Peanut Genome Initiative Research Progress Chart for Priorities Identified in the Biotech Peanut White Paper 2006

Priority	Accomplished		Targets				
	2007	2008	2009	2010	2011	2012	2013
Molecular Markers	cDNA (EST) library of 10,000 peanut genes	Microarray with 8400 EST genes for screening; 5500 DNA markers for genetic map A genome	DNA markers for regions of the genome that are rich in genes for disease resistance	Customized microarrays with genes for disease resistance	Customized microarrays with genes for flavor & quality traits	Ability to create a DNA fingerprint of each accession in the germplasm collection	Ability to sequence & genotype progeny of breeding populations
10 Key Traits	Conventional QTL discovery & inheritance studies	Developed germplasm with PAC and RKN resistance	Early maturing, high O/L varieties for improved flavor characteristics	Varieties with stacked traits (PAC, RKN, O/L)	Improved decision models for best management practices & use of genomic tools	Varieties with stacked traits for TSWV, leaf spots, PAC, RKN, O/L)	Agronomic varieties with improved water use efficiency
Genomic Map	Useful genetic populations for mapping (positioning) DNA markers on genetic map	High density genetic map of the peanut genome	Physical map of both diploid genomes	Initiate sequence and assemble of diploid genomes	Physical map of the tetraploid genome	Initiate sequencing the tetraploid genome	Assembly & quality control analysis of the tetraploid genome sequence
Trait Analysis	Flavor & quality analysis of UPPT entries	Evaluation of oil % in wild species; tocopherol, folate, amino acid analysis of core collection	Entry of seed composition descriptors in the USDA GRIN database	Analysis of protein, oil, carbohydrate, amino acid composition of entries in germplasm collection	Quantitative database for bionutrient levels in entries of the germplasm collection	High throughput capacity for association of genotypes with disease resistance traits	High throughput capacity for association of genotypes with peanut quality traits
Transformation Systems	Gene gun used to transform plants with the desired foreign DNA sequences	Imported Agrobacterium protocol for more efficient transformation frequency from India	Ability to create stable transformations and reduce time to regenerate fertile GM plants	Ability to transform any peanut genotype	Methods that target specific genes or regions of chromosomes	Effective components of system in public domain	Ability to insert stacked genes for multiple traits
Biotech Peanut	GM peanut with resistance to Sclerotinia blight (OK)	GM peanuts with resistance to Sclerotinia (VA), Stem Rot	GM peanuts with elevated folate	GM peanuts with modified protein composition (reduced allergenic potential)	GM peanuts with drought tolerance	Yield assessment of current GM peanuts	Breeding programs for agronomic GM peanuts
Registration	Initiated regulatory approval process for GM Sclerotinia resistance	Demonstrated little problem with pollen transfer between field grown peanuts	Operative agreements for freedom to operate with GM technology	Regulatory approval for field testing of transgenic material	Methods to control volunteer GM peanuts in commercial production systems	Protocol for monitoring potential GM effects on the environment	Deregulation of GM peanuts
Mutated Peanut Collection	Established a chemically mutated peanut population for reverse genetics	Discovered 3 DNA markers for ara-h2 (allergen protein genes)	Characterize the alleles for all peanut proteins, oil and fatty acid composition	Determine the function of candidate genes in QTL for PAC resistance	Determine the function of candidate genes in QTL for TSWV & leaf spot resistance	Determine the function of candidate genes in QTL for drought tolerance	High density proteomic maps of candidate gene products for various traits
Genetic Changes	Biotechniques to silence genes in peanut	Silenced the expression of a major allergen, ara-h2	Eliminate genes for specific peanut proteins, oil and fatty acids	Discovery of TSWV resistance genes & appropriate gene markers	Discovery & transfer of useful genes from wild to commercial peanuts	Routine use of bridge species for development of interspecific hybrids	Adoption of marker assisted selection of traits in all breeding programs
Animal Test Model	Inbred pigs (F2) selected for hypersensitivity to peanut, monoclonal antibodies against swine IgE	Inbred pigs (F3) selected for hypersensitivity to peanut, monoclonal antibodies against swine IgE	Inbred pigs (F4) selected for hypersensitivity to peanut, ELISA assay for swine IgE	Inbred pigs (F5) selected for hypersensitivity to peanut, histology, immunology	Determine how tissue identify & respond to antigenic proteins	Target protein genes for elimination by GM techniques	Distribute uniform pig lines on a fee basis for clinical, animal & plant research on food allergy
Peanut Information System	Alignment with the National Legume Information System	Transcript assembly & EST database for advanced DNA marker discovery	Interactive access to portions (gene clusters) in the peanut genome sequence	State of art interactive genomic database for peanut	Advanced software for comparing genome sequences among species	Access to all sequenced plant genomes through LIS affiliation in the Virtual Plant Information System	Capacity to provide interactive access to the entire peanut genome sequence