



Solanaceae Coordinated Agricultural Project

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SolCAP

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Final SolCAP Meeting



San Diego, CA

Mark your calendar for the Final SolCAP project meeting. Learn about all the exciting research happening with SolCAP! The meeting will take place at the Plant and Animal Genome Conference, at the Town and Country Resort, in San Diego, CA. It will be held on Sunday January 13, 2013 from 8am to 10am in the Garden Salon #2 room. (See page 7 for the meeting agenda.) This will be an excellent opportunity to review the accomplishments our team has made over the past four years. The SolCAP project is unique in that one third of our budget is devoted to education and extension components. SolCAP is the lead CAP for an eXtension.org initiative on plant breeding called Plant Breeding and Genomics community of practice. On January 14 at 5pm in the Garden Salon #2 room at the Town and Country Resort, SolCAP will be hosting a PBG Workshop. All plant scientists are welcome to attend. **Please see page 7 for more details.**

A SolCAP Perspective:

SNP genotyping in Potato and Tomato populations: Translational research for the Solanaceae breeding community

To address emerging needs within the Solanaceae community, a call for mapping populations to be SNP genotyped with the Infinium arrays was sent to the potato and tomato communities during the tenure of SolCAP. Between SolCAP and the potato community six tetraploid and three diploid mapping populations for SNP genotyping.

(continued on p.2)

A SolCAP Perspective continued:

These populations are described as follows:

Atlantic x Superior (tuber calcium, reducing sugars, internal defects, specific gravity (starch))

B1829-5 x Atlantic (chip color, internal heat necrosis, specific gravity, maturity)

W2310-3 x Kalkaska (scab R, chip color, reducing sugars, specific gravity, asparagine, acrylamide)

DM x 84SD22 / DM x RH (SNP mapping)

Jacqueline Lee x MSG227-2 (specific gravity, late blight resistance, vine maturity)

W4 x 524-8 (specific gravity, chip color, disease resistance)

Premier Russet x Rio Grande (reducing sugars, FF, chips color, yield, tuber shape, etc.)

Waneta x Pike (chip color, specific gravity, scab resistance, pink rot)

SNP Genotyping is now completed for potato. Two diploid populations were used to evaluate concordance between SNP genetic positions and SNP physical position within the draft genome and the tetraploid populations are being used to identify and validate marker linkages to major loci and QTL influencing sugar content. These bi-parental mapping populations should complement the diversity panel and russet mapping population that SolCAP has genotyped and phenotyped. Having a set of genome wide markers is facilitating the tetraploid mapping and QTL analysis. Each population has 1000s of SNPs segregating in the progeny reducing the gaps associated with previous markers used. Some of the preliminary results were presented at the PAA SolCAP workshop in 2012. In the Tundra x Kalkaska mapping population we have identified disease resistance QTL for scab and a major QTL for chip color from 6-month 45F storage. The tetraploid SNP data also provides an opportunity to examine double reduction in SNPs located distal to the centromere. In 2013 many of the QTL analyses should be completed.

For tomato six populations were selected for SNP genotyping. These populations represented public breeding programs with data for yield and fruit characteristics; quality traits including Brix, antioxidants, and carbohydrates; disease resistance including late blight, early blight, virus, and bacterial resistance. These populations were developed for a mixture of interspecific and intraspecific mapping, introgression, MAS, and association mapping approaches. One population was SNP genotyped with support from seed industry/genetic service providers, thus further leveraging SolCAP resources.

Based on observed recombination between markers from the 7720 SNP tomato Infinium chip, two 384 SNP panels were selected for processing and fresh market populations. SNPs in each panel were chosen based on genetic and physical locations in the genome and polymorphic information content. These optimized subsets are available as supplemental files on eXtension.org (<http://www.extension.org/pages/61007/>). Three fresh market tomato populations from NC State, Florida and Cornell were genotyped with the 384 SNPs using the KASPAR assay. The processing populations were genotyped using the BeadXpress platform. One nested RIL population

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A SolCAP Perspective continued:

developed from four elite parents yielded 185 to 261 polymorphic markers for each sub population with 115 polymorphic markers in common. Marker-trait linkage has been established and validated for yield and yield component traits in this population. The tomato SNPs have also been useful for discovery of novel resistance loci within the context of intraspecific breeding populations using directional selection approaches.

Two populations (one potato and one tomato) will be genotyped by low pass sequencing with Illumina. For tomato an interspecific RIL population of 143 lines was chosen for sequencing up to 0.5X. Parental lines will be sequenced 10X. This population has been phenotyped for lycopene, late blight resistance and yield related traits.

We felt that it was important that the SolCAP small grants program was designed to vet community proposals. Through the review process, we have been able to direct translational research towards promising populations and approaches.



Dr. David Douches



Dr. David Francis



Dr. Allen Van Deynze

Journal Highlights :

Sim S-C, Durstewitz G, Plieske J, Wieseke R, Ganai MW, et al. (2012) Development of a Large SNP Genotyping Array and Generation of High-Density Genetic Maps in Tomato. PLoS ONE 7(7): e40563. doi:10.1371/journal.pone.0040563

Felcher KJ, Coombs JJ, Massa AN, Hansey CN, Hamilton JP, et al. (2012) Integration of Two Diploid Potato Linkage Maps with the Potato Genome Sequence. PLoS ONE 7(4): e36347. doi:10.1371/journal.pone.0036347

Merk, Heather L., Shawn C. Yarnes, Allen Van Deynze, Nankui Tong, Naama Menda, Lukas A. Mueller, Martha A. Mutschler, Steven A. Loewen, James R. Myers, and David M. Francis. "Trait diversity and potential for selection indices based on variation among regionally adapted processing tomato germplasm." *Journal of the American Society for Horticultural Science* 137, no. 6 (2012): 427-437.

Potato and Tomato Beadchip Cost Reduced!!!!

Based upon the feedback the Solanaceae community provided regarding anticipated usage of SolCAP Tomato and Potato SNP chips, Illumina is able to offer these chips at \$60/sample through end of 2012 (**Deadline Dec 21, 2012**).

Purchase your Potato or Tomato Illumina I-SCAN Bead Chips now for only **\$60/sample!!**

Stipulations:

Have your order (Purchase Order) in place before 12/21/2012!

Order in multiples of 48 samples (the smallest kit configuration)

To purchase your chips contact consortiamanager@illumina.com with sample numbers.

Check out the SolCAP webpage for [Potato](#) and [Tomato](#) Genotyping databases and cluster files.

More details:

- * Pricing is USD \$60 per sample for 2012. This pricing DOES NOT include shipping, taxes, insurance or service fees. Per sample pricing includes chips and all reagents needed to run the chips
- * Beadchips are compatible with iScan, HiScan or BeadArray Reader instruments
- * Beadchips need to be shipped directly to the service provider or location where the iScan or BeadArray Reader are located
- * Min order for each is 48 samples
- * Quotations will be issued with a 30 day deadline for orders
- * Sample numbers need to be in units of 48 samples each
- * If you require assistance in finding a CS Pro or a Core Lab that supports service on an Illumina Array instrument, please contact your local account manager, Inside Sales Representative or Scott Taylor for assistance

Tomato Breeder's Roundtable

The Tomato Breeder's Roundtable (TBRT) started as an informal meeting of tomato breeders in 1955. Over the past five decades the TBRT has become an important meeting for the international tomato research and breeding community. The informal characteristics of the TBRT which has been preserved over five decades, offers a great forum for participants to discuss the latest developments in tomato breeding and associated technology. February 6-8 2013 in Chiang Mai, Thailand. For more information see: <http://www.tbirt2013.com/>



Affordable SNP genotyping facility at Michigan State University



A high throughput Single Nucleotide Polymorphism (SNP) genotyping lab has been set up in Room 2100 of the Molecular Plant Science Bldg. The lab is equipped with an Illumina iScan system and the associated facilities to run Illumina high throughput assays. In an Infinium assay, a sample can be genotyped with 3,000-1,200,000 SNP markers, depending on the format of the BeadChips. We encourage the MSU community as well as non-MSU users to use this high throughput SNP genotyping system.

Cost for processing Illumina BeadChips:

The cost for processing an Illumina BeadChip is \$1,536/run (4,6 or 8 chips can be analyzed in each run). The cost is for processing, which includes labor, equipment maintenance and consumables.

Infinium BeadChips must be purchased separately and to save shipping costs you can have Illumina ship the chips directly to us:

Shipping Address:

MSU Infinium SNP Genotyping Lab, Attention: Dr. Daniel Zarka, 2100 Plant and Soil Sciences Building, Department of Plant, Soil and Microbial Sciences, East Lansing, MI 48824-1325.

Requirements for Sample Submission:

When submitting samples, make sure the DNA concentration is determined with PicoGreen (specific for double stranded DNA) and the DNA concentration is in the range of 50-100 ng/ul. We will also check the DNA concentration with PicoGreen. If the DNA concentration is less than 50 ng/ul, we will request you to resubmit the DNA samples. An additional cost will be charged for checking the resubmitted samples. The platform for submission is a 96 well PCR plate with 15ul of DNA for each sample.

Analysis of Data:

The data needs to be processed with Genome Studio software. The software is installed on a computer in the lab. If you need a Genome Studio software license, then you need to purchase the license from Illumina directly.

For more information about the MSU SNP Genotyping Facility, please contact Kelly Zarka by E-mail at zarka@msu.edu.



Plant Breeding and Genomics Community of Practice is pleased to announce our new content coordinator, Shawn Yarnes.

Shawn joins the project via Ohio State University from her home base, UC Davis, where she recently completed post-doctoral work with Allen Van Deynze. She has a background in QTL discovery and disease resistance breeding in a variety of crop and tree species. Feel free to contact her with any questions you may have about PBG content at shawnyarnes@gmail.com.

Plant Breeding and Genomics Partnerships



[Plant Breeding and Genomics](http://www.eXtension.org) (PBG) is a multi-institutional group of researchers and IT professionals supporting science-based outreach efforts at <http://www.eXtension.org>. PBG and their partners work together to create, edit, peer review and publish outreach material to eXtension, the on-line publishing arm of Cooperative Extension. PBG offers outreach and education efforts aimed at plant breeders, seed industry professionals, and students. Publishing to eXtension represents a defined objective for inclusion in [AFRI competitive grants](#).

PBG is home to a variety of high quality outreach materials, including: breeding and genomics tutorials and webinars, crop-specific breeding information, and grower-specific information. PBG offers an established network for outreach and education. Since the launch of our webinar series in September 2011, PBG content has been visited 250 thousand times, and 1035 people from 56 countries and hundreds of organizations are registered to receive the PBG newsletter.

PBG is committed to free sharing of ideas, techniques, and computational tools for the advancement of science, agriculture, and global food security. We are looking for partners who share our commitment to excellence in science outreach. If you are interested in including PBG in upcoming proposals you will want to get a PBG letter of support. Please contact Shawn Yarnes (shawnyarnes@gmail.com) or David Francis (francis.77@osu.edu) for further information.

Connect To Plant Breeding and Genomics Webinars and Content

[YouTube](#)

[eXtension](#)

[PBGworks](#)

Connect to Plant Breeding and Genomics News

[Scoop.it](#)

[Facebook](#)

[Twitter](#)

Final SolCAP Meeting Agenda

Garden Salon #2, Town & Country Convention Center, San Diego, California

January 13, 2013: 8AM –Noon

Refreshments (Bagels, muffins, fruit and coffee) will be served.

- 8:00-8:05am Welcome and Introduction
- 8:05-8:20am SolCAP overview
David Douches, Michigan State University
- 8:20-8:40am The SolCAP Potato Story
David Douches, Michigan State University
- 8:40-9:00am The SolCAP Tomato Story
David Francis, Ohio State University
- 9:00-9:15am Outreach, Education and Extension
Allen Van Dynze, U.C. Davis / Shawn Yarnes, Ohio State University
- 9:15-9:30am Evaluation of extension activities:
Michael Coe, Cedar Lake Research Group
- 9:30-10:15am USDA Leadership/Future Outlooks/Open discussion
USDA Leadership/David Douches, Michigan State University
- 10:15-10:30am Break
- 10:30-11:15am Advisory Board meeting: **Closed session**
- 11:15-11:50am Discussion: **Closed session**
Comments from Advisory Board with Executive Committee
- 11:50am –Noon Closing Comments
David Douches, Michigan State University

Workshop: Plant Breeding and Genomics Community of Practice at eXtension.org: Inquiry-Based Continuing Education

The Plant Breeding and Genomics (PBG) Community of Practice on eXtension.org will highlight the need, both locally and globally, for technical continuing education in the field of genomic assisted crop improvement. The growth of publically available sequence data for numerous crop species, and increasing power of open access computational tools, has opened up new strategies for crop improvement for all plant breeders. Inquiry-based learning, through self-paced, how-to, educational modules is proving to be a successful way to connect breeding professionals to emerging technologies. This session will provide an introduction to the PBG community, its resources, and strategies to integrate and expand the community.

Date: Monday, January 14, 2013

Time: 5-7pm

Location: Garden Salon 2 (above Charlies restaurant), Town and Country Resort, San Diego CA

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Visit us on the web:
<http://solcap.msu.edu>

Calendar of Events:



January 9-11, 2013, [Potato Expo 2013](#), Ceasars Palace, Las Vegas, Nevada

January 13, 2013, Final SolCAP Meeting and Advisory Board Meeting, 8am– Noon, in Garden Salon #2, Town and Country Resort and Convention Center, San Diego, CA.

January 14, 2013, Plant Breeding and Genomics CoP Workshop, 5-7pm, in the Garden Salon #2, Town and Country Resort and Convention Center, San Diego, CA.

January 12-16, 2013, [Plant and Animal Genome \(PAG\) Conference](#), Town and Country Resort and Convention Center, San Diego, CA.

February 6-8 2013. [The Tomato Breeder's Roundtable \(TBRT\)](#) Shangri-La Hotel, Chiang Mai, Thailand.

July 15-19, 2013. [2013 In Vitro Biology Meeting –Plants](#), Rhode Island Conference Center and the Westin Providence Hotel, Providence, Rhode Island

July 20-24, 2013. [Plant Biology 2013](#) Providence, Rhode Island

July 20-24, 2013 [2013 97th Annual Meeting](#)"100th Anniversary of PAA"Quebec City, Quebec, Canada

July 22-25, 2013 [ASHS Annual Conferences](#) Desert Springs JW Marriott Resort & Spa, Palm Desert, California



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