**CO-PRINCIPAL INVESTIGATORS**

Jeanne Romero-Severson, University of Notre Dame; Scott Schlarbaum, University of Tennessee at Knoxville; Mark Coggeshall, University of Missouri; Haiying Liang, Clemson University; Oliver Gailing, Michigan Technological University; Ketia Shumaker, University of West Alabama.

**SENIOR PERSONNEL**

Meg Staton, Bioinformatics, Clemson University; Nick Wheeler, Project manager.

**PROJECT MANAGEMENT PLAN:**

**COMPANY GENOMICS OF ENVIRONMENTAL STRESS RESPONSES IN NORTH AMERICAN HARDWOODS**

Project # IOS-1025974
John E. Carlson, PI
Pennsylvania State University
jec16@psu.edu, 814-863-9164

**PROJECT SUMMARY**

The eastern hardwood forests are complex systems, covering over 400 million acres and providing habitat and food for wildlife, long-term carbon sequestration and other essential ecosystem services as well as wood and biomass. Exotic pests, diseases and invasive plants, together with climate change and forest fragmentation, are threatening the sustainability of the eastern forest ecosystems. In this project, seven university research groups are collaborating to produce EST databases, genetic markers, genetic linkage maps, and reference populations for a taxonomically broad set of eastern hardwood tree species: yellow poplar (Liriodendron tulipifera), sweetgum (Liquidambar styraciflua), honey locust (Gleditsia triacanthos), northern red oak (Quercus rubra), black walnut (Juglans nigra), sugar maple (Acer saccharum), and green ash (Fraxinus pennsylvanica). The results will be available at the project website (www.hardwoodgenomics.org) and at Dendrome (http://dendrome.ucdavis.edu). All sequence data will be deposited at NCBI.

**PLANTS WERE SELECTED TO MAXIMIZE**

- Phylogenetic breadth
- Geographic coverage
- Economic importance
- Ecological impacts

**Mapping Population Plantations**

<table>
<thead>
<tr>
<th>Species</th>
<th>Location</th>
<th>Investigator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quercus rubra</td>
<td>Tennessee</td>
<td>Scott Schlarbaum</td>
</tr>
<tr>
<td>Juglans nigra</td>
<td>Missouri</td>
<td>Mark Coggeshall</td>
</tr>
<tr>
<td>Liriodendron tulipifera</td>
<td>Tennessee</td>
<td>Scott Schlarbaum</td>
</tr>
<tr>
<td>Liquidambar styraciflua</td>
<td>Missouri</td>
<td>Mark Coggeshall</td>
</tr>
<tr>
<td>Gleditsia triacanthos</td>
<td>Missouri</td>
<td>Mark Coggeshall</td>
</tr>
</tbody>
</table>

**Creating Mapping Populations Without Making Crosses**

**EST Database Development - Stress treatments of full-sib seedlings for RNA**

<table>
<thead>
<tr>
<th>Treatment type</th>
<th>Treatment description</th>
<th>Treatment length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold</td>
<td>4 °C</td>
<td>Overnight at 4 °C, 24 hours at normal temps</td>
</tr>
<tr>
<td>Heat</td>
<td>40 °C</td>
<td>24 hours</td>
</tr>
<tr>
<td>Drought</td>
<td>To pre-dawn water potential at 1.2 – 3.5 Mpa</td>
<td>App. one week</td>
</tr>
<tr>
<td>Wounding</td>
<td>4 holes per leaflet with paper punch</td>
<td>5 or 24 hrs</td>
</tr>
</tbody>
</table>

**PROGRESS IN POPULATION DEVELOPMENT:**

**Northern Red Oak - 509 full sibs**

**Yellow poplar - 800 OP seedlings**

**Black walnut - 337 full sibs**

**Green ash - 700 seedlings**

**Sweetgum - 71 ramets**

**Honey Locust - 400 seedlings**

**OUTREACH, EDUCATION**

**UNDERGRADUATE RESEARCH INTERNSHIP AT PENN STATE, 2011**

Dantria Grace and Christen Nelms, with Dr. K Shumaker

**RESULT**

Black Walnut BAC library

**http://www.hardwoodgenomics.org/**

Penn State - Mont Alto, July 10, 2011

First Annual Meeting, Penn State - Mont Alto, July 10, 2011

Pictured left to right - Tao Xu, Shiyi Thum-Ammongwida, Meg Staton, Mark Coggeshall, Tim McCahey, Nicholas Whithner, James Rosseau-Severson, John Carlson, Haiying Liang, Scott Schlarbaum, Charles Addo-Quaye, Teodora Best, Oliver Gailing, Jordan Prindle, Dantria Grace, Stephen DiFazio (Advisor), Ketia Shumaker, Dan Abbott (Advisor).