Some RiceCAP researchers attended the 5th International Symposium of Rice Functional Genomics (ISRFG) in Tsukuba, Japan. There were 350 participants in the meeting, from 23 different countries.

In conjunction with the ISRFG, the Oryza SNP Consortium [International Rice Research Institute (IRRI), Colorado State University (CSU), J. Craig Venter Institute (JCVI), Max Planck Institute, McGill University and Perlegen Sciences] held a workshop to kick off the first release of the OryzaSNP Database on October 17. The workshop was chaired by Jan Leach (CSU), and approximately 50 scientists attended the workshop. An overview of the strategy that was used for SNP discovery was presented by Ken McNally (IRRI), the overall project coordinator. Twenty diverse rice lines representing temperate and tropical japonicas, indica, aromatic, deep water and Aus were used for SNP discovery: Nipponbare, Tainung-67, LTH, M202, Moroberekan, Azucena, Cypress, Dom-sufid, N-22, Dular, FR13A, Rayada, Aswina, Saduchoo, Minghui 63, SHZ-2, IR64, Swarna, Pollaki and Zhenshan 97B (McNally et al., Plant Physiol 2006). Sequence representing 100 Mb of unique (95 Mb) and nearly unique regions (5 Mb) of the IRGSP (International Rice Genome Sequencing Project) release 4 reference sequence were chosen for tiling onto Perlegen oligo arrays. Long range PCR was performed from each of the 20 cultivars, and amplicons were hybridized on the arrays. A total of 259,721 SNPs in one or (Continued on page 3)
As a result of extensive sampling, USDA investigators were able to determine that the presence of LLRICE601 was limited to Cheniere and that the presence of LLRICE604 was limited to CL131. In both cases, only trace amounts of GE material were present. No short- or medium-grain rice varieties tested positive for either LLRICE601 or LLRICE604. Based upon the findings of the investigation, APHIS will not be pursuing enforcement against Bayer CropScience. Given the lack of available information and evidence, USDA was unable to make any definitive determinations that could have resulted in enforcement action.

APHIS is releasing a report of the findings as well as lessons learned from this and other investigations and from its experience as regulators. For example, APHIS is considering establishing retention requirements for records. APHIS also is considering greater isolation distances between seed breeding fields and GE varieties in order to reduce the likelihood of pollen flow.

The new Biotechnology Quality Management System, announced in September, will help industry to establish best management practices. APHIS will encourage universities, small businesses and large companies to participate. The goal of the voluntary program is to help developers establish policies and quality control practices that proactively address potential issues before they materialize.


### Arkansas Rice Harvest Sets Record

Arkansas rice farmers produced an estimated 160 bushels per acre in 2007, breaking the previous record set in 2004 by 4.9 bushels per acre, the University of Arkansas Division of Agriculture said Monday. This record was accomplished on 75,000 fewer acres than last year.

Weather played a major role in the record season, said Stewart Runsick, program coordinator for the UA Cooperative Extension Service. Many farmers planted earlier than normal this year thanks to dry weather in March and April, he said. Runsick said that earlier planting seems to lead to higher yields and cooler temperatures during flowering contributed to higher yields and quality.


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### Rice Blast Fungus Sequenced

Researchers have sequenced the genome of the rice blast fungus, *Magnaporthe grisea*, opening the door to the development of crops that can resist infection. Rice blast destroys enough rice to feed 60 million people each year. "That’s a very conservative estimate," says plant pathologist Ralph Dean, who has studied the fungus for more than a decade at North Carolina State University in Raleigh. In combination with the DNA sequence of rice itself, which researchers with the International Rice Genome Sequencing Project (IRGSP) established in 2002, Dean and his colleagues hope the code will facilitate the development of genetically modified rice capable of resisting the disease.

more cultivars relative to the Nipponbare genome sequence were identified by Perlegen’s model-based algorithm. The data released during the workshop (release 1) includes quality calls from the Perlegen analyses. Analysis of the data quality is ongoing; the next release will include information generated by the Max Planck group using a machine learning approach similar to that described in the recently published Arabidopsis thaliana SNP manuscript (Clark et al., 2007). The second release will also include a subset of Sanger-generated sequences produced by TIGR that cover a portion of the genomes from the diverse rice lines. This data will be used to add power to the machine learning and to provide a check of the data quality.

The OryzaSNP data is available to the general research community via a genome browser and a series of web-based search pages. Rebecca Davidson (CSU) and Kevin Childs (JCVI) demonstrated these resources to the workshop participants. The OryzaSNP Browser can be viewed on-line: http://irfgc.irri.org/cgi-bin/gbrowse/oryzasnp10/. The browser contains SNP data that is related to both the IRGSP and TIGR rice pseudomolecules. Tracks exist to display gene loci for either TIGR v5 or RAP v1 gene models. There are also tracks to show both the LR-PCR amplicons that were used for hybridization as well as the tiled regions that were resequenced. The tiled regions are displayed for each cultivar and these glyphs are color-coded according to the quality of the base calls in that region. Clicking on the tiled region glyphs will produce a multifasta file of pseudosequences for that region for each of the cultivars. A final set of tracks display the base calls for each cultivar at each SNP position.

Links to the OryzaSNP search pages are available at http://irfgc.irri.org/index.php?option=com_content&task=view&id=33&Itemid=31. Researchers can search the SNP database by chromosome coordinate, cultivar, gene locus ID and SNP ID. Output generated from the SNP search pages is provided as tab delimited text for easy transfer into local spreadsheets or databases. Three hypothetical examples of using the search pages were demonstrated including 1) search for your favorite gene(s) using the Gene Locus and SNP ID searches, 2) analyze QTL regions using the Pairwise Cultivar search, and 3) obtain a genome-wide SNP dataset using the Multiple Cultivar Search. Similar examples with output can be viewed at http://irfgc.irri.org/index.php?option=com_content&task=view&id=31&Itemid=31. Users of the OryzaSNP Browser and search pages are encouraged.

(Continued on page 4)
to provide feedback and suggestions on other useful tools and search queries for subsequent releases of the data.

Masahiro Yano (Nat. Inst. Agrobiological Sciences, Japan) gave a brief update on his efforts in SNP discovery. His laboratory is currently conducting a genetic variation study among diverse japonica sub-species. The workshop wrapped up with Hei Leung (IRRI) giving final thoughts and leading a discussion of plans for the next phase. Questions from the audience lead to a discussion on availability of germplasm used in the SNP study. Although IRRI remains the primary source, institutions in several countries, including USDA-ARS at Stuttgart, have either volunteered or are being approached to distribute seed stock to expedite access.

The next ISRFG meeting will be held in 2008 in Korea, and the 2009 meeting will be in Manila in conjunction with the Rice Genetics VI meeting.

References:

Article contributors:
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Jan E. Leach, University Distinguished Professor, Colorado State University, Fort Collins, CO

Many thanks to RiceCAP for providing travel funding to the ISRFG 2007 for K. Childs and R. Davidson.
Workshops and Conferences

IRRI Shortcourse — Rice: Research to Production; May 18 thru Jun 8, 2008

The International Rice Research Institute (IRRI) and Cornell University professor Susan McCouch will offer the three week shortcourse “Rice: Research to Production” again next spring, May 18 - June 8, 2008. Ten students who are U.S. residents will be selected. Their scholarship will include course fees, accommodations and transportation costs up to $1,400. The deadline for applications is December 15, 2007. For additional information and application form visit either the RiceCAP web site, Calendar > Upcoming Events (http://www.ricecap.uark.edu/calendar_upcoming.htm), or Cornell University’s Office of International Programs web site (http://ip.cals.cornell.edu/).

RTWG to Meet in San Diego, CA, February 18-21, 2008

The 32nd Rice Technical Working Group (RTWG) meeting will be held February 18-21, 2008, at the Westin San Diego in San Diego, California. The Rice Technical Working Group meets biannually and brings together scientists, extension personnel, government and industry representatives and growers involved in all aspects of rice production. The objective of the RTWG meeting is to share information, coordinate research and join efforts to find solutions for the rice industry’s most important problems.

Among the main speakers for the RTWG 2008 meeting are Robert Zeigler, International Rice Research Institute Director General; Will Horwath, Professor of Soil Biogeochemistry in the Department of Land, Air and Water Resources, University of California Davis; and Scott Rozelle, Helen F. Farnsworth Senior Fellow in the Freeman Spogli Institute for International Studies, Stanford University.

RTWG 2008 will feature a poster session, committee meetings, a symposium and the following technical sessions:

- Rice Culture
- Breeding and Genetics
- Economics and Marketing
- Plant Protection
- Processing, Storage and Quality
- Rice Weed Control and Growth Regulation

Find information on all aspects of the meeting and register to attend at the 32nd Rice Technical Working Group meeting Web site: http://www.plantsciences.ucdavis.edu/rtwg or from the RiceCAP Calendar > Upcoming Events, http://www.ricecap.uark.edu/calendar_upcoming.htm.
Rice Utilization Workshop Meeting Summary and Presentations Online

The USA Rice Federation launched the 2007 Rice Utilization Workshop section of the food processing web site today, http://www.usarice.com/processing/rice_workshop.html. The speaker presentation section has downloadable speaker summaries, presentations and a meeting summary that includes short- and long-term recommendations for promoting rice as a healthful food.

The February forum, held in New Orleans, LA, was co-sponsored with USDA’s Agricultural Research Service and explored marketing rice for its health-beneficial properties by focusing on phytonutrients and opportunities for a health claim for rice. The workshop “Beneath the Hull: Exploiting the Health-Beneficial Properties of the Rice Grain”, sixth in a series, provides a scientific forum for current and potential users of rice and technical experts to discuss current research progress in post-harvest utilization of rice, future research directions, and strategies for solving research needs.

The speakers at the workshop included RiceCAP board member Don McCaskill (Riceland), RiceCAP researcher Anna McClung (USDA ARS), and Terry Seibenmorgen (Univ. Arkansas). They gave presentations to an audience of rice millers, processors, researchers and industry representatives. Dr. McClung’s presentation included marker assisted selection (MAS) for milling generated from the RiceCAP research.

Food Processing

Rice Utilization Workshop

February 2007 forum explored rice health claims. 2005 Dietary Guidelines for Americans recommendations and a wealth of research findings on the nutritional benefits of whole grains have opened up an exciting new opportunity for whole grain rice. How well is the rice industry positioned to capitalize on this growing trend?

The February 1-2, 2007, forum co-sponsored with USDA Agricultural Research Service explored marketing rice for its health beneficial properties. Industry members, rice

People

American Plant Pathologist Featured in Time Magazine

Robert Zeigler, a plant pathologist who has headed IRRI (Philippines-based International Rice Research Institute) since 2005, was featured in the October 1, 2007, issue of Time Magazine’s section Innovators: Revolution in the Garden. Dr. Zeigler earned his PhD in plant pathology from Cornell University in 1982, his Masters in botany (forest ecology) from Oregon State University in 1978, and his BSc in biological sciences from the University of Illinois in 1972.

Before joining IRRI, he worked for the Peace Corps as a science teacher in the Democratic Republic of Congo in Africa, as a technical adviser for Burundi’s maize program at the Institut des Sciences Agronomiques du Burundi, and the International Center for Tropical Agriculture (CIAT) in Co-

(Continued on page 7)
lombia as a visiting research associate working on cassava. As population continues to grow in the rice-dependent parts of the world, what’s needed is nothing less than a second Green Revolution, and Zeigler is making it happen. Under his leadership, the IRRI has redoubled efforts to breed strains of rice that can survive both drought and flooding—one strain being developed can even grow on dry land. That would benefit farmers today who remain mired in poverty because their fields are too hot and dry (and could become hotter and drier still). Zeigler believes that by tackling stagnating rice yields, the institute can help tackle global poverty too. “Rice that is ready for a tougher climate tomorrow will also help us deal with the problems of the poor today,” he says.

Most ambitious and potentially game-changing is a program to produce rice that can photosynthesize more efficiently — allowing it to grow more robustly — using four carbon atoms rather than three. It’s called C4 rice, and one possible technique for producing it could involve genetically modifying the plant by transplanting genes from a C4 crop like corn. Read the full Time story at http://www.time.com/time/specials/2007/innovators/article/0,28804,1614837_1663720_1663744,00.html.

Dr. Robert Zeigler (photo from Golden Rice Project)

Outreach

McCLUNG GIVES RICECAP UPDATE TO CEREAL CHEMISTS

Anna McClung was invited to present an update on new technologies developed as a result of the RiceCAP project at the annual American Society of Cereal Chemist meeting that took place in San Antonio, TX Oct. 7-10, 2007. The meeting was attended by some 2000 public and industry researchers representing all of the major cereal grain crops. Dr. McClung’s presentation was one of seven talks presented in the “Embracing Emerging Technologies for Rice Quality” symposium and was entitled “RiceCAP: Development of molecular markers associated with long grain milling yield” by Anna McClung, Eduard Boza, Robert Fjellstrom, Zhigang Guo, Farman Jodari, Steve Linscombe, Karen Moldenhauer, J. Clare Nelson, James Oard, Brian Scheffler, and Xiangqing Sun. The talk summarized findings from the RiceCAP QTL analysis of MY1 and MY2 populations and the use of new image analysis technology to quantify numerous grain trait measurements that impact milling quality. This report demonstrated how RiceCAP is facilitating the integration of molecular technology into public U.S. breeding programs so that new discoveries in genomic research can be used by the rice breeding community for the development of new cultivars that have high value and will help the US rice industry remain competitive in the global marketplace.
## Calendar of Events

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### Schedule of Events

1/6-8/08—8th International Long- Oligonucleotide Microarray Workshop, University of Arizona, Tucson, AZ

2/18/08—Annual RiceCAP Meeting (2007 report), tentative date.

2/18-21/08—Annual RTWG Meeting.

5/18-6/8/08—IRRI Rice Production shortcourse, Philippines. (Deadline application is December 15, 2007)

8/20-23/08—4th International Symposium on Rhizoctonia, Berlin, Germany.

### Event Details

For all event details, see the appropriate link at [http://www.ricecap.uark.edu/calendar_upcoming.htm](http://www.ricecap.uark.edu/calendar_upcoming.htm)

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RiceCAP

A coordinated research, education, and extension project for the application of genomic discoveries to improve rice in the United States. A project supported by the National Research Initiative (NRI) of the Cooperative State Research, Education and Extension Service (CSREES).