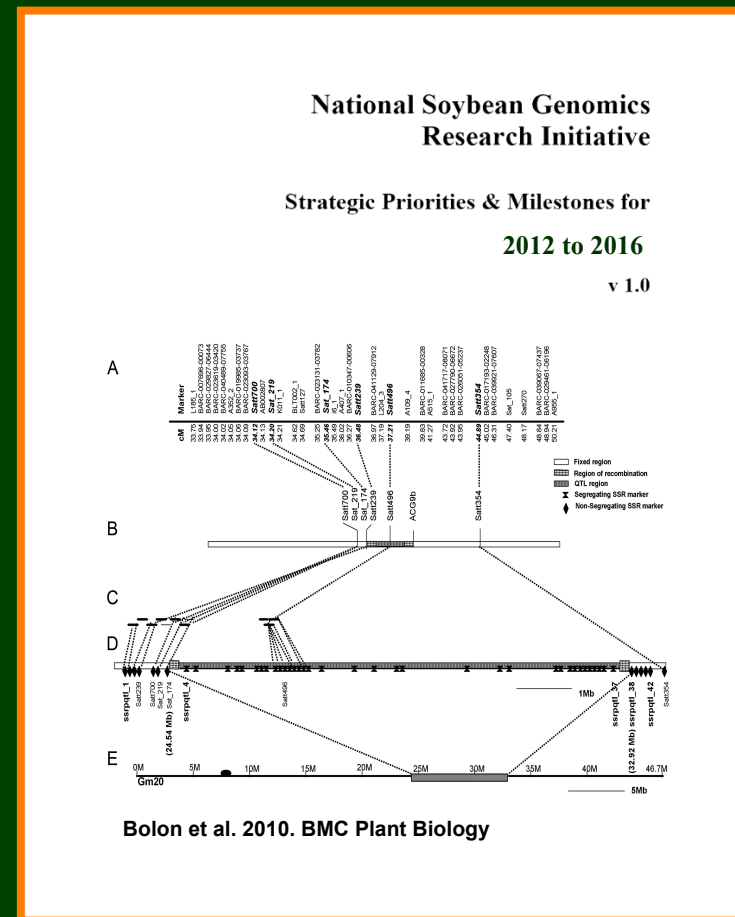


# Developing the 2012-2016 Strategic Plan for Soybean Genomics

Report from the  
27-28 July 2010  
Planning Workshop held  
in St. Louis, MO



# Facilitators/Coordinators

Workshop Chair: Roger Boerma

Workshop Facilitators: Ed Ready, Roy Scott, Rich Wilson

Subarea Coordinators:

- Genome Sequence: Scott Jackson, David Grant
- Gene Function: Michele Graham, Gary Stacey
- Transformation/Transgenics: Theresa Musket
- Translational Genomics: Perry Cregan, Brian Diers

Workshop Funding: United Soybean Board

# Scope of the Plan

Improve understanding of soybean genome organization & structure

Develop genomic tools & characterize soybean genes

Apply technology to improve soybean productivity, stress management, & quality

# Strategic Research Plan Format

Goal: a statement defining the desired outcome from a general area of research

Performance Measure: a research Objective that is relevant to the Goal (why the work is important & what is needed to get the job done)

Milestones & Deliverables (outputs expected over the 5-year program cycle)

Prioritize Performance Measures for funding

# Strategic Goals for Soybean Genomics Research

## Genomic Sequence Subarea

- **David Hyten, USDA-ARS**
- **Jianxin Ma, Purdue University**
- **Jeremy Schmutz, Hudson Alpha Institute for Biotech**
- **Steve Canon, USDA-ARS**
- **Leah McHale, The Ohio State University**
- **Bob Stupar, University of Minnesota**
- **Jessica Schlueter, Univ. of North Carolina - Charlotte**
- **Matt Hudson, University of Illinois**

# Strategic Goals for Soybean Genomics Research

## ***Goal 1: Genome Sequence: Assess the quality and utility of the soybean genome sequence***

**1.1: Ensure the accuracy of reference sequence assembly**

**1.2: Capturing and leveraging existing genetic diversity in soybean germplasm**

**1.3: Improving bioinformatic resources for genomic analysis and practical applications**

# Strategic Goals for Soybean Genomics Research

***Goal 1: Genome Sequence: Assess the quality and utility of the soybean genome sequence***

**1.4: Reveal function of targeted genome sequences to facilitate gene discovery and application**

**1.5: Leveraging genomic information from Phaseoloids and other species**

**1.6: Determine role of epigenetics in soybean improvement**

# Strategic Goals for Soybean Genomics Research

## *Gene Function Subarea*

- **Melissa Mitchem, University of Missouri**
- **Steve Clough, University of Illinois**
- **Ed Cahoon, University of Nebraska - Lincoln**
- **Julian Chaky, Pioneer Hibred International Inc.**
- **Lila Vodkin, University of Illinois-Urbana**
- **Randy Shoemaker, USDA-ARS**
- **Trupti Joshi, University of Missouri**
- **Ivan Baxter, USDA-ARS**



# Strategic Goals for Soybean Genomics Research

***Goal 2: Gene Function: Develop functional genomic technologies to optimize utility of genome sequence information in germplasm enhancement***

**2.1: Develop comprehensive soy gene expression data**

**2.2: Develop near-isogenic lines (NIL) to help reveal genetic mechanisms that mediate useful traits**

**2.3: Develop an improved infrastructure to facilitate genome annotation**

# Strategic Goals for Soybean Genomics Research

***Goal 2: Gene Function: Develop functional genomic technologies to optimize utility of genome sequence information in germplasm enhancement***

**2.4: Achieve high-definition genomic characterization of soy biological mechanisms and regulatory systems**

**2.5: Use functional genomic methods to characterize transcription regulated pathways**

**2.6: Advance gene modification technologies to help associate candidate genes with a discrete phenotype**

# Strategic Goals for Soybean Genomics Research

***Goal 2: Gene Function: Develop functional genomic technologies to optimize utility of genome sequence information in germplasm enhancement***

**2.7: Create a saturated transposon insertion population with defined flanking sequences that can be used to identify mutants by BLAST sequence comparison**

**2.8: Implement outreach opportunities for education and use of genomic databases**

**2.9: Develop an ORFeome library from agronomically important genes (tissue or treatment specific) and gene families**

# Strategic Goals for Soybean Genomics Research

## *Transformation/Transgenics Subarea*

- **John Finer, The Ohio State Univ**
- **David Somers, Monsanto**
- **Ted Klein, DuPont Agricultural Biotechnology**
- **Tom Clemente, University of Nebraska - Lincoln**
- **Paula Olhoft, BASF Plant Science**
- **Jack Widholm, University of Illinois-Urbana**
- **Wayne Parrott, University of Georgia**
- **Jennifer Jones, United Soybean Board**

# Strategic Goals for Soybean Genomics Research

***Goal 3: Transformation/Transgenics: Optimize transgenic methods and improve understanding of natural genes for modification of trait expression***

**3.1: Establish a soybean genetic repository and distribution center (this was also a performance measure for the Gene Function group)**

**3.2: Develop next generation transformation and targeting technologies and utilize these transgenic approaches to help elucidate gene function and deploy genes of interest**

# Strategic Goals for Soybean Genomics Research

## *Translational Genomics Subarea*

- **Henry Nguyen, University of Missouri**
- **Tommy Carter, Jr., USDA-ARS**
- **Katy Rainey, Virginia Tech**
- **George Graef, University of Nebraska - Lincoln**
- **Dechan Wang, Michigan State University**
- **Jim Specht, University of Nebraska - Lincoln**
- **Saghai Maroof, Virginia Tech**
- **Kevin Matson, Monsanto**
- **Glenn Bowers, Syngenta Seeds**
- **Bill Beavis, Iowa State University**

# Strategic Goals for Soybean Genomics Research

## ***Goal 4: Translational Genomics: Optimize breeding efficiency with robust sequence-based resources***

- 4.1: Develop analytical approaches to characterize soy germplasm diversity based on the SoyHapMap 1.0 data to identify parental lines for breeding purposes**
- 4.2: Discover gene/QTL for qualitative traits and develop tightly linked markers using the haplotype variation in SoyHapMap 1.0**
- 4.3: Discover gene/QTL for quantitative traits and develop tightly linked markers using the haplotype variation in SoyHapMap 1.0**

# Strategic Goals for Soybean Genomics Research

## ***Goal 4: Translational Genomics: Optimize breeding efficiency with robust sequence-based resources***

**4.4: Develop and populate a marker-trait association database and the user interface**

**4.5: Define the molecular genetic signatures of selection in 70+ years of U.S. soybean breeding by use of the 50,000 SNP Illumina Infinium Assay**

**4.6: Define optimum breeding models applicable to different breeding situations using *in silico* analysis**



# Soybean Genomics Research Strategic Plan 2012-2016

## "OVERARCHING" PROJECTS

- Provide additional support staff for continued development and population of *SoyBase*
- Develop genetic repository/ distribution center for soybean mutants/transgenic lines

# Soybean Genomics Research Strategic Plan 2012-2016

## Special Acknowledgement

During the workshop it was realized this would likely be one of Dr. Ed Ready's last major assignments as Program Manager with the United Soybean Board's Production Committee prior to his well-earned retirement. The participants of this workshop wish to express their appreciation to Dr. Ready for his dedication, professionalism, and unprecedented ability to work through complex issues and arrive at the best solution for the U.S. soybean industry. As a research portfolio manager, he is known as a "quick study" that possesses the ability to communicate highly complex technologies in understandable language to a wide range of audiences. As a part of the larger soybean community we wish to say, "Thanks Ed!"