M.
The three milling populations used in RiceCAP project differ considerably in grain characteristics. Parents of these populations were used in extensive testing to develop protocols for induced fissuring that would maximize and clearly show parental differences in fissuring susceptibility. Parts of this process and justifications for selecting the final induced fissuring protocol have been discussed.

In a 129-RIL population from Cypress x RT0034 in two environments, QTLs were identified for highly heritable kernel dimension and other traits but not for milling yield. At a pleiotropic head-rice/days-to-heading QTL on chromosome 8, expressed in Louisiana, a Cypress lateness allele reduced kernel quality.

13. Thickness and Cultivar Effects on Rice Fissuring Due to Adsorption. Tolbert, A.C., Moldenhauer, K.A.K., Siebenmorgan, T. J., Bautista, R., Blocker, M.M. and Prislovsky, S.E.
The objective of this study was to examine the fissuring element of rice kernels to determine the most significant factor among cultivar, thickness, and year or their interactions. Rice cultivar and kernel thickness were the main factors observed.

We have been using a set of TeQing-into-Lemont introgression lines to fine-map sheath blight resistance QTL. In the course of dissecting a QTL region previously mapped on chromosome 9, we discovered a gene for spreading culms (or open plant-type) residing in one half of the QTL region, while the sheath blight locus appears to reside in the other half.

A large deletion mutant and several mapping populations are being developed to assign the functions of rice genes, and to identify useful mutants for rice breeding programs in the US.

Genotyping results revealed that the F5 RILs population derived from
a cross of the japonica cultivar Lemont and the indica Jasmine 85 is a good mapping population with low non-parental alleles and low percentages of skewed simple sequence repeat markers.

17. **Field Evaluation of Rice (Oryza sativa L.) Agronomic Traits Important for Early Planting in Arkansas.** Stivers, A.M., Gibbons, J.W. and Anders, M.M.

Planting date studies, 2005 and 2006, were conducted at the University of Arkansas RREC to study the effects of early planting on diverse germplasm and breeding lines. This research is aimed at equipping rice breeders with data concerning which traits are most useful when screening for early planting in field conditions.

18. **Rice Breeding for Temperate Latin America.** Corredor, E., Cruz, M., Jennings, P., and Zorrilla, G.

The Latin American Fund for Irrigated Rice, FLAR, conducts a regional breeding program that is closely integrated with the rice programs of its 15 member countries. A separate sub-program established for partners in temperate South America, focuses on cold tolerance, high yield potential, quality, and disease resistance.

19. **Evaluation of Cold Tolerance in Rice under Controlled Conditions.** Cruz, M., Corredor, E., Jennings, P. and Zorrilla, G.

The Latin American Fund for Irrigated Rice, FLAR, studied different methodologies to select for cold tolerance and releases cold tolerant breeding lines for programs conducted by its partners in Brazil, Uruguay, and Argentina. Methods were developed to evaluate rice in three stages: germination (dry seed), vegetative (seedlings), and reproductive (flowering).


In 2005, a tall mutant of the Californian medium grain variety M-206 was identified. This mutant is approximately 20 cm taller than M-206. Initial data indicate increased kernel size, improved seedling vigor and better emergence through 22 cm deep water, but also a slight reduction in yield under normal conditions.


Recently, the Rice Experiment Station in Biggs, CA, isolated a spontaneous M-206 mutant, designated DW-206, with a mutation to the PHD (Plant Height Discovery) gene. The poster describes the phenotypic characteristics, genetic nature, chromosomal location, and potential applications of the mutant allele for rice varietal improvement.

In January, the USDA set the stage for the oncoming 2007 Farm Bill debate by releasing a comprehensive proposal followed by the House of Representatives passing H.R. 2419 legislation in July. This study compares the impact of the USDA proposal and H.R. 2419 on Arkansas representative panel rice farms.

23. **Impact of Crawfish Production on Rice Production Costs in a Rice/Crawfish/Rice Rotation.** Salassi, Michael E. and Deliberto, Michael A.

In a rice-crawfish production rotation, the crawfish operation results in costs being imposed on the rice operation. Estimates are presented for the impact of ratoon crop loss, increased field preparation work and increased weed control costs for rice resulting from related crawfish production.

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**Plant Protection**


The panicle rice mite (PRM), Steneotarsonemus spinki, was discovered in several greenhouses and fields in Louisiana in 2007. In response to this discovery, a program of research was initiated to evaluate potential management strategies for this pest. Key results of this research program will be presented.

25. **Identification of Semiochemicals from Defensive Glands of the Rice Stink Bug, Oebalus pugnax (F.).** Hamm, J. C., Stout, M. J., and Pourian, S.

Stink bugs are characterized by the production of large quantities of strong smelling and irritating defensive chemicals, which are released when the bugs are disturbed, and may also serve as alarm pheromones. Defensive components were sampled and identified using coupled GC/MS, and our results suggest that the defensive chemicals found in *O. pugnax* are qualitatively similar to those found in other stink bug species but differ quantitatively.


27. **Susceptibility of Nine Indica Germplasm Lines to Three Rice Insect Pests.** Bernhardt, J. B.
In a field trial, nine new indica germplasm lines were evaluated for susceptibility to infestation, damage, and losses to three insect pests – the rice water weevil, rice stalk borer and the rice stink bug.

28. **Durable (Field) Resistance Provides Primary Rice Blast Control In Arkansas Rice Production. Lee, F. N.**
A sustained period of historic per-acre rice production occurred in Arkansas during 2001-2007. Modern cultivars grown during this period possessed a very high yield potential packaged with multiple desirable agronomic characteristics. Use of flood-induced field resistance to control rice blast, *M. grisea* Cav., was a key component of this package.

Rice cultivar susceptibility to false smut and kernel smut differs under a variety of cultural management practices. Using the conditions found to be most favorable for disease (tillage, rotation, fertility and irrigation), nurseries were established to determine conditions for optimal cultivar performance and minimal disease incidence.

Disease reaction, yield loss and economic return data were collected on 20 rice cultivars in a paired plot study where azoxystrobin was applied to one-half of the plots. Yield loss and economic return varied greatly depending on cultivar. While disease rating and yield loss were correlated, the relationship was imperfect.

Disease reaction, yield loss and economic return data were collected on several new fungicides that will likely be registered for use on rice in the U.S. during the next few years. At least two new fungicides showed good potential for disease control.

Toxoflavin is the major phytotoxin causing virulence in pathogenic strains of *B. glumae*. Toxoflavin deficient mutants (TDMs) were generated from the virulent *B. glumae* strain 336gr-1 and tested under field conditions. Results indicate that the mutants were still capable of causing limited panicle blight disease on susceptible rice varieties, while a natural TDM did not cause disease.
   Artificial inoculated plots have always been suspected of overestimating disease development. Comparison on fungicide trials in artificially inoculated and naturally infested plots are compared.

   Stand establishment problems consistently cause significant production losses and management problems in Arkansas rice fields. To determine the role of the environment and seedling disease pathogens on stand establishment, field and controlled environmental studies were conducted using selective fungicides, and pathogens were isolated from seedlings.

**Processing, Storage & Quality**

35. **Analysis of Genotypic Diversity in Lipid Hydrolytic Stability of Rice Bran during Storage. Chen, Ming-hsuan and Yan, Wengui.**
   Lipid hydrolytic stability of rice bran during storage was analyzed for a subset of rice germplasm from the National Small Grain Collection. Rice with red or purple bran was the lowest in hydrolytic rancidity; while rice with light-brown bran (the typical bran color of US rice), had the widest range.

**Rice Culture**

36. **Impact of Hurricane Flooding on Low Lying Rice Land in Louisiana. Breitenbeck, Gary, Kraska, Joe, Saichuk, Johnny and Cormier, Howard.**
   The impacts of 2005 storm surge flooding on the salinity of rice soils in coastal Louisiana are discussed as well as grower recommendations and remediation techniques.

   Rice grain yield and K uptake data from 25-30 site-years of research on silt loam soils will be presented. The relationships between soil-test K and relative rice yields and plant-K concentrations and content at panicle differentiation and late boot will be discussed.

38. **Silicon Concentration Rice Varieties. Dunn, D.J., Stevens, G. and Beighley, D.**
The high silicon (Si) content of rice tissue may limit its suitability for use as a bio-fuel feed stock. Conversely high Si content may have value as a Si source for computer chip manufacture. Tissue samples were collected from nine varieties of rice. These samples were analyzed for Si content.

39. **Phosphorus Studies at the University of Missouri for Rice. Dunn, D.J. and Stevens, G.**
The results of investigations concerning the rate and timing of phosphorus fertilization for rice will be presented. Polymer coatings for P fertilizers were also investigated.

40. **Evaluation of Tillage and Rotation System Effects on Rice Yield and Selected Chemical and Physical Properties: First Three Years. Harrell, D.L. and Bond, J.A.**
A crop rotation study was established in 2005. Rice rotations included: rice-rice, rice-soybean, rice-grain sorghum and rice-fallow. Two tillage systems, no-till and conventional till, were also included in the study. Initial results will be discussed.

41. **The Use of Sub-Surface Drip Irrigation for Rice. Medley, J.C. and Wilson, L.T.**
The increased demand for water from cities and industries is a growing concern for the Texas rice industry. Because of this, it has become important to develop more efficient irrigation practices. An experiment is being conducted, with the cooperation of NetafimUSA, to determine the feasibility of using sub-surface drip irrigation for rice crops.

42. **Canopy Photosynthetic Rates of Some Commercially Available Hybrid and Inbred Rice Cultivars. Medley, J.C. and Wilson, L.T.**
Canopy chambers were constructed to measure the canopy photosynthetic rates of four hybrid and four conventional inbred rice cultivars. The carbon exchange rate within a chamber was logged every 30 seconds for a five minute period before moving to the next chamber. A complete cycle through all eight chambers takes approximately 40 minutes. Data collection continued for a three-day period for each run.

43. **Responses of Southern Rice Cultivars to Elevated Ultraviolet-B (UV-B) Radiation. Mohammed, Abdul Razack and Tarpley, Lee.**
In the near future, as a result of ozone depletion there will be increased levels of UV-B radiation. Eight popular southern U.S. rice cultivars were selected for the UV-B screening process. Our results indicated that the hybrids were less sensitive to high UV-B radiation compared to conventional cultivars.

44. **Regional Assessment of Soil-Based Nitrogen Tests for Rice Production in the Mid-South USA. Roberts, T.L., Norman, **
Assessment of soil-based nitrogen tests on an inter-regional basis
to determine the correct geographical scale on which to implement
 correlation and calibration for N fertilizer recommendations in rice
production.

**Dissolved Organic Carbon Losses from Rice Production Systems under Various Straw and Water Managements.** Ruark, M.D., Linquist, B.A., van Kessel, C., Six, J., Greer, C.A., Mutters, R.G. and Hill, J.E.
In California, rice straw management has shifted from burning to
incorporation and winter flooding. This may increase dissolved organic
carbon (DOC) losses, which can affect drinking water quality. The
objective of this study was to measure seasonal losses DOC from rice
agroecosystems.

**Nitrogen, Phosphorus, and Potassium Losses from Flooded Rice Fields in Northern California.** Ruark, M.D., Linquist, B.A., van Kessel, C., Six, J., Greer, C.A., Mutters, R.G. and Hill, J.E.
In California, rice straw management has shifted from burning to
incorporation and winter flooding. This may increase nitrogen (N),
phosphorus (P), and potassium (K) losses, which can affect agronomic
efficiency and water quality. The objective of this study was to measure
seasonal losses N, P, and K from rice agroecosystems.

**Nitrogen in Surface Water and Silt-Loam Soil Cores Following Fertilizer Application and Surface Ponding.** Savin, M.C., Tomlinson, P.J., Norman, R.J., Daigh, A., Brye, K.R., and Miller, D.M.
Data will be presented of inorganic N and urea N following incubations
in which N fertilizer was dissolved on top of dry and muddy silt-loam soil
cores which were then ponded with surface water for 12 to 96 hours.

**Effects of Planting Date and Seeding Rate on Grain Yield and Yield Components of Southern Long- and Medium-Grain Rice.** Sha, X., Theunissen, S.J., Henry, B.J. and Linscombe, S.D.
Delayed planting will result in significant yield loss in rice. In this
study, we try to answer if some or all yield components are affected by
different seeding dates and if the yield loss of late-planted rice can be
compensated by higher seeding rates.

**Herbicide Options for Ducksalad (Heteranthera limosa) Management.** Atwal, J.S, Webster, E. P., Bottoms, S. L.,
Hensley, J. B.
Ducksalad (*Heteranthera limosa*) is a common aquatic weed in rice fields. Herbicide treatments were applied at delayed preemergence, cotyledon and spooning stages of ducksalad. Newpath, Command, V-10142, Bolero, Regiment, Basagran, Unison, Strada and Grasp controlled more than 80% of ducksalad after four to seven weeks of spraying.

50. **Clearfield Rice Hybrids Respond Differently to Late-Season Imazamox Applications.** Bond, J.A., Walker, T.W., Buehring, N.W. and Vaughn, L.C.
Results of research comparing the response of three Clearfield rice hybrids and one Clearfield variety to application rates and timings of imazamox will be presented.

51. **Response of Rice to Low Rates of Glyphosate and Glufosinate.** Davis, B.M., Scott, R. C. and Smith, K. L.
A study was conducted to evaluate the effects of low rates of glyphosate and glufosinate on rice. Visual estimates of injury, plant heights, maturity, and yield were among the parameters evaluated. The purpose of this data is to provide insight into the potential drift issues that may arise from the introduction of glufosinate tolerant crops. The effects of glufosinate will be compared and contrasted to the better known effects of glyphosate.

52. **Influence of Penoxsulam Herbicide on Yield and Tolerance in California Water-Seeded Rice.** Shatley, D.G. and Mann, R.K.
Yield and tolerance of two formulations of penoxsulam herbicide, applied to multiple varieties of California water-seeded rice were evaluated over a three year period from 2005 through 2007. Penoxsulam granule applied into continuous flood and penoxsualm SC formulated as a post foliar spray were compared at various rates to commercial standards.

53. **Use of SSR Markers to Discern Reciprocal Outcrossing Rates Between Weedy Red Rice Types and Rice Cultivars Having Different Degrees of Flowering Synchronization.** Gealy, D.R. and Estorninos, L., Jr.
A broad range of flowering synchronization between red rice and rice was established by planting rice cultivars that flowered earlier, similar to, or later than red rice. Five SSR markers were used to identify hybrids. Outcrossing rates differed greatly depending on the degree of synchronization and the pollen donor.

54. **Evaluation of Texasweed (*Caperonia palustris*) Emergence and Growth in Response to Shade.** Godara, R.K., Williams, B.J. and Burns, A.B.
Field experiments were conducted at LSU Agcenter Northeast Research Station, St. Joseph, LA. Shade levels of 0, 30, 50, 70 and 90% were
achieved using six-foot-three-inch shade cloth tents. Shade didn't affect Texasweed germination and emergence; however, growth of plants under different shade levels was significantly different.

A summary of research conducted in the Southern U.S. from 2005 to 2007 to examine the impact on weed control and rice tolerance from various adjuvant types tank mixed with Clincher®, Grasp®, and Grasp® tank mixed with other herbicides.

56. **The Effect of Phosphorus Fertilizer Placement on Weed and Algae Growth in Rice Systems.** Lundy, M., Fischer, A., van Kessel, C., Ruark, M., Pedroso, G., Hill, J., Spencer, D., Mutters, R., Greer, C., Linquist, B.
The effect of fertilizer management practices on weed growth and abundance in California rice systems is not known. The objective of this study was to evaluate the effect of phosphorus (P) fertilizer and its placement in the soil on weed growth, cover and abundance.

Grasp® SC (penoxsulam) can be applied postemergence in rice in tankmixes with other rice herbicides, such as cyhalofop-butyl, triclopyr, propanil, halosulfuron, and quinclorac, to provide a broader spectrum of weed control. These tankmixes can be applied in water-seeded and drill-seeded rice, both preflood and postflood.

To understand the patterns of herbicide resistant Echinochloa spp. observed throughout California, we are establishing the relative contribution of crop management practices, landscape variables and mechanisms of resistance dispersal and their interactions. An integrative approach will allow us to identify the main factors involved, facilitating management decisions.

59. **California Weedy (Red) Rice.** Ortiz A., Fischer A.J., Greer C., Schaal, B., Eckert, J., Osuna, M.D. and Laca, E.
California red rice accessions were characterized molecularly and morphologically. In another study those accessions were compared with cultivated rice (and with red rice from southern US at the DNA level).
Penoxsulam Faces Metabolic Resistance in California’s Late Watergrass. Yasuor, H., Osuna, M.D., De Prado, R., Fischer, A.J.
A population of Echinochloa phyllopogon with suspected resistance to penoxsulam was found in rice growing areas in California. Whole plant bioassays were conducted to study the response of E. phyllopogon to penoxsulam and to detect the involvement of cyt P450 monooxygenases in E. phyllopogon resistance to penoxsulam.

Distribution and Origin of Herbicide-Resistant Echinochloa Oryzoides in Rice Fields of California. Osuna, M.D., Okada, M., Ahmad, R., Fischer, A.J. and Jasieniuk, M.
To provide insight into the origins and spread of resistance, 434 individuals from 23 populations (12 resistant, 11 susceptible) in rice fields across California were genotyped at seven microsatellite loci.

Certain Latin American rice breeding programs are incorporating genetic resistance to imidazolinone herbicides into rice. It is critical to develop information for farmers and farm advisers enabling the rational use of this technology. Adequate use of this technology should focus on the avoidance of imidazolinone resistance evolution in weed (including red rice) populations.

Algae present problems in California rice fields. Growers report that algae are less inhibited by copper treatments than previously. Measurements of the copper-binding capacity of rice straw indicate that from 25 to 75% of a copper treatment would be bound by straw and thus not available to inhibit algae.

Seed Treatments for Planting Rice into Cool Soil. Tarpley, L. and Mohammed, A.R.
Novel rice seed treatments were evaluated for use when planting into cool soil. Emergence percentage and time, seedling vigor, and desirable seedling phenotype were evaluated.

Post-flood Annual Grass Control in Drill-seeded Rice. Williams, B.J., Burns, A.B., and Godara, R.K.
Programs for controlling barnyardgrass and Amazon sprangletop after permanent flood will be discussed.

66. **Effect of Adjuvant Selection on Weed Control in Drill-Seeded Rice with Selected Herbicides. Burns, A.B., Williams, B.J. and Godara, R.K.**
Effect of adjuvant class on weed control with cyhalofop, bispyribac, penoxsulam and imazethapyr will be discussed.

A study of misidentification of *Heteranthera* species and misidentification of one of these species with *Monochoria vaginalis* will be discussed. Morphological characteristics for field identification of these weeds will be presented.

68. **Adapting to Climate Change for Sustainable Intensification of Rice Production. Nguyen, N.V.**
The accumulation of the greenhouse gases in the atmosphere has warmed the planet and caused changes in the global climate. The associated long-term changes in weather conditions will have serious impacts on rice production. Understanding the potential impacts of climate change on rice-based production systems is important; but the identification of possible mechanisms for rice-based production systems to adapt to climate change is essential for the development of appropriate strategy and/or policy to support sustainable intensification of rice production for food security of the population.
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