**SolCAP: Solanaceae Coordinated Agricultural Project**

**Translating Solanaceae Sequence Diversity and Trait Variation into Applied Outcomes Through Integrative Research, Education, and Extension : Initiation Date October 2008**

Project Co-Directors: David Douches1, Robin Buell1, David Francis2, Allen Van Deynze3, Walter De Jong3, Lukas Mueller1 and Alexandra Stone3, Project Assistant: Kelly Zarka1

1: Michigan State University, 2: Ohio State University, 3: University of California-Davis, 4: Cornell University, 5: Oregon State University

---

**SolCAP PROJECT OVERVIEW**

**The Basis of SolCAP:**

Leverage knowledge and resources from the Solanaceae species, potato and tomato, to positively impact applied breeding and crop quality across traditional commodity boundaries.

**Potato and Tomato:**

- Are the two most economically important species in Solanaceae
- Annually account for $6.3 Billion in farm value
- The United States is one of the world leading producers

---

**SolCAP: Solanaceae Coordinated Agricultural Project**

**SolCAP germplasm panels**

- Potato: Elite potato germplasm contributions were made from 16 programs across the U.S. and 6 international programs. The panel consists of 320 potato lines currently used by the community and are being SNP genotyped and phenotyped across 3 different environments.
- Tomato: The core collection of tomato germplasm has been assembled which includes 478 accessions. Wild accessions have also been added to provide insight into loci that have been introgressed into cultivated backgrounds.

---

**Table 1. Elite potato and tomato germplasm sequenced.**

<table>
<thead>
<tr>
<th>Species</th>
<th>Culture</th>
<th>Market Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. tuberosum</td>
<td>Premier Sussex</td>
<td>Processing-French Fry</td>
</tr>
<tr>
<td>S. tuberosum</td>
<td>Snowden</td>
<td>Chip processing</td>
</tr>
<tr>
<td>S. lycopersicon</td>
<td>PL7600</td>
<td>Fresh market</td>
</tr>
<tr>
<td>S. lycopersicon</td>
<td>NCA473</td>
<td>Fresh market</td>
</tr>
<tr>
<td>S. lycopersicon</td>
<td>OH9242</td>
<td>Processing</td>
</tr>
<tr>
<td>S. lycopersicon</td>
<td>OH98-6405</td>
<td>Fresh market</td>
</tr>
<tr>
<td>S. lycopersicon</td>
<td>PI14490</td>
<td>Cherry</td>
</tr>
<tr>
<td>S. pennellii X S. tuberosum</td>
<td>PI21816</td>
<td>Wild</td>
</tr>
</tbody>
</table>

---

**SNP Discovery in Elite Tomato and Potato Germplasm**

- From existing sequence databases, we have identified potato and tomato sequences with candidate Single Nucleotide Polymorphisms (SNPs). These can be accessed through the project website under the tomato and potato pages.
- To expand our SNP discovery, we have generated 1.8 Billion DNA clusters for use by the community.

---

**Infinium Platform Development for Tomato and Potato**

- The GA2 sequences were used in conjunction with the potato and tomato reference genomes made available by the Potato Genome Sequencing Consortium and the Tomato Genome Initiative, respectively, to identify SNPs within the sequenced accessions. To design the potato and tomato Infinium SNP platforms, we applied a stringent set of filters to remove sequencing errors, alignment errors, low coverage issues, closely spaced SNPs, triallelic/Solano-specific SNPs and those SNPs with low Infinium SNP scores. After filtering, 69,011 total candidate SNPs from the three potato transcriptomes and 26,830 total candidate SNPs from the six tomato transcriptomes were available for design of the potato and tomato Infinium platforms.
- A set of 96 SNPs from both the potato and tomato candidate Infinium SNP sets were used in a BeadScope assay to validate our SNP predictions. The validation rate for potato was 95% and 97% for tomato.

---

**Education and Extension**

- SolCAP's extension component involves creation of a web community within the eXtension.org Community of Practice through which plant breeders, basic scientists, agricultural professionals, extension specialists and others can publish content and network.
- Education:
  1. Scientific workshops
  2. Development of curriculum for graduate students
  3. Breeder practicum
- Solanaceae Genome Network:
  - Integrated genomic and phenotypic databases
  - Solanaceae Genome Network (GNN) website database: http://sgn.cornell.edu/