IRRI’s 5th International Rice Genetics Symposium and the 3rd International Rice Functional Genomics Symposium

The 5th International Rice Genetics Symposium and the 3rd International Rice Functional Genomics Symposium, sponsored by the International Rice Research Institute (IRRI), was held November 19-23 in Manila, the Philippines. The meeting was a dynamic forum attended by over 700 scientists from all over the world. The meeting featured a broad range of basic and applied research on rice genetics and functional genomics. In addition, the meeting included an overview of the RiceCAP project, USAID-funded international linkage projects, and CSREES funded rice functional genomics projects. With the completion of rice genome sequencing, major advances in rice genetics and functional genomics have been made during the last five years. The map-based

Participants of the USAID funded Linkage and CSREES funded Rice Functional Genomics and RiceCAP meeting organized by Dr. Hei Leung

USDA-CSREES Travel Awards Enable Four Students and Postdocs to Participate in the 5th International Rice Genetics Symposium and the 3rd International Rice Functional Genomics Symposium in Manila, Philippines

To promote advances in rice research made in the US research community, to provide an opportunity to learn about the latest developments in structural, functional and evolutionary genomics and genetics research, and to facilitate future international collaborations in rice research, the USDA-CSREES supported the travel of two graduate students and two post doctoral fellows to attend the 5th International Rice Genetics Symposium and the 3rd International Rice Functional Genomics Symposium (RG5-IRFG3), November 19-23, 2005. The students, Anjali S. Iyer-Pascuzzi (Cornell University) and Myron Bruce (Colorado State University), and

Rice Facts & Folklore

In Bali, white rice is most commonly used for those daily offerings to the Gods and it is also part of the daily ritual when it is stuck on the forehead for good luck. Some believe that the grains must remain on the forehead to ensure continued luck while others believe that it is simply the application of a few grains that brings luck and there is no change of fortune if they later fall off or are brushed off.

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According to a new study update released by the National Center of Food and Agricultural Policy (NCFAP), in 2004, biotech varieties, compared to conventional crops, increased food production by 6.6 billion pounds, a 24% improvement from 2003, and provided $2.3 billion in additional net returns for U.S. growers, a 21% increase from the previous year. U.S. farmers planted biotech crops on 118 million acres, an increase of 11% over the previous year. Biotech crops also reduced pesticide use by an additional 34%, or 15.6 million pounds. Pesticide use dropped by 15.6 million from 2003 to 2004.


People

Dr. Rajeshwari Ramanan (M.Sc (Botany), Univ. of Delhi, 1976 and Ph.D., Univ. of Hyderabad) is currently a Visiting Scholar at University of California, Davis in Dr. Pamela C. Ronald’s lab as a part of a two-year collaborative project funded by National Science Foundation (NSF). She is involved in the RiceCAP effort towards developing the VIGS technology in rice.

RiceCAP Outreach

K-12 outreach at Colorado State University

On November 9th, Jan Stephens and undergraduate assistant Katie Gustafson, traveled to the school district of Lonestar Colorado which is on the Kansas-Colorado border near Otis, Colorado. They presented their “Classroom activities in Plant biotechnology” program to the students and to several teachers. They chose different aspects of the program that were presented at almost every grade level from 1st to 12th throughout the day. Students in the lower grades were introduced to the concept of plants getting sick and what scientists can do to help them be healthy. They had to find out what the mystery plant was after smelling and observing the final step of a DNA extraction (which was great color and smell) and comparing their guesses to a picture of several sick plants as well as solving a word puzzle using the genetic code table. The 4th-6th grade used information from doing the final step of a DNA extraction, observing gel electrophoresis results and the genetic code table to solve a puzzle. The 7th and 8th grades learned about DNA structure and function and carried out the whole DNA extraction procedure for plant tissue. High school students were introduced to more in-depth information about DNA structure, function, transcription and translation. They were introduced to gel electrophoresis and restriction enzyme digestion and were taught how to use a micropipettes. At the end of the day, several teachers were taught how to use the whole program in their classrooms and where the different components of the kit were to be used.

On December 12th, Jan and Dr. Genaleen Diaz, a visiting scientist from the Philippines, presented a talk to 65 3rd grade students at Dunn elementary school in Fort Collins. They have been

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IRRI Meeting, cont.

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Dr. Nollie Vera Cruz discusses her research at one of her experimental rice plots at IRRI

cloning of rice genes for economically important traits (e.g., heading date, grain yield, plant height, submergence tolerance, and disease resistance) is now being successfully conducted in many laboratories around the world. New and improved technologies (e.g., microarrays, gene tagging and RNA silencing) are being commonly used to facilitate the functional discovery of rice genes. Furthermore, an increased effort is now being made to utilize the genomic information being accumulated for improving many traits including rice quality, yield, pest resistance and abiotic stress tolerance.

The meeting featured a number of keynote speakers including Drs. Ron Phillips, Gurdev Khush, and Dave Mackill of the RiceCAP Scientific Advisory Board, and research presentations by several RiceCAP scientists including Drs. Jan Leach, Scot Hulbert, Guo-liang Wang and Yinong Yang. Following the meeting in Manila, there was a field tour of the IRRI campus in Los Baños highlighting many facets of contemporary field and laboratory rice research. A more complete summary of the meeting will be made available in the near future.

Travel Awards, cont.

(Continued from page 1)

postdocs Dr. Kristi Mather (North Carolina State University) and Dr. Jeremy Edwards (University of Arizona), were selected for the travel support from a competition based on research abstracts and how the envisioned attendance at the meeting would further their current and future in rice research.

Anjali S. Iyer-Pascuzzi is a fourth-year doctoral student with Dr. Susan McCouch in the Department of Plant Breeding and Genetics at Cornell University. Last year, Anjali reported the cloning of the rice bacterial blight recessive resistance gene, Xa5 (Iyer and McCouch, 2004, MPMI 17: 1348-1354). This unusual resistance gene encodes the gamma subunit of transcription factor IIa. At RG5-IRFG3, she presented her current findings in a poster entitled “The rice bacterial blight disease resistance gene encodes the gamma subunit of transcription factor IIa and the dominant susceptible allele is not dose-dependent” Anjali plans to continue working in rice throughout her career, either focusing on disease resistance or nutritional elements of rice. Myron Bruce just completing his third semester as a doctoral student at Colorado State University in the laboratory of (Continued on page 4)
Travel Awards, cont.

(Continued from page 3)

Japanese researchers have developed a new variety of rice that offers a 30 percent increase in yield, the Yomiuri Shimbun reported Wednesday. Researchers at the Tokyo University Graduate School of Agricultural and Life Sciences, who developed the strain, said the new plant can be planted vertically and placed closer to a neighboring plant than can standard varieties. Moreover, the upright leaves of the plant allow more sunlight through to its base, helping the plant to grow.

Assistant researcher Tomoaki Sakamoto said these two factors could increase production per unit area by up to 30 percent.

Dr. Jan Leach. Myron is using rice lesion mimic mutants as tools to dissect disease defense response pathways in rice, particularly those involved in broad-spectrum resistance, or resistance to more than one pathogen. In the poster he presented at RG5-IRFG3, “Expression profiling and gene localization of rice lesion mimic mutant spl1”, Myron focused on the rice spotted leaf mutant spl1, which shows enhanced resistance to rice blast and bacterial blight, two important rice diseases. To understand the basis for the broad-spectrum disease resistance exhibited by this mutant, he studied gene expression profiles and presented an array-based strategy to discover the spl1 gene.

Dr. Kristi Mather is a postdoctoral researcher with Dr. Michael Perugganan in the Department of Genetics at North Carolina State University. Kristi was a speaker in one of the concurrent sessions at RG5-IRFG3, and her presentation was entitled “Population genomics and LD in rice.” She described her studies of the evolutionary forces that shape the genomic variation in cultivated rice (Oryza sativa) and its wild ancestor (O. rufipogon). Her findings on SNP (single nucleotide polymorphism) variation and LD (linkage disequilibrium) lay the groundwork for future LD mapping studies to identify genes underlying phenotypically important rice traits.

Dr. Jeremy Edwards is a postdoctoral fellow in the laboratory of Dr. David Galbraith at the University of Arizona. His poster, entitled “Microarray-based QTL mapping in rice”, described his progress toward the development of a microarray platform for rapid and cost-effective genetic mapping in rice. Jeremy has a long history of working with rice; prior to joining the Galbraith lab, he studied the origins and distribution of allelic diversity in populations of wild and cultivated rice for his Ph.D. at Cornell University.

The RG5-IRFG3 meeting was the largest gathering in the history of rice genetics/functional genomics research, and was attended by approximately 720 participants from 43 countries. There were 60 US participants, and US-supported research was featured prominently in scientific sessions, with eight (of 26) plenary speakers and nine (of 55) concurrent session speakers being from the US. The USDA-CSREES also provided travel assistance for six plenary and concurrent session speakers. This meeting was clearly an exciting venue for rice biologists and geneticists!

Following the meeting, the International Rice Research Institute hosted meeting attendees, including the student and postdoctoral travel awardees, for a day of field and laboratory tours. This was the first opportunity for many rice biologists to see large-scale methods to screen for biotic or abiotic stresses (such as submergence tolerance, etc) as well as to experience the breadth of phenotypic diversity found in the rice germplasm collection as well as the deletion mutant collection.

Myron Bruce, graduate student at CSU, inspects rice mutant collections at the International Rice Research Institute.
The successful sequencing of about 40,000 possible coding genes for rice is seen to accelerate the means for raising yield of rice and also other crops of the grass family including wheat, maize, barley, and oats.

"If we find that favorable sequence in rice, we can use that information to accelerate the job. (We will know) which variety gives us a higher yield, which varieties grows in favorable condition. That sequence in rice will be similar in wheat, in maize," Takuji Sasaki, National Institute of Agrobiological Sciences (NIAS) vice president, told reporters during the International Rice Genetics Symposium at the Edsa Shangri la Hotel.

The Philippine government through the Philippine Rice Research (PRRI) has been part of an effort to determine genetic information in rice in order to identify which rice variety has the characteristics desired in a specific rice growing region in the country.

Good characteristics may be tolerance to drought, tolerance to salinity, disease resistance, pest resistance, high yield, and vitamin and mineral content.

"To make a DNA (trait-carrying genes) of a rice plant, to make a clone (of a variety that has a good trait) is very easy. But we need a sequence of the DNA which will accelerate studies on rice varieties," said Sasaki.

PRRI Director Leocadio S. Sebastian said researchers have identified the function of some 2,000 rice coding genes out of some 40,000 coding genes.

"The good thing about this is if you know what gene has your desired trait, you can isolate it, clone it, and transfer that variety to one that doesn’t have that trait. We will use it to improve the variety released to farmers," he said.

Ronald L. Phillips, Center for Microbial and Plant Genomics at the University of Minnesota’s Department of Agronomy and Plant Genetics, said the future of the improvement of rice variety will be as simple as "switching on and off" a gene.

Since rice varieties continue to change as time goes by, it is important for researchers to keep all the information about rice genes so that this may be accessed in the future as the need arises.

"Resistance to insect or disease does not last that long because a disease may be caused by a virus, and you will find that there’s a new strain of that disease. It happens all the time," Phillips said.

The Philippines is presently engaged in trying to raise rice yield by developing those varieties that are resistant to the disease tungro or to bacterial blight.

PRRI, the International Rice Research Institute and other rice research groups are sharing genetic information on rice with the Mexico-based International Center for Wheat and Maize nd other institutions engaged in developing high yielding varieties for other crops.
**Outreach, cont.**

(Continued from page 2)

studying rice with a geographical and cultural emphasis so Jan talked to them about how rice is grown, harvested and processed in Asia and the US and also about its importance as a food crop for the world. Rice cultivation was related to climate and rainfall amounts throughout the world. Gena then presented information about the importance of rice in the daily and spiritual life of various parts of Asia and discussed some of the many festivals related to rice. The students finished with an activity to correctly order pictures of different aspects of rice growth and harvesting. The students were enthusiastic about the program and asked some great questions!

**RiceCAP Participates at the 2005 Rice Outlook Conference**

At the Rice Outlook Conference in Austin, TX, there were 563 people pre-registered. Dr. Anna McClung gave a presentation which included an overview of research at Beaumont and Stuttgart ARS locations, an overview of RiceCAP effort, and an announcement of upcoming RTWG meeting. The RiceCAP poster, pamphlets and newsletters were placed on display near the registration center (Dr. Chris Greer.) To review Dr. McClung’s presentation, please look on the RiceCAP web site at: http://www.uark.edu/ua/ricecap/events.htm.

The next Rice Outlook Conference will be held on Dec 3-5, 2006 in Las Vegas, NV.

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**Investment in the hybrid rice commercialization program has benefited the Philippine government through savings of US $23.23 M that would have been spent for rice importation. A study of the Philippine Rice Research Institute (PhilRice) showed that government investments on hybrid rice commercialization incurred financial and economic benefit-cost ratios of 1.56 and 1.13, respectively.**

CropBiotech Update, 12/9/05. For the full article, see http://www.philrice.gov.ph/newsroom.php?newsTag=783
### Calendar of Events

#### JANUARY 2006

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### Schedule of Events

- **01/14-18/06**—Plant and Animal Genome XIV Conference
- **01/15/06**—RiceCAP Meeting, Town & Country Resort & Convention Center, San Diego, CA
- **2/24-25/06**—RiceCAP PI meeting held in conjunction with RTWG meeting [http://beaumont.tamu.edu/RTWG2006/](http://beaumont.tamu.edu/RTWG2006/)
- **2/26-3/1/06**—Rice Technical Working Group Meeting

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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).

**We're on the web!**

[www.uark.edu/ua/ricecap](http://www.uark.edu/ua/ricecap)