

Peanut Genome Initiative Research Progress Chart

Priority	Accomplished		Targets					
	2007	2008	2009	2010	2011	2012	2013	
Molecular Markers	Library of 10,000 expressed peanut genes	Gene chip with 8400 genes markers; 5500 gene markers for A genome genetic map	6000 new DNA markers positioned on genetic map	Customized microarrays with genes for disease resistance	Customized microarrays for food safety,	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
Key Traits	Conventional breeding & inheritance studies	Developed germplasm with PAC and RKN resistance	Early maturing, high O/L varieties for improved flavor characteristics in yield tests	Varieties with stacked traits (PAC, RKN, O/L) in yield test	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 Maps	Useful mapping populations for QTL discovery	Discovery of QTL for Key Traits	First SSR-based genetic map of the peanut genome	SNP-based genetic reference map of the peanut genome	Sequence and assemble of diploid genomes	Initiate sequencing the tetraploid genome	Assembly & quality control analysis of the tetraploid genome sequence	
Germplasm Collection	Flavor & quality analysis of UPPT entries	Initial evaluation of oil; tocopherol, folate, amino acid in core collection	Ensure seed viability in germplasm collection	Phenotypic analysis of 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	
GM Methods	Gene gun used to transform plants with the desired foreign DNA sequences	Breakthrough protocol for efficient transformation frequency	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	Transform peanut with resistance to Sclerotinia blight (OK)	Transform peanuts with resistance to Sclerotinia (VA), Stem Rot	Transform peanuts with elevated folate	Transform peanuts with modified protein composition (reduced allergenic potential)	Transformed peanuts with drought tolerance	Yield assessment of current GM peanuts	Breeding programs for agronomic GM peanuts	
Regulatory Approval	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	
Gene Discovery	Ability to create gene markers in chemically mutated peanuts	Discovered 3 DNA markers for ara-h2 (allergen protein genes)	Characterize the alleles for the high O/L trait	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	
Gene Characterization	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	Ability to identify mechanism for genetic resistance to PAC	Ability to identify mechanism for genetic resistance for TSWV & leaf spot resistance	Ability to identify mechanism for genetic resistance for drought tolerance		
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	