Soybean (*Glycine max* (L.) Merr.)
Prepared by R. C. Shoemaker et. al.  1 October 2004

**Genome features**
- 1,115 Mbp/haploid genome
- # chromosomes: 20/haploid complement
- Wide range in chromosome size
- Five chromosomes with at least one heterochromatic arm

**Special biological features of interest**
- Ancient paleopolyploid (14 MY and 45-55 MY)
- Accumulates high levels of seed protein
- Large seed size
- Advanced embryogenic systems methodologies
- Adapted to wide range of latitudes
- Close relatives are one annual (*G. soja*) and many perennials (*Glycine* sp.)
- Allergen-free germplasm exists
- Produces many bioactive seed compounds such as isoflavones, saponins, sterols, sphingolipids and lectin

**Genetic resources**
- USDA Germplasm collections (USDA-ARS, Urbana, IL)
  - Domestic Cultivar Collection
    - "old", released prior to 1945 (208 accessions including some Asian landraces)
    - "modern", released by public institutions after 1945 (474 cultivars)
    - "proprietary" (60 cultivars)
  - Genetic Stock Collection
    - Type Collection (194 lines)
    - Isoline Collection (593 lines)
    - Germplasm Releases (178 lines maintained)
- USDA Collection
  - *Glycine max* ~ 16,750
  - *Glycine soja* ~ 1,100
  - 16 perennial specis ~900

- Asian Vegetable Research and Development Center ~ 14,000 *G. max*
- China ~ 26,000  *G. max*
- Global Collections
Glycine max ~ 170,000 accessions in ~ 160 institutions in ~ 70 countries
Glycine soja ~ 10,000
Glycine spp (perennials) ~3,500

- Many mapping populations (BC populations, RILs, etc.) well populated with markers and publicly available.
- Large amounts of descriptive data on germplasm in GRIN
- Established genomic databases (SoyBase and LIS)

BAC libraries
- Williams 82 BACs (HindIII and BstI) - USDA-ARS at Iowa and Missouri
- Fairibault - Minnesota
- Forrest - Southern Illinois
- PI 437654 -Clemson
- PI 229358 - Georgia

Molecular markers
- RFLPs: ~550
- SSRs: ~1015
- SNPs/STTs: ~1,000 SNP from 1,000 unigenes; ~ 8,000 SNPs identified in 2,000 STSs
- AFLPs: 650
- many addition isoenzymes and classical genes

ESTs, experimentally defined genes, and genomic sequences
- ESTs: > 340,000, from more than 80 different cDNA libraries
- Genomic sequence: several megabases, mostly from disease resistance loci, but one pair of homoeologous BACs
- AFFYMETRIX Soybean GeneChip (28,000 genes)
- Microarrays (36,000 unigenes)
- Long-oligo arrays in process

Cytogenetics
- Jackson: FISH FIBER FISH with RFLP clones and BACs
- Knapp: FISH FIBER FISH with cDNA clones
- Hymowitz: Karyotypes and trisomics

Consortium or initiatives
- United Soybean Board, Better Bean Initiative