

In appreciation of Plant Breeding

Gramene News

FAQ ... p3

Upcoming Outreach ... p3

Community News

In Appreciation of Plant Breeding... p 1

News ... p 2

Opportunities ... p 3

Recommended Reading ... p4

Strong expansion of corn-based ethanol production in the United States affects virtually every aspect of the field crops sector, ranging from domestic demand and exports to prices and the allocation of acreage among crops. Overall, plantings expand and a higher portion of the total is planted to corn. Higher feed costs and the increased availability of distillers grains also affect the livestock sector.
From USDA-ERS

Gramene Release. V25 is planned for June 2007.

The North American Wheat Workers' Workshop was held in Saskatoon, Saskatchewan, Canada, from March 12-14. Traveling to Canada in mid-March is risky, but with the exception of a couple of inches of snow the weather was cooperative. This small but very active workshop covered a great many issues and for a complete agenda I refer you to <http://www.wheatworkers.ca>. This was the first time that I or Gramene had attended this workshop, and although many individuals at Gramene may be more familiar with the issues of discussion, I was able to jump in over my head and learn a lot of things about the science of grain wheat.

Did you know that wheat stem rust has historically caused epidemic losses of 50-75% in many countries across many continents? Did you know that cereal stem rust was considered a weapon of the Cold war!? On the positive side, breeding programs have improved resistant varieties of wheat so it has not been a problem for farmers growing resistant varieties. But our food supply is still not secure – breeding programs have not eradicated problems – it's simply lead to mutations of more virulent strains. For example, look at Ug99, threatening wheat production in Africa. With international travel and winds (jet-streams) it will certainly be a global threat in the future, because most of our current varieties of wheat are not resistant to it. For more information see <http://www.globalrust.org/>. Researchers are also continuously working to improve control of stripe rust, leaf rust, and wheat scab. Bob Beard, from Warburtons, UK, made an impact upon the audience when showing dramatic differences in loaf size due to Fusarium head blight (FHB). Manufacturers have consistency and quality requirements that they need to achieve.

Pests such as Hessian Fly, midge and sawfly are also problems for wheat, causing the plant stems to break and fall over. The concepts of a solid-stem wheat which is

more resistant to pests, crushes growing eggs and impedes larval growth and tunneling resulting in less damage was intriguing to me. Will wheat straw no longer have the hollow trait giving it its name? And, as with the rusts, solutions are only temporary because of stronger pests develop. What would happen if no one was researching these things?

I was also introduced to a new perspective on food safety. With a previous background in agricultural economics I had considered food safety to be about global agricultural security issues – similar to the Cold War

use of cereal rusts as a weapon. From the perspective of a miller or baker, however, food safety is related to allergens, mycotoxins, and heat formed contaminants. Educated consumers also have concerns. As a result, millers are trying to find ways to make whole grains and fibers in a manner that will taste good to consumers, reduce the development of carcinogens, and address health issues through improved nutritional density and micronutrients. These issues may be addressed in part by managing the manufacturing process, but they also are affected by breeders selecting traits and genetics that relate to these issues. For more information on these issues, check out the Joint Institute of Food Safety and Nutrition at <http://www.jifsan.umd.edu/>, or the Health Grain project at <http://www.health-grain.org/pub/>.

There were many questions being asked. What traits are being researched, and are these appropriate traits? How do we find a balance between commercial crop development and scientific exploration and discovery? What are the roles of both public and private sectors? How can we apply knowledge about the model organisms to other crops? How can we increase teamwork despite lack of proximity? How can we improve the access of all researchers to technology? How will we address intellectual property rights in a collaborative

Continued on next page

What would happen if no one was researching these things?

In Appreciation, *continued...*

world? How will the development and production of bio-energy crops affect the world's food supply? And of particular concern to consumers - where do we draw the line on GMO's?

The workshop wrapped up having expanded my consciousness about the complexity of the issues. Sometimes I like to challenge myself to look at the bigger picture and what it means for our future. The days of working independently may be gone for good. Any solution to the need to feed an exploding world population will require the involvement of many voices – breeders & farmers, manufacturers, economists, geneticists, chemists, philosophers, environmentalists, lawyers, social scientists and more. There are numerous opportunities for newcomers of various interests to enter this field, and students are faced with more career options than ever before. The meeting ended with an energized group asking what they can learn from others, and perhaps the next conference will include representatives from Arabidopsis, rice and maize.

Article contributed by Claire Hebbard, Gramene Outreach Coordinator, Cornell University.

New Species Page:

With release 24 Gramene introduced the new species page for *Brachypodium distachyon*. This organism has several features that recommend it as a model plant for functional genomic studies. Traits that make it an ideal model include its small genome (~355Mbp), small physical stature, a short lifecycle, and few growth requirements. Although rice has historically been used as the model organism for grasses, it has some drawbacks which may rule it out as the best model for addressing the growing conditions, post-harvest biochemistry and pathogenic response of temperate cereals. Rice, with a relatively longer lifecycle, is physically much larger and temperamental to grow, and it is more distantly related to the Triticeae wheat, barley and rye than *Brachypodium*. *Brachypodium*, with its polyploidy accessions, can serve as an ideal model for these grains (whose genomics size and complexity are major barriers to sequencing), as well as for forages and turf grass. *B. distachyon* also has homologs for genes currently thought to synthesize the lignin precursors essential for biofuels, and therefore holds promise as a model organism herbaceous biofuel crops such as Switchgrass. See: <http://www.gramene.org/species/brachypodium/brachypodium_intro.html>

Gramene Species pages provide summaries of all the data in Gramene for *Oryza*, *Zea*, *Hordeum*, *Triticum*, *Secale*, *Pennisetum*, *Avena*, *Setaria*, *Sorghum*, *Zizania* and *Brachypodium*.

Community News:

Book Release: "Rice Functional Genomics: Challenges, Progress and Prospects", Upadhyaya, Narayana M. (Ed.), will be released in Spring of 2007. You can view the book details, including "Table of Contents" and sample pages at the Springer website <<http://www.springer.com/east/home/generic/search/results?SGWID=5-40109-22-173700505-0>>

NSF Provides \$14 Million to Advance Research in Comparative Genomics of Economically Important Plants (1/9/07). see <http://www.nsf.gov/news/news_summ.jsp?cntn_id=108263>

The National Institute for Agrobiological Sciences in Japan announced the release of a web tool which searches cis-element candidates from the upstream regions of differentially regulated genes of rice. The tool is available at <<http://hpc.irri.cgiar.org/tool/nias/ces>>.

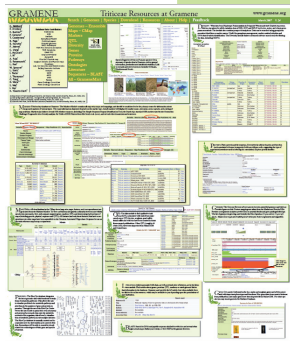
U.S. will grow more corn in 2007 than any time since World War II, thanks to demand for ethanol; prices plummet. (3/30/07) <http://money.cnn.com/2007/03/30/news/economy/corn_plantings/index.htm?cnn=yes>. See also <<http://www.ers.usda.gov/Publications/FDS/2007/03Mar/FDS07C01/>>

New agricultural research institute planned (3/19/07), see <<http://www.the-scientist.com/news/home/52943/>>. US lawmakers plan to introduce legislation within the next few weeks to establish a new research institute - the National Institute of Food and Agriculture (NIFA) would be an independent agency within the US Department of Agriculture (USDA), overseeing up to \$1 billion in competitive extramural research grants.

Gramene Outreach:

Gramene will be at these upcoming meetings. You may attend these workshops and posters to learn about Gramene or get answers to questions. See the Calendar below for dates and locations.

- April 16-20 - **ITMI** (Poster)
- May 8-12 - **Biology of Genomes** - (Posters)
- May 21-23 - **AGRON-OMICS Workshop**
- July 7-11 - **ASPB-BSA** - (Demonstration with TAIR and SGN)
- November 4-8 - **Crop Sciences** - (Poster)



Link to Poster from
NAWWW2007

Gramene FAQ

Contact Gramene through the "Feedback" link at the top of any page to ask questions. Here are some recent questions that have been answered.

Q: I have a genelist from barley and would like to compare it to the *H. vulgare* gene ontology lists. Is there a way to do that?

A: Yes. We provide the gene ontology associations to Uniprot proteins from *Hordeum* (various species). From the Gene Ontology listed on < http://www.gramene.org/plant_ontology/index.html#ontology > you will need to browse Molecular Function, Biological Process, Cellular Component. Click on "browse" and go to the protein section of the annotations to select the *Hordeum* species you are interested in. For example, under "Molecular Function" there are 989 protein annotations for *Hordeum vulgare* [Gramene release #24]. Click on that number and from the results page you can download the GO annotations by clicking the 'download' button located in the top-right of the results table. You can then use the downloaded files to map the GO terms to the probe sets from your species. However in order to do this a mapping to Uniprot database accessions is required for the other species.

Q: How much and what type of data do you have for *Brachypodium*?

A: There is a species page for *Brachypodium*, so click on the *Brachypodium* image on the species nav bar at the bottom of the page, and go to "Gramene Statistics". The current data in Gramene is listed here, and it is updated with each quarterly release of the database. Check back for updates. http://www.gramene.org/species/brachypodium/brachypodium_stat.html

Community Calendar

2007

- Apr. 9-10.** RiceCAP Marker Discussion Group. Dale Bumpers National Rice Research Center - Stuttgart, AR
- Apr. 11-13.** 5th European Conference on Evolutionary Computation Machine Learning and Data Mining in Bioinformatics. Valencia, Spain.
- April 16-20** ITMI (International Triticeae Mapping Initiative) Israel.
- Apr. 17-19.** Workshop on Clearing Old Hurdles with New Science: Improving Rice Grain Quality. IRRI, Los Baños, Laguna, Philippines
- May 8-12.** Biology of Genomes, Cold Spring Harbor, NY, USA.
- May 13 - June 1.** RICE Research to Production . IRRI, Los Baños, Laguna, Philippines
- May 21-23.** AGRON-OMICS Workshop "Ontologies, standards and best practice". Ghent, Belgium
- May 31- June 3.** 9th Annual Plant Sciences Institute Symposium on Epistasis: Predicting Phenotypes and Evolutionary Trajectories. Ames, Iowa, USA.
- Jun 27-29.** Data Integration in the Life Sciences
- July 7-11.** ASPB Chicago, Illinois, USA.
- July 21-25.** 15th Annual International Conference on Intelligent Systems for Molecular Biology (ISMB) & 6th European Conference on Computational Biology (ECCB). Vienna, Austria.
- Aug. 13-17.** Computational Systems Bioinformatics, UC San Diego.
- Aug. 20-21.** 2007 Rice Breeding Course: Laying the Foundation for the Second Green Revolution. Philippines
- Aug. 29-31.** Environmental ontology workshop. Oxford, England
- Oct. 9-14.** 4th International Rice Blast Conference, Vaya Huatian International Hotel, Changsha, Hunan, China
- Nov 4-8.** Crop Sciences International Meeting (ASA-CSSA-SSSA), New Orleans, LA, USA

Community Opportunities

Here are opportunities for researchers and students. Please check with each organization to confirm due dates, as they are prone to change.

- **32nd RTWG.** Title-Summary due **Nov 1, 2007**, Abstracts due **Dec. 1, 2007**. <http://www.uaex.edu/RTWG/default.htm>
- **2nd International Biocurator's Meeting,** Abstract **Jul 1 2007**. <http://tesuque.stanford.edu/biocurator.org/Mtg2007/index.html>
- **ASPB** - Abstracts due **4/4/07**. Abstracts via the web at www.aspb.org/abstract.
- **Monocots IV.** Symposium proposals due **6/1/07**. Abstracts for oral contributions and posters due **5/31/08**. www.monocots4.org/
- **ISMB** Poster and PLoS abstracts due **4/6/07**. , Travel grant applications due 4/27/07) www.iscb.org/ismbecb2007/

GRAMENE



A GENOMIC RESOURCE FOR CEREALS

BLAST
Genome Browser
CMap
Genetic Diversity
Genes & Alleles
Maps and CMap
QTL

Ontologies
Pathways
Literature
Proteins
Markers
GrameneMart

Gramene is a curated, open-source, web-accessible free data resource for comparative genome analysis in the grasses. Our goal is to facilitate the study of cross-species homology relationships using information derived from public projects involved in genomic and EST sequencing, protein structure and function analysis, genetic and physical mapping, interpretation of biochemical pathways, gene and QTL localization and descriptions of phenotypic characters and

For updates on releases and other information, join Gramene's mailing list or view the mailing list archive at <http://www.gramene.org/mailarch-announce/>.

email.gramene@gramene.org

www.gramene.org

Do you have news to share?

The Gramene Newsletter is a community resource about cereals and cereal genomics. It is a forum for community members to share news and current events. Some ideas for contributions include:

What are your current research projects?
How do you use on-line databases?
Information on shared resources.

Articles, news items, events, opportunities or inquiries should be submitted to the GrameneNews editor at cer17@cornell.edu. Gramene reserves the right to select contributions which meet the educational mission of the publication. Photos are also encouraged. Please provide print quality photos (300dpi) images, credit and caption

The United States, Australia, the EU, Canada, and Argentina have historically been the primary exporters of wheat, although exports from the Black Sea region have grown in the past 10 years.

Recommended Reading

Plant Gene and Alternatively Spliced Variant Annotator: A Plant Genome Annotation Pipeline for Rice Gene and Alternatively Spliced Variant Identification with Cross-Species Expressed Sequence Tag Conservation from Seven Plant Species. Chen, F.C.; Wang, S.S.; Chaw, S.M.; Huang, Y.T., Chuang; T.J. Plant Physiol. 2007; 143:1086-1095.

Floral displays: genetic control of grass inflorescences. Kellogg, E.A. Curr Opin Plant Biol. 2007 Feb;10(1):26-31. doi:10.1016/j.pbi.2006.11.009

Enhancing salt tolerance in a crop plant by overexpression of glyoxalase II. Singla-Pareek, S.L.; Yadav, S.K.; Pareek, A.; Reddy, M.K.; Sopory, S.K.; Transgenic Res. 2007 Mar 27; doi: 10.1007/s11248-007-9082-2.

Root-ABA1 QTL affects root lodging, grain yield, and other agronomic traits in maize grown under well-watered and water-stressed conditions. Landi, P; Sanguineti, M; Liu, C; Li, Y; Wang, T; Giuliani, S; Bellotti M; Salvi, S; Tuberosa, R. Journal of experimental botany, 2007, 58, pp.319-326. doi:10.1093/jxb/erl161

Dicot and monocot plants differ in retinoblastoma-related protein subfamilies. Lendvai, A.; Pettko-Szandtner, A.; Csordas-Toth, E.; Miskolczi, P.; Horvath, G. V.; Gyorgyey, J.; Dudits, D. Journal of experimental botany, 2007 Mar 26; doi:10.1093/jxb/erm022

Comparison of orthologous loci from small grass genomes Brachypodium and rice: implications for wheat genomics and grass genome annotation. Bossolini, E.; Wicker, T.; Knobel, P.A.; Keller, B. The Plant journal : for cell and molecular biology, 2007, 49, pp.704-717

Gramene Staff

Lincoln Stein, PI
Susan McCouch, Co-PI
Doreen Ware, Co-PI
Pankaj Jaiswal, Co-PI, Curator
Ed Buckler, Co-PI
Chengzhi Liang, Coordinator
Junjian Ni, Curator
Immanuel Yap, Curator
Anu Pujar, Curator
Isaak Yosief Teclé, Curator
Dean Ravenscroft, Curator
Chih-Wei Tung, Curator
Ken Youens-Clark, Developer
Shulamit Avraham, Developer
Liya Ren, Developer
William Spooner, Developer
Payan Canaran, Developer
Sharon Wei, Developer
Terry Casstevens, Developer
Jim Thomason, Developer
Claire Hebbard, Outreach