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Seed Seminar
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Albany, Georgia
Peanut Genomic Initiative
Research Areas

- Crop Management and Productivity
- Quality and Safety
- Disease and Pest Management
- Gene Discovery and Genome Analysis
- Genetics and Germplasm Enhancement
- Plant Transformation Technology
Three Primary Goals

- Develop improved transformation systems and GMO peanuts \((GM0)\)
- Develop molecular markers for resistant genes to the primary peanut disease and quality attributes \((Non\ GMO)\)
- Create a mutated peanut collection using chemical knockouts to eliminate unwanted traits \((Non\ GMO)\)
Goal #1 – GMO Peanuts

*Uses genes from other plants, fungi, and bacteria and inserts them into a peanut.*
Research Update
GMO Peanuts

- US has developed genetically modified germplasm with white mold, stem rot, and aflatoxin resistance
- First GMO Peanut
  - Sclerotinia GMO Peanut (Dr. Grabau Va. Tech)
    - T5 level for field increases (fifth season)
    - Trait is stable, need to ask for seed increase (approval by EPA)
- GMO Bt Peanut is in the pipeline but need to understand the pathway to get approval and licensing (insect resistance)
Goal #2 – Molecular Markers

This not considered GMO as the genes will come from peanuts.
Research Update

Develop Molecular Markers

- Tools for all genetic traits
  - Identified 27,000 + active genes
  - 5000 DNA markers to create map of peanut genome
  - Developed thousands of gene sequences to use for screening
  - Started Peanut Bioinformatic System (database for gene sequences)
Research Update
Develop Molecular Markers

- Tools for disease resistance traits
  - Discovered two markers specifically for TSWV resistance
  - Discovered three markers for nematode resistance
  - Screening selected lines to identify specific markers with resistance to TSWV, leaf spot, aflatoxin, white mold, and CBR
Research Update
Develop Molecular Markers

- Tools for quality and safety traits
  - Discovered two markers for high oleic trait
  - Screened germplasm for differences in oil content
  - PeanutAge – a chip with DNA markers for oleic acid genes
  - Discovered three markers to indicate absence of two of the peanut allergens
  - Screening the core of the core collection for nutritional traits
Research Update
Develop Molecular Markers

- Tools for environmental stress screening
  - Using thousands of DNA sequences to select for drought and heat tolerance
  - Screening for the mechanism that indicates drought resistance (protein differences)
  - Discovered three markers for drought tolerance
  - Developed field systems in US and India to screen for drought tolerance
Goal #3 – Chemical Mutations

These are not considered GMO peanuts. Using chemical knockouts to eliminate unwanted peanut traits.
Research Update
Chemical Knockouts

- Created 20,000 mutated germplasm
- Working to understand the mutations and the impacts on the gene rich regions
- Continuing to expand the mutated germplasm
Three Primary Goals

- Develop improved transformation systems and GMO peanuts (GMO)
- Develop molecular markers for resistant genes to the primary peanut disease and quality attributes (Non GMO)
- Create a mutated peanut collection using chemical knockouts to eliminate unwanted traits (Non GMO)
Thank you for your continued support!