RiceCAP

RiceCAP News

MAY 2008 VOLUME 4 ISSUE 7

The Genetic Stocks – Oryza Collection

Lorie Bernhardt, USDA ARS DBNRRC, using bar code technology with the GSOR.

The Genetic Stocks – Oryza Collection (GSOR) was established in 2003 at the Dale Bumpers National Rice Research Center (DBNRRC) in Stuttgart, Arkansas. The purpose of the collection is to provide a repository and distribution center for genetic stocks, mapping populations, and unique genetic collections that are of value to the rice research community. The initial contribution included 19 dominant and recessive genetic male sterile and induced mutants for early flowering, semi-dwarfism, and elongated uppermost internode stocks developed by J. Neil Rutger, USDA, Agricultural Research Service (ARS), Research Geneticist at DBNRRC.

During the next three years, 885 accessions were donated to the GSOR: two mapping populations, 193 Japanese mutants donated by Dr. T. Kinoshita, and nine additional rice mutants developed by DBNRRC scientists. Also, the GSOR became a distributor of Nipponbare seed in January 2005. This was the first rice cultivar to be sequenced by the International Rice Gene Sequencing Project and the GSOR seed source is directly descended from the single plant selection made by Dr. Takuji Sasaki for use by the international consortium.

By 2007, the GSOR collection had expanded with 2080 new entries including another mapping population and single plant, pure seed sources of the USDA Rice Core Collection developed by ARS Geneticist Wengui Yan. The Core Collection consists of 1790 accessions that are representative of the diversity found in the entire National Small Grains Collection (NSGC) of rice, which includes over 18,000 accessions. Also, 50 genetic stocks identified as the 'California' and 'Jodon' mutant sets were transferred to GSOR from the NSGC in Aberdeen, ID. The California set was described in 1972 by California scientists H.L. Carnahan, C.W. Johnson, and J.N. Rutger (ARS); and the Jodon set in 1977 by ARS Geneticist Nelson Jodon.

On May 1, 2008, the GSOR collection grew to a total of 23,091 accessions with the addition of a deletion mutant set developed by ARS Research Molecular Plant Pathologist, Yulin Jia. This deletion mutant set includes 15,192 putative mutants

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Rice Facts & Folklore

Rice, paddy rice, chowdhury rice (English)

Dhanya, vrihi, nivara, syali (Sanskrit)

Dhan, chaval (Hindu)

Chal (Bengal)

Dangar, choka (Gujarat)

Nellu, arisi (Tamil)

Source: *http://www.plantcultures.org/plants/rice_plant_profile.html*

Inside This Issue

Paper Addresses Ethical Concerns in Agri-Biotech

Aside from risk assessments, ethical and social concerns must also be addressed with respect to agricultural biotechnologies. Immaculada de Melo-Martin and Zahra Meghani point this out in "Beyond risk: A more realistic risk-benefit analysis of agricultural biotechnologies" published in the EMBO Reports of the European Molecular Biology Organization.

Some excerpts from their paper: "...This brief review of the scientific literature reveals that the discussion is grounded on a pervading and problematic assumption: that the primary, if not the only, ethical question about GMOs is the trade-off between the risks and benefits to human health, the world food supply and the environment...For example, one might be concerned that the use of transgenic crops could lead to a loss of the knowledge that informs traditional farming. There are also concerns that these new agricultural products could impede the empowerment of local communities or popular participation in local decision-making processes... Moreover, transgenic seeds are not only biological entities, but are also the subjects of intellectual property rights, and could therefore be used to exercise control over agricultural systems and practices. Currently, a handful of seed companies own most of the patents for various GM plants, which means that farmers must purchase their seed stock from them, at prices set by those businesses. The increasing dependence of the developing world on the interests of the global-market and the effects that this might have on people's well-being are serious ethical concerns that should not be ignored. Of similar importance are considerations of the social and economic consequences of the increasing levels of ownership of the world's food resources by a handful of corporations... Moreover, if one does regard producing sufficient food for the world's population as a legitimate goal, one can also become legitimately concerned with producing and distributing it in a way that means people are actually fed. Hunger and malnutrition around the globe are the products of many factors, which include an inequitable distribution of wealth within and between nations, a lack of infrastructure to transport and distribute food to those who need it, civil wars, corrupt governments and financial policies that require poor nations to cut government spending on food for the poor. As long as these conditions exist, it is necessary to question whether and how transgenic crops alone could alleviate hunger and malnutrition among the poor... Disagreements about the reliability or adequacy of risk assessments are not an expression of irrationality or a misunderstanding of scientific knowledge...It is ethically problematic when scientists and policy makers systematically evade discussions about the possibility that even the best scientific data and analyses might be limited. If such considerations are excluded from the debate, it is unlikely that institutional regulations and safety mechanisms will be developed to deal with such unknown consequences...We recognize that including the public in such deliberations about risk assessments might create problems of its own. There might be issues of literacy, as some people might not even have a basic science background. It might be difficult for the public to reach a consensus about what risks to accept, especially in light of conflicting scientific opinions. Nonetheless, it seems more compatible with the values of a democratic society to overcome these problems rather than to simply eliminate the public from decisions that will have a

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Genomic Tools for Breeding Japonica Rice

The majority of cultivated rice can be grouped into two major subspecies: indica and japonica. The genetic diversity of the japonica subspecies, however, is narrower compared to indica rice. In order to develop high yielding and stress tolerant varieties, the japonica rice germplasm must be diversified. A review paper published by the journal Molecular Breeding discusses recent genomic approaches to assist breeding in the japonica subspecies.

Researchers can locate useful genes in indica as well as wild rice relatives using the full sequence of the rice genome and the available tools offered by genomics. Such tools include

EU Requires Certification of Chinese Rice Products

An emergency measure, adopted by the European Commission, will require rice and rice product imports from China to be certified free from the genetically modified Bt63. The decision has been taken after Chinese rice products containing the unapproved GM rice were discovered in the EU market between 2006 and 2007. The Commission said that, despite earlier measures announced by Chinese authorities, alerts concerning the presence of Bt63 were reported until late last year.

The Commission's decision specifies that, from April 15 2008, rice product originating in or consigned from China can enter the EU market only if it is accompanied by an original analytical report issued by an official or accredited laboratory which demonstrates that the product does not contain Bt36. The measure also requires Member States to take appropriate measures, including random sampling and analysis of imported rice products.

More information is available at http://www.food.gov.uk/enforcement/alerts/2008/apr/bt63

Improve Your Vocabulary and Help Feed the Hungry

FreeRice (http://www.freerice.com/), a sister web site of poverty.com (http://www.poverty.com/), states its goals to be 1) providing English vocabulary, and 2) helping to end world hunger. By participating in their on-line world recognition game, you help them achieve both goals.

A team of professional lexicographers from the firm of Lexiteria customizes the word database. There are words of varying difficulty and the game automatically adjusts to your vocabulary level. There are 60 levels, but FreeRice FAQ states that people rarely get above level 50.

You have the option of selecting your starting vocabularly level, being retested on missed words, and to have FreeRice keep an accumulated total of the amount of rice that you have donated via their word game.

FreeRice states that the site is operated at no profit. The cost of the donated rice comes from the advertisements that appear on the bottom of your monitor. The money generated by those advertisements is then used to buy the rice. So by playing, you generate the money that pays for the rice donated to hungry people. The rice is distributed by the United Nations World Food Program.

Additional ways to help end world hunger are offered on their FAQ page.

One correct word is worth 20 rice grains, 5 correct words are worth 100 rice grains, so play the game and improve your vocabulary while helping to fight world hunger.

Thanks to Debbie Huey, UOA Plant Pathology, for sending us the web site.

EcoTILLING, a high-throughput procedure of screening mutants for sequence differences in known genes, and microarray-based genotyping. Useful genes can be incorporated to commercial japonica varieties through marker-assisted breeding. The author suggests that breeding strategies successfully employed in indica rice breeding, such as idiotype breeding and wide hybridization, might also be applied in japonica rice improvement.

Paper: Negrao, S., Oliveira, M.M., Jena, K.K., and Mackill, D. 2008. Integration of genomic tools to assist breeding in the *japonica* subspecies of rice. Molecular Breeding 1380-3743 | DOI 10.1007/s11032-008-9177-3. Full article is available at http://www.springerlink.com/content/h70810v82521552j/?p=ae31797184e847199e890c0a15b94189&pi=4

Research Updates

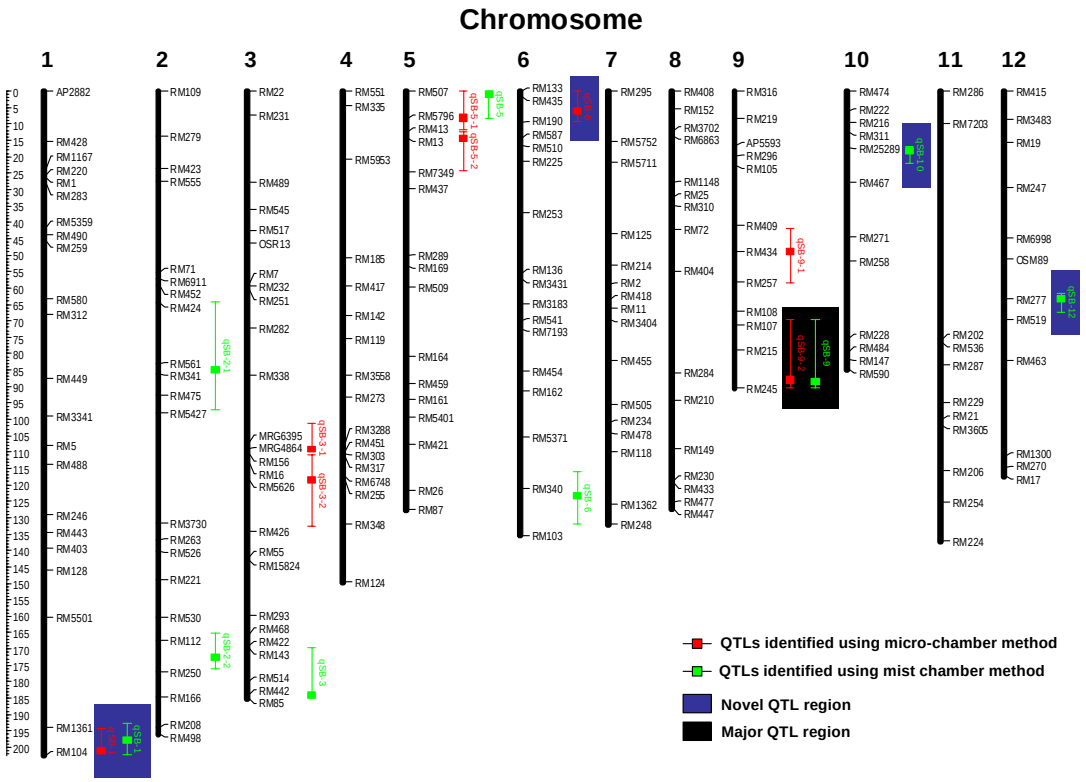
FOUR NOVEL QUANTITATIVE TRAIT LOCI (QTLS) FOR SHEATH BLIGHT RESISTANCE ARE IDENTIFIED USING RECOMBINANT INBRED LINE POPULATION OF THE CROSS OF LEMONT / JASMINE 85

Jasmine 85, a midseason aromatic long-grain indica cultivar adapted to the US and having strong resistance to sheath blight was crossed with Lemont (susceptible) and has been advanced to the F5 generation for mapping QTLs for sheath blight resistance. A subset of this population consisting of 256 individuals was recently genotyped using 199 simple sequence repeat (SSR) markers. A high density SSR linkage map was constructed representing a total of 1684.2 cM of genetic distance, and averaging 8.5 cM between markers. The disease reactions of 250 F5 RILs to the sheath blight pathogen were evaluated in a greenhouse using both the micro-chamber and mist chamber methods developed as part of RiceCAP. Eight and nine QTLs responsible for sheath blight resistance were identified using phenotypic data from micro-chamber and mist chamber methods using Windows QTL Cartographer version 2.5 (see Figure).

Four new QTLs were identified on Chromosomes 1, 6, 10 and 12 in this study that have not been reported in the literature. Three QTLs on Chromosomes 1, 5 and 9 were identified using both methods. One major QTL associated with RM245 on Chromosome 9 was determined to contribute 23.8% of phenotypic variation using the micro-chamber and 29.0% using the mist chamber method.

Inoculated field trials of these RILs to sheath blight pathogen are being conducted in three locations (Arkansas, Louisiana, and Texas) to confirm the importance of these QTLs and to discover new QTLs under field conditions. A large RIL population consisting of 800 individuals has also been advanced to the F8-9 generation using single seed descent and will be ready for distribution to the rice community through the Genetic Stocks Oryza (GSOR) collection at USDA ARS Dale Bumpers National Rice Research Center in Stuttgart, AR.

Contributed by: Yulin Jia, Guangjie Liu, and Anna McClung.



Workshops and Conferences

MAS BarleyCAP Workshop June 16-18, 2008 (application deadline: May 15)

BarleyCAP is offering a workshop June 16-18, 2008, on Association Genetics, Marker-Assisted Selection, at the University of Minnesota, St. Paul, MN. Information and an application form is available at www.barleycap.org (click on "Calendar" in left panel). The second page of the form may be printed out and used as a poster for your institution. Registration forms are due May 15, 2008. The workshop is limited to 40 people so be sure to register early.

Presenters are Kevin Smith and Rex Bernardo (University of Minnesota), Jean-Luc Jannink (USDA-ARS, Ithaca, NY), and Shiaoman Chao (USDA-ARS, Fargo, ND).

Cost: Free for BarleyCAP participants and their students and postdocs; $100 for non-BarleyCAP participants to cover three lunches, a reception and coffee breaks. A check or money order will be accepted by mail; no credit cards.

Mail registration forms to: Lynne Medgaarden, University of Minnesota, Agronomy and Plant Genetics, 1991 Upper Buford Circle, 411 Borlaug Hall, St. Paul, MN 55108. Questions: Voice (612) 625-4742, Fax: (612) 625-1268, email: medga001@umn.edu.

Rooms have been reserved at the Radisson University Hotel, 615 Washington Ave S.E., Minneapolis, MN 55414, phone: 612-379-8888, Fax: 612-379-8682, website: www.radisson.com/hotels/universi. Please reserve your room by May 15. Ask for group: BarleyCAP Workshop. Rate is $139 plus tax. Hotel shuttle will take you to campus.

Note: Participants are asked to bring along laptop computers. You will load the new program into your computer and learn how to use it during the workshop.

Outreach

Presentations to Undergraduates at UA, Pine Bluff

Dr. Yulin Jia, Dr. Stephano Costanzo (USDA Postdoctoral Research Associate), and Mr. Yuntao Dai (a University of Arkansas graduate student from the Department of Plant Pathology), were invited by Dr. Tameka Bailey, an assistant professor at the University of Arkansas—Pine Bluff, to attend and present seminars on April 25 to a mixture of 40 undergraduates with disciplines in botany and genetics. Jia presented an overview of rice production worldwide, economics and updated projects and accomplishments on host-pathogen interactions, distributed brochures on "Science in Your Shopping Cart", on RiceCAP, and on the Dale Bumpers National Rice Research Center (DBNRRC) facilities. Jia also discussed internships and employment careers at USDA-ARS with senior students. Costanzo discussed his education experience in the US vs Italy and Dai described his education experience as a student from China and his future plans.

There are additional plans for outreach by other scientists from DBNRRC to undergraduates of UAPB.

People

DR. IOANA DINU JOINS SCHEFFLER TEAM IN STONEVILLE, MS

Dr. Ioana Dinu is a new employee with the USDA-ARS, MSA (Mid-South Area) Genomics Laboratory with Dr. Brian Scheffler. She joined the Scheffler team in January 2008 and will be working on the various mapping projects within the RiceCAP community, especially those associated with mapping of genes for sheath blight resistance and milling quality. There are several different mapping populations within these projects and her main focus will be on SB2, MY2 and MY3.

Ioana has research experience in both industry and academia. She has her Ph.D. in Applied Plant Sciences/Plant Molecular Genetics from the University of Minnesota. Her dissertation centered on examining and bridging pre- and post-zygotic genetic incompatibilities. As part of her chromosome marker work, Ioana evaluated the affinity and differentiation of the chromosome DNA structures with GISH (genomic in situ hybridization) between genome types of Solanum; Ioana also verified the identity of individual chromosomes using ribosomal RNA gene sequences as probes for physical mapping with FISH (fluorescence in situ hybridization).

Ioana's area of expertise is in developing and applying molecular genetic markers to enhance crop breeding. She has strong research experience, initiative and knowledge in the area of molecular markers, DNA sequence analysis, genome investigation and chromosome biology. Within industry, Ioana's duties were in maximizing turn-around time and invested capital. With Delta & Pine Land (D&PL), her work focused on supporting genetic assays for allele mining of genes for insect and herbicide resistance and native genes in proprietary germplasm. Also with D&PL, Ioana researched, optimized and verified assays for custom sequence cloning, multiple sequence analysis, as well as SNP (single nucleotide polymorphism) evaluation and allele discrimination using Taqman technology. The Taqman assay was used mostly for detecting genetic variation for trait assessment. In addition, Ioana streamlined SSR markers in multiplex reactions for large-scale genotyping.

Ioana and her family have lived in the Mississippi Delta for four years. She has a lovely daughter, Isabelle, who is 3 years old. Her husband, Bogdan Dinu, is also a member of the rice community and he is employed as a cost coordinator with the Uncle Ben's (MARS) rice processing plant in Greenville, MS.

Dr. Ioana Dinu

Contributed by:
Brian Scheffler

(Continued from page 1)

developed by fast neutrons and 4,911 mutants developed through treatment with ethyl methane sulfonate. This material will be useful for the identification of mutants for crop improvement and functional genomics.

Each entry held by the GSOR is described in the Collection Catalog which is on the web site of the GSOR, http://www.ars.usda.gov//Main/site_main.htm?docid=8318. Each description contains a link to the GRIN page where customers may request samples of the material.

All seed requests are acknowledged when received and orders are shipped within 7-10 business days, when possible. Since the first seed distribution in March 2004, GSOR has shipped 4,248 samples of rice. Of these, 53% of the requests have been shipped to domestic users and 47% have been shipped to international customers. GSOR works with customers to assure that seed shipments meet state or national phytosanitary requirements. Protocols are in place for receiving or sending seed to prevent spread of any pest (e.g. rice panicle mite and bakanae). Since many countries require inspection for white tip nematode, GSOR has implemented a method in accordance with APHIS guidelines to treat seed for this pest as a precaution prior to shipment, thus expediting seed shipments. Barcode software and handheld scanners have also been implemented to accurately manage inventories as well as phenotypic data acquired on the rapidly expanding collection.

During the 2007 season, over 150 mutants and genetic stocks were planted in a field nursery and made available for researchers to visit during the annual Rice Field Day at Stuttgart. Some 50 U.S. and international cultivars commonly used by the research community were also planted as a reference. Selections from the Kinoshita Collection of Japanese mutants were planted, representing such phenotypes as: minute grains; dense or compact panicles; open panicles; long to short awns; tan, gold and purple hulls; long outer glumes; and lazy plants. Accessions ranged from 16 to 124 cm in height and from 59 to 133 days for flowering. Researchers were invited to visit Stuttgart and make their own observations of this collection. A demonstration plot will be planted in 2008 and researchers are invited to see examples of the mutants held by the GSOR Collection. Photos showing differences in the mutants as they grow and develop in the field nursery will be posted on the GSOR web site.

Immediate plans for the GSOR are to receive over 5,000 TILLING mutants developed by Drs. Tom Tai and Luca Comai. Dr. Jia has plans to donate another 2,000 gamma irradiated deletion mutants. Dr. Yan will provide results from his work on the Core Collection, including DNA fingerprinting of a Mini-Core (217 accessions) identified within the Core Collection. In the near future, GSOR will be distributing the parents and mapping populations researched as part the USDA CREES NRI RiceCAP effort (http://www.ricecap.uark.edu/). Presently, the National Science Foundation is funding a project led by Drs. Susan McCouch and Carlos Bustamante (Cornell Univ.), and Anna McClung and Georgia Eizenga (ARS DBNRRC) resulting in the donation of 400 *O. sativa* cultivars selected from single plants, along with complete phenotypic and genotypic data associated for approximately 50 agronomic and grain quality traits (http://www.ricediversity.org).

Contributed by: Anna McClung and Lorie Bernhardt , both with USDA ARS DBNRRC.

For more information on GSOR, contact: Dr. Anna McClung, Research Leader, USDA AR Dale Bumpers National Rice Research Center, 2890 Hwy 130 E., Stuttgart, AR 72160

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More photos from the Genetic Stocks – Oryza Collection

(Right) Yulin Jia and Rachel Joslin with the neutron mutant planting effort in April, 2005.

(Left) Yulin Jia with EMS mutant, Sept 2001.

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Biotech Ethics

significant impact on their lives."

Limiting the ethical discussion about agricultural biotechnologies to questions of risk assessments incorrectly assumes that the discussion on potential risks and benefits of agri-biotechnologies is the sole significant normative concern. Second, framing the debate in terms of technical problems effectively limits who legitimately participate in the discussion. "These normative issues must not be left to scientific experts in a democratic society, but should be subjected to proper public deliberations - not ones steered by the media or pressure groups", said Martin and Meghani.

Paper: Melo-Martín, I. and Meghani, Z. 2008. Beyond risk. A more realistic risk–benefit analysis of agricultural biotechnologies. EMBO reports 9, 4, 302–306 / doi:10.1038/embor.2008.39

The full paper is available at http://www.nature.com/embor/journal/v9/n4/full/embor200839.html.

Contributing source: CropBiotech, 4/4/08

Calendar of Events

MAY 2008

SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18 IRRI workshop →	19	20	21	22	23	24
25 →	26	27	28	29	30	31

JUNE 2008

SUN	MON	TUE	WED	THU	FRI	SAT
1 IRRI workshop →	2	3	4	5	6	7
8 IRRI workshop	9	10	11	12	13	14
15	16 MAS workshop	17 MAS workshop	18 MAS workshop	19	20	21
22	23	24	25	26	27	28
29	30					

SCHEDULE OF EVENTS

5/18-6/8/08—IRRI Rice Production shortcourse, Philippines. (Deadline application was January 10, 2008)

6/16-18/08—MAS workshop, Barley-CAP, St. Paul, MN.

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

1/12/09—Tentative date for RiceCAP annual meeting for the 2008 report.

EVENT DETAILS

For all event details, see the appropriate link at 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).

We're on the web!
www.ricecap.uark.edu

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