Proceedings

APRES
AMERICAN PEANUT RESEARCH & EDUCATION SOCIETY, INC.

54th Annual Meeting

American Peanut Research and Education Society

MANAGING RISK AND PROMOTING SUSTAINABILITY IN THE COMPLEX WORLD OF PEANUTS

Program and Schedule of Events

July 12-14, 2022
Omni Las Colinas Hotel

APRES
AMERICAN PEANUT RESEARCH & EDUCATION SOCIETY, INC.

54th Annual Meeting

July 12-14, 2022 * Dallas, TX

Sponsors

Wednesday Night Reception & Dinner
Bayer
BASF

Meeting Breaks
Birdsong Peanuts
Fine Americas
Premium Peanut

Spouses Hospitality Suite
Texas Peanut Producers Board

Ice Cream Social
American Peanut Council
Golden Peanut & Tree Nuts
National Peanut Buying Points Association
The J.M. Smucker Company
U.S. Gypsum
Valent
Virginia Peanut Growers Association

Excellence in Research & Education Awards & Reception
Corteva™ Agriscience

Graduate Student Luncheon
Syngenta

Joe Sugg Award
Graduate Student Competition
North Carolina Peanut Growers Association
National Peanut Board

Graduate Student Poster Competition
National Peanut Board

Fun Run
JLA, Inc.

Registration Bags
Visjon Biologics

Peanut Snacks

Alabama Peanut Producers Association
Florida Peanut Producers Association
Georgia Peanut Commission
Hershey Chocolate
Mars Wrigley Confectionery
Oklahoma Peanut Commission
South Carolina Peanut Board
Texas Peanut Producers Board
Trader Joe's
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APRES COMMITTEE ROSTER
2021-22

Bailey Award Committee
Peter Dotray, Chair (2023)
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Marshall Lamb (2023)
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Dudley Dabbs (2024)

Coyt T. Wilson Distinguished Service Award Committee
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Marshall Lamb (2024)

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Hannah Jones (2023)
Scott Monfort (2024)

Joe Sugg Graduate Student Award Committee
Robert Kemerait, Chair (2022)
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Jim Scruggs (2023)
Sally Taylor (2024)
Dan Anco (2024)

Nominating Committee
Gary Schwarzlose, (2022) Past President
David Bertioli (2022)
Gibbs Wilson (2022)
Renee Arias (2022)

Peanut Quality Committee
Lisa Dean, Chair (2022)
Ricky Hartley (2022)
Lyndsay Bashore (2022)
Darlene Cowart (2024)
Zack Barnes (2024)
Jeff Dunne (2024)
Kris Balkcom (2024)

Program Committee
President-Elect, Chair
Rebecca Bennett – Technical Committee Chair
Johnny Cason – Local Arrangements Chair
Naveen Puppala – Fun Run Chair
Julie Marshall - Spouse Program Chair

Publications and Editorial Committee
Josh Clevenger, Chair (2022)
Nino Brown (2022)
Dylan Wann (2023)
Maria Balota (2024)

Public Relations Committee
Darlene Cowart, Chair (2023)
Shane Powell (2022)
Wen Carter (2022)
Hannah Jones (2024)

Site Selection Committee
Todd Baughman, Chair (2023)
Jianping Wang (2022)
Jamie Rhoads (2022)
Johnny Cason (2023)
Dan Anco (2024)
Scott Tubbs (2024)
Henry McLean (2024)

54th APRES Annual Meeting

July 12-14, 2022
Omni Las Colinas Hotel, Dallas, TX

Schedule of Events

Click to Access List of Individual Presentations

Monday	**USA-CST Time**	**Event**	**Meeting Room**	**Moderator**
7/11/22	8:00-5:00PM	Registration and Meeting Room Setup	Meet in Mandalay Foyer	Map - Page 21
	12 Noon-1:00	Program Committee Meeting and Lunch	Mandalay Ballroom	Mark Burow, Texas A&M University
	TBD	Joe Sugg Graduate Student Award Competitions Committee Meeting		Bob Kemerait, University of Georgia

Tuesday	**USA-CST Time**	**Event**	**Meeting Room**	**Moderator**
7/12/22	All Day	Registration	Las Colinas Foyer	Map - Page 21
	All Day	Poster Setup & Refreshments Area *Sponsored by Premium Peanuts*	Mandalay & Las Colinas Foyers	
	8:00-10:00	Seed Summit	Las Colinas Salon D	Steve Brown, Peanut Foundation & Corley Holbrook, USDA-ARS
Pages 6-7	9:00-10:30	Joe Sugg Award Graduate Student Competition - Masters Students* *Sponsored by North Carolina Peanut Growers Association and National Peanut Board*	Mandalay Ballroom	Bob Kemerait, University of Georgia
	10:30-12 Noon	Crop Germplasm Committee	Las Colinas Salon D	Maria Balota, Virginia Tech
	12 Noon-1:00	Lunch on Your Own		
	13:00-17:00	Spouses Hospitality Suite Open	White Rock	Julie Marshall, Lubbock Christian University
	13:00-15:00	COMMITTEE MEETINGS		
	13:00-14:00	Site Selection Committee	Las Colinas Salon A	Todd Baughman, Oklahoma State University
	13:00-14:00	Bailey Award Committee	Las Colinas Salon B	Peter Dotray, Texas Tech University
	13:00-14:30	Peanut Quality Committee	Las Colinas Salon D	Lisa Dean, USDA-ARS
	14:00-15:00	Public Relations Committee	Las Colinas Salon A	Darlene Cowart, Birdsong Peanuts
	14:00-15:00	Publications & Editorial Committee	Las Colinas Salon B	Josh Clevenger, HudsonAlpha
	14:00-15:00	Finance Committee	Las Colinas Salon C	Zach Barnes, Hampton Farms
Pages 6-7	15:00-16:45	Joe Sugg Award Graduate Student Competition - Masters Students* *Sponsored by North Carolina Peanut Growers Association and National Peanut Board*	Mandalay Ballroom	Bob Kemerait, University of Georgia
	17:00-18:00	Board of Directors Meeting	Windsor Ridge	David Jordan, APRES President, NCSU
	18:00-20:00	Ice Cream Social *Sponsored by APRES Sustaining Members*	Event Lawn (Next to the Pool)	

Wednesday	**USA-CST Time**	**Event**	**Meeting Room**	**Moderator**
7/13/22	All Day	Registration	Las Colinas Foyer	Map - Page 21
	All Day	Posters & Refreshments Area *Sponsored by Birdsong Peanuts*	Mandalay & Las Colinas Foyers	
	8:00-15:00	Spouses Hospitality Suite Open	White Rock	Julie Marshall, Lubbock Christian University
Page 8	8:00-9:45	GENERAL SESSION*	Las Colinas Salons D-F	David Jordan, APRES President, NCSU
Page 8	10:00-12:30	Sustainabiity Symposium*	Las Colinas Salons D-F	David Jordan, APRES President, NCSU
	12:30-13:30	Lunch on Your Own		
Pages 8-9	13:30-14:45	Marker Symposium*	Las Colinas Salons A-C	Mark Burow, Texas A&M University
Pages 9-10	13:30-17:00	Joe Sugg Award Graduate Student Competition - PhD Students* *Sponsored by North Carolina Peanut Growers Association and National Peanut Board*	Mandalay Ballroom	Bob Kemerait, University of Georgia
Pages 10-11	15:00-17:15	Breeding, Genetics, Biotechnology I	Las Colinas Salons A-C	Waltram Ravelombola, Texas A&M University
	18:30-21:00	APRES Family Dinner *Sponsored by Bayer & BASF*	Las Colinas Salons D-F	

Thursday	**USA-CST Time**	**Event**	**Meeting Room**	**Moderator**
7/14/22	6:00-7:15	Fun Run *Sponsored by JLA*	Meet on Event Lawn	
	All Day	Registration	Las Colinas Foyer	Map - Page 21
	All Day	Posters & Refreshments Area *Sponsored by Fine Americas*	Mandalay & Las Colinas Foyers	
	8:00-15:00	Spouses Hospitality Suite Open	White Rock	Julie Marshall, Lubbock Christian University
Page 12	8:00-9:00	Weed Science & Entomology	Las Colinas Salon D	Kayla Eason, USDA-ARS
Pages 12-13	8:00-10:30	Joe Sugg Award Graduate Student Competition - PhD Students* *Sponsored by North Carolina Peanut Growers Association and National Peanut Board*	Mandalay Ballroom	Bob Kemerait, University of Georgia
Page 13	8:15-9:15	Food Science & Physiology	Las Collinas Salons A-C	Cristiane Pilon, University of Georgia
	9:00-14:00	Spouse Tour - Dallas Aquarium	Meet in Lobby at 8:45	Julie Marshall, Lubbock Christian University
Page 14	9:15-11:15	Mycotoxins & Plant Pathology	Las Colinas Salons D	Ken Obasa, Texas A&M University
Pages 14-15	9:30-11:30	Harvesting & Production	Las Colinas Salon A-C	Audrey Gamble, Auburn University
Page 15	10:45-12:15	Breeding, Genetics, Biotechnology II	Mandalay Ballroom	Nino Brown, University of Georgia
	12:15-13:15	Lunch on Your Own		
	12:15-13:15	Graduate Student Luncheon *Sponsored by Syngenta*	Lakewood	Cassie Newman, APRES GSO President, NCSU
Page 16	13:15-16:00	Breeding, Genetics, Biotechnology III	Mandalay Ballroom	Amanda Hulse-Kemp & Alicia Massa, USDA-ARS
Page 17	13:30-15:30	Extension Techniques	Las Colinas Salon D	Trey Price, Louisiana State University
Pages 18-21	16:00-17:00	Poster Session - *All Authors Present*	Mandalay & Las Colinas Foyers	
Pages 20-21	16:00-17:00	National Peanut Board Graduate Student Poster Competitition	Las Colinas Foyer	Bob Kemerait, University of Georgia
	17:00-18:00	APRES 54th Annual Business Meeting & Awards Ceremony	Salons A-D	David Jordan, APRES President, NCSU
	18:00-19:30	Awards Reception *Sponsored by Corteva Agriscience*	Event Lawn (Next to Pool)	

*Livestreamed - APRES registration cover Dallas attendance or Connection via Zoom

APRES
AMERICAN PEANUT RESEARCH & EDUCATION SOCIETY, INC.

Annual Business Meeting and Awards Ceremony

July 14, 2022
Omni Las Colinas Hotel, Dallas, Texas

Minutes

President David Jordan called the annual business meeting to order.

Jordan gave his President's report, noting key highlights from his year leading the organization.

Jordan noted the minutes from the 2021 annual business meeting had been posted to the website for members to review and asked for any addition or corrections. Hearing none, he entertained a motion. Chris Butts moved and Maria Balota seconded approval of the minutes. The motion passed.

Committee Reports

Finance Committee – Zach Barnes, chairman of the Finance Committee, presented the current APRES financials and balance sheet. He noted that transition to the American Peanut Council (APC) will necessitate a year of investment during 2022. He noted that conference income will return to near normal for in-person meetings comparable to levels seen in 2017-19. With the transition to the new management team, the proposed budget includes a recommendation to spend $18,000 in FY 2022 for membership database migration and website redesign. The budget also includes $6,500 to conduct a financial review as required by the by-laws and per the contract with APC. The committee thanked Kim Cutchins for her service to APRES.

President Jordan noted the Board had already approved the budget for 2022.

Nominating Committee – Gary Schwarzlose, chairman, presented the Nominating Committee report. He noted the following new board members and officers for 2022-2023:

- Mark Burow, President
- Bob Kemerait, President-elect
- David Jordan, Past President
- Maria Balota, Va/Carolinas University Representative
- Shelly Nutt, Industry Rep – Grower Representative
- Rebecca Bennett, USDA-ARE Representative
- Samantha Dasawat, APRES Graduate Student Representative

Present Jordan opened the floor for additional nominations. Chris Butts moved and Todd Baughman seconded to close the floor to nominations. The motion passed.

Public Relations Committee – Darlene Cowart, chairwoman, gave the Public Relations Committee report. She recognized the industry members that had retired in the past year. Cowart also named the industry members who had passed away over the past year. She noted that the PR committee is proposing peanut butter donations through Peanut Proud for the 2023 APRES meeting in Savannah.

Peanut Quality Committee – Committee chairwoman Lisa Dean reported that the committee met earlier in the week and discussed the quality of the 2021 crop, including a slight reduction in acreage and drought problems in the Southwest. She noted that the 2020 results are available, and the 2021 crop is still being analyzed. There was also discussion in the committee about fewer chemicals being available due to tightening regulations.

Publications and Editorial Committee – Chairman Josh Clevenger reported that the Publications & Editorial Committee met and announced that Peanut Science journal would now be open access. He noted that there were 35 submissions to the journal in 2020. In 2021 there were 19 submissions. The current associate editors will remain with the addition of a genomics associate editor. He updated the group on the transition of Peanut Science to a new platform, which is nearly complete. The possibility of cultivar and germplasm registrations being submitted to Peanut Science is being discussed by a subset of the Committee.

Site Selection Committee - Todd Baughman, chairman of the Site Selection Committee, reported that the 2023 Annual Meeting will be held in Savannah, Georgia. For 2024 the group is looking at a location in the Southwest region. For 2025, the group will evaluate locations in the Virginia/Carolina's. The committee also recommended the addition of a representative from ARS to the committee to ensure government travel restrictions/per diem restrictions are considered.

Program Committee – Mark Burow, chairman of the Program Committee, thanked all the volunteers and committee members for making the meeting successful. He noted that the 54th Annual Meeting had 224 people registered as of June 30, including 17 international participants. The spouses program had 22 spouses and 12 children registered. There were 63 people registered for the Fun Run.

President Jordan announced there was one item of new business. He explained the creation of a Bylaws Committee to help with retention of historical decisions by the board. He noted the proposed changes were distributed to members via e-mail with 30 days notice as required by the bylaws.

The proposed addition to the bylaws:
k. By-Laws Committee –
This committee shall consist of three members. For the first appointment, the chair of the committee will serve for three years, one member will serve a two-year term and one member will serve a one-year term. Thereafter, all members shall serve a three-year term. The President shall appoint a Chair from among incumbent committee members. The primary function of this committee is to capture and maintain the procedures, rules, regulations, guidelines, interpretations, standard practice of APRES in one central location through the creation and maintenance of a Manual of Operations and the utilization of this document to provide guidance to the APRES Board of Directors, Committees and management structure. The Chair of the By-Laws Committee serves as an ex-officio member of the Board of Directors and Executive Committee.

Shelly Nutt moved acceptance of the proposed by-laws changes. Bob Kemerait seconded. The motion passed.

David Jordan recognized the outgoing board members:

- Gary Schwarzlose
- Nathan Smith
- Lisa Dean
- Shelly Nutt
- Cassie Newman
- Mark Burow
- David Jordan

APRES Graduate Student Organization - President Cassie Newman gave a brief overview of their activities during the meeting and announced the president for 2022-23 will be Samantha Dasawata, Clemson University.

The business meeting transitioned to the awards ceremony:

Joe Sugg Graduate Student Award – Chairman Bob Kemerait announced the following winners:

- PhD section
    - Third place – Chiarri Rossi, University of Georgia
    - Second place – Nick Hurdle, University of Georgia
    - First place – Esther Achola, Makere University
- Master's section
    - Third place – Kenyana Taylor, Valdosta State University
    - Second place – Savannah Banner, Birdsong Peanuts
    - Jessica Bell – University of Georgia
- Poster presentation
    - First place – Megan Mills, Virginia Tech

Corteva Agriscience Awards for Excellence in Research and Education - Chairwoman Soraya Bertioli announced that Corley Holbrook of USDA-ARS was selected as the 2022 winner.

Bailey Award - Chairman Peter Dotray announced that S.B. Davis, R.S. Tubbs, R.C. Kemeriat and A.K. Culbreath of the University of Georgia are the 2022 winners.

Fellow of the Society – Chairwoman Kelly Chamberlin announced that Jim Elder of J.M. Smucker Company and Gary Schwarzlose of Bayer were inducted as Fellows of the Society for 2022.

Coyt T. Wilson Distinguised Service Award – Chairman Tim Grey announced that Bob Sutter of North Carolina is the recipient of the 2022 award.

Incoming President Mark Burow presented David Jordan with the Past President's Award and thanked him for service leading the organization in 2021-22.

President Burow adjourned the annual business meeting.

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Tuesday, JULY 12, 2022

09:00-10:30 **15:00-16:45**	**Joe Sugg Award Graduate Student Competition - Masters Students*** *Sponsored by North Carolina Peanut Growers Association and National Peanut Board* *Moderator: Bob Kemerait, University of Georgia*

Mandalay Ballroom

09:00 AM CDT	**Identifying the Alternative Hosts of Groundnut Rosette Disease Virus Complex and the Vector Role in Disease Carryover** **H. SSENDAGIRE*,** M.O. SSEMAKULA, T.L. ODONG, Makerere University, Kampala, Uganda; H.M. OTIM, National Crop Resource Research Institute (NaCRRI), Uganda; D.K. OKELLO, National Semi Arid Resource Research Institute (NaSARRI), Uganda; and C.M. DEOM, University of Georgia, Athens, GA.
09:15 AM CDT	**Handheld RGB-Based Phenotyping to Assess Groundnut Rosette Disease Resistance and Identify Trait Associated Components** **I. CHAPU*,** R.C.O. OKELLO, Department of Agricultural Production, College of Agricultural and Environmental Sciences, Makerere University, P. O. Box 7062, Kampala, Uganda; K.D. OKELLO, National Semi-Arid Resources Research Institute, P. O. Box 56, Soroti, Uganda; and M. BALOTA, Tidewater AREC, Virginia Tech, Suffolk, VA.
09:30 AM CDT	**Effect of Boron and Calcium Fertilizer Application, Harvesting Dates and Storage Techniques on the Seed Quality and Yield of Peanuts (*Arachis hypogaea*)** **B. MKANDA*,** Lilongwe University of Agriculture and Natural Resources, Malawi; W. MHANGO, Crop and Soil Sciences Department, Bunda College, Lilongwe University of Agriculture and Natural Resources, Malawi; R. BRANDENBURG, D. JORDAN, and D. REISIG, North Carolina State University, Raleigh, NC.
09:45 AM CDT	**Biological Nitrogen Fixation and Yield of Groundnuts in Response to Plant Density, Inorganic Fertilizer and Rhizobia Seed Inoculation** **P. MTENGEZO*;** W. MHANGO, Crop and Soil Sciences Department, Bunda College, Lilongwe University of Agriculture and Natural Resources, Malawi; R. BRANDENBURG, D. JORDAN, D. REISIG, North Carolina State University, Raleigh, NC.
10:00 AM CDT	**Effects of Aflasafe Application and Management Practice Combination on Yield and Aflatoxin Levels in Groundnut** **M. MEYA*,** Lilongwe University of Agriculture and Natural Resources, Bunda Campus, Lilongwe, Malawi; L. MATUMBA, Lilongwe University of Agriculture and Natural Resources, Natural Resources College Campus, Lilongwe, Malawi; G. MACDONALD, Agronomy Department, University of Florida, Gainesville, FL.
10:15 AM CDT	**Drought Tolerant and Seedling Vigor Screening in Groundnut (*Arachis hypogaea*) using Photogrammetry in a Breeding Program in Ghana** **E. K. SIE*,** R. OTENG-FRIMPONG, D. K. PUOZAA, Y. B. KASSIM, A.R. MASAWUDU and R. ADOMBILLA, CSIR-Savanna Agricultural Research Institute, Tamale, Ghana, A. DANQUAH, and K. OFORI, University of Ghana, Legon, Accra, M. BALOTA, Virginia Tech, Suffolk, VA, and D. HOISINGTON and J. RHOADS, Feed the Future Innovation Lab for Peanut, University of Georgia, Athens, GA.
BREAK	
15:00 PM CDT	**Impact of New Prohexadione Calcium Formulation on Vine Growth Suppression and Yield of Peanut (*Arachis hypogaea* L.)** **S.L. BANNER***, W.S. MONFORT, and R.S. TUBBS, Crop and Soil Sciences Department, The University of Georgia, Tifton, GA.
15:15 PM CDT	**Impact of In-Furrow Fertilizers on Peanut Germination in Multiple Locations** **M. WHEELER*,** W.S. MONFORT, Department of Crop and Soil Sciences, The University of Georgia, Tifton, GA; K. BALKCOM, Department of Crop, Soil and Environmental Sciences, Auburn University, 202 Funchess Hall, Auburn University, AL; D. ANCO, Plant and Environmental Sciences Department, Clemson University, 64 Research Rd, Blackville, SC; D. WRIGHT, Agronomy Department, The University of Florida, 155 Research Rd., Quincy, FL; D. JORDAN, Department of Crop and Soil Sciences, North Carolina State University, Williams Hall 4207, Raleigh, North Carolina; and M. BALOTA, School of Plant and Environmental Sciences, Virginia Tech University, 6321 Holland Road, Suffolk, VA.
15:30 PM CDT	**Evaluating Alternatives to Chlorothalonil for Managing Peanut Diseases in Alabama** **L. KAUR*,** H.L. CAMPBELL, A. STRAYER-SCHERER, Auburn University, Department of Entomology and Plant Pathology, Auburn, AL; and C. PARKER, Wiregrass Research and Extension Center, Auburn University, Headland, AL.

15:45 PM CDT	**BREAK (Paper Withdrawn)**
16:00 PM CDT	**Evaluating the Effect of Elemental Sulfur with Demethylation Inhibitors (DMI) And Quinone Outside Inhibitors (QoI) on Germination and Growth of *Nothopassalora personata*** **K. TAYLOR*,** J. TURCO, E.G. CANTONWINE, Biology Department, Valdosta State University, Valdosta, GA; A.K. CULBREATH, Plant Pathology Department, University of Georgia, Tifton, GA.
16:15 PM CDT	**Sensitivity of *Athelia rolfsii* from Commercial and Research Peanut Fields in Georgia to Mefentrifluconazole and Benzovindiflupyr** **J.BELL*** and T. BRENNEMAN, Plant Pathology Department, The University of Georgia, Tifton, GA.
16:30 PM CDT	**Efficacy and Economics of Precision Soil Sampling Strategies for Site-Specific Soil pH Management in Peanut** **M.W. TUCKER*,** S.S. VIRK, G.H. HARRIS, Department of Crop and Soil Sciences, University of Georgia, Tifton, GA; A.R. SMITH, Department of Agricultural and Applied Economics, University of Georgia, Tifton, GA; D.S. Carlson, Worth County Extension, University of Georgia Cooperative Extension, Sylvester, GA ; J. Kichler, Colquitt County Extension, University of Georgia Cooperative Extension, Moultrie, GA.

Wednesday, JULY 13, 2022

08:00-09:45	**General Session** *Moderator: David Jordan, APRES President, North Carolina State University*

Las Colinas Salons D-F

08:00 AM CDT	**Welcome to Texas! We Finally Got Here!** Gary Schwarzlose APRES Past President, Bayer
08:15 AM CDT	**Documenting the Sustainability of U.S. Peanut Production** Eric Coronel American Peanut Council
08:45 AM CDT	**Twenty-Five Years Later: How Risk to Tomato Spotted Wilt Virus was Addressed in the Southeastern U.S.** Panel: Steve Brown, Peanut Foundation; Albert Culbreath, University of Georgia; Bob Kemerait, University of Georgia
09:15 AM CDT	**Beyond the Peanut Genome** David Bertioli University of Georgia

Wednesday, JULY 13, 2022

10:00-12:30	**Sustainability Symposium** *Moderator: David Jordan, APRES President, North Carolina State University*

Las Colinas Salons D-F

10:00 AM CDT	**Maintaining Consumer Demand for Peanut Products** Victor Nwosu Mars-Wrigley
10:30 AM CDT	**Risk Reduction - A Third Party Perspective** Foy Mills, Jr. JLA, Inc.
11:00 AM CDT	**Addressing the Limitations of Peanut Resistance Due to Narrow Genetic Diversity** Soraya Bertioli University of Georgia
11:30 AM CDT	**Risks to Availability and Efficacy of Pesticides** W. Scott Monfort University of Georgia
12:00 PM CDT	**Challenges with Establishing and Maintaining Effective Seed Systems: A Global Perspective** Jamie Rhoads University of Georgia

Wednesday, JULY 13, 2022

13:30-14:45	**Marker Symposium** *Moderator: Mark Burow, APRES President Elect, Texas A&M University*

Las Colinas Salons A-C

13:30 PM CDT	**SNP Array Technology in Peanut** **P. OZIAS-AKINS***; Y. CHU, Department of Horticulture, The University of Georgia, Tifton, GA, and Institute of Plant Breeding, Genetics & Genomics, University of Georgia, Tifton, GA 31793. W. KORANI and J. CLEVENGER, HudsonAlpha Institute of Biotechnology, Huntsville, AL.

13:50 PM CDT	**Integrated Genomics for Rapid Marker Development and Targeted Crop Improvement** **J. CLEVENGER***; W. KORANI; C. VALERIO; Z. MYERS. HudsonAlpha Institute for Biotechnology, Huntsville, AL.
14:10 PM CDT	**High-Throughput Analysis of KASP Marker Data** **R.J. ANDRES***, C.S. NEWMAN, and J.C. DUNNE. Department of Crop and Soil Science, North Carolina State University, Raleigh, NC.
14:30 PM CDT	**Cost-Effective Genotyping by Resequencing Using Tecan Allegro Targeted Genotyping V2** **C. SUNG***, Department of Plant and Soil Science, Texas Tech University, Lubbock, TX; A. HILLHOUSE, TAMU Veterinary Med. Genome Center, College Station, TX; J. DUNNE, R. ANDRES, and C. NEWMAN, NC State University, Raleigh, NC; M. D. BUROW, Texas A&M AgriLife Research, Lubbock, TX, and Department of Plant and Soil Science, Texas Tech University, Lubbock, TX.

Wednesday, JULY 13, 2022

13:30-17:30	**Joe Sugg Award Graduate Student Competition - PhD Students** *Sponsored by North Carolina Peanut Growers Association and National Peanut Board* *Moderator: Bob Kemerait, University of Georgia*

Mandalay Ballroom

13:30 PM CDT	**Understanding the Physiological Basis of Carbon Allocation of Peanut Cultivars Under Water-Stress Conditions** **B. BHATTARAI***, H. KAUR-KAPOOR, and H.E. LAZA, Dept. Plant and Soil Science, Texas Tech Univ., Lubbock, TX.
13:45 PM CDT	**Evaluation of Peanut Development Using Plant Growth Regulators as Seed Treatment and Flumioxazin Application** **J. DE SOUZA RODRIGUES***, T.L. GREY, Department of Crop and Soil Sciences, The University of Georgia, Tifton, GA.
14:00 PM CDT	**Photosynthetic Efficiency, Leaf Spot Control, and Yield of Peanut Plants Treated with Dodine** **C. ROSSI***, C. PILON, A.K. CULBREATH, T. BRENNEMAN, R.S. TUBBS, University of Georgia, Tifton Campus - Tifton, Georgia-USA; and D.J. ANCO, Clemson University, Edisto Research and Education Center - Blackville, South Carolina, USA.
14:15 PM CDT	**High and Normal Oleic Runner-type Peanut Cultivar by Year Effects on Seed Germination and Vigor Response to Temperature** **N.L HURDLE***. T.L. GREY, W.D. BRANCH, W.S. MONFORT, Univ. of Georgia,Tifton, GA.
14:30 PM CDT	**Evaluating Peanut Varieties for Early Maturity in North Mississippi** **J. WHITTENTON***, B. ZURWELLER, J. GORE, A. FOX, Plant and Soil Sciences, Mississippi State University, Mississippi State, MS;, B. TILLMAN, North Florida Research and Education Center, University of Florida, Marianna, FL; and D. WANN, International Peanut Group, Brownfield, TX.
14:45 PM CDT	**Quantifying Acetochlor Thermal Stability** **A.E. McEACHIN***, T.L. GREY, The University of Georgia, Dept. of Crop & Soil Sciences, Tifton, GA; K.M. EASON, USDA-ARS, Tifton, GA; and K. RUCKER, Bayer Crop Sciences, Tifton, GA.
15:00 PM CDT	**BREAK**
15:15 PM CDT	**The Effects of Paraquat Use on Peanut in the Southwestern United States** **Z.R. TREADWAY***, J.L. DUDAK, T.A. BAUGHMAN, Oklahoma State University, Ardmore, OK; P.A. DOTRAY, Texas Tech University and Texas A&M AgriLife Research and Extension Service, Lubbock, TX; W.J. GRICHAR, Texas A&M AgriLife Research, Yoakum, TX.
15:30 PM CDT	**Residual Tankmix Options in Peanut** **J.L. DUDAK***, Z.R. TREADWAY, T.A. BAUGHMAN, R.W. PETERSON, Oklahoma State University- Institute of Agriculture Biosciences, Ardmore, OK.
15:45 PM CDT	**Weed Management Using Diode Laser Treatments** **C.J. MWITTA***, G.C. RAINS, E.P. PROSTKO, University of Georgia, Tifton, GA.
16:00 PM CDT	**Black Pod Peanut Shell Extracts Reduce In Vitro *Aspergillus parasiticus* Growth** **M.D. GOYZUETA***, B.L. TILLMAN, North Florida REC, Agronomy Department, University of Florida, Marianna, FL.

16:15 PM CDT	**Phenotyping of QoI Sensitivity in *Aspergillus* section *Nigri* from Peanut Fields in Georgia** **B.S. JORDAN***, T.B. BRENNEMAN, M.E. ALI, Dept. of Plant Pathology, University of Georgia, Tifton, GA; R.S. ARIAS, ARS-USDA-National Peanut Research Laboratory, Dawson, GA ; and A.K. CULBREATH ,Dept. of Plant Pathology, University of Georgia, Tifton, GA 31793-5766.
16:30 PM CDT	**In Vitro Antifungal Activity of Ferulic Acid Against *A. flavus* Growth** **L. COMMEY***, Department of Plant and Soil Science, Texas Tech University, Lubbock, TX 79409; H. SUDINI, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, India; H. FALALOU, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Niamey, Niger; T.K. TENGEY, Centre for Scientific and Industrial Research-Savanna Agricultural Research Institute, Nyankpala, Ghana; M.D. BUROW, Texas A&M AgriLife Research, Lubbock, TX, and Department of Plant and Soil Science, Texas Tech University, Lubbock, TX; V. MENDU, Department of Plant and Soil Science, Texas Tech University, Lubbock, TX.
16:45 PM CDT	**Nematode and Peanut Response to Fluopyram as Influenced by Crop Sequence and Cultivar Selection** **E. FOOTE***, D.L. JORDAN, J. DUNNE, A. GORNY, and R.L. BRANDENBURG, North Carolina State University, Raleigh, NC; W. YE, North Carolina Department of Agriculture and Consumer Services, Raleigh, NC; W.S. MONFORT, University of Georgia, Tifton, GA; and C. HOLBROOK, Crops and Genetics Breeding Research Unit, USDA-ARS, Tifton, GA.

Wednesday, JULY 13, 2022

15:00-17:15	**Breeding, Genetics, Biotechnology I** *Moderator: Waltram Ravelombola, Texas A&M University*

Las Colinas Salons A-C

15:00 PM CDT	**Development of an Array of KASP Markers for Screening Peanut for Hybridity and for Varietal Identification** **M.D. BUROW***, Texas A&M AgriLife Research, Lubbock, TX 79403, and Texas Tech University, Dept. of Plant and Soil Science, Lubbock, TX; F. NEYA, P. SANKARA, Université Ouaga I; J. Ki-Zerbo, Département de Phytopathologie et Mycologie Tropicale, Ouagadougou 03, BURKINA FASO; R. CHOPRA, L. COMMEY, C.-J. SUNG, and V. MENDU, Texas Tech University, Dept. of Plant and Soil Science, Lubbock, TX; A.R. SEHRAWAT, Maharshi Dayanand University, Rohtak, INDIA; H. PHAM, Texas A&M AgriLife Research, Lubbock, TX; J. CASON, and C. SIMPSON, Texas A&M AgriLife Research, Stephenville, TX.
15:15 PM CDT	**Genetic Variants in the Peanut Transcriptome in Response to *Aspergillus* Infection** **A.N. MASSA***, V.S. SOBOLEV, V.A. ORNER, T.E. WALK, C.L. BUTTS, M.C. LAMB, and R.S. ARIAS, National Peanut Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Dawson, GA; and Y. LIANG and K.L. CHILDS, Plant Biology Department, Michigan State University, East Lansing, MI.
15:30 PM CDT	**Proteomic Analysis of *Arachis hypogaea* Seeds from Different Maturity Classes** **J.A. MARSHALL***, Department of Chemistry and Biochemistry, Lubbock Christian University, Lubbock, TX; A. CHERRY and B. FISHER, Department of Mathematics, Lubbock Christian University, Lubbock, TX; W.D. BRANCH, Institute of Plant Breeding, Genetics & Genomics, The University of Georgia, Tifton, GA; H. MOLINA, The Proteomics Resource Center, The Rockefeller University, New York, NY; C. LIEBOLD, Consumer Foods R&D, The J. M. Smucker Co., Lexington, KY.
15:45 PM CDT	**Advances in Genomics-Based Tools for Peanut Breeding** **A.M. HULSE-KEMP*,** USDA-ARS, Genomics and Bioinformatics Research Unit, Raleigh, NC; C. Newman, R. Andres, J.C. DUNNE, North Carolina State University, Department of Crop and Soil Sciences, Raleigh, NC; J.N. VAUGHN, USDA-ARS, Genomics and Bioinformatics Research Unit, Athens, GA; B.E. SCHEFFLER, USDA-ARS, Genomics and Bioinformatics Research Unit, Stoneville, MS.
16:00 PM CDT	**BREAK**
16:15 PM CDT	**Allele-Specific Expression of a Transcription Factor Gene Influences Peanut Nodulation** Z. ZHAO, Y. WANG, Z. PENG, Z. LUO, **J. WANG***, Agronomy Department, University of Florida, Gainesville, FL.

16:30 PM CDT	**Genetic Mapping of Yield-related Traits in Three Bi-Parental Recombinant Inbred Line Populations** Y. CHU and **P. OZIAS-AKINS***, Horticulture Department, University of Georgia Tifton Campus, Tifton, GA; R. HOLTON Institute of Plant Breeding, Genetics and Genomics, University of Georgia, Athens, GA; C.C. HOLBROOK, USDA- Agricultural Research Service, Crop Genetics and Breeding Research Unit, Tifton, GA; R. HOVAV, Department of Field Crops, Institute of Plant Sciences, Agriculture Research Organization-The Volcani Center, Israel.
16:45 PM CDT	**Genome-wide Approach to Investigate Peanut (*Arachis hypogaea*) Resistance to Early Leaf Spot and Late Leaf Spot Using a Peanut MAGIC Population** E. THOMPSON, C. ADAMS, S. GANGURDE, H. WANG, A.K. CULBREATH, Univ. of Georgia, Dept. Plant Pathology, Tifton, GA; B. TONNIS, M. WANG, USDA-ARS, Plant Genetic Resources Conservation Unit, Griffin, GA; W. KORANI, J.P. CLEVENGER, HudsonAlpha Institute for Biotechnology, Huntsville, AL; S. BERTIOLI, Univ. of Georgia, Dept. Plant Pathology, Athens, GA; D. BERTIOLI, Univ. of Georgia, Dept. Crop Soil Sciences, Athens, GA; **B. GUO***, USDA-ARS, Crop Genetics and Breeding Research Unit, Tifton, GA.
17:00 PM CDT	**Australian Peanut Breeding, 44 years of History. Where to Now?** **D.J. O'CONNOR***, G.C. WRIGHT, S. WOOD, BegaPeanuts, Kingaroy, Queensland, Australia; D. FLEISCHFRESSER, L. OWENS, Agrisciences Queensland, Department of Agriculture and Fisheries, Mareeba, Queensland, Australia.

Thursday, JULY 14, 2022

08:00-09:00	**Weed Science & Entomology** *Sponsored by: North Carolina Peanut Growers Association and National Peanut Board* *Moderator: Kayla Eason, USDA-ARS*

Las Colinas Salon D

08:00 AM CDT	**Classic® (Chlorimuron) Effects on New Peanut Cultivars** **E.P. PROSTKO***, C.C ABBOTT, and T.M. RANDELL-SINGLETON, Dept. of Crop & Soil Sciences, The University of Georgia, Tifton, GA; and R.C. KEMERAIT, Dept. of Plant Pathology, The University of Georgia, Tifton, GA.
08:15 AM CDT	**Weed Control with Gramoxone plus Basagran with Residual Herbicides in North Carolina** G.S. BUOL, **D.L. JORDAN*** and E. FOOTE, North Carolina State University, Raleigh, NC.
08:30 AM CDT	**Effect of Dicamba or 2,4-D plus Glyphosate Drift Rate and Exposure Timing on Peanut Response** **P. DEVKOTA***, N. SINGH, O.S. DARAMOLA, University of Florida/IFAS, West Florida Research and Education Center, Jay, FL.
08:45 AM CDT	**Biology and Management of the Rootworm Complex in Georgia Peanut** **M.R. ABNEY*** and A.L. SKIPPER, Entomology Department, The University of Georgia, Tifton, GA.

Thursday, JULY 14, 2022

08:00-10:30	**Joe Sugg Award Graduate Student Competition - PhD Students** *Sponsored by: North Carolina Peanut Growers Association and National Peanut Board* *Moderator: Bob Kemerait, University of Georgia*

Mandalay Ballroom

08:00 AM CDT	**Novel *loci* for Resistance to Groundnut Rosette Disease in Cultivated Peanut (*Arachis hypogaea* L.)** **E. ACHOLA***, Makerere University Regional Center for Crop Improvement, Kampala, Uganda and School of Agricultural Sciences, Makerere University, Kampala, Uganda; D. A. ODENY, International Crops Research Institute for the Semi-Arid Tropics–Nairobi, Kenya; D. K. OKELLO, National Semi-Arid Resources Research Institute, Serere, Uganda; D. FONCEKA, Regional Study Center for the Improvement of Drought Adaptation, Senegalese Institute for Agricultural Research, BP 3320, Thiès, Senegal; P. WASSWA, School of Agricultural Sciences, Makerere University, Kampala, Uganda; J. CLEVENGER, HudsonAlpha Institute for Biotechnology, Alabama, U.S.A.
08:15 AM CDT	**Labor Time Requirements Associated with Pest and Crop Management Packages for Peanut Production in Ghana** **S. ARTHUR***, G. BOLFREY-ARKU, M.B. MOCHIAH, and J.Y. ASIBUO, Council for Scientific and Industrial Research - Crops Research Institute, Kumasi, Ghana; R. AKROMA and J. SARKODIE-ADDO, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana; G. MAHAMAH and J. NBOYINE, Council for Scientific and Industrial Research-Savana Agricultural Research Institute, Wa, Ghana; D.L. JORDAN and R.L. BRANDENBURG, North Carolina State University, Raleigh, NC; and D. HOISINGTON, and J. RHOADS, Feed the Future Innovation Lab for Peanut, University of Georgia, Athens, GA.
08:30 AM CDT	**Effect of Variety and Management Practices on Soil Arthropod Management, Yield, and Aflatoxin Contamination in Peanut Production across Three Geographical Locations of Ghana** **A. SEIDU***, Department of Crop Science, Faculty of Agriculture, Food and Consumer Sciences, University for Development Studies, Nyankpala, Tamale, Ghana and Council for Scientific and Industrial Research-Savanna Agricultural Research Institute, Nyankpala, Tamale, Ghana; I.K. DZOMEKU, Department of Crop Science, Faculty of Agriculture, Food and Consumer Sciences, University for Development Studies, Nyankpala, Tamale, Ghana; M. ABUDULAI, J.A. NBOYINE, and F. ANAMAN, Council for Scientific and Industrial Research-Savanna Agricultural Research Institute, Nyankpala, Tamale, Ghana; and D.L. JORDAN, Department of Crop and Soil Sciences, North Carolina State University, Raleigh, NC.
08:45 AM CDT	**The Construction of a Chromosome Segment Substitution Line Population for the Systematic Introduction of Wild Alleles from *Arachis batizocoi* and *Arachis stenosperma* into Cultivated Peanut** **E.C. BARNES***, Institute of Plant Breeding, Genetics & Genomics, University of Georgia, Athens, GA; S.L.M. LEAL-BERTIOLI, Institute of Plant Breeding, Genetics & Genomics and Department of Plant Pathology, The University of Georgia, Athens, GA; and D.J. BERTIOLI, Institute of Plant Breeding, Genetics & Genomics and Department of Crop & Soil Sciences, The University of Georgia, Athens, GA.

09:00 AM CDT	**Evaluating Georgia Peanut Production Scenarios Using the Field to Market Fieldprint Platform Sensitivity Analysis** **K.R. REAGIN***, W.M. PORTER, Department of Crop and Soil Sciences, University of Georgia, Tifton, GA ; and E.C. CORONEL, American Peanut Council, Tifton, GA.
09:15 AM CDT	**BREAK (Papers Withdrawn)**
09:45 AM CDT	**Pyramiding Alleles from the Wild Crop Relative *Arachis cardenasii* Increases Resistance to Early and Late Leaf Spot in Peanut** **M. GONZALES*,** Department of Plant Pathology, University of Georgia, Athens, GA; R. KEMERAIT JR. and A. CULBREATH Department of Plant Pathology, University of Georgia, Tifton, GA; R. ANDRES and J. DUNNE, Department of Crop and Soil Sciences, North Carolina State University, Raleigh, NC; B. ABERNATHY and D.J. BERTIOLI, Department of Crop and Soil Sciences, University of Georgia, Athens, GA; S.C.M. LEAL-BERTIOLI, Department of Plant Pathology, University of Georgia, Athens, GA.
10:00 AM CDT	**Mutmap and Whole Genome Re-Sequencing to Identify Gene(s) Controlling Peanut Resistance to Early Leaf Spot and/or Late Leaf Spot Diseases** **E. THOMPSON***, S. GANGURDE, H. WANG, A.K. CULBREATH, University of Georgia, Department of Plant Pathology, Tifton, GA; W. KORANI, J.P. CLEVENGER, HudsonAlpha Institute for Biotechnology, Huntsville, AL; S. BERTIOLI, University of Georgia, Department of Plant Pathology, Athens, GA; D. BERTIOLI, University of Georgia, Department of Crop and Soil Sciences, Athens, GA; P. OZIAS-AKINS, University of Georgia, Department of Horticulture, Tifton, GA; B. GUO, USDA-ARS, Crop Genetics and Breeding Research Unit, Tifton, GA.
10:15 AM CDT	**Reduced-Cost Genotyping in Peanut Breeding Programs Using Genotyping by Resequencing** **C. SUNG***, Department of Plant and Soil Science, Texas Tech University, Lubbock, TX; R. KULKARNI, Iowa State University, Ames, IA; A. HILLHOUSE, TAMU Veterinary Med. Genome Center, College Station, TX; P. OZIAS-AKINS, University of Georgia, Tifton, GA; C. E. SIMPSON and J. CASON, Texas A&M AgriLife Research, Stephenville, TX; M. D. BUROW, Texas A&M AgriLife Research, Lubbock, TX, and Department of Plant and Soil Science, Texas Tech University, Lubbock, TX.

Thursday, JULY 14, 2022

08:15-09:15	**Food Science & Physiology** *Moderator: Cristiane Pilon, University of Georgia*

Las Colinas Salons A-C

08:15 AM CDT	**Peanut Skin Extracts as Natural Antioxidant Ingredients for Peanut Butter** D.A. MOHEBPOUR, Department of Food, Bioprocessing and Nutrition Sciences, North Carolina State University, Raleigh, NC; **L.L. DEAN*** and K.W. HENDRIX, Food Science and Market Quality and Handling Research Unit, USDA, ARS, SEA, Raleigh, NC.
08:30 AM CDT	**Does Peanut Maturity Impact Roasting Chemistry?** **M. SCHOLTEN*,** C. LIEBOLD, The J.M. Smucker Company, Lexington, KY; and J.A. MARSHALL, The Department of Chemistry and Biochemistry, Lubbock Christian University, Lubbock, TX .
08:45 AM CDT	**Physiological Components of Seed Quality in Peanut** L.A. MORENO, **C. PILON***, R.S. TUBBS, Department of Crop and Soil Sciences, The University of Georgia , Tifton Campus, Tifton, GA; and A.F. SANTOS, Department of Agriculture, Federal University of Lavras, Lavras, MG, Brazil.
09:00 AM CDT	**Using Photosynthetic and Isotopic Techniques to Identify Different Drought Tolerant Mechanisms in Peanut** **A. SANZ-SAEZ***, Q. ZHANG, Auburn University, Auburn, AL 36849; P.M. DANG, USDA-ARS National Peanut Research Lab, Dawson, GA 39842; Y. FENG, Auburn University, Auburn, AL 36849; M.C. LAMB, USDA-ARS National Peanut Research Lab, Dawson, GA 39842; C.Y. CHEN, Auburn University, Auburn, AL 36849.

Thursday, JULY 14, 2022

09:15-11:15	**Mycotoxins & Plant Pathology** *Moderator: Ken Obasa, Texas A&M University*

Las Colinas Salon D

09:15 AM CDT	**Effects of Fungicides and Herbicides on Performance of Peanut (*Arachis hypogea*) Varieties at Different Densities** **W. MHANGO***, P. MTENGEZO, B. MKANDA, Crop and Soil Sciences Department, Lilongwe University of Agriculture and Natural Resources, Malawi; J. CHINTHU, Chitedze Agriculture Research Station, Malawi; A. GOODMAN, Horizon Farms, Malawi; R. BRANDENBURG, D. JORDAN, and D. REISIG, North Carolina State University, Raleigh, NC.
09:30 AM CDT	**Determining the Most Effective Time Interval for Fungicide Sprays Following Miravis plus Elatus or Convoy** **D.L. JORDAN*** and B.B. SHEW, North Carolina State University, Raleigh, NC.
09:45 AM CDT	**New Fungicide Tank-Mix Options and Spray Timings for Reducing Losses to Late Leaf Spot and Sclerotinia Blight in Virginia Peanuts** **D.B. LANGSTON, JR.*** and L. BYRD-MASTERS, Tidewater Agricultural Research and Extension Center Plant Pathology, Virginia Tech, Suffolk, VA.
10:00 AM CDT	**Aflatoxin: An Old Problem that Requires New Solutions Today and Tomorrow** **J.C. FOUNTAIN*,** Department of Biochemistry, Molecular Biology, Entomology, and Plant Pathology, Mississippi State University, Mississippi State, MS.
10:15 AM CDT	***Aspergillus flavus* Pangenome to Capture the Diversity in a Single Reference Genome** **S. GANGURDE***, H. WANG, R. KEMERAIT, B. DUTTA, Department of Plant Pathology, University of Georgia, Tifton, GA; J. FOUNTAIN, Department of Biochemistry, Molecular Biology, Entomology and Plant Pathology, Mississippi State University; P. BAJAJ, M. PANDEY, International Crops Research Institute for Semi-Arid Tropics (ICRISAT), Hyderabad, India; H. ABBAS, USDA-ARS, Biological Control of Pests Research Unit, Stoneville, MS; P.K. CHANG, USDA-ARS, Southern Regional Research Center, New Orleans, LA; B. GUO, USDA-ARS, Crop Genetics and Breeding Research Unit, Tifton, GA.
10:30 AM CDT	**Performance of Insecticides Co-Applied In-Furrow with Superabsorbent Polymer Compared to Industry Standards** **D.J. ANCO***, J.B. HIERS, Edisto Research and Education Center, Clemson University, Blackville, SC; and A.K. CULBREATH, Department of Plant Pathology, University of Georgia, Tifton, GA.
10:45 AM CDT	**Extension and Aflatoxin in Groundnuts: Awareness, Incidence, and Good Management Practices in Sub-Saharan Africa** J.L. JELLIFFE, U.S. Department of Agriculture, Economic Research Service, Kansas City, MO; B.E. BRAVO-URETA, University of Connecticut, Department of Agricultural and Resource Economics, Storrs, CT; **D.L. JORDAN***, North Carolina State University, Department of Crop and Soil Sciences, Raleigh, NC; W. APPAW, Kwame Nkrumah University of Science and Technology, Department of Food Science and Technology, Kumasi, Ghana; A. DANKYI and M.B. MOCHIAH, Council for Scientific and Industrial Research, Crops Research Institute, Kumasi, Ghana.
11:00 AM CDT	**Techniques for Field Research with Soilborne Pathogens of Peanut** **T.B. BRENNEMAN*** and A.K. CULBREATH, Department of Plant Pathology, University of Georgia, Tifton, GA.

Thursday, JULY 14, 2022

09:30-11:30	**Harvesting & Production** *Moderator: Audrey Gamble, Auburn University*

Las Colinas Salons A-C

09:30 AM CDT	**Effects of Foreign Material, LSK, and Fill Level on Drying Performance in Semi-Drying Trailers** **C.L. BUTTS***, J.S. MCINTYRE, R.B. SORENSEN, M.C. LAMB, National Peanut Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Dawson, GA 39842.
09:45 AM CDT	**First Steps to Develop a Peanut Dryer Muffler to Meet OSHA Noise Requirements** **J.S. McINTYRE***, H.J. COOK, National Peanut Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Dawson, GA 39842.
10:00 AM CDT	**Determining Optimal Digging Time in North Mississippi Peanut Production Systems** **B. ZURWELLER*,** B. WHITTENTON, J. MAY, J. GORE, Plant and Soil Sciences, Mississippi State University, Mississippi State, MS 39762.

10:15 AM CDT	**Effects of Peanut Digger Blade Geometry on Yield and Losses** L.A. SAMENKO, K.R. KIRK, **B.B. FOGLE***, D.J. ANCO, Edisto Research & Education Center; Clemson University, Blackville, SC; and A.P. TURNER, Agricultural Mechanization & Business,Clemson University, Clemson, SC.
10:30 AM CDT	**Evaluating Accuracy and Distribution Uniformity of Gypsum Application in Peanut for a Spinner-Disc Broadcast Spreader** **S.S. VIRK***, M.W. TUCKER, and G.H. HARRIS, Department of Crop and Soil Sciences, University of Georgia, Tifton, GA.
10:45 AM CDT	**Influence of Application Volume and Droplet Size on Spray Penetration into Peanut Canopy** **M. SAPKOTA*,** S.S. VIRK, E.P. PROSTKO, Department of Crop and Soil Sciences, University of Georgia, Tifton, GA; R.C. KEMERAIT, Department of Plant Pathology, University of Georgia, Tifton, GA; and G.C. RAINS, Department of Entomology, University of Georgia, Tifton, GA.
11:00 AM CDT	**Evaluation of Apogee as a Plant Growth Regulator on Peanuts in Alabama** **K.B. BALKCOM***, Crop, Soils and Environmental Sciences, Auburn University, Headland, AL 36345; and J.A. KELTON, Alabama Cooperative Extension, Auburn University, Headland, AL 36345.
11:15 AM CDT	**Cover Crop Influence on Soil Health and Peanut Production in Alabama** **A.V. GAMBLE***, H.L. DECKER, A.M. JOHNSON, and K.S. BALKCOM, Department of Crop, Soil and Environmental Sciences, Auburn University, Auburn, AL.

Thursday, JULY 14, 2022

10:45-12:15	**Breeding, Genetics & Biotechnology II** *Moderator: Nino Brown, University of Georgia*

Mandalay Ballroom

10:45 AM CDT	**Mapping Iron Deficiency Chlorosis Tolerance in Peanut** **B.N. MOTAGI***, R.S. BHAT, A.D. TAYADE, M.P. JADHAV, A.S. NADAF, R.V. KOTI, University of Agricultural Sciences, Dharwad, Karnataka, India; S.S. GANGURDE, USDA-ARS, Tifton, GA; and V. SHARMA, R.K. VARSHNEY, M.K. PANDEY, ICRISAT, Patancheru, Telangana, India.
11:00 AM CDT	**Performance and Utilization of African Groundnut Core Set in East and Southern Africa** **D. KALULE OKELLO***, E. ACHOLA, National Semi-Arid Resources Research Institute, Soroti, Uganda; A. MUITIA, Mozambique Agriculture Research Institute (IIAM), Nampula Research Station, Nampula Mozambique; J. CHINTU, The Department of Agricultural Research Services (DARS), Chitedze Research Station, Lilongwe. Malawi; J.M. LUTANGU, Zambia Agricultural Research Institute (ZARI), Msekera Research Station, Chipata, Zambia; D. FONCEKA, Centre d'Etude Régional pour l'Amélioration de l'Adaptation à la Sécheresse (CERAAS), Thiès, Senegal; and D. HOISINGTON, University of Georgia, Athens, GA.
11:15 AM CDT	**Development and Release of Two Spanish Groundnut Varieties for Cultivation In Malawi** **J.M.M. CHINTU***, and D. SIYENI, Department of Agricultural Research Services, Chitedze Research Station, Lilongwe, Malawi.
11:30 AM CDT	**Delineation of the Relationship Between RGB-Based Indices and Conventional Scores for Early and Late Leaf Spot Diseases in Peanut Lines** **R. OTENG-FRIMPONG***, Y.B. KASSIM, D.K. PUOZAA, and E.K. SIE, CSIR-Savanna Agricultural Research Institute, Tamale, Ghana; A. DANQUAH, and D.A. AKOGO, University of Ghana, Legon, Accra, Ghana; M. BALOTA, Virginia Tech, Suffolk, VA; and M.D. BUROW, Texas A&M AgriLife Research, Lubbock, TX, and Department of Plant and Soil Science, Texas Tech University, Lubbock, TX.
11:45 AM CDT	**Assessment of Yield-Related Traits in a Population of Recombinant Inbred Lines of Peanut (*Arachis hypogaea* L.) Developed for High Oleic Content** **I. FAYE***, Institut Sénégalais de Recherches Agricoles-Centre National de Recherches Agronomiques, Bambey, Sénégal; T. GUEYE, Université Iba Der Thiam de Thiès- Ecole Nationale Supérieure d'Agriculture, Thiès, Sénégal; D. FONCEKA, A. SAMBOU, Institut Sénégalais de Recherches Agricoles-Centre d'Etude Régional pour l'Amélioration à l'Adaptation à la Sécheresse, Thiès, Sénégal; and M.D. BUROW, Texas A&M AgriLife Research and Texas Tech University Department of Plant and Soil Science, Lubbock, TX.
12:00 PM CDT	**Genetic Dissection of the Crop Maturation Trait in Peanut** K. SRINIVAS, Y. LEVY, A. HAREL, **R. HOVAV***, Department of Field Crops, Institute of Plant Sciences, Agriculture Research Organization - the Volcani Center, Israel; and Y. CHU and P. OZIAS-AKINS, Department of Horticulture and Institute of Plant Breeding, Genetics and Genomics, University of Georgia, Tifton, GA.

Thursday, JULY 14, 2022

13:15-16:00	**Breeding, Genetics & Biotechnology III** *Moderators: Amanda Hulse-Kemp and Alicia Massa, USDA-ARS*

Mandalay Ballroom

13:15 PM CDT	**Helping Wild *Arachis* Taxonomy and Introgression Using SNP Markers** **F. J. DE BLAS***, Institute of Plant Breeding, Genetics and Genomics, The University of Georgia, Athens, GA ; D. MATUSINEC, Institute of Plant Breeding, Genetics and Genomics, The University of Georgia, Athens, GA; K. COSTELLO, Institute of Plant Breeding, Genetics and Genomics, The University of Georgia, Athens, GA; S.C.M. LEAL-BERTIOLI, Plant Pathology Department/IPBGG, University of Georgia Athens, Athens, GA; D.J. BERTIOLI, Department of Crop and Soils Science/IPBGG, The University of Georgia, Athens, GA.
13:30 PM CDT	**Genetic Gain Achieved Over 90 Years of Breeding Runner Peanut Cultivars at the University of Georgia** **N. BROWN***, W.D. BRANCH, Dept. of Crop and Soil Sciences, University of Georgia, Tifton, GA.
13:45 PM CDT	**Current Challenges in Peanut Breeding for Drought Tolerance and Future Prospects** **P.M. DANG***, M.C. LAMB, USDA-ARS National Peanut Research Lab, Dawson, GA ; A. SANZ-SAEZ, C.Y. CHEN, Auburn University, Auburn, AL.
14:00 PM CDT	**Discovery of a Resistance Gene Cluster Associated with Smut Resistance in Peanut** **K.D. CHAMBERLIN*** and R.S. BENNETT, USDA-ARS, Stillwater, OK; J. BALDESSARI, G. DE LA BARRERA, G. CORDES , N.G. GRANDON, E.M.C. MAMANI, and A.V. RODRIGUEZ, INTA, Manfredi, Argentina; S. MORICHETTI, Aceitera General Deheza, Argentina; C.C. HOLBROOK, USDA- ARS, Tifton, GA ; P. OZIAS-AKINS and Y. CHU, University of Georgia, Tifton, GA; S.P. TALLURY, USDA-ARS, Griffin, GA; J.P. CLEVENGER and W. KORANI, Hudson Alpha Institute for Biotechnology, Huntsville, AL; B. SCHEFFLER, R. YOUNGBLOOD, and S. SIMPSON, USDA ARS, Stoneville, MS.
14:15 PM CDT	**Profitability of Growing Peanut Cultivars with Resistance to Leaf Spot Under Different Production Systems** **C.C. HOLBROOK***, United States Department of Agriculture-Agricultural Research Service, Tifton, GA ; M.C. LAMB, United States Department of Agriculture-Agricultural Research Service, Dawson, GA; P. OZIAS-AKINS, Y. CHU, Department of Horticulture, The University of Georgia, Tifton, GA, and Institute of Plant Breeding, Genetics & Genomics, University of Georgia, Tifton, GA; A.K. CULBREATH and T.B. BRENNEMAN, Department of Plant Pathology, The University of Georgia, Tifton, GA.
14:30 PM CDT	**BREAK**
14:45 PM CDT	**Release of a Virginia-Type Peanut Cultivar, 'N.C. 20', for the Virginia-Carolinas Production Region** **J.C. DUNNE*,** R.J. ANDRES and A.T. OAKLEY, Crop and Soil Sciences Department, North Carolina State University, Raleigh, NC.
15:00 PM CDT	**Development of Peanut Cultivars with the University of Florida: Performance of Florida Breeding Lines in Virginia** **M. BALOTA***, W. CHERRY, Tidewater Agricultural Research and Extension Center, School of Plant & Environmental Sci., Virginia Tech, Suffolk, VA; B.L. TILLMAN, North Florida Research & Education Center, Agronomy Dept., Univ. of Florida, Marianna, FL.
15:15 PM CDT	**Construction of Genetic Diversity Panel of USDA Peanut Germplasm Collection for Omics Research** **C. CHEN***, A. SANZ-SAEZ, Auburn University, Auburn, AL; M.L. WANG, S. TALLURY, B. TONNIS USDA-ARS Plant Genetic Resources Conservation Unit, Griffin, GA ; J. YU, T. GUO, Iowa State University, Ames, IA, P. DANG, USDA-ARS National Peanut Research Lab, Dawson, GA.
15:30 PM CDT	**Biochemical Characterization of *Arachis* Induced Allotetraploids and their Parent Wild Species** **B.D. TONNIS***, D.J. BERTIOLI, S.C.M. LEAL-BERTIOLI, IPBGG, University of Georgia, Athens, GA; and M.L. WANG, S.P. TALLURY, Plant Genetic Resources Conservation Unit, USDA-ARS, Griffin, GA.
15:45 PM CDT	**The Peanut Shell as a Barrier and Target in Breeding Peanut to Resist Aflatoxin** **B.L. TILLMAN***, Univ. of Florida, Agronomy Dept., NFREC, Marianna, FL.

Thursday, JULY 14, 2022

13:30-15:30	**Extension Techniques** *Moderator: Trey Price, Louisiana State University*

Las Colinas Salon D

13:30 PM CDT	**Comparison of Peanut White Mold Fungicide Programs in Bulloch County, Georgia** R. C. KEMERAIT, A. R. SMITH, **W. G. TYSON***, Department of Plant Pathology, University of Georgia, Tifton, GA; Agricultural and Applied Economics, University of Georgia, Tifton, GA; and Bulloch County Cooperative Extension, University of Georgia, Statesboro, GA.
13:45 PM CDT	**Evaluating Peanut Fungicide Programs for White Mold and Leafspot Control** **T. PRICE*,** Extension Agent, University of Georgia, Cook County, Adel, Georgia; R.C. KEMERAIT, Extension Plant Pathologist, Department of Plant Pathology, University of Georgia, Tifton, Georgia.
14:00 PM CDT	**Peanut Rx: Still a Dynamic Risk Management Tool to Refine Disease Control** **R.C. KEMERAIT*,** A.K. CULBREATH, T.B. BRENNEMAN, C. CODOD, and S. BAG, Department of Plant Pathology, The University of Georgia, Tifton, GA; R.S. TUBBS, W.S. MONFORT, E.P. PRSTKO, C. PILON, N. BROWN, Department of Crop and Soil Science, The University of Georgia, Tifton, GA; R. SRINIVASAN, and M. ABNEY, Department of Entomology, The University of Georgia, Tifton, GA; J. LAFOREST, Center for Invasive Species and Ecosystem Health, The University of Georgia, Tifton, GA, The University of Georgia, Tifton, GA; B. TILLMAN, Agronomy Department, The University of Florida, Marianna, FL; N. DUFAULT and I. SMALL, Plant Pathology Department, The University of Florida, Gainesville, FL; A. STRAYER-SHERER and A.L. JACOBSON, Department of Entomology and Plant Pathology, Auburn University, Auburn, AL; K. BALKCOM and C. CHEN, Department of Crop, Soil, and Environmental Sciences, Auburn University, Auburn, AL; A.L.; B. ZURWELLER, Department of Plant and Soil Sciences, Mississippi State University, Starkeville, MS; D.J. ANCO, Plant and Environmental Sciences Department, Blackville, SC; and R. OLATINWO, USDA Southern Research Station, Pineville, LA.
14:15 PM CDT	**Summary of Herbicide and Fungicide Use in Peanut in North Carolina and Virginia in 2021** **B. BARROW*** and D.L. JORDAN, North Carolina State Extension, Raleigh, NC; and D. Langston, Tidewater Agricultural Research and Extension Center, Suffolk, VA.
14:30 PM CDT	**A Novel Image Analysis Strategy for Peanut Maturity Assessment** **K. R. KIRK***, D. ANCO, B. FOGLE, and J. HIERS, Edisto REC, Clemson University, Blackville, SC.
14:45 PM CDT	**Peanut Maturity Workshop Results and the Adoption of Recommended Cultural Practices in Pitt County, North Carolina Contributing to Peanut Yields from 2021** **M. SMITH*** and D.L. JORDAN, North Carolina State University, Raleigh, NC.
15:00 PM CDT	**Results from On-Farm Testing in 2021: First Year with a New Dump Cart and Weigh Scale** **M. LEARY***, L. MILES, C. ELLISON, L. GRIMES, B. BARROW, and D.L. JORDAN, NC State Extension, Raleigh, NC.
15:15 PM CDT	**Alternative Sources of Calcium and Recommendations for Providing Calcium to the Pegging Zone of Peanut in the Southeast** **G.H. HARRIS*,** Department of Crop & Soil Sciences, The University of Georgia, Tifton, GA.

Thursday, JULY 14, 2022

16:00-17:00	**Poster Session**

Mandalay Foyer and Las Colinas Foyer

16:00 PM CDT	**Out-Scaling Improved Peanut Production Packages in Southern Ghana** **G. BOLFREY-ARKU***, S. ARTHUR, M.B. MOCHIAH, J.Y. ASIBUO, A. AGYEKUM, and D. ABINTERA, Council for Scientific and Industrial Research - Crops Research Institute, Kumasi, Ghana; D.L. JORDAN and R.L. BRANDENBURG, North Carolina State University, Raleigh, NC; and D. HOISINGTON and J. RHOADS, Feed the Future Innovation Lab for Peanut, University of Georgia, Athens, GA.
16:00 PM CDT	**Evaluation of Sentinel-2 Satellite Data for Groundnut Yield Estimation in Malawi** D. LOBELL, Stanford University, Stanford, CA; E. ZUZA, The Open University, Faculty of Science, Technology, Engineering & Mathematics, School of Environment, Earth and Ecosystem Sciences, The Open University, Milton Keynes, The United Kingdom; C. SIBAKWE, Catholic Development Commission in Malawi (CADECOM), Old Bishops House, Zomba, Malawi; A. GOODMAN, Operations Director, Horizon Farming Ltd, Mitundu, Lilongwe, Malawi; D. JORDAN, Department of Crop and Soil Sciences, North Carolina State University, Raleigh, NC; D. REISIG, and **R. BRANDENBURG***, Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC .
16:00 PM CDT	**High Throughput Seed Sorting for Oleic Acid Concentration in Peanut Breeding Populations using QSorter Technology from QualySense** **N. BROWN***, W.D. BRANCH, Dept. of Crop and Soil Sciences, University of Georgia, Tifton, GA; B. DAVIS, J. DAVIS, JLA International, Albany, GA .
16:00 PM CDT	**Experiences Developing Peanut Production Risk Tools Using Microsoft Excel** **G. BUOL***, and D.L. JORDAN, North Carolina State University, Raleigh, NC.
16:00 PM CDT	**Disease and Yield Response of Selected Peanut Cultivars to Low and High Input Fungicide Programs in Southeast Alabama** H.L. CAMPBELL* and A.STRAYER-SCHERER, Dept. of Entomology and Plant Pathology, Auburn University, AL; C. PARKER, Wiregrass Research and Extension Center, Headland, AL.
16:00 PM CDT	**Conidia Production of *Nothopassalora personata* on Media** E.G. CANTONWINE, **K. TAYLOR***, R. HUNTER, Biology Department, Valdosta State University, Valdosta, GA; and A.K. CULBREATH, Plant Pathology Department, University of Georgia, Tifton, GA.
16:00 PM CDT	**An Evaluation of Fungicide Programs in Two Peanut Genotypes with Contrasting Disease Resistance** **E.T. CARTER***, UF/IFAS Jackson County Extension, Marianna, FL 32446; B.L. TILLMAN, M.W. GOMILLION, L.C. ICHAZO, North Florida Research and Education Center, Marianna, FL 32446; N.S. DUFAULT, Plant Pathology Department, The University of Florida, Gainesville, FL.
16:00 PM CDT	**Screening for Resistance to Leaf Spot (*Nothopassalora personata* and *Passalora arachidicola*)** **J.M. CASON***, Texas A&M AgriLife Research, Texas A&M University System, Stephenville, TX; W.J. GRICHAR, Texas A&M AgriLife Research, Texas A&M University System, Yoakum, TX; M.D. BUROW, Texas A&M AgriLife Research, Texas A&M University System, Lubbock, TX, and Department of Plant and Soil Science, Texas Tech University, Lubbock, TX; C. MONCLOVA-SANTANA, Texas A&M AgriLife Research, Texas A&M University System, Lubbock, TX, and Department of Plant and Soil Science, Texas Tech University, Lubbock, TX; W. RAVELOMBOLA, E. KIMURA, Texas A&M AgriLife Research, Texas A&M University System, Vernon, TX; and C.E. SIMPSON, Texas A&M AgriLife Research, Texas A&M University System, Stephenville, TX.
16:00 PM CDT	**Deletion of acdS Gene in a *Bradyrhizobium japonica* Strain Does Not Affect Peanut Root Nodulation** O.D. ADENIJI, S. WANG, Y. WANG, **C.Y. CHEN***, and Y. FENG, Auburn University, Auburn, AL
16:00 PM CDT	**Quantifying Impact of Glufosinate Drift on Peanut Using Unmanned Aerial System** **P. DEVKOTA***, N. SINGH, and J. IBOYI, University of Florida/IFAS, West Florida Research and Education Center, Jay, FL.
16:00 PM CDT	**Relationship Between Potassium Rates and Plant Density on Peanut Productivity** **P.R. LEITE***, C. PILON, R.S. TUBBS, G.H. HARRIS, Department of Crop and soil Sciences, University of Georgia, Tifton Campus, GA; C.F. CORDEIRO, Department of Crop Science, College of Agricultural Sciences, Sao Paulo State University, Botucatu SP, 18610-307, Brazil; and F.R. ECHER, Department of Agronomy, Sao Paulo Western University, Presidente Prudente, SP 19067-175, Brazil.
16:00 PM CDT	**Influence of High-Residue Rye on Palmer Amaranth Seed Persistence** T. M. WEBSTER, **K. M. EASON*,** Agriculture Research Service, United States Department of Agriculture, Tifton, GA; and T. L. GREY, Department of Crop and Soil Sciences, The University of Georgia, Tifton, GA.

16:00 PM CDT	**Assessment of Peanut Fungicide Programs and Sulfur in Irwin County, GA, 2020-2021** **P. EDWARDS***, K. BELL, and W. POPE, UGA Extension, Ocilla, GA; J. BENNETT, UGA Extension, Rochelle, GA; S. CARLSON ,UGA Extension Sylvester, GA; G. HANCOCK, UGA Extension, Ashburn, GA; A. K. CULBREATH and R.C. KEMERAIT, Department of Plant Pathology, University of Georgia, Tifton, GA.
16:00 PM CDT	**Influence of Variety Selection on Leaf Spot Management with Various Fungicide Programs in North Carolina** **E. FOOTE***, D.L. JORDAN, and J. DUNNE, North Carolina State University, Raleigh, NC.
16:00 PM CDT	**Control of Palmer Amaranth with Herbicide Programs in the South Texas Peanut Production Area** **W.J. GRICHAR*,** and J.A. McGINTY, Texas A&M AgriLife Research and Extension Center, 10345 State Hwy 44, Corpus Christi, TX.
16:00 PM CDT	**Assessment of Peanut Fungicide Programs on Yield and Profitability and Reinforcing the Importance of Timely Fungicide Applications in Mitchell County, Georgia for 2021** **B.W. HAYES***,C.D. PERRY, A.R. SMITH, R.C. KEMERAIT, Mitchell County Cooperative Extension, University of Georgia, Camilla, GA; Stripling Irrigation and Research Park, Camilla, GA; Agricultural and Applied Economics, University of Georgia, Tifton, GA; Department of Plant Pathology, University of Georgia, Tifton, GA.
16:00 PM CDT	**Project Explores Cognitive Advances in Students in Ghana through Collaboration Fostered by Feed the Future Innovation Lab for Peanut** **D. HOISINGTON*,** M MANARY, J. JOHNSON, B. PARKER J. RHOADS, A. FLOYD. Feed the Future Innovation Lab for Peanut, The University of Georgia, Athens, GA.
16:00 PM CDT	**Development and Characterization of Interspecific Peanut Hybrids for the Enhancement of Genetic Diversity within Cultivated Peanut and Deposition into Germplasm Banks** **M. S. HOPKINS***, J. LEVERETT, S. LEAL-BERTIOLI, and D. BERTIOLI, Institute of Plant Breeding, Genetics and Genomics, University of Georgia, Athens, GA, USA.
16:00 PM CDT	**Chemical Composition of Kernels in Virginia Market Type Cultivars Based on Pod Mesocarp Color** **A. KAUFMAN*,** L. DEAN, S. GOODELL, and J. ALLEN, Department of Food, Bioprocessing, and Nutritional Sciences, North Carolina State University, Raleigh, NC; and D.L. JORDAN, North Carolina State University, Raleigh, NC.
16:00 PM CDT	**Estimation of Double Reduction in Segmental Allotetraploid Peanut** **S. LAMON***, Institute of Plant Breeding, Genetics and Genomics, The University of Georgia, Athens, GA; J.F. DOS SANTOS , I.J. DE GODOY, Campinas Agronomical Institute, Botafogo, Campinas, SP, Brazil; M.D.C. MORETZSOHN, Embrapa Genetic Resources and Biotechnology, Brasília, DF, Brazil; S. LEAL-BERTIOLI, Institute of Plant Breeding, Genetics and Genomics and Dept. Plant Pathology, The University of Georgia, Athens, GA; and D.J. BERTIOLI, Institute of Plant Breeding, Genetics and Genomics and Dept. Crop & Soil Sciences, The University of Georgia, Athens, GA.
16:00 PM CDT	**Evaluation of Stem Rot Resistance Components in Peanut** **S. MADUGULA***, Agriculture College, NAIRA Srikakulam ANGRAU, Andhra Pradesh, India; S. SUBEDI, Plant and Environmental Science, New Mexico State University, Las Cruces, NM; S. SANOGO, Department of Entomology, Plant Pathology and Weed Science, New Mexico State University, Las Cruces, NM; M. OJHA and N. PUPPALA, Agricultural Science Center at Clovis, New Mexico State University, Clovis, NM.
16:00 PM CDT	**Anthem Flex Herbicide Systems for Weed Management in Peanut** **M.W. MARSHALL*,** Clemson University
16:00 PM CDT	**Mitigating Groundnut Rosette Disease Infections in Northern Ghana: The Importance of Planting Dates, Insecticides and Varieties** **J.A. NBOYINE*** and R. OTENG-FRIMPONG, D.K. PUOZAA, M. ABUBAKARI, P. AGRENGSORE, CSIR–Savanna Agricultural Research Institute, Tamale, Ghana; D. JORDAN, North Carolina State University, Raleigh, NC.
16:00 PM CDT	**Identification of Two New Bacterial Pathogens of Peanut, Causing Early Seedling Decline Disease in the Texas Panhandle** **K.C. OBASA*** Department of Plant Pathology & Microbiology, Texas A&M AgriLife Research & Extension Center, Amarillo, TX 79106; and L. HAYNES, Texas A&M AgriLife Extension Services, Texas A&M University, College Station, TX.
16:00 PM CDT	**Comparison of FAD2 KASP Markers and Near Infrared Spectrometer for Selection of the High Oleic Oil Trait in Peanut** **H.M. PHAM*,** Texas A&M AgriLife Research, Lubbock, TX; J.M. CASON, B.D. BENNETT, Texas A&M AgriLife Research, Stephenville, TX; L. COMMEY, V. MENDU, Department of Plant and Soil Science, Texas Tech University, Lubbock, TX; M.D. BUROW, Texas A&M AgriLife Research, Lubbock, TX, and Department of Plant and Soil Science, Texas Tech University, Lubbock, TX.

16:00 PM CDT	**On-going Fungicide and Growth Regulator Research in Louisiana Peanut** **P. PRICE*** and B. PADGETT, LSU AgCenter, Macon Ridge Research Station, Winnsboro, LA, and Dean Lee Research and Education Center, Alexandria, LA.
16:00 PM CDT	**Screening of Valencia Breeding Lines for Drought Tolerance** **N. PUPPALA***, M. OJHA, New Mexico State University, Clovis, NM; P. PAYTON, A. YOUNG J. MAHAN , USDA Cropping System Research Lab, Lubbock, TX ; M. BUROW and H. PHAM, Texas A&M AgriLife Research, Lubbock, TX, and Texas Tech University, Department of Plant and Soil Science, Lubbock, TX.
16:00 PM CDT	**High-throughput Phenotyping of Organic Peanuts** A. MANLEY, **W.S. RAVELOMBOLA***, Department of Soil and Crop Sciences, Texas A&M AgriLife Research-Vernon, TX; J. CASON, Department of Soil and Crop Sciences, Texas A&M AgriLife Research-Stephenville, TX; M.D. BUROW, HANH PHAM, Department of Soil and Crop Sciences, Texas A&M AgriLife Research-Lubbock, TX; P. HINSON, Department of Soil and Crop Sciences, Texas A&M AgriLife Research-Vernon, TX.
16:00 PM CDT	**Fungicide Program Evaluation in Berrien County, Georgia** **B. REEVES***, University of Georgia Extension Berrien County, Nashville, GA; T. BARNES, University of Georgia Extension Atkinson County, Pearson, GA; D. PRICE, University of Georgia Extension Cook County, Adel, GA; and R. KEMERAIT, Department of Plant Pathology, The University of Georgia, Tifton, GA.
16:00 PM CDT	**Effect of Variety and Management Practices on Soil Arthropod Management, Yield, and Aflatoxin Contamination in Peanut Production across Three Geographical Locations of Ghana** **A. SEIDU***,, Department of Crop Science, Faculty of Agriculture, Food and Consumer Sciences, University for Development Studies, Nyankpala, Tamale, Ghana and Council for Scientific and Industrial Research-Savanna Agricultural Research Institute, Nyankpala, Tamale, Ghana; I.K. DZOMEKU, Department of Crop Science, Faculty of Agriculture, Food and Consumer Sciences, University for Development Studies, Nyankpala, Tamale, Ghana; M. ABUDULAI, J.A. NBOYINE, and F. ANAMAN, Council for Scientific and Industrial Research-Savanna Agricultural Research Institute, Nyankpala, Tamale, Ghana; and D.L. JORDAN, Department of Crop and Soil Sciences, North Carolina State University, Raleigh, NC.
16:00 PM CDT	**Evaluation of Peanut Rx Spray Programs for Peanut Disease Control in Southeast Alabama** **A. STRAYER-SCHERER***, and H.L. CAMPBELL, Dept. of Entomology and Plant Pathology, Auburn University, AL; C. PARKER, Wiregrass Research and Extension Center, Headland, AL.
16:00 PM CDT	**Seeding Rate as Affected by Planting Date for Three Peanut Cultivars** **R.S. TUBBS***, and W.S. MONFORT, Crop and Soil Sciences Department, University of Georgia, Tifton, GA.
16:00 PM CDT	**Efficacy and Economics of Precision Soil Sampling Strategies for Site-Specific Soil pH Management in Peanut** **M.W. TUCKER***, S.S. VIRK, G.H. HARRIS, Department of Crop and Soil Sciences, University of Georgia, Tifton, GA ; A.R. SMITH, Department of Agricultural and Applied Economics, University of Georgia, Tifton, GA; D.S. Carlson, Worth County Extension, University of Georgia Cooperative Extension, Sylvester, GA; J. Kichler, Colquitt County Extension, University of Georgia Cooperative Extension, Moultrie, GA.
16:00 PM CDT	**Crop Yield and Financial Investment of Sub-Surface Drip Irrigation over the Life of the System** **R. WELLS***, D.L. JORDAN, and D. WASHBURN, North Carolina State University, Raleigh, NC ; and S. BARNES and T. CORBETT, Peanut Belt Research Station, Department of Agriculture and Consumer Services, Lewiston-Woodville, NC.

Thursday, JULY 14, 2022

16:00-17:00	**National Peanut Board Graduate Student Poster Competition**

Mandalay Foyer

16:00 PM CDT	**Development of Trifludimoxazin for Use in Peanut** **C.C. ABBOTT***, and E.P. PROSTKO, Dept. of Crop & Soil Sciences, The University of Georgia, Tifton, GA.
16:00 PM CDT	**Heat Tolerance in Peanut Genotypes Derived from Wild Species** **K.J. AWORI***, C. PILON, J.L. SNIDER, Department of Crop and Soil Sciences, The University of Georgia, Tifton, GA; S. BERTIOLI, Department of Plant Pathology, The University of Georgia, Athens, GA; D. BERTIOLI, Department of Crop and Soil Sciences, The University of Georgia, Athens, GA; and V. TISHCHENKO, Department of Crop and Soil Sciences, The University of Georgia, Griffin, GA .

16:00 PM CDT	**Evaluation of Organic Spanish Peanut (*Arachis hypogaea* L.) Breeding Lines for Production, an Update** **W. CARRILLO***, Tarleton State University, Stephenville, TX; J.M. CASON, C.E. SIMPSON, B.D. BENNETT, Texas A&M AgriLife Research, Texas A&M University System, Stephenville, TX , W. RAVELOMBOLA, Texas A&M AgriLife Research, Texas A&M University System, Vernon, TX; M. BAHANDARI, Texas A&M University at Corpus Christi, TX; M.D. BUROW, Texas A&M AgriLife Research, Texas A&M University System, Lubbock, TX, and Department of Plant and Soil Science, Texas Tech University, Lubbock, TX.
16:00 PM CDT	**Viewing and Characterizing Haustoria of *Nothopassalora personata* in Vivo** **D.A. CASTELLANO*,** E.G. CANTONWINE, J.A. NIENOW, Valdosta State University, Valdosta, GA; and C.C. HOLBROOK, USDA-ARS, Tifton, GA.
16:00 PM CDT	**Development of High-Throughput Phenotyping System for Pods in Peanut (*A. hypogaea*)** **N. GARRITY***, J. DUNNE, R. ANDRES, R. AUSTIN, D. JORDAN, Crop Science Department, North Carolina State University, Raleigh, NC; and C. YENCHO, Horticulture Department, North Carolina State University, Raleigh, NC.
16:00 PM CDT	**Development of Crosses Made from Runner Introgression Populations for High Oleic Oil Content and Resistance to Early and Late Leaf Spot in Peanut** **T. GAUS-BOWLING***, Physical and Biological Sciences, Amarillo College, Amarillo, TX; J. CASON, and C. SIMPSON, Texas A&M AgriLife Research, Stephenville, TX; and M.D. Burow, Texas A&M AgriLife Research, Lubbock, TX, and Texas Tech University, Dept. of Plant and Soil Science, Lubbock, TX.
16:00 PM CDT	**Reinventing Peanut: Origin, Evolution and Domestication of [*Arachis ipaënsis* x *Arachis duranensis*]^{4x} neopolyploids** **S. LAMON***, Institute of Plant Breeding, Genetics and Genomics, The University of Georgia, Athens, GA; S. LEAL-BERTIOLI, Institute of Plant Breeding, Genetics and Genomics and Department of Plant Pathology, The University of Georgia, Athens, GA; and D.J. BERTIOLI, Institute of Plant Breeding, Genetics and Genomics and Department of Crop & Soil Sciences, The University of Georgia, Athens, GA.
16:00 PM CDT	**Peanut Response to Diclosulam in the Southwest** **M. MILLS***, Texas Tech University, Lubbock, TX; P.A. DOTRAY, Texas Tech University, Texas A&M AgriLife Research, and Texas A&M AgriLife Extension Service, Lubbock, TX; W.J. GRICHAR, Texas A&M AgriLife Research, Corpus Christi, TX; T.A. BAUGHMAN, Oklahoma State University, Ardmore, OK.
16:00 PM CDT	**Comparison of Technologies for Assessing Leaf Spot Severity** **C.S. NEWMAN***, A.T. OAKLEY, R. AUSTIN, R.J. ANDRES, J.C. DUNNE, Department of Crop and Soil Sciences, North Carolina State University, Raleigh, NC; A.M. HULSE-KEMP, USDA-ARS GBRU, Raleigh, NC.
16:00 PM CDT	**Bio-Fungicide Seed Treatments on Valencia Peanut Yield and Grade** **M. OJHA***, N. PUPPALA and S. MADUGULA, Agricultural Science Center at Clovis, New Mexico; and S. SANOGO, Entomology, Plant Pathology and Weed Science, New Mexico State University, Las Cruces, New Mexico.
16:00 PM CDT	**An Examination of Downforce Settings at Varied Planting Speeds in Peanut** **A.R. RUSSELL*** and W. PORTER, University of Georgia, Crop and Soil Science Department, Tifton, GA .
16:00 PM CDT	**Spray Deposition and Quality as Affected by Ground Speed for a Boom Sprayer without a Rate Controller** **M. SAPKOTA***, S.S. VIRK, E.P. PROSTKO, Department of Crop and Soil Sciences, University of Georgia, Tifton, GA; R.C. KEMERAIT, Department of Plant Pathology, University of Georgia, Tifton, GA; G.C. RAINS, Department of Entomology, University of Georgia, Tifton, GA.
16:00 PM CDT	**Examining Peanut Response to Photo-Intensity for Application in Speed Breeding** **T. SEELY***, J. DUNNE, D. JORDAN, Crop and Soil Science Department, North Carolina State University, Raleigh, NC ; R. FERNANDEZ, Horticulture Department, North Carolina State University, Raleigh, NC.
16:00 PM CDT	**Evaluation and Standardization of Stem Rot Inoculation Techniques for Resistance Selection in Peanut** **S. SUBEDI*,** Plant and Environmental Science, New Mexico State University, Las Cruces, NM; S. MADUGULA, Agriculture College, NAIRA Srikakulam ANGRAU, Andhra Pradesh, India; S. SANOGO, Department of Entomology, Plant Pathology and Weed Science, New Mexico State University, Las Cruces, NM; M. OJHA and N. PUPPALA, Agricultural Science Center at Clovis, New Mexico State University, Clovis, NM.

Development of Trifludimoxazin for Use in Peanut

C.C. ABBOTT*, and E.P. PROSTKO, Dept. of Crop & Soil Sciences, The University of Georgia, Tifton, GA 31793.

Trifludimoxazin is a new protoporphyrinogen oxidase-inhibiting (PPO) herbicide under possible development for preemergence (PRE) use in peanut (*Arachis hypogaea* L.). Because of its altered binding site, trifludimoxazin may have potential to combat PPO-resistant weeds. Numerous field trials have been conducted in Georgia to evaluate peanut cultivar tolerance and weed control efficacy. Irrigated, small-plot field trials were conducted at the UGA Ponder Research Farm near Ty Ty, Georgia. Weed-free, peanut cultivar trials, conducted in 2019, 2020, and 2021, included 3 cultivars (GA-06G, GA-16HO, and GA-18RU) and 4 PRE applications of trifludimoxazin at 0, 25, 38, and 75 g ai/ha. Trifludimoxazin efficacy trials were conducted on in 2020 and 2021 with the same rates applied PRE in various weed control programs. All PRE treatments were applied 1 day after planting (DAP) using a CO_2-powered, backpack sprayer calibrated to deliver 140 L/ha at 275 kPa with 11002AIXR nozzles. Data collected in the variety trials included trifludimoxazin effects on peanut density (stand), leaf necrosis, stunting, and yield. Data collected from the efficacy trials included weed control (%), peanut stunting, peanut leaf necrosis, and yield. All data were subjected to ANOVA and means separated using the Tukey-Kramer HSD Method (P=0.05). No interactions between peanut variety and trifludimoxazin rate were observed. Peanut stand/density was not reduced by any rate of trifludimoxazin. Trifludimoxazin @ 75 g ai/ha resulted in an increase in both peanut stunting (5%) and leaf necrosis (9% necrosis). When averaged over trifludimoxazin rate, there was a significant difference in yield between varieties. GA-16HO yielded 5%-7% less than GA-06G and GA-18RU. When averaged over variety, peanut yields were not reduced by any rate of trifludimoxazin. Herbicide treatments that included trifludimoxazin provided ≥ 83% weed control and was similar to treatments that included flumioxazin. Peanut yield was not significantly different between any trifludimoxazin treatments and current standards. In summary, the peanut varieties evaluated in these studies were not sensitive to trifludimoxazin and trifludimoxazin herbicide treatment combinations provided weed control similar to comparable standards.

Biology and Management of the Rootworm Complex in Georgia Peanut

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The southern corn rootworm, *Diabrotica undecimpunctata*, is native to the US where it is a serious pest of peanut. The banded cucumber beetle, *D. balteata*, is native to the tropics, but its range has expanded to include most of the US peanut production area. The purpose of this study was to define seasonal variation in adult rootworm populations in commercial peanut fields and to determine the effect of proximity to a putative early season host on infestations in peanut. The effect of soil type, irrigation and insecticide use on rootworm abundance and incidence of pod injury was also evaluated. In 2020, sweep nets and yellow sticky traps baited with a plant volatile lure were used to sample rootworm populations in eleven peanut fields from July-September; baited sticky traps were used to monitor rootworm adults in 32 peanut fields in 2022. *Diabrotica balteata* was significantly more abundant than *D. undecimpunctata* across all fields in both years. No clear effects of soil type, irrigation or insecticide use could be discerned in 2021. The results of small-plot field research and laboratory bioassays designed to evaluate the efficacy chlorpyrifos alternatives were largely inconsistent. Growers with fields at high risk for rootworm injury face a serious challenge in the coming years if no consistently effective management option can be identified. Chemigation offers some promise for rootworm management, but currently available insecticides have not provided adequate reduction in injury.

Novel loci for Resistance to Groundnut Rosette Disease in Cultivated Peanut (*Arachis hypogaea* L.)

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Groundnut Rosette Disease (GRD) is the most devastating biotic stress of peanut in Africa. The disease is widespread in Sub-Saharan Africa (SSA) and its offshore islands resulting in 100% yield loss in severe cases. GRD is caused by a complex of three viral agents, transmitted by an aphid, *Aphis craccivora* Koch. Host plant resistance towards aphids or the virus is the most effective attempt in the management of the disease for resource constrained farmers across Africa. Efforts from breeding programs across Africa have resulted in the release of tolerant Varieties However, The Genetic Basis Of GRD Resistance Is Not Fully Understood. Insights Into The genetic control of GRD resistance will guide breeding approaches and facilitate marker assisted breeding.

Two hundred genotypes representative of the diversity of peanut across breeding programs in Africa were phenotyped in three seasons: across two GRD hotspots (Serere and Nakabango) in Uganda. Data was collected on Percentage Disease Incidence and GRD severity at 4, 8 and 12 weeks after planting. Additionally, a bi-parental population was developed between ICGV 91707 and Serenut 1 (the resistant and susceptible parent respectively). 250 F2:3 lines were evaluated at one location in Nakabango across three replicates with the parents as checks. Whole genome sequencing was done for both populations.

The GWAS analysis across environments identified significant SNPs located on either Chromosome A04 or B04. On the other hand, preliminary QTL (Quantitative Trait Loci) analysis with the bi-parental position revealed a significant marker on Chromosome 4. Several putative genes associated with disease resistance were detected in the significant regions that are associated with disease resistance. Results reported in this study provide insight into the genetic architecture of GRD resistance and consequently the basis for development of molecular markers for Marker assisted selection for GRD resistance.

Performance of Insecticides Co-Applied In-Furrow with Superabsorbent Polymer Compared to Industry Standards

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Management decisions mitigating thrips (*Frankliniella* spp.) injury and tomato spotted wilt infection (caused by *Tomato spotted wilt virus*) are primarily limited to being enacted at the beginning of the growing season. Previous work explored corresponding potential management contribution of concurrent insecticide application with a superabsorbent polymer in-furrow but reported effects to be marginal or variable across experiments. To more thoroughly probe this potential, data from a collection of 40 experiments conducted from 2009 through 2021 was analyzed to examine the efficacy of insecticides (aldicarb, imidacloprid, imidacloprid plus fluopyram, phorate, and a nontreated check) applied in-furrow at planting for peanut production. In addition to treatments applied individually, experiments included imidacloprid (n = 11) or phorate (n = 18) applied in the presence of 2 lb/A superabsorbent polymer. Results indicated that neither imidacloprid nor phorate alone significantly varied with regard to stand count ($P > 0.13$), thrips injury ($P > 0.24$), tomato spotted wilt incidence ($P > 0.12$), or yield ($P > 0.36$) when compared to their co-application with the polymer. These results were consistent across variety susceptibility levels to tomato spotted wilt. Treatment profitability will also be discussed.

High-Throughput Analysis of KASP Marker Data

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Here we report on the development of a free web-based SNP calling application that rapidly analyzes results from fluorescence-based, allele-specific PCR markers (i.e. KASP or PACE). The application was developed in Python using Plotly Dash, deployed via Heroku, and can be accessed via snp-caller.herokuapp.com. The SNP caller provides a simple, high-throughput method to convert the output file from any microplate reader to actionable genotypic data. It can be accessed anywhere with an internet connection without the need to purchase or install any additional software and will be continuously updated as needed.

Labor Time Requirements Associated with Pest and Crop Management Packages for Peanut Production in Ghana

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In Ghana, peanut pod yield is often 76% lower than the minimum potential of 2.5 tons/ha in compared with improved recommendation practices from research outputs. To improve peanut yield nearer to the minimum potential, pest and crop management packages at three different levels were investigated in Kumasi, Tamale, and Wa in the Ashanti, Northern and Upper West Regions of Ghana, respectively. Production packages consisted of low input package (LIP), medium input package (MIP), and high input package (HIP) with a range of financial and labor commitments. To determine the time and labor investment required for the different pest and crop management packages, three separate experiments arranged in a 2 × 3 factorial were established in the 2019 cropping season and were continued in 2020 and 2021 in the same plots with different cropping sequences. The factors included two levels of peanut varieties that included Yenyawoso (improved variety with pest resistance) and Shi-Tao-Chi (local standard variety). The three levels of inputs for the two varieties consisted of: 1) the LIP including high quality seed, timely planting, and 1 manual weeding; 2) the MIP of high system that included high quality seed, timely planting, 2 manual weedings, 2 or 3 applications of local soap; and fertilizer (15:15:15, N-P_2O_5, K_2O) applied 3 weeks after planting (WAP); and 3) the HIP of high quality seed, timely planting, preemergence application of pendimethalin followed by 1 manual weeding, 2 applications of fungicide (azoxystrobin plus difenoconazole), application of fertilizer described previously, and calcium fertilizer applied 6 WAP. Data collected on the time required for each practice from planting to harvesting were converted to hours/hectare with six hours considered as one-person day (one labor day). Data were analyzed with Statistix 9 data analysis software; ANOVA was generated and means separated by SED at $p = 0.05$.

When data was pooled over locations in 2019, both Yenyawoso and Shi-Tao-Chi produced greater kernel yields in the HI (1.7 and 1.7 metric tons/ha, respectively) followed by the MIP (1.3 and 1.1 metric tons/ha, respectively), and the LIP (1.0 or 0.7 metric tons/ha, respectively). At Wa, 35, 42, and 23 person days were required for the LIP, MIP, and HIP, respectively, for Shi-Tao-Chi. For Yenyawoso, 32, 38, and 21 person days were required for these respective production packages. At Kumasi, 50, 58, and 29 person days were required for Shi-Tao-Chi in the LIP, MIP, and HIP, respectively, with 41, 56, and 28 person days required for Yenyawoso. At Tamale, 49, 57, and 30 person days were recorded for Shi-Tao-Chi while 41, 52, and 28 person days were required for Yenyawoso for LIP, MIP, and HIP, respectively. Generally, weed management was the most time consuming activity requiring 28 to 37% of time in the HIP, 48 to 59% in MIP, and 43 to 52% of time in the LIP when pooled over all locations. Sowing was the second most time consuming input followed by harvesting. Analysis on the time required to remove pods from vines after harvesting, indicated that additional time was needed for this practice in the HIP compared with the MIP and LIP. Within each production system, Shi-Tao-Chi required more time for removing pods from vines than Yenyawoso, principally due to its smaller pod size. Farmers, most notably women and in some cases men, are likely to adopt technologies that are less time consuming but lead to greater yield and financial return. Therefore, technologies that reduce labor needed for weeding, sowing, and harvesting could be useful for the adoption of improved production packages.

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labor needed for weeding, sowing, and harvesting could be useful for the adoption of improved production packages.

Heat Tolerance in Peanut Genotypes Derived from Wild Species

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Our ability to produce enough food for the increasing global population will require new scientific and technological strategies focusing on crops, land, and the environment. The impacts of climate change cast more doubt on the efforts to achieving food security due to unprecedented events such as heatwaves. The need to grow heat tolerant crops will play a crucial role of stabilizing yields even at higher global temperature. Peanut, being a crop of global importance, is not exempted when it comes to heat stress. Therefore, the objectives of this research are 1) to screen and identify heat tolerant peanut genotypes that could potentially be used in peanut breeding programs and 2) to use gas exchange and chlorophyll a fluorescence data and develop an automated model that ranks the peanut genotypes based on their photosynthetic thermotolerance capability. This model will help accelerate the selection process of peanut genotypes for improved heat tolerance. This study was conducted at the University of Georgia, Griffin campus. Sixteen peanut genotypes, including wild genotypes possessing a wider genetic pool and commercially available cultivars, were used. The genotypes were grown in growth chambers under controlled conditions. A heat stress of 45^{o}C was induced 60 days after planting for seven consecutive days. Photosynthetic measurements were taken using Li-Cor 6800 at the last day of heat stress and 7 days after the end of heat stress to assess genotype recovery. A leaf was collected from each plant concurrently with the photosynthetic measurements for chlorophyll a fluorescence assessment using the OJIP test from a portable fluorometer. The chlorophyll a fluorescence results were used to calculate the T_{15} for each parameter (i.e., the temperature to cause a 15% decline in the given photosynthetic parameter).

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Evaluation of Apogee as a Plant Growth Regulator on Peanuts in Alabama.

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This research was conducted at the Gulf Coast Research and Extension Center in Fairhope, Al from 2019-2021. The test was setup using a complete randomized block design. We evaluated Ga 12 Y and AU NPL 17 with Apogee applications at various locations and rates for three years. Application rates were either 0, 3.6 oz/A, 5.4 oz/A, or 7.25 oz/A at canopy closure for one application or followed by a second application 3 weeks after initial spray. Trials were to determine if there was a yield benefit from the treatment and what kind of return on investment would be realized. In addition to the small plot research, we also evaluated the product across multiple on farm locations during the same time period. In summary we found the product to be vulnerable to adverse growing conditions. Our research results indicated a lack of yield gain in non-irrigated fields, which is consistent with results from other peanut growing states.

Development of Peanut Cultivars with the University of Florida: Performance of Florida Breeding Lines in Virginia.

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Starting in 2012, University of Florida and Virginia Tech partnered with the goal to develop virginia market type cultivars with increased super extra-large kernel (SELK) content to satisfy the gourmet market requirements. The agreement included crossing and advancement to F4 in Florida, followed by thrips and *Tomato spotted wilt virus* (genus Tospovirus; family Bunyaviridae) (TSWV), yield trials, and advancement to F7 in Virginia. In this way 'Walton' was released in 2019, even though 'Walton' is not a large seeded cultivar but rather has superior yield that is maintained under dry conditions. In 2020 and 2021, ten lines and five checks including 'Bailey II', 'Emery', 'N.C. 20', 'Sullivan', and 'Walton', were tested for yield and grade characteristics in replicated trials at the Tidewater Agricultural Research and Extension Center (TAREC) in Suffolk, VA, and three other locations in Virginia and Northern North Carolina. In 2020, the test at TAREC included treatments with and without in-furrow thrips control. For this test, thrips damage and TSWV incidence were monitored, in addition to yield and grade. In 2021, all tests were maintained under optimum recommended management. A few lines exhibited superior yield, ELK, and insect & TSWV resistance relative to the checks. For some lines, the SELK content was 10 to 15% higher than for the checks. Results suggest that the UF can develop high yields and large kernels in Virginia.

Impact of New Prohexadione Calcium Formulation on Vine Growth Suppression and Yield of Peanut (*Arachis hypogaea* L.)

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Growers continually face management decisions for controlling excessive vine growth with the introduction of newer runner market-type peanut (*Arachis hypogaea L.)* cultivars. One-way growers have achieved this is through the use of prohexadione calcium. Prohexadione calcium is a plant growth regulator used in peanuts to reduce internode length through inhibition of gibberellin biosynthesis. Currently, prohexadione calcium is only available as a granular formulation (Kudos 27.5 WDG and Apogee 27.5 WDG); however, a liquid experimental formulation (FAL-2042) by Fine-Americas Inc. is being evaluated to determine its efficacy on vine growth suppression, disease severity, and yield response for runner market-type cultivars.

In 2021, an on-farm trial in Tift County Georgia was conducted to evaluate varying rates of FAL-2042 compared to Kudos 27.5 WDG on the cultivar Georgia-12Y. Treatments consisted of an untreated check, FAL-2042 at 140 g ai h^{-1}, 105 g ai h^{-1}, 70 g ai h^{-1}, and Kudos 27.5 WDG at 105 g ai h^{-1}. Initial treatments were applied when 50% of the lateral branches were touching and again 14 days later. Treatment responses were assessed based on mainstem height, height to node ratio, % *Rhizoctonia solani* severity, yield, and net revenue. Reduction of mainstem height and height to node ratio was significant for all FAL-2042 treatments compared to the untreated check. Greatest suppression was exhibited by all three rates of FAL-2042 compared to Kudos 27.5 WDG. FAL-2042 at 105 g ai h^{-1} and 70 g ai h^{-1} significantly reduced %*Rhizoctonia solani* compared to the untreated check. Kudos 27.5 WDG significantly increased yield and return on investment compared to the untreated check, however no significant difference was shown among growth regulator treatments. Further rate studies are needed to confirm the observed differences between FAL-2042 and Kudos 27.5 WDG; However, FAL-2042 may provide a stronger physiological reaction within the plant.

The Construction of a Chromosome Segment Substitution Line Population for the Systematic Introduction of Wild Alleles from *Arachis batizocoi* and *Arachis stenosperma* into Cultivated Peanut

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Chromosome segment substitution line (CSSL) populations are a genomic tool first developed in tomato and since constructed in a diverse group of commodity and specialty crops. CSSL populations are formed through the development of an advanced backcross population with introgressions of minimal size from one genome in the background of another genotype, usually a common cultivar. Ideally, each line contains only one introgression with the entire donor genome represented across the population. As a tool, CSSL populations have a wide range of applications, including QTL discovery and gene mapping. They are also commonly employed by plant breeders for the introduction of novel alleles from crop wild relatives. In peanut, one CSSL population has previously been generated through the formation of an *Arachis duranensis* × *Arachis ipaensis* tetraploid hybrid and recurrent backcrossing to cultivated peanut. The aim of this project is to form another CSSL population featuring introgressions of *Arachis batizocoi* and *Arachis stenosperma* in an elite cultivar background. The lines used are previously generated and derive from an *Arachis batizocoi* × *Arachis stenosperma* induced allotetraploid that has been recurrently backcrossed to cultivated genotypes. Currently, a population of 81 lines covering 64.9% of the A subgenome and 45.7% of the B subgenome (based on ThermoFisher Axiom Arachis 48 K SNP array genotyping) are being maintained for this purpose. The introgressions in these lines vary in size from several megabases to nearly entire chromosomes; lines with very large introgressions will be further backcrossed to break down genome coverage into smaller introgressions. The portions of the genome not currently covered by the 81 lines will be recovered through the selection and backcrossing of previous backcross generations with introgressions in these regions. Upon completion, these CSS lines will encapsulate the genetic diversity of two wild species that can be systematically phenotyped and, owing to their tetraploid form and largely cultivated genome, are suitable for the immediate introduction to peanut breeding programs aimed at a multitude of genetic improvement goals.

Summary of Herbicide and Fungicide Use in Peanut in North Carolina and Virginia in 2021

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A survey was administered at county extension meetings in North Carolina and the state peanut production meeting in Virginia to determine herbicide and fungicide use. The survey instrument included the following questions: 1) peanut yield and acreage, 2) what was your most common weed management program for the 2021 peanut crop, and 3) What was your fungicide spray program on a 2-week or bi-weekly schedule. Categories for herbicides included: preplant burndown (PPL), preplant incorporated (PPI), preemergence (PRE), cracking or emergence stage (GC), early postemergence (EPOST) within the first 30 days after peanut emergence (DAE), mid-postemergence (MPOST) 30 to 60 DAE, and 60 DAE or later. Approximately 76 growers completed the survey, which represented 27,000 acres (22% of acres).

A total of 502 herbicide listings were observed across all timings for the 76 growers. Eighty-one percent of growers made at least three to five applications during the growing season. The highest number of applications was noted for preemergence and early postemergence timings (27 to 31% of applications) with 20%, 14%, and 8% of growers applying herbicides at cracking state of peanut (AC), 30-60 days after peanut emergence (DAE), and greater than 60 DAE, respectively. Out of the 107 herbicides listed for preplant applications, 49% were glyphosate with 17% were 2,4-D. Thirty percent of listings included pendimethalin. Forty-one percent of herbicides listed included flumioxazin preemergence with 35% as metolachlor. Paraquat was listed for 35% of applications at the GC stage followed by metolachlor (20%) and bentazon (18%). At the EPOST timing, 2,4-DB was listed the most times (21%) followed by acifluorfen plus bentazon (16%), imazapic (13%), bentazon (12%), and metolachlor (8%). Clethodim and lactofen were listed 5% of the time at the EPOST timing. At the MPOST timing, 2,4-DB was also listed the most (44%) followed by acifluorfen plus bentazon (20%), clethodim (10%), pyroxasulfone (6%), imazapic (5%), metolachlor (5%), and lactofen (4%). When herbicides were applied 60 DAE or later, clethodim constituted 39% of the listings followed by 2,4-DB (32%) and Ultra Blazer (10%).

A total of 408 fungicide listings were noted across all surveys and the timings of application. The majority of growers applied four or five sprays (28% and 23%, respectively) with approximately 10% making two or six applications. Chlorothalonil was listed 29% of the time for all fungicide listings followed by prothioconazole plus tebuconazole (18%), pydiflumetofen (15%), tebuconazole (14%), and azoxystrobin plus benzovindiflupyr (10%). When one application of pydiflumetafen was listed, 14% and 21% of the listings included co-application with azoxystrobin plus benzovindiflupyr. When applied twice, pydiflumetafen was listed 2% of the time alone and 9% of time when applied with azoxystrobin plus benzovindiflupyr. Other fungicides mixed with pydiflumetafen were listed less frequently (no more than 3% of listings) and included tebuconazole and flutolanil. At least one application of chlorothalonil was listed as following sprays of pydiflumetafen (67%) with prothioconazole plus tebuconazole listed 13% of the time. Several other fungicides were listed 10% of the time. Ten percent of the listings included pydiflumetafen were not followed by other fungicides.

Sensitivity of *Athelia rolfsii* from Commercial and Research Peanut Fields in Georgia to Mefentrifluconazole and Benzovindiflupyr

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The control of *Athelia rolfsii* in peanut is largely dependent on fungicides. DMIs and SDHIs have been heavily used for more than 20 years on peanuts and rotational crops. This intensive exposure raises concern of fungicide resistance, including effects on newer products such as Provysol (mefentrifluconazole), a DMI, and Elatus (benzovindiflupyr + azoxystrobin), an SDHI plus a QoI. *A. rolfsii* isolates were collected from 14 fields across South Georgia where disease control was less than expected, and their sensitivities were assessed using in vitro assays. The sensitivity of 256 isolates (about 20 per location) was first assessed using one discriminatory dose of benzovindiflupyr at 0.20 ppm and mefentrifluconazole at 0.50 ppm. The range of percent inhibition for benzovindiflupyr across all locations was 44.00-62.80 (LSD=5.85), with a mean value of 50.58 ppm, whereas the range for mefentrifluconazole was 41.52-61.89 (LSD= 7.26), with a mean value of 53.26 ppm. Though there were some significant differences among locations for both benzovindiflupyr and mefentrifluconazole, the differences were not to a magnitude where major differences in disease control across locations would be expected. The sensitivity of isolates from grower fields was generally similar to those from long-term research sites with peanut monoculture. There was also a weak positive correlation in the sensitivities of benzovindiflupyr and mefentrifluconazole ($r = 0.17009$, $p \leq 0.0001$), suggesting that there could be some low levels of cross-resistance between the DMI and SDHI fungicide classes.

EC50 values were then determined for five of the most and least sensitive isolates using concentrations of benzovindiflupyr and mefentrifluconazole that ranged from 0.01 to 10.00 ppm. The EC50 values for the mefentrifluconazole sensitive isolates ranged from 0.08 to 0.10 ppm and had an average of 0.09 ppm, whereas the less sensitive isolates had EC50 values ranging from 0.11 to 0.22 ppm and had an average of 0.14 ppm. The EC50 values for the benzovindiflupyr sensitive isolates ranged from 0.002 to 0.03 ppm and had an average of 0.02 ppm, whereas the less sensitive isolates had EC50 values ranging from 0.05 to 0.07 ppm with an average of 0.06 ppm. Studies are currently underway to determine if these differences in sensitivity have any impact on the level of disease control from applications in the field.

Beyond the Peanut Genome

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The publication of the peanut genomes in 2016 and 2019 marked the successful completion of the Peanut Genome Project's foundational goals. These genome sequences now provide a common reference for genetics research all over the world, and the provide the locations of essentially all peanut genes. New research tools developed using the framework of the sequenced genome now allow the visualization of the genetic makeup of individual peanut plants and breeding progeny in unprecedented detail. This has allowed the genetic tagging of valuable agronomic traits, from both cultivated and wild species, and the deployment of DNA markers which add power to breeding programs. Genetic traits tagged with DNA markers include resistances to late leaf spot, nematodes, white mold and rust, and traits such as seed size and the high oleic trait. Increasingly the use of genomic tools is becoming standard in the production of improved cultivars making peanut more productive and sustainable. Genomic technologies continue to advance, creating new possibilities to select and create elite genetics

Addressing the Limitations of Peanut Resistance Due to Narrow Genetic Diversity

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Most food crops have undergone domestication and selection, resulting in a substantial reduction of genetic diversity. Peanut is an extreme case since it is has a recent origin (about 8000 years ago) and it is sexually incompatible with its wild relatives, that possess high levels of genetic diversity and a range of adaptative traits that are of agricultural relevance (resistance to pests and diseases, tolerance to abiotic stresses, broader range of environment adaptation). Like many other crops, peanut is most important away from its origin and its wild relatives, South America; for breeding, these wild species should be available in different areas of the planet. Because of restrictions of germplasm exchange due to various international convention of Biological Diversity and Nagoya protocol, make the use of wild species for peanut breeding has been very limited. In the Wild Peanut Lab at UGA we have created a pipeline to characterize wild species, render them into a tetraploid, peanut-compatible form, introgress and genetically characterize the segments that confer resistance to the crop. These tetraploid lines (induced allotetraploids) are being deposited in the USDA/NPGR gene banks, so they are preserved and available to breeders in the USA and worldwide. We envisage this will be a major legacy for the peanut community for decades to come, enabling the production of a more sustainable and affordable crop.

Understanding the Physiological Basis of Carbon Allocation of Peanut Cultivars Under Water-Stress Conditions

B. BHATTARAI*, H. KAUR-KAPOOR, and H.E. LAZA, Department of Plant and Soil Science, Texas Tech University, Lubbock, TX

The second-largest peanut (*Arachis hypogaea* L.) producing region in the U.S is the semi-arid Texas High Plains (THPs) which experiences a high temperature and low precipitation. Growers are concern about the sustainability of the irrigated peanut production due to the rapid decline of the Ogallala aquifer, the source of irrigation. Hence, drought-tolerant peanut cultivar will most likely increase as it enhances the soil health, reduces irrigation footprint, and N inputs. Therefore, to understand the physiological basis of carbon allocation and identify the peanut cultivar to optimize the water use efficiency and regional production a field experiment was conducted at the USDA-ARS, Lubbock, Texas during the 2020 and 2021 growing season. An experiment was conducted with irrigation treatment (dryland and irrigated) and peanut cultivar (AG18, Georgia-09B, Lariat, and C7616) with four replications. The leaf gas exchange was measured using the infrared gas analyzer portable photosynthesis system, LiCOR-6800. The partitioning of biomass into the root, stem, leaf, and nut was done at physiological maturity. The net assimilation rate, stomatal conductance, and internal CO_2 concentration were 14%, 26%, and 26.3% higher in irrigated as compared to dryland treatment. Among cultivars, C7616 had a higher assimilation rate (13% and 7%), stomatal conductance (10.9% and 21.4%), and internal CO_2 concentration (4.7% and 3.9%) compared to Georgia-09B and Lariat, respectively. Also, carbon allocation towards root growth in dry land conditions was the greatest in C7616 (95% more) compared to Georgia-09B (27% less) and Lariat (5% more). Similarly, in dryland conditions decrease in the seed yield was relatively less in C7616 (35%) than Georgia-09B (390%) and Lariat (215%) when compared with irrigated treatment. The greater rate of assimilation and a higher allocation of resources in root growth indicates that C7616 has the best resiliency to the dryland conditions in the THP.

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Out-Scaling Improved Peanut Production Packages in Southern Ghana

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The introduction of the USAID Feed the Future Peanut Mycotoxin Innovation Laboratory (PMIL) project in Ghana resulted in the development of improved peanut varieties with tolerance to pests and diseases as well as technologies for sustainable yield increase that included post-harvest handling of peanut. The current project Peanut Innovation Laboratory (PIL) in Southern Ghana focuses on pest, disease and crop production packages. One of the main production challenges is the sustainable management of pests (weeds inclusive) and diseases; which often is challenging for female, small-scale farmers. To disseminate and out-scale outputs from these projects to contribute to Ghana's realization of SDG Goals 1-5, a demonstration field was set up with farmers at Ayigbe in the Wenchi District of the Bono Region in 2021. The treatments included Nkatse kokoo, a popular local peanut variety and three improved varieties (Yenyawoso, Crops Dehyee and Crops Agbeyiye). These varieties were evaluated in production packages: 1) high input (HIP) of preemergence herbicide followed by one manual weeding, application of NPK and calcium fertilizers, and fungicide application; 2) medium input (MIP) of two manual weedings, application of NPK, and local soap; 3) low input (LIP) of two manual weedings and the application of local soap; and 4) farmer practice (FP) of one manual weeding. Each variety and package system was replicated three times. Farmers identified pests and their impact on peanut growth and development, timely intervention of treatments, and when and how to use pesticides judiciously for health and environmental safety. Data were recorded on pest and disease incidence and severity, farmers' acceptance of each system and variety, and then pod yield. Data were subjected to ANOVA with means separated using Tukey's test ($p \leq 0.05$).

Thirty-two farmers (10 males and 22 females) benefited from the field demonstration. All the farmers preferred the HIP and MIP for pest and disease management. Farmers normally associate defoliation of leaves to physiological maturity of the pod and not to the effect of leaf spot disease. They therefore expressed amazement on seeing green leaves on peanut plants subjected to HIP and MIP. Generally, all three improved varieties outperformed the local variety under all the systems. Yenyawoso and Agbeyiye were the preferred choice by 96% and 92% of farmers present, respectively. These two varieties had an overall acceptance of ≥ 93% for females and 90% for males. The variety Dehyee and the local variety Nkatse kokoo were accepted by 56% and 28 % of the farmers, respectively, and were the least preferred by women (≤ 53%) females and males (≤ 60%). Pod yield of Yenyawoso or Agbeyiye was 4.9 and 3.0 tons/ha under HIP; 3.2 and 1.1 tons/ha under MIP; 1.9 and 0.7 tons/ha under LIP; and 1.3 and 0.5 tons/ha for the FP. Yield of Nkatse kokoo was < 0.5 tons/ha for all the systems. Female preference for particular variety were based on high yield, tolerance to insect pests and disease, and ability to suppress weeds, hence the choice of Yenyawoso and Agbeyiye. Outflow from the field demonstrations catalyzed farmers to request seed for their next season cultivation of which we obliged by giving them some quantities. It seems obvious from the outputs that this approach of participatory field demonstrations of system inputs for peanut production to farmer groups could be more efficient for technology dissemination for adoption, capacity building (knowledge and skills enhancement) and out-scaling of research recommendations, which may eventually contribute to the actualization of the SDG goals for the different gender groups.

Evaluation of Sentinel-2 Satellite Data for Groundnut Yield Estimation in Malawi

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Satellite data have proven useful low-cost yield estimation in many crops and regions, but have not yet been rigorously tested in groundnut systems. We describe a study to evaluate the utility of Sentinel-2 satellite data, which acquires ~weekly optical images at 10m resolution, for yield prediction. Field boundaries were outlined for 330 groundnut fields during the 2021 growing season in Malawi and yields on these fields were measured with a crop-cut from a central part of the field. Multi-date Sentinel-2 data were processed to remove clouds and harmonic regression was used to estimate canopy greenness throughout the season. The peak greenness was found to exhibit significant positive correlation with yield, consistent with prior work in other crops in the region. However, substantial noise in the ground measures precluded a precise estimate of satellite performance. We recommend that future field work aim to acquire 2-3 crop cuts at random locations per field, even if fewer total fields are covered, to enable more precise evaluation of Sentinel-2 yield estimates. In addition, measuring weed coverage and total groundnut biomass for a subset of fields would help to better understand sources of error and improve future estimates.

Techniques for Field Research with Soilborne Pathogens of Peanut

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Peanut is subject to attack by a variety of soilborne pathogens, primarily fungi and nematodes, that can cause serious crop loss if not properly managed. Genetic resistance is a foundation of management for many of these, and our increasing knowledge of the peanut genome and plant breeding techniques has increased the demand for reliable phenotypic data. Another key management approach is the use of fungicides, and there is an ongoing need for consistent data required for the development of new products. Achieving this data requires a combination of very specific cultural practices and management, and may include field inoculations with the pathogens of interest. This presentation will focus on summarizing the techniques and methods developed over many years to consistently produce disease epidemics in the field and evaluate them appropriately to generate reliable data. The focus will be on the details of experimental design and methods that can make all the difference between success and failure, but may not be generally known or appreciated.

Genetic Gain Achieved Over 90 years of Breeding Runner Peanut Cultivars at the University of Georgia.

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The peanut breeding effort has been continuously carried out since 1931 in Georgia. We were interested to see what progress has been made over the course of the breeding effort, starting with the first runner cultivar, Southeastern Runner (SER) 56-15, released by B.B. Higgins in 1947. Essentially a land race cultivar, SER 56-15 was pure-lined from a farmer-saved seed cultigen popular in the early 1900s. We tested SER 56-15 along with 15 contemporary Georgia runner cultivars at Tifton, GA from 2019 to 2021 to evaluate pod yield, grade quality, and resistance to tomato spotted wilt virus. Pod yield has improved >3500 lbs/acre, representing a 210 lbs/acre increase per cultivar release, and dollar value increase of $38/acre per cultivar released.

High Throughput Seed Sorting for Oleic Acid Concentration in Peanut Breeding Populations using QSorter Technology from QualySense.

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The peanut industry requires high-oleic fatty acid seed oil concentration for some products, and normal-oleic fatty acid concentration in others. Peanut breeders therefore, are tasked with developing high-oleic cultivars as well as normal-oleic cultivars. Selection for high-oleic acid concentration, previously carried out using gas chromatography to measure oleic acid concentration, has been improved using near-infrared technology which non-destructively estimates oleic acid concentration. It has also been made easier and cheaper with the development of highly accurate and inexpensive DNA molecular markers. A machine that has recently been developed by QualySense, the QSorter, shows promise in high throughput measurement and sorting of high-oleic seeds from segregating breeding populations, improving throughput and potentially driving prices down further. In this study, we evaluated the utility and accuracy of the machine on F_1 and F_2 populations, and are currently refining sorting thresholds.

Experiences Developing Peanut Production Risk Tools Using Microsoft Excel

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Microsoft (MS) Excel was used to create peanut production risk management tools for North Carolina (USA), Ghana, Malawi, Argentina, and India. These tools were aimed at improving the delivery of recommended production and pest management practices to farmers for pre-season planning to minimize potential yield loss from multiple pests. The risk tools also provide a log feature, allowing farmers to record and save production information that can be reviewed and used in future decisions. Editing features built into the base risk tool, allow for the various production practices and pests of each country to be incorporated into each risk tool. The development of the risk tools has been beneficial in bringing researchers from multiple disciplines together to identify knowledge gaps and identify future research efforts. Microsoft Excel with its built-in Visual Basic for Applications (VBA) programming language and MS Excel's general use by scientist and practitioners has proven to be a good platform for developing and distributing the peanut risk tools. However, the MS Excel based risk tools do have some limitations. The two primary limitations are the requirement to have MS Excel and the ability to expand the risk tools for in-season decisions when crop conditions and pest populations are dynamically changing. In the future, concepts from the current risk tools, especially evaluating multiple pests and interactions, should be useful in the development of in-season decision aids to assist farmers in making timely recommended management practices to mitigate risk of pest yield loss and to ensure good crop development.

Development of an Array of KASP Markers for Screening Peanut for Hybridity and for Varietal Identification.

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A rapid screen for distinguishing true hybrids from inadvertent selfs, and for identification of peanut varieties is needed for use by peanut breeders. SSR markers have been developed for validating hybrids, but the small difference between bands and limited number of markers has made this difficult on rapid agarose gels. As many SNPs have been developed, we have converted a limited number of SNP markers from the Arachis Axiom Array chip and Rad-Seq data to KASP markers. From a total of 72 of these SNPs plus SNPs for FAD2A, FAD2B, and resistance to Ma-1, we developed a set of 24 KASP markers. These were tested initially against 24 tetraploid peanut accessions including varieties and related breeding lines, and it was found possible to distinguish all accessions from each other; some varieties by 6 to 10 markers, closely-related sister lines by at least 2 markers. Testing against common peanut varieties, sister breeding lines, and parents of crosses is underway to determine the utility of this marker set. It is hoped that this will provide a rapid method for validating hybrids and identifying varieties.

Effects of Foreign Material, LSK, and Fill Level on Drying Performance in Semi-Drying Trailers

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Semi-trailer vans modified for drying farmers stock peanuts were introduced in West Texas between 1997 and 2000. These high-capacity drying trailers gained popularity throughout the peanut producing areas of the United States and are currently used to dry between 50 and 65% of the annual peanut crop. Little research has been published regarding the performance of these drying units. A study was conducted at a peanut buying facility where four high-capacity drying trailers were instrumented with 36 thermocouples each to monitor temperatures during drying. A vacuum was used to extract samples from the top, middle, and bottom of the load at nine locations in each trailer at the beginning and the end of each drying cycle. Foreign material, loose shelled kernel, and kernel moisture content was determined for each sample. Fill level of each trailer was calculated by dividing the weight peanut material delivered in the trailer by the capacity of the trailer. Initial and final moisture content averaged 14 and 9%, respectively. Average drying time for each load was 8 ± 5 hours. On average, the trailers were filled to 75% capacity. The average foreign material was 7% with a standard deviation of 5%. Similarly, the LSK averaged 8% ± 4%. Neural network models were developed to predict the range in final moisture content and the drying time of a load of peanuts as a function of fill level, initial and final moisture content, percent foreign material, and percent loose shelled kernels. The average R^2 for the 4-node neural network to predict drying time was 0.73 with an RSME of 2 hrs. The 2-node neural network model to predict the moisture range in a load of peanuts after drying had an R^2 of 0.77 and an RSME of 0.5%.

Disease and Yield Response of Selected Peanut Cultivars to Low and High Input Fungicide Programs in Southeast Alabama

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The reaction of twelve peanut cultivars to early leaf spot *Passalora arachidicola,* late leaf spot *Novopassalora personatum*, and rust *Puccinia arachidis* along with white mold *Athelia rolfsii* as influenced by fungicide program was assessed in southeast Alabama at the Wiregrass Research and Extension Center (WREC). Leaf spot intensity was evaluated using the Florida 1-10 leaf spot scoring system and rust was evaluated using the ICRISAT 1-9 rating scale. Stem rot incidence was assessed immediately after plot inversion by counting the number of disease loci per row. Yields were reported at <10% moisture.

For the no-fungicide control, leaf spot-incited defoliation differed significantly across cultivars with AU-NPL 17, and Georgia-14N, and TifN/V High O/L having lowest defoliation. While rust was sporadic throughout the plots, highest rust intensity was with Georgia-16HO. With the standard fungicide program, Georgia-18RU, TUFRunner 511, AU 16-28, TUFRunner 297, and Georgia-09B had significantly greater defoliation levels than AU-NPL 17 and TifN/V High O/L. While significant differences in defoliation were noted with the intensive fungicide program, defoliation levels were low across all cultivars. White mold incidence was greater for Georgia-09B than Georgia-16HO along with TifN/V High O/L, Georgia-12Y, FloRun 331, and Georgia-14N with the latter four cultivars having similarly low disease indices. The intensive fungicide program greatly reduced this incidence of this disease compared with the standard fungicide program and the nontreated-fungicide control. While the high yield recorded for Georgia-14N was equaled by Georgia-16HO, Georgia-06G, and TifN/V High O/L, similarly low yield was recorded for Georgia-09B, TUFRunner 511, and TUFRunner 297. Pod yield reported for the intensive fungicide program was significantly greater compared with the standard and no fungicide control with the latter having the lowest yield.

Evaluation of Organic Spanish Peanut (*Arachis hypogaea* L.) Breeding Lines for Production, an Update

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Estimates show that 98% of organic peanut production in the U.S is produced in West Texas. Organic producers receive premiums for their product but are limited in the use of suitable fungicides, herbicides, and seed treatments to control numerous production issues. Throughout the season, organic producers can see poor germination, stand establishment, weed and disease control without the application of common chemicals. The Texas A&M AgriLife Research Peanut Breeding Program initiated an evaluation of current germplasm in 2020 and 2021with an on-farm trial in Terry and Gains Co. Texas in certified organic fields. Twenty lines were evaluated, consisting of 16 breeding lines and 4 commercially available checks. Entries were planted without the commercially available seed treatment in 2 row 3 m plots replicated 3 times. Plots were planted in a randomized complete block design with stand counts taken by hand at 7,14, 21 and 28 days after planting. Plots were managed in accordance with common production practices for organically certified land. Additional plot data was collected and evaluated for visual greenness, pod rot, yield, and grade. Visual differences were examined based on date of stand counts in 2020 and 2021. Statistical differences were found in Yield, %TSMK and in both years. Furthermore, the 2020 location had heavy pod rot infestation and 2 entries showed statistically significantly reduced %DK. Finally, pod samples for these were also analyzed using Image-J software to estimate % pod rot infection where no significant differences were found. Data for the trial will be presented.

An Evaluation of Fungicide Programs in Two Peanut Genotypes with Contrasting Disease Resistance

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Fungicides and cultivar selection are key components of a peanut integrated disease management plan. However, the interaction between these components on peanut diseases (e.g. white mold (*Athelia rolfsii*) and leaf spots (*Passalora arachidicola*; *Nothopasslora personata*) is unclear. The objective of this experiment was to quantify differences in disease response between peanut genotypes FloRun 331^{TM} (FR331) and Georgia 06G (GA06) under seven Peanut Rx based fungicide programs and two controls. Leaf spot (LS) defoliation was estimated using the Florida 1-10 scale. Foliar disease onset occurred between 75 and 90 days after planting (DAP) with scale ratings ranging from 5 to 8 at 135 DAP. Stem rot incidence was recorded throughout the season as the number of 1-ft foci/90 ft of row with below ground hit ratings collected 148 DAP at digging. Fungicide program did not have an impact on stem rot hits, but incidence was numerically lower with FR331™ having 0.53 hits per treatment compared to GA06’s 2.75 hits. Yield responses related to fungicide program varied between cultivars, however, both cultivars saw significant ($p < 0.01$) yield savings when fungicides were applied. These yield savings were larger on average for GA06 (1,825 lb/acre) than FR331 (1,588 lb/acre), especially for chlorothalonil alone applications (GA06 = 1827 lb/acre, FR331=997 lb/acre). Cultivar resistance as well as yield potential is critical to determining the impact fungicide programs will have on yield savings.

Screening for resistance to leaf spot *(Nothopassalora personata and Passalora arachidicola)*.

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Leaf spot is one of the most common diseases in the peanut belt and represents one of the most costly to control. Genetic resistance represents the most cost-effective method of control. Infection is produced by 2 casual agents, *Nothopassalora personata* (previously known as *Cercosporidium personatum*) which causes late leaf spot and *Passalora arachidicola* (previously known as *Cercospora arachidicola*) which causes early leaf spot. As the name implies early leaf spot is typically seen early in the season and late leaf spot occurring later. However, either disease can occur at anytime during the season with characteristic dark-brown (ELS) to black (LLS) lesions first appearing at the bottom of the plant and progressing upward. Early leaf spot can be confirmed by spores on the upper leaf surface and late leafspot by spores on the lower leaf surface. The Texas A&M AgriLife Research peanut program has been developing breeding lines and screening for leaf spot resistance for over 30 years at a screening nursery at the former Texas A&M AgriLife Research and Extension Center in Yoakum, Texas as well as off station testing locations. The advanced line test represents the programs most developed lines that are tested around the state at up to 9 locations. For disease evaluations we conduct late season ratings prior to harvest to estimate disease. Plots are rated at the end of the season for overall leaf spot infection on a 0-10 scale, where 0 is no disease and 10 is all plants dead. At the Yoakum, Tx site in 2020 and 2021 plots were planted in 1 row, 3.1 m replicated plots with 3 replications. The 2020 growing season was extremely dry while the 2021 season was wet. Overall, disease incidence was average in both years. Statistical differences were found in both years although the coefficient of variation was high in both years, which is common in screening nurseries. Statistically significant differences were found in this set of ratings and will be presented.

Viewing and Characterizing Haustoria of *Nothopassalora personata In Vivo*

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Nothopassalora personata is the fungal causative agent of late leaf spot in peanut and causes premature defoliation if not controlled. *N. personata* is a hemi-biotroph that uses specialized hyphae called haustoria to take nutrients from the plant cells during the biotrophic phase. The following method was developed to characterize haustoria *in vivo*. Late leaf spot lesions up to 3mm wide were cut from infected leaves and soaked in 10% KOH for one hour to remove the waxy cuticle. Sections were transferred to Visikol Optimal Clearing Agent for Plant Biology, a chloral hydrate alternative, and placed in a 37ºC water bath overnight or until cleared. After clearing, tissues were transferred to Lactophenol Cotton Blue stain, and placed in a 37ºC water bath for 15 minutes. Tissues were destained using two one-minute water washes prior to microscopic observation. Haustoria were visible at 400X on the lower surface of all lesion sizes observed, occurring on all sides of the lesion near the necrotic edge. This method provides a simple way to observe haustoria associated with lower epidermal cells of peanut leaves. Efforts to compare haustoria production for peanut genotypes with different levels of late leaf spot resistant are underway.

Discovery of a Resistance Gene Cluster Associated with Smut Resistance in Peanut

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Peanut smut, caused by *Thecaphora frezzii* Carranza & J.C. Lindq., is an emerging threat for the global peanut industry. The disease's destructive potential can be exemplified by pod incidence values as high as 70% and yield losses reaching 30%. Because fungicides have shown moderate but highly variable levels of control levels, development and deployment of smut resistant cultivars are the best strategies for disease management. Screening for smut-resistant germplasm requires years of field trials and is currently the only option for breeders because genetic markers for resistance have not yet been developed. The objectives of this study were to perform whole genome sequencing (WGS) on a recombinant inbred line (RIL) population developed for smut resistance mapping and subsequently fine map discovered QTL associated with smut resistance. An expedited strategy was employed by phenotyping in the F_5 generation. We phenotyped 200 families with 3 plants per family for smut resistance in infested fields during the 2019/2020 season in General Deheza (32°45′23″S 63°47′20″W), Argentina. Each individual was sequenced using iGenomX RipTide library preparation and Illumina NovaSeq sequencing to yield approximately 1 times genome coverage. Analysis of the phenotype and genotype data using Khufu resulted in the identification of a single major smut resistance QTL on chromosome 12 (B02). Chromosome level genome sequences were assembled for the resistant parent (Ascasubi) and susceptible parent (10_2870) using PacBio HIFI sequencing. Analysis of the QTL region identified a resistance gene cluster where the resistant lineage retained certain R genes that were lost in the susceptible lineage. The structural variation represents strong functional variation controlling smut resistance. A validation population was sequenced using Khufu to validate the QTL region and analysis confirmed the major locus on chromosome 12. The identified variation will be used to develop smut resistant varieties quickly using molecular assisted breeding strategies.

Handheld RGB-based Phenotyping to Assess Groundnut Rosette Disease Resistance and Identify Trait Associated Components

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Groundnut rosette disease remains the most devastating foliar disease of groundnuts in Sub-Saharan Africa (SSA) causing upto 100% yield loss. Advancements of molecular breeding techniques have provided opportunities to understand the gentic components that control GRD resistance variation. However, accurately phenotyping large breeding populations for GRD resistance remains a challenge. Red-Green-Blue (RGB) based phenotyping has has become a popular method in image based plant phenotyping due to the wide availability of RGB cameras. In this study, 200 genotypes of groundnut (*Arachis hypogaea* L.) from the African core collection were grown under field conditions at Nakabango, Uganda which is a hotspot for groundnut rosette disease. The severity was assessed visually and handheld RGB images were collected during the different growth stages across the growing season. RGB indices were derived using the Breedpix plugin of the CIMMYT maize scanner. Strong associations between the visual scores and RGB indices were recorded at 12 weeks after planting. RGB indices Green Area (GA, $r = -0.75$), Greener area (GGA, $r = 0.71$) and Crop Senescence Index (CSI, $r = 0.55$) were the best associated with visual scores. The genome wide association study was performed, identifying genomic regions associated with the image-derived indices CSI, GA, and GGA on chromosomes A04 and B04. A putative gene *Aradu.P5PIT*, a disease resistance protein located next to single nucleotide polymorphisms (SNP) of leaf photosynthesis were detected by both visual scores and CSI (associated with canopy yellowness). These image derived indices and associated genes present an opportunity to improve phenotyping using objective measures and, apply molecular tools to improve breeding of GRD resistant groundnut varieties.

Construction of Genetic Diversity Panel of USDA Peanut Germplasm Collection for Omics Research

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Recent advances in sequencing technology and analysis tools have made omics research feasible for many species, including soybean, rice, maize, wheat, *Brachypodium distachyon*, *Brassica rapa*, *Brassicaoleracea*, and *Brassica napus* et al., which offers a much broader understanding of crop gene functions thus can be extremely useful in crop improvement. A well represented genetic diversity panel is critical for the success of omics research. Based on the current available data for the USDA peanut germplasm collection such as morphological traits, origins, chemical traits, and Arachis_Axiom2 SNP array genotyping data, and pedigree information, we constructed a genetic diversity panel of 350 accessions to present an entire USDA peanut germplasm diversity, which included six botanical types, geographical distribution, unique genetic resource, significant donor parents of modern developed peanut cultivars. This panel will be used for genome wide association study (GWAS), development of high-throughput phenotyping system, and some other genomic research.

Deletion of *acdS* Gene in a *Bradyrhizobium japonica* Strain Does not Affect Peanut Root Nodulation

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Aminocyclopropane-1-carboxylic acid (ACC) deaminase interferes with the production of a plant stress hormone, ethylene, and has been implicated in nodule formation and rhizobial competitiveness in legumes. However, little information is available on the effect of ACC deaminase on nodulation in peanuts. Here, we evaluated the effects of rhizobial ACC deaminase on nodulation of two peanut genotypes. Two rhizobial mutant strains, one with ACC deaminase gene knocked out and the other over-expressed, as well as the wild strain, were inoculated onto pre-germinated seeds in Leonard jars and uninoculated plants served as controls. The dry weights (shoot and root) for inoculated plants were similar. The nodule numbers and N concentrations in shoot differed between the uninoculated and the inoculated treatments, but there were no significant differences among plants inoculated with different rhizobial strains. Based on the N balance method, the amounts of N fixed in the shoots for treatments inoculated with mutant strains were not significantly different from those inoculated with the wild strain. The results show that the absence or over-expression of the ACC deaminase gene in rhizobia did not impair its ability to form root nodules in peanuts. Furthermore, the nodulation assay suggests that symbiotic nitrogen fixation was not affected by ACC deaminase activity.

Development and Release of two Spanish Groundnut Varieties for cultivation In Malawi

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The performance of several elite groundnut genotypes selected from ICRISAT's regional breeding nursery and other breeding programs was assessed at Chitedze, Chitala, Ngabu and Baka research stations from 2014/15 season to 2017/18 and at on farm in 2017/18 season. A total of 16 test genotypes plus two check released varieties (Kakoma and Baka) were used. The trials were laid out in an incomplete block design with 3 replications. The days to 75% flowering averaged at 39 days. Significant differences were also observed in terms of yield among the genotypes in all sites. On average, across the test sites, the following candidate genotypes out yielded the check Kakoma; ICGV-SM 03530 by over 12.9%, 31.3 % and 13.3% in 2014/15, 2015/16 and 2016/17 seasons respectively; ICGV-SM 08528 by over 34.1%, 17.5%, 8.2% and 35 % in 2014/15, 2015/16, 2016/17 and 2017/18 seasons respectively; and ICGV-SM 08538 by over 41.3%, 18.7%, 16.5% and 11.3% in 2014/15, 2015/16, 2016/17 and 2017/18 seasons respectively. The genotypes ICGV-SM 08538 and ICGV-SM 03530 were among the most stable genotypes. Because of the excellent performance of the Spanish genotypes, the genotypes were proposed that they be released for use by farmers in Malawi.

Genetic Mapping of Yield-related Traits in Three Bi-parental Recombinant Inbred Line Populations

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Crop yield is a complex trait influenced by multiple genes. Each gene has a small quantitative effect on yield and the effect has environmental influences. Yield component traits contributing to peanut production include not only commonly measured traits such as pod/seed size, weight, maturity, seed per pod, shelling percent and harvest index but also traits describing plant architecture and phenology such as mainstem height, growth habit, canopy size, branching pattern, peg-to-pod ratio, vegetative and reproductive node numbers, time-to-flower, etc. Three recombinant inbred line populations advanced from Florida-07 x NC 3033, Tifrunner and GT-C20 reciprocal crosses, Florida-07 and ICG1471 reciprocal crosses were utilized to dissect the genetic controls of these yield component traits. Polymorphic SNP markers detected by the Axiom_*Arachis*2 SNP array were used to construct linkage maps. Total map distances were 5683 cM, 3362 cM and 4594 cM for the respective populations, and the linkage maps consisted of 27, 20 and 30 linkage groups for the three populations, respectively. These three populations were planted in the field in 2020 and 2021 to be utilized for phenotypic data collection. Multiple interval mapping of the 2020 data set identified 80 QTL regions for thirty traits from the three populations. Additional QTL mapping will be performed for 2021 data to determine stable QTL across environments.

Integrated Genomics for Rapid Marker Development and Targeted Crop Improvement

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High throughput marker technologies weigh cost, accuracy, precision, scalability, throughput, and reproducibility. The available technologies provide an advantage on some metrics while sacrificing others. For example, capture-based sequencing technologies are highly accurate, cost efficient, high throughput, but lack precision because they are focused on a small number of common markers. Alternatively, whole genome sequencing is highly precise, yet has been cost prohibitive and low throughput. Using a random oligo-based library prep which can multiplex up to 960 samples, we have reduced the cost of whole genome sequencing to levels comparable with array and capture-based genotyping technologies. Combined with the informatics platform, Khufu, highly accurate analysis of low coverage sequencing data maintains throughput. Because whole genome variants are assayed that are population-specific, there is no ascertainment bias that accompanies fixed marker sets. Multiple outcomes are possible after data generation, including diversity analysis, purity assessment, population genotyping, foreground and background marker-assisted selection, and genomic selection. We have bundled the sequencing and analysis into Khufu, an affordable and scalable genotyping and analysis platform. Khufu is currently being used widely across plant and animal species, but was developed specifically for peanut. The informatics are uniquely tuned to deliver genomics to any sized research program.

In Vitro Antifungal Activity of Ferulic Acid against *A. flavus* Growth

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Aspergillus flavus colonization in peanut leads to aflatoxin contamination which poses a serious threat to human health and food safety. *A. flavus* invasion in peanut is mostly prevalent during the post-harvest stage where the seed coat is the only protective layer of the endosperm. In attempt to regulate *A. flavus* growth in peanut, an *In Vitro* Seed Colonization assay (IVSC) and radial growth were used to establish the role of insoluble polyphenols from peanut seed coat in regulating *A. flavus* contamination based on the comparison between resistant and susceptible genotypes. We sought to identify the biochemicals present in the seed coat extract and studied the antifungal properties of each of the compounds in response to *A. flavus* colonization. HPLC analysis was used to identify the biochemicals present in the seed coat extract. Antifungal properties of the polyphenols were determined using the poison food technique. The radial growth bioassay and calculated minimum inhibitory concentration showed that ferulic acid inhibits *A. flavus* growth when compared to the positive control Nystatin (a known fungicide). The result shows that ferulic acid could be used as a selection tool in screening for *A. flavus* resistant lines in breeding programs.

Documenting the Sustainability of U.S. Peanut Production

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From the year 2000 up to 2021, average U.S. peanut yields increased by nearly 70%. In the same period, cropland planted to peanuts has fluctuated between 1.07 to 1.87 million acres, with over 1.4 million acres planted to peanuts in 16 out of the last 22 years. From 1.63 million tons in 2000 to 3.19 million tons in 2021, national peanut production has surpassed U.S. peanut consumption levels. Consequently, a significant share of U.S. peanuts needs to be placed in the world markets, where there is competition from several peanut-producing countries in terms of volume and quality.

American Peanut Council (APC), the umbrella organization for the U.S. peanut industry, has assessed peanut market signals in the sustainability space for over a decade. In 2022, APC launched a comprehensive sustainability framework to document and verify the sustainability outcomes of U.S. peanut production. These outcomes will be used to develop industry messages to share with peanut buyers to protect and expand markets for American-grown peanuts. In addition, the sustainability framework serves as a tool for continuous improvement for peanut producers, where they can learn about recommended farm management practices of interest to peanut buyers and how to improve their environmental footprint over time.

The sustainability framework takes the form of an online platform where growers can answer a self-assessment about critical and recommended farm management practices, and where they can enter field-level data for fields representative of their peanut operations. The field-level data fulfills the requirements to run an analysis from the Fieldprint Platform, which calculates eight sustainability metrics based on farming practices. The environmental metrics include GHG Emissions, Energy Use, Soil Conservation, and Soil Carbon, among others.

Current Challenges in Peanut Breeding for Drought Tolerance and Future Prospects

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Drought is the main abiotic stress in peanut that can cause significant yield loss and reduce seed quality. Plants responds to drought stress by modulating plant morphology, physiology, biochemistry, and molecular gene activation. Progress in the development of drought tolerant peanut lines has been difficult due to the multi-allelic affect and variable environmental factors. Yield, as a composite of all the interactions of biotic and abiotic components and stress tolerant genetic potential of specific peanut genotypes, can be significantly variable depending on year and location. Recent advances in peanut genomics research have identified QTLs for drought tolerance and putative drought responsive candidate genes through GWAS analysis. But the usefulness of these putative gene markers must be validated by field experiments and consistently correlated with the phenotyping traits measured. Recent research has indicated that several potential drought tolerance mechanism(s) exist in peanuts ranging from morphological, physiological, biochemical, and/or genetic variations in different genetic background that maybe combined through targeted crosses to produce peanut lines with higher levels of drought tolerance. A discussion of our on-going drought research as well as other drought research to highlight the needs or potentials of different peanut traits that can be targets for peanut drought breeding will be presented.

Beyond the Peanut Genome

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The publication of the peanut genomes in 2016 and 2019 marked the successful completion of the Peanut Genome Project’s foundational goals. These genome sequences now provide a common reference for genetics research all over the world, and the provide the locations of essentially all peanut genes. New research tools developed using the framework of the sequenced genome now allow the visualization of the genetic makeup of individual peanut plants and breeding progeny in unprecedented detail. This has allowed the genetic tagging of valuable agronomic traits, from both cultivated and wild species, and the deployment of DNA markers which add power to breeding programs. Genetic traits tagged with DNA markers include resistances to late leaf spot, nematodes, white mold and rust, and traits such as seed size and the high oleic trait. Increasingly the use of genomic tools is becoming standard in the production of improved cultivars making peanut more productive and sustainable. Genomic technologies continue to advance, creating new possibilities to select and create elite genetics, but at the same time, bringing new challenges.

Peanut Skin Extracts as Natural Antioxidant Ingredients for Peanut Butter

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Peanut butter is a popular food product made from roasted peanuts. Due to its high oil content, the shelf life is often limited by lipid oxidation. This process results in rancid aromas and flavors that have negative impacts on consumers. Peanut skins, the paper-like coatings that surround peanut kernels, are a waste product of peanut blanching operations. This material contains phenolic compounds with antioxidant properties in chemical assays that indicate they would be effective in preventing lipid oxidation in foods. The additions of peanut skin extracts to fresh peanut paste were evaluated for their effectiveness in retarding oxidation of the lipids present. Peanut skins were extracted with a mixture of 70% ethanol in water to isolate the phenolic compounds present. The extracts were spray dried with and without encapsulation with maltodextrin. The encapsulation produced a free-flowing powder with more physical bulk that is easier to handle. A paste was produced from freshly roasted peanuts and the extracts were added at 1% and 2%. The paste was packed into glass jars and incubated at 30 C and 26 % relative humidity. Control samples of peanut paste without the addition of the peanut skins extract ingredients were prepared using both blanched and unblanched peanuts from the same batch of peanuts. Samples were evaluated biweekly over a 24-week period for free fatty acids, peroxide value, hexanal production and with descriptive sensory analysis to determine the progression of lipid oxidation. Free fatty acids were elevated by the addition of the extracts, but the peroxide values were decreased over the test period. Hexanal production was not significantly different between treatments. Descriptive sensory analysis showed a decrease in roast peanut flavor and an increase in rancid off flavors over time regardless of the additions. The addition of the peanut skin extracts also resulted in distinct flavors that were not considered positive attributes for peanut butter.

Helping Wild *Arachis* Taxonomy and Introgression Using SNP Markers

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Wild *Arachis* species are being universally reported as source of traits to beat the challenges of the food production in a world climate changing context. Wild species identification is currently done solely using morphological traits, which is not an easy task. Few taxonomists are able to positively identify *Arachis* species. Accession identification adds a new whole lawyer of complexity. The accurate identification of wild *Arachis* species and accessions is an important issue for introgressions. Due to plasticity in phenetic characters the identification based on morphological features has been exclusively performed by botanists. In order to help identification of species/accessions a set of 696 wild *Arachis* accessions and 378 *A. hypogaea* lines were analyzed using the 48K 'Axiom_*Arachis*2' SNP array. A filtering process resulted in about 100 SNP distinguishing *A. hypogaea* vs non-*A. hypogaea* species/accessions. Based on the results, a set of Single Nucleotide Polymorphism (SNP) markers were designed which were used to successfully in differentiate *A. hypogaea* from non-*A. hypogaea* (wild) genotypes. The development this set of SNP markers is the first step for the assembly of a toolbox to help speed the introgression of wild desirable genes into peanut elite lines to obtain new peanut viarieties with resistance traits.

Quantifying Impact of Glufosinate Drift on Peanut Using Unmanned Aerial System

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The herbicide drift can negatively impact peanut growth and yield. The off-target movement of herbicides applied in LibertyLink cotton, soybean, and corn can result in a significant yield reduction in peanut. The research was conducted to evaluate the impact of herbicide-drift on peanut using NDVI measured from an unmanned aerial system (UAS). The study evaluated the impact of 50%, 12.5%, 3.14%, 0.79%, and 0.2% of the label rate of glufosinate applied at 25 and 60 DAP peanut. NDVI, peanut injury, yield, height, width, and leaf area index (LAI) were measured at 4 weeks after herbicide application. The NDVI was calculated from data collected with a multispectral camera mounted on a UAS. Among different glufosinate rates, 50% of the label glufosinate rate caused the highest peanut injury and resulted in NDVI reduction, height, weight, LAI, and yield. The average peanut injury from 50% glufosinate rate applied at 25 DAP and 60 DAP were 70 and 51%, respectively. Moreover, the 50% glufosinate rate reduced the NDVI by 51.9 and 33.8% when applied at 25 DAP and 60 DAP, respectively. Similarly, the peanut yield was reduced by 68% with glufosinate applied at 50% of label rate. NDVI showed a strong correlation with peanut injury, yield, height, and canopy width with R^2 of 0.83 to 0.96, 0.64 to 0.90, 0.63 to 0.93, and 0.75 to 0.93, respectively. Therefore, UAS derived NDVI could be a good parameter to quantify peanut injury and yield reduction caused by the glufosinate herbicide drift.

Effect of Dicamba or 2,4-D plus Glyphosate Drift Rate and Exposure Timing on Peanut Response

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Field research were conducted to evaluate response of peanut exposure timing at 25, 50, or 75 days after planting (DAP) to dicamba or 2,4-D with glyphosate. Dicamba plus glyphosate was applied at 1.1+2.5, 4.4+10, 17.6+40, and 70.4+160 g ae ha^{-1}; and 2,4-D plus glyphosate was applied at 2.1+2.2, 8.4+8.8, 33.6+35.2, and 134.4+140.8 g ae ha^{-1}. At 4 WAT, peanut injury from dicamba plus glyphosate was >12% while exposed at 25 DAP compared to 50 DAP or later. Peanut injury with 2,4-D plus glyphosate was in the order of 25 DAP (24%) > 50 DAP (18%) > 75 DAP (12%). At 4 WAT, peanut injury ranged from 10 to 44% and injury increased with the higher rates of dicamba plus glyphosate. Similarly, peanut canopy, height, and yield reduction across dicamba plus glyphosate rates ranged from 1 to 32%, 3 to 31%, and 3 to 41%, respectively.

Peanut injury from 2,4-D plus glyphosate was from 8 to 38% and similar rate response was observed. Peanut canopy reduction (>19%), height reduction (>21%), and yield reduction (>9) was greater when exposed to dicamba plus glyphosate at 25 DAP compared to 50 or 75 DAP. Likewise, peanut canopy reduction (>13%) and height reduction (>6%) with 2,4-D plus glyphosate was observed greater at 25 DAP compared to 75 DAP, but there was no response on yield reduction. Peanut canopy, height, and yield reduction from 2,4-D plus glyphosate rate was 1 to 22%, 2 to 23%, and 5 to 33%, respectively.

Relationship Between Potassium Rates and Plant Density on Peanut Productivity

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Nutrients are very important for plant development and yield, including potassium (K), which has direct impact on biochemical processes of peanut (*Arachis hypogaea* L.) plants, being an activator and constituent of enzymes. Plant density can also influence peanut productivity. However, the relationship between K rates and plant density on peanut yield has not been fully investigated. The objective of this research was to evaluate the effect of potassium application and plant density on plant growth and productivity of runner-type peanut under irrigated conditions. The experiment was conducted in Attapulgus, GA using the cultivar Georgia-06G. Soil was classified as Dothan Loamy sand and the field had bahiagrass (*Paspalum notatum*) until 2018, followed by corn in 2019, prior to peanut planting on June 2, 2020. Potassium rates were 0, 25, and 50 kg ha^{-1}, applied as potassium chloride, whereas plant densities were 11.1, 15.5, 20.0, and 24.4 plants m^{-2}. The experimental design was a randomized complete block with split plot design and four replications. The plots were 3.6 m wide and 9.1 m long. Potassium application at the 50 kg ha^{-1} rate was split, with 25 kg K ha^{-1} being applied at planting and 25 kg K ha^{-1} side dressed at 30 days after emergence (DAE). Dry matter accumulation was evaluated in three plants from each plot at 30, 50, 70, 90, and 110 DAE. Leaf area index (LAI) was measured at 30, 50, and 70 DAE, whereas leaf potassium concentration was obtained at 70 DAE. Yield was assessed at harvest 154 DAE. The results showed that the highest potassium rate (50 kg ha^{-1}) resulted in less day matter accumulation at all sampling dates. There was interaction between plant density and K rates on LAI only 50 DAE, with lower LAI for the density of 11 plants m^{-2} at all rates as well as the rate of 25 kg ha^{-1} at 15.5 plants m^{2}. An interaction between K rates and plant density was also observed for leaf K concentration. The application of 50 kg K ha^{-1} at the densities of 11.1 and 15.5 plants m^{-2} increased leaf K concentrations. Potassium application of 25 kg ha^{-1} increased yield only at the lowest plant density. Density of 19.1 plants m^{-2} without K application resulted in maximum yield of 5072 kg ha^{-1}. Future research can be expanded to other varieties, different soil textures, irrigation availability and rainfall pattern seeking to understand the dynamics of potassium in peanut under different plant densities.

Residual Tankmix Options in Peanut

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Residual herbicides applied preemergence (PRE) are a key component of a successful peanut weed management program. Controlling weeds within the first 4-6 weeks after planting (WAP) to is critical to minimize yield loss due to weed competition. The objectives of this two-year study were to evaluate the efficacy of various residual herbicide, alone and in combination, to determine the best management options for weed control in peanut. Treatments included PRE combinations of Valor (flumioxazin) at 2 oz acre^{-1}, Outlook (dimethenamid) at (12.8 fl oz acre^{-1}), and Pursuit (imazethapyr). Pursuit was either applied PRE at 4 fl oz acre^{-1} or as a split application PRE (2 fl oz acre^{-1}) followed by At-Crack (AC) (2 fl oz acre^{-1}). All treatments included Prowl H2O (32 fl oz acre^{-1}) PRE, Gramoxone (16 fl oz acre^{-1}) + Zidua (1.75 fl oz acre^{-1}) + Agri-Dex (1% v/v) AC , Cobra (12.5 fl oz acre^{-1}) + 2,4-DB (21 fl oz acre^{-1}) + Agri-Dex (1% v/v) mid-postemergence (POST1), and Select Max (16 fl oz acre^{-1}) + Agri-Dex (1% v/v) late postemergence (POST2). All treatments resulted in less than 10% peanut injury, except Pursuit applied PRE (4oz acre^{-1}) in 2020. This treatment resulted in over 15% injury; however, peanut had recovered by mid-season. Season long Palmer amaranth control (>95%) was achieved in both years when Valor was applied in combination with Pursuit and/or Outlook. In 2020, early season control of Texas panicum was >95% with all treatments except Valor PRE. Late season control was at least 95% with all treatments, excluding Valor and Outlook alone PRE. Treatments that included Pursuit applied PRE and/or AC control Texas panicum at least 90% with the exception of Pursuit + Valor PRE or Pursuit + Valor + Outlook PRE. Yellow nutsedge control was at least 98% with all treatments season long, except Valor PRE, in 2020. While in 2021, Pursuit PRE, Pursuit PRE + AC alone or in combination with Outlook PRE, were the only treatments that resulted in at least 80% yellow nutsedge control late season. Season long control (at least 95%) of ivyleaf morningglory was achieved with all treatments except Outlook PRE, in 2020. However, the only treatments providing at least 90% control season long, in 2021, were Pursuit alone or plus Valor PRE and the combination of Valor + Outlook + Pursuit PRE + AC. The lack of differences in 2020 with both yellow nutsedge and ivyleaf morningglory may be due to lower populations of both species. A yield increase was observed with all treatments both years compared to the untreated check. This research solidifies the need for residual programs that include multiple modes of action. This is to both to improve multi-species weed control and reduce potential for herbicide resistance.

Release of a Virginia-type Peanut Cultivar, ‘N.C. 20’, for the Virginia-Carolinas Production Region

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N.C. 20 was developed using a combination of pedigree selection and modified pedigree selection (single-seed descent) among, and within families descended from a three-way cross. The initial cross was made between the breeding line N01015T and a sister breeding line to Gregory (N000098ol). The resulting F7 derived line (X02083 [F2-01-S-01-S-05: F7]) was then crossed to the variety ‘Sugg’. Yield of N.C. 20 is similar to those of existing Virginia-type cultivars including Bailey II, Bailey, Emery and Sullivan. In the NCSU Advanced Testing Program for yield, consisting of 18 trials across six years at three locations, N.C. 20 exceeded yields of Bailey, Bailey II, Sullivan and Wynne and was similar to the yields of Emery. N.C. 20 had bright jumbo and fancy pods. In the regional performance trials (Peanut Variety and Quality Evaluations) conducted from 2017 through 2020, N.C. 20 had a greater yield than all currently available Virginia-type varieties and a similar crop value to Bailey and Bailey II. During the regional performance testing, it was determined that N.C. 20 has a slightly later maturity date than Bailey and Bailey II; however, this did not affect the oleic acid content, with an average of 81.5% and an oleic-to-linoleic acid ratio of 21.2. N.C. 20 is considered moderately resistant or tolerant to the most common diseases in the Virginia-Carolina peanut production area: early leaf spot caused by *Passalora arachidicola*, late leaf spot caused by *Nothopassalora personata*, Sclerotinia blight caused by *Sclerotinia minor*, and tomato spotted wilt caused by Tomato spotted wilt tospovirus. In addition, N.C. 20 provides greater yields under heavy leaf spot pressure when compared to currently available Virginia-type peanut varieties. The roasted peanut and sweetness attributes of N.C. 20 were similar to Bailey and compared well with the runner-type flavor standards Georgia Green and Georgia-06G. N.C. 20 has high-oleic oil chemistry. The high-oleic trait produces an array of changes in the fatty acid composition of peanut oil compared with normal-oleic cultivars, most notably the elevation of oleic acid and the reduction of linoleic and palmitic acid content. Compared to normal oleic cultivars like Bailey, N.C. 20 exhibits the extended shelf life associated with high-oleic lines like Bailey II, Emery, Sullivan and Wynne.

Influence of High-Residue Rye on Palmer Amaranth Seed Persistence

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The impact of high-residue rye and fallow systems on freshly harvested Palmer amaranth was evaluated over time. Seeds were buried in areas with a 5-year history of high-residue rye and strip tillage and an adjacent field with a history of conventional tillage. Plastic cassettes with mesh were filled with soil and 100 seed before burial. These cassettes were exhumed at 20 intervals over the course of several years (2016-2021). Recovered seed were evaluated for viability in the laboratory by testing for seed coat firmness. Intact seeds were placed into petri dishes and evaluated for germination. Data was regressed to fit an appropriate model for seed viability and rye/no-rye treatments. Differences between high-residue rye and fallow systems could identify specific factors that regulate Palmer amaranth persistence.

Assessment of Peanut Fungicide Programs and Sulfur in Irwin County, GA, 2020-2021

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Disease management is essential for profitable peanut production in Irwin County; however, cost of fungicide programs is among the greatest expenses for our farmers. The objective of this multiyear study was to provide peanut growers with information from local data to aid in their selection of a “best” fungicide program. A replicated, large-plot, on-farm fungicide study was conducted in Irwin County, GA in 2020 and 2021 to assess the efficacy of several fungicide programs for the management of late leaf spot (*Nothopassalora personata*) and southern stem rot (*Scelrotium rolfsii*). The fields selected for this study were in cotton, cotton, peanut rotations which are common in this county. Both trials were planted to ‘Geogia-06G’ on 18 May, inverted in late Oct, and harvested soon thereafter. Plots were 18-rows wide by the length of the field and were arranged in a randomized complete block design with four replications. Plots were rated for severity of leaf spot disease and incidence of stem rot immediately prior to and immediately after the peanuts were inverted. Fungicide treatments included: 1) – Priaxor (6 fl oz/A) – Umbra/Echo (36 fl oz/A, 1 pt/A) – Muscle ADV (2 pt/A) – Umbra/Echo-Muscle ADV; 2) - Priaxor-Umbra/Microthiol Disperss (5 lb/A)-Muscle ADV – Umbra/Microthoil Disperss – 3) - Priaxor – Convoy/Echo (32 fl oz/A, 1.5 pt/A) - Muscle ADV – Convoy/Echo- Muscle ADV and 4) – Lucento (5.5 fl oz/A) – Elatus (9.5 oz/A) – Lucento (5.5 fl oz/A) – Convoy/Equus (21 fl oz/A, 1.5 pt/A) – Muscle ADV. Fungicides were applied on a 14-day interval beginning approximately 45 days after planting. Leaf spot/rust ratings (FLA 1-10 scale/ICRISAT 1-9 scale) were 3.19/1.06 (treatment 1, Umbra program), 2.48/1.00 (treatment 2, Umbra sulfur program), 3.81/1.00 (treatment 3, Convoy/Echo program), and 3.29/1.00 (treatment 4, Lucento/Elatus/Convoy program). Stem rot ratings (hits per 200 ft) were 5.0 (treatment 1),5.8 (treatment 2), 9.5 (treatment 3), and 3.1 (treatment 4). Average yields from treatments 1-4 combined across 2020 and 2021 were (1. 5401.076), (2. 5514.923), (3. 5370.718) and (4. 5509.426) lb/A. Based upon results from this study, peanut growers have multiple programs of similar efficacy from which to choose for management of leaf spot and stem rot diseases. Perhaps of greatest interest, growers can substitute specific sulfur products (5 lb/A) for Echo (chlorothalonil) (1.0 pt/A) and maintain yield, reduce cost while slightly improving leaf spot control.

Assessment of Yield-related traits in a Population of Recombinant Inbred Lines of Peanut (*Arachis hypogaea* L.) developed for High Oleic Content

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Peanut (*Arachis hypogaea* L.) is the most important cash crop in Senegal. However, still now all released varieties are low oleic content and that is hindering peanut industry development in Senegal. In order to provide farmers with high oleic peanut varieties we have developed an F_5 population derived from a cross between Turquie and Schubert. Turquie is a Virginia-type peanut variety with big seed size while Schubert is a Spanish-type bunch variety with earliness and high oleic content. We evaluated 188 F_5 families of that population along with 10 varieties as checks among which the parental lines for yield related traits at Nioro Research Station (Senegal) using an augmented design. After harvest, we have examined the family mean of pod weight (PW) per plant, total kernel weight (TKW) per plant, sound kernel weight (SMK) per plant and 100 seed weight (HSW).

Analysis of variance revealed significant effect of the genotypes for all traits except pod weight. In addition, significant differences among families were observed, indicating large genetic and phenotypic variability in that population. Among tested families, eight have TKW significantly higher than that of the parental line Schubert, and five families have HSW higher than 65 g. These are promising lines that would be released as high oleic peanut varieties with better seed quality traits.

Effects of Peanut Digger Blade Geometry on Yield and Losses

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Research was conducted at Clemson University's Edisto Research and Education Center in 2020 and 2021 to determine the effects of peanut digger blade geometry and aggression on peanut harvest loss during peanut digging operations. The two years of research utilized an independent, random block design with five replications consisting of four blade geometry treatments: blade bevel down, blade bevel up, small shim (0.318 cm; 0.125 in.) and large shim (0.635 cm; 0.25 in.). In addition to blade geometry treatments, two late leaf spot control treatments (low levels of control and high levels of control) were prescribed to plots. Testing was conducted in two fields, one for each year of research. The investigation was focused on two distinct regions within each field, an area of lighter textured soils (95% sand content for 2020 and 94% sand content for 2021) and an area of heavier textured soils (91% sand content for 2020 and 85% sand content for 2021). The Virginia peanut variety, Emery, was used for the study. Digging operations utilized a two-row automated depth controlled KMC 2-38 peanut digger and all plots were planted and dug with the use of RTK corrected autosteer in two-row plots, 19.2 meters (63ft) in length. Consistent engine speeds and gear ranges were used during digging, resulting in consistent ground speeds of 4.0 kph (2.5 mph) for both years of research. Recovered yield data was collected using a 2-row plot combine and consistent combine settings were used throughout the duration of harvest in each year.

Results from the study demonstrated average recovered yield benefits of 242 kg ha^{-1} (216 lb ac^{-1}) in heavy soils and 214 kg ha^{-1} (191 lb ac^{-1}) in heavily diseased peanuts when increased blade aggression was used. Testing further demonstrated significantly improved recovered yields in the most adverse digging conditions tested with blade geometry optimization; indicating a mean recovered yield increase of 323 kg ha^{-1} (288 lb ac^{-1}). The research suggested substantial effects on yield recovery as a function of blade geometry and aggression and characterized peanut digger blade performance during operation.

Nematode and Peanut Response to Fluopyram as Influenced by Crop Sequence and Cultivar Selection

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Crop sequence, cultivar, and nematicide can affect plant parasitic nematodes in soil and peanut yield. Populations of nematodes in soil and peanut yield were determined when the cultivars Bailey II and TifNV High O/L were planted with imidacloprid or imidacloprid plus fluopyram in the seed furrow across ten rotations. Cropping sequences included continuous peanut and peanut planted at different intervals in combination with corn, cotton, and soybean over a seven-year time period. Imidacloprid or imidacloprid plus fluopyram were applied to the same area of each plot in 2019 (peanut), 2020 (cotton), and peanut (2021). Population of plant parasitic nematodes in soil was determined in September of 2019, 2020, and 2021. Visible estimates of peanut condition within two weeks of digging and vine inversion were determined for peanut using a scale of 0 to 5 where 0 = the entire canopy expressing a yellow peanut canopy and 5 = a deep green peanut canopy. In 2021, peanut root growth was evaluated using a scale of 1 to 10 where 1 = least amount of root damage and 10 = greatest amount of root damage caused by nematodes. Yield of cotton and peanut was determined. Data for population of plant parasitic nematodes in soil transformed to the natural log, plant condition, root injury caused by nematodes, and crop yield were subjected to ANOVA for a 10 (rotation sequence) by 2 (fluopyram treatment) in 2019 and 2020 or a 10 (rotation sequence) by 2 (fluopyram treatment) by 2 (peanut cultivar) factorial treatment arrangement. A t-test or Fisher's Protected LSD test at $p \leq 0.05$ were used to compare means of significant main effects and interactions.

Regardless of year or crop, the interaction of cropping sequence by fluopyram treatment was not significant for population of root knot nematodes in soil, plant condition rating for peanut, root damage caused by nematodes (2021 only), and crop yield. The main effect of rotation sequence was significant in both years for nematode population in peanut but not for cotton. Fluopyram did not affect root knot nematode population in peanut in 2019 or cotton but did reduce the population of this pest in peanut in 2021 compared with the non-treated control. Plant condition rating in peanut was the same in both years when comparing fluopyram treatments while root growth showed less damage when fluopyram was applied in 2021. Yield of peanut in both years and cotton in 2020 was not affected by fluopyram treatment. In 2021 when cultivar was considered, fewer nematodes were observed in soil and less root damage was noted for the cultivar TifNV High O/L compared with Bailey II. However, the difference in nematode population and root branching did not translate into a difference in peanut yield.

Influence of Variety Selection on Leaf Spot Management with Various Fungicide Programs in North Carolina

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Determining effectiveness of fungicide programs based on cultivar resistance to pathogens is important is establishing recommendations to farmers. Research was conducted in North Carolina during 2021 at three locations to compare leaf spot incidence (percentage of leaves with lesions), canopy defoliation caused by leaf spot disease, and yield of the Virginia market type cultivars Bailey II, Emery, and Sullivan when five fungicide programs for leaf spot and southern stem rot were used. Fungicide programs included: 1) non-treated control, 2) chlorothalonil followed by (fb) Miravis plus Elatus (4 weeks of control) fb Provost Silver fb chlorothalonil, 3) bi-weekly applications of chlorothalonil fb Provost Silver fb Revytek fb Lucento fb chlorothalonil, 4) bi-weekly applications of chlorothalonil fb chlorothalonil plus tebuconazole (3 bi-weekly sprays) fb chlorothalonil, and 5) chlorothalonil fb chlorothalonil plus tebuconazole 4 weeks later fb chlorothalonil 4 weeks later. Visual estimates of percent leaf spot incidence and defoliation caused by leaf spot were recorded prior to digging and vine inversion using a scale of 0 to 100%. Pod yield was also recorded.

When pooled over the three locations, applying fungicide increased control of leaf spot and protected yield compared with non-treated peanut. Generally, Bailey II was affected less by leaf spot that Sullivan, and both Bailey II and Sullivan expressed greater resistance to leaf spot than Emery. As expected, the least effective fungicide program (treatment 5 listed above) was when chlorothalonil was applied alone or with tebuconazole when the interval between sprays was 4 weeks rather than 2 weeks. In contrast, the fungicide program that included chlorothalonil alone or with tebuconazole was the most effective fungicide program when fungicides were applied bi-weekly (treatment 4 listed above). Fungicide programs including Miravis (treatment 2 listed above) or Revytek and Lucento (treatment 3 listed above) suppressed leaf spot and protected yield but not as well as the chlorothalonil/tebuconazole bi-weekly program.

Aflatoxin: An Old Problem that Requires New Solutions Today and Tomorrow

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Aflatoxin contamination has been a constant struggle and focus of the peanut research community for the last 60 years. Since the discovery of aflatoxins, progress has been made in the mitigation of their contamination of peanut in several vital areas including processing, shelling, moisture control, harvest practice, variety development, and biotechnology. However, as the 2019-2020 season clearly demonstrated, this old problem is still very relevant to the industry today. New solutions are needed to address vital components of the aflatoxin issue to mitigate contamination and losses in the future. While many avenues are being explored by the research community for developing control measures in the future, this recent outbreak highlights the immediate need for solutions today and in the short term. Progress, however, must be rooted in the lessons of the past which are at risk of being overlooked as the research community looks to the future. Here, a review of past and more recent advances in our understanding of aflatoxin contamination will be covered to shed light on novel research directions including host plant resistance, genetics and plant breeding, biotechnology and genetic engineering, biological controls, aflatoxin sampling and detection methodologies, and optimized cultivation and processing practices. The goals of these endeavors must be two-fold, to bring practical, immediate relief to stakeholders today, and to develop new solutions for the future. Moving forward in a coordinated fashion, all of these approaches will be vital to the creation of an integrated management strategy to combat aflatoxin contamination.

Cover Crop Influence on Soil Health and Peanut Production in Alabama

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The southeastern United States has a long history of soil degradation, and cover crop utilization has the potential to restore soil productivity in crop production systems. Cover crops have been shown to increase soil organic matter, improve soil structure, and enhance nutrient-use efficiency. A study was established in 2017 at two locations in Alabama (WREC and TVREC) to examine the impact of cover crops on dynamic soil health indicators. Cover crop treatments including monocultures and combinations of cereal rye (*Secale cereale*), crimson clover (*Trifolium incarnatum*), and Daikon radish (Raphanus sativus) as well as a fallow treatment were arranged in a randomized complete block design in cotton-legume cash crop rotations. Soil health indicators measured included permanganate oxidizable carbon (POXC), soil organic carbon (SOC), water stable aggregates (WSA), and soil strength (AUCC.I.). These soil properties as well as cash crop yield and cover crop biomass have been evaluated over a period of four years (2018-2021). At TVREC, SOC increased in the top 5 cm of soil over the four-year period, and some cover crop treatments were able to increase SOC and POXC compared to the fallow control. At WREC, SOC and POXC showed little effect due to cover crop treatment. WSA did not improve with cover cropping at either location. AUCC.I. results showed a relationship between higher biomass production and reduced soil strength, and many cover crop treatments were able to improve AUCC.I. Cotton yield was higher in almost all cover crop treatments than the fallow at TVREC after four years of cover cropping, but WREC did not show an effect on cotton yield. Peanut yield was lower following clover cover crop compared to the fallow in 2019, but rye, radish, and fallow treatments had similar yields. Utilization of cover crops shows the potential to improve soil health depending on the soil type, cover crop, and management system.

Aspergillus flavus Pangenome to Capture the Diversity in a Single Reference Genome

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There were several chromosome-level reference genomes published recently for *Aspergillus flavus*, a significant advancement for genomic studies. However, a single reference genome creates reference bias in the genomic analysis, such as an 310Kb insertion was reported for isolate AF13 and which was missing in isolate NRRL3357. A regulator gene *atfC* has been identified within this insertion of AF13, a high aflatoxin producer. To tackle the reference bias a pangenome framework can be developed, which could include the variation and diversity of all the genes from one species. An *A. flavus* pangenome can be used as a reference genome to discover novel aflatoxin regulator genes. Here we sequenced a total of 221 isolates of diverse origin, including 98 isolates from various parts of corn plants in Mississippi and 161 isolates (123 *A. flavus* used for this pangenome and 38 *A. parasiticus* excluded) from various soils of different cropping systems in Georgia. In addition, we also included 125 isolates from public domain. Finally, the whole genome sequencing data for 346 isolates was used to develop scaffold level assemblies. The genome size of these isolates was in a range of 36.5Mb-43.5Mb with an average genome size of 37.37 Mb. A total of 1.8 million genome wide SNP variants were discovered across the isolates. Population structure analysis identified six sub-populations, indicating significant genome level diversity among the isolates. The isolates from corn clusters separately with slight admixture, indicating unique genome composition of isolates associated with different parts of corn plants. Furthermore, 346 assemblies were used to identify the core and the accessory genomes and a pangenome framework with variations from all isolates have been developed. We are investigating the variation of aflatoxin producing gene clusters among the isolates and in comparison, to *A. parasiticus*. The mutations associated with increased or reduced aflatoxin biosynthesis will also be investigated. This pangenome of *A. flavus* will be used for Pan-GWAS analysis to demonstrate the potential of pangenome to identify the genes associated with aflatoxin and secondary metabolites production.

Development of High-Throughput Phenotyping System for Pods in Peanut (*A. hypogaea*)

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We want to increase the speed and accuracy of peanut pod characterization by bringing the current grading system into the modern age. We plan on doing this by implementing modern computer vision techniques in the python coding language along with developing an imaging platform to take consistent high quality images for analysis. In the early stages of proving this concept we have used the packages OpenCV and PlantCV to prove that we can pick individual peanuts out of an image as well as extract their length, width and Hunter L score. Going forward a neural net will be trained (package yet to be determined) to increase the robustness of our object detection.

The data generated from this project will then go on to be used in a GWAS study to examine a population of 265 individuals in hopes of discovering a useable marker for peanut pod size.

Development of Crosses Made from Runner Introgression Populations for High Oleic Oil Content and Resistance to Early and Late Leaf Spot in Peanut

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The peanut (*Arachis hypogaea* L.) is a worldwide important legume crop that is cultivated in semiarid, tropical, and sub-tropical regions. This leguminous crop provides a major source of protein and oil worldwide. There are several foliar diseases that severely limit peanut yield, and the two that impact production the most are early leaf spot (caused by *Cercospora arachidicola* S. Hori) and late leaf spot [caused by *Cercosporidium personatum* (Berk. and Curtis) Deighton]. These fungal diseases cause significant yield losses in most of the areas where peanuts are grown, which decreases the profitability to growers. Oftentimes, both diseases occur in the same field with at times one being more prevalent than the other. Pod losses can exceed 50% in fields where the diseases are not managed properly and when environmental conditions favor fungal pathogens. Additionally, both diseases can cause complete defoliation (Knauft, Gorbert, & Nordern, 1988).

The purpose of this study is to evaluate crosses made from runner introgression populations for high oleic oil content and resistance to early and late leaf spot in the field and lab and validate DNA markers associated with disease resistance. This study is in its early stages and crosses are currently being developed. Crosses were made between resistance BC3 introgression lines from the TxAG-6 x Florunner population, and early-maturing runner breeding lines. Hybridity was confirmed by NIR analysis of the high oleic trait. The BC3 generation has been harvested, and F4 breeding lines will be planted for evaluation of response to leaf spots.

Pyramiding Alleles from the Wild Crop Relative *Arachis cardenasii* Increases Resistance to Early and Late Leaf Spot in Peanut

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Early (ELS) and late (LLS) leaf spots caused by *Passalora arachidicola* and *Nothopassalora personata* respectively, are two of the most devastating diseases in peanut that are effectively managed with a multiple fungicide program. Chlorothalonil a commonly used fungicide in disease management programs and one of the most effective for leaf spot control was banned by the European Union (EU) due to its potential risk to wildlife and human health. This new regulation could negatively impact US peanut growers as some countries in the EU are major importers of peanut. Resistant cultivars are needed to reduce the use of fungicides to sustainably mitigate leaf spot diseases. However, cultivated peanut (*Arachis hypogaea* L.) only has low to moderate level of resistance to both ELS and LLS in the US. This study aims to obtain lines with multiple resistances that introgress genomic segments from the wild species *Arachis cardenasii* that confer long-term, high level of resistance to foliar diseases into lines with resistance to root-knot nematode and the high oleic property. BC_1F_2 lines were generated from a cross between cultivar 'Bailey' and an advanced line IAC 321 and crossed with cultivar 'TifNV H/O', all with different *A. cardenasii* segments*.* To evaluate resistance to foliar diseases in a controlled environment, 100 BC_1F_2 lines were tested using detached leaf bioassays. Six different components of resistance were measured: incubation period (IP), lesion number per leaf area (LN/LA), number of sporulating lesions per leaf area (SL/LA), percent diseased leaf area (DLA), Area under the disease progress curve of the lesions per leaf area ($AUDPC_{LN}$) and AUDPC of the sporulating lesions per leaf area ($AUDPC_{SL}$). Lines with wild-derived segments exhibited higher level of resistance to both ELS and LLS with lower values of LN/LA, SL/LA, DLA, $AUDPC_{LN}$ and $AUDPC_{SL}$ than the parents. Resistance to leaf spots was also confirmed under field conditions using 395 BC_1F_2 lines. Same results were obtained in the field wherein lines with segments from both parents have lower disease scores and AUPDC values. Overall results infer that combined wild-type alleles gives strong resistance to both ELS and LLS. Advanced lines with multiple resistances from different wild-derived segment combinations will provide high level of resistance to these fungal diseases that would require minimal spray reducing cost of production and lessening the environmental effects of fungicides.

Breeding, Biotechnology, and Genetics

Black Pod Peanut Shell Extracts Reduce In vitro *Aspergillus parasiticus* Growth

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Peanut (*Arachis hypogaea* L.) is one of the food crops affected by aflatoxin, a mycotoxin produced by *Aspergillus* spp. Aflatoxins are one of the most potent naturally occurring carcinogens known. Attempts to identify an *Aspergillus* or aflatoxin resistant peanut have been unsuccessful partly due to the large environmental effect on toxin development. However, the benefits of a resistant or tolerant peanut cultivar would be enormous for farmers, the peanut processing industry, and consumers. Thus, there is a need to continue searching for a cultivar that could reduce *Aspergillus* growth or aflatoxin contamination. University of Florida breeding research results with landrace "Vaina Negro" (Black pod in English) has led to the hypothesis that it could be tolerant to aflatoxin based on the chemical composition of its shell as compared to the shell of commercial peanut genotypes. Black pod shell methanol extracts had significantly higher concentrations of total polyphenols and total antioxidants when compared to a commercial cultivar. These extracts were added to Czapek's agar and the media was inoculated with *Aspergillus parasiticus.* Plates were scanned every two days for 10 days with an Epson flatbed scanner starting two days after inoculation. Scans were analyzed using the WinCam® pixel color classification software. Media containing landrace extracts reduced growth and growth rate by 15% when compared to the media with no peanut shell extracts by 12% when compared to the commercial cultivar ($p<.0001$). Additionally, inoculated media based on coconut milk and evaluated with a fluorometer showed that extracts of the landrace had 21% and 22% less fluorescence attributed to aflatoxin 130 hours after inoculation when compared to the commercial cultivar and inoculated media without extracts, respectively. Fluorescence is commonly used to estimate aflatoxin concentrations from ground peanut seeds. These results show that the compounds present in the landrace influence *Aspergillus* growth and possibly aflatoxin contamination. A reduced growth of the fungus could result in a reduced risk for infection that leads to reduction of aflatoxin levels thus providing a level of tolerance to these peanuts.

Control of Palmer Amaranth with Herbicide Programs in the South Texas Peanut Production Area

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Palmer amaranth (*Amaranthus palmeri* S. Wats.) represents a significant threat to peanut (*Arachis hypogaea* L.) production across Texas. A field trial was conducted in 2021 in a peanut field near Pearsall, TX (28.8649° N; -99.1528° W) to investigate herbicide programs for season-long management of this weed. The trial included fifteen treatments and was arranged as a randomized complete block design with three replications. Treatments included preemergence (PRE) applications of pendimethalin at 1.06 kg ha^{-1} either alone or in combination with flumioxazin (71.5 g ha^{-1}), *S*-metolachlor (1.42 kg ha^{-1}), imazethapyr (25.2 g ha^{-1}), pyroxasulfone + carfentrazone (65.4 + 4.7 g ha^{-1}), dimethenamid-P (0.63 kg ha^{-1}), or acetochlor (1.26 kg ha^{-1}). These were followed by either at-cracking applications of paraquat + pyroxasulfone (0.28 + 0.12 kg ha^{-1}), early postemergence (EPOST) applications of either pyroxasulfone + carfentrazone + 2,4-DB (65.4 + 4.7 g ha^{-1} + 0.45 kg ha^{-1}) or imazapic + 2,4-DB (70.0 g ha^{-1} + 0.45 kg ha^{-1}), or mid postemergence (MPOST) applications of *S*-metolachlor + 2,4-DB (1.42 + 0.45 kg ha^{-1}).

Thirteen days after PRE applications were made, control of Palmer amaranth was highest with tank mixtures of pendimethalin with either flumioxazin, *S*-metolachlor, flumioxazin + *S*-metolachlor, pyroxasulfone + carfentrazone, or dimethenamid-P (99-100% control), versus that of pendimethalin + acetochlor (90%), pendimethalin + imazethapyr (60%), or pendimethalin alone (67 to 78%). Fourteen days after EPOST applications were made, control of Palmer amaranth was greatest with pendimethalin + flumioxazin PRE (91%), pendimethalin + dimethenamid-P (91%), pendimethalin + *S*-metolachlor PRE (92%), and pendimethalin + flumioxazin + *S*-metolachlor PRE (96 to 97). By four weeks after all applications were made, the greatest control of Palmer amaranth was observed with pendimethalin + *S*-metolachlor PRE (80%), pendimethalin PRE followed by pyroxasulfone + carfentrazone + 2,4-DB EPOST (81%), pendimethalin PRE followed by imazapic + 2,4-DB EPOST (84%), pendimethalin + flumioxazin PRE (88%), pendimethalin + flumioxazin + *S*-metolachlor PRE (96%), pendimethalin + *S*-metolachlor PRE followed by *S*-metolachlor + 2,4-DB MPOST (98%), and pendimethalin + flumioxazin + S-metolachlor PRE followed by *S*-metolachlor + 2,4-DB MPOST (98%).

Genome-wide Approach to Investigate Peanut (*Arachis hypogaea*) Resistance to Early Leaf Spot and Late Leaf Spot Using a Peanut MAGIC Population

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As DNA sequencing costs decrease and bioinformatics advances, it is increasingly feasible for genetic and genomic mapping studies to be based on whole genome sequencing data, even for large populations. The resolution of genetic mapping is often insufficient to pinpoint causal genes in bi-parental and smaller-sized populations. Recently, we developed a multiparent advanced generation intercross (MAGIC) population with eight parental founders to conduct high-resolution mapping of quantitative traits, including peanut early leaf spot (ELS) and late leaf spot (LLS). This population comprises 2775 F_7 recombinant inbred lines (RILs). A subset of 310 RILs were randomly selected to evaluate the suitability of the population for genetic and genomic studies and to map the causal QTLs or genes precisely. The genotyping was conducted by whole genome re-sequencing at low coverage, and SNPs were called using a new sequence analysis pipeline KHUFU. The phenotypic data collected in the first year include disease rating for leaf spots, total seed oil chemistry, pod constriction and reticulation, 100 pod-weight, 100 seed-weight, and shelling percentage. These phenotypic data showed significant variation within this MAGIC population and demonstrated normal distribution for all traits, indicating the potential utility of this MAGIC as a new genetic resource for dissection of complex traits and for breeding selection. The controlled inoculation in the greenhouse and laboratory will be carried out for parental lines to confirm the resistance/susceptibility to ELS and LLS pathogens. Analysis of sequencing data and multi-year phenotypic data are in progress. This peanut MAGIC could serve as an important resource used for fine map of disease resistance, yield, and quality.

Alternative Sources of Calcium and Recommendations for Providing Calcium to the Pegging Zone of Peanut in the Southeast

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Providing calcium fertilizer to the pegging zone of peanut can be extremely important to avoid reduced yields, pod rot and poor germination of peanuts saved for seed. Traditionally, calcium has been provided by applying either lime at planting or gypsum (calcium sulfate) at early bloom. However, in recent years lime and gypsum have been harder to obtain. Therefore, alternative sources of calcium such as liquid lime, liquid calciums, polysulfate and even incinerated chicken litter are being explored. Replicated field trials analyzing the effectiveness of these alternatives will be presented in this paper. The ability of these alternative calcium fertilizers to increase both yield and calcium levels in the harvested nuts will be presented.

In addition, an alternative way of recommending gypsum applications based on pegging zone soil sample results will also be presented. The University of Georgia currently recommends gypsum application when the soil test calcium in a pegging zone sample is less than 500 lb/a and/or the calcium to potassium ratio is less than 3 to 1. If gypsum is needed according to these criteria than the recommended application rate is 1000 pounds of gypsum per acre. An alternative recommendation scheme that accounts for different levels of calcium, the calcium to potassium ratio and the calcium to magnesium ratio is currently being used by at least one private soils laboratory in Georgia. Eight different scenarios can lead to eight different gypsum applications rates being recommended ranging from zero to 1250 lb/a and includes rates as low as 300 and 500 lb/a gypsum per acre. Replicated field trials testing this alternative recommendation scheme will also be presented in this paper.

Assessment of Peanut Fungicide Programs on Yield and Profitability and Reinforcing the Importance of Timely Fungicide Applications in Mitchell County, Georgia for 2021

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In 2018, peanut diseases were reported to reduce crop value by 16.1% and to cost Georgia farmers $160.7 million in terms of management expenses and value of lost yield. White Mold (*Sclerotium rolfssii*) is one of the most destructive diseases that peanut growers face in southwestern Georgia. Leaf spot diseases (*Passalora arachidicola* and *Nothopassalora personata*) are also a chronic problem. Producers in Mitchell County have many fungicide options, but programs vary greatly in cost and efficacy. Since 2017, Mitchell County Extension has conducted annual large-plot, on-farm field trials in commercial peanut fields. The objective of these trials is to evaluate and compare newer fungicide programs to older standards to provide local growers with additional unbiased, research-based data in order to make the best decision for their own operations. Each field trial is planted to a randomized complete block design with three replications. Plots are twelve rows wide by the length of the field, and the center six rows are harvested for yield. Plots are assessed for severity of leaf spot and incidence of white mold immediately prior to harvest. Treatment means are separated using Fisher's Protected LSD and average adjusted revenue is calculated using revenue based on yield and adjusted for the average fungicide and application costs of each treatment. This study also reflects the importance of timely fungicide applications on profitability. During the 2021 crop year, the grower was delayed due to weather on the main field while the research plots were sprayed according to the prescribed fungicide application schedule. This delay increased white mold and leaf spot incidence outside the research plot area and reduced the grower's yield by nearly 2,000 lb/ac. This also reduced profitability for the grower because the average adjusted revenue was down nearly $300/ac compared to the average adjusted revenues for the research plots. Results from these trials are used by peanut producers in Mitchell County and surrounding counties to make fungicide selections for future crops and to reinforce the importance of timely application of fungicides.

Project Explores Cognitive Advances in Students in Ghana through Collaboration Fostered by Feed the Future Innovation Lab for Peanut

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Through the Feed the Future Innovation Lab for Peanut (Peanut Innovation Lab), researchers are producing and testing a peanut-based ready-to-use meal for students in northern Ghana to gauge its effects on physical growth and cognitive learning. Building on previous research, the project is comparing the impacts of various formulations of this product compared to a standard school meal in three districts of northern Ghana. Birdsong Peanuts and the National Peanut Board each invested to evaluate the effectiveness a school feeding product developed by Washington University's Mark Manary. The World Food Programme has targeted school nutrition as a way to improve lives of children in low- and middle-income countries, where school meals are sporadic, starchy and may not contain the best ingredients to help a hungry child grow and concentrate in class.

Profitability of Growing Peanut Cultivars with Resistance to Leaf Spot Under Different Production Systems

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Late leaf spot (LLS) caused by *Northopassalora personata*, is a foliar disease that plagues peanut production worldwide. Chemical control is expensive, sometimes inaccessible and can be difficult to apply. One effective solution to control this disease would be the development of resistant cultivars. Three well-defined segments of wild *Arachis cardenasii* chromosomes confer excellent resistance to late leaf spot. We have been using MAS in an accelerated backcross breeding scheme to develop leaf spot resistant cultivars. We began replicated yield trials with selections from the first backcross in 2019. We added selections from the second backcross in 2020. We continued testing these selections along with common check cultivars in 2021. All genotypes are tested under three production systems. We used a full fungicide regime (six sprays) in one system and no fungicide in another. For the third system we used one application of Convoy at 60 days after planting to provide a moderate level of control for white mold. Leaf spot severity in 2020 and 2021 confirmed that the backcross selections have excellent resistance to late leaf spot. Several leaf spot resistant selections exhibited excellent yield and grade when grown under reduced sprayed conditions. The highest net revenue per acre was obtained by growing leaf spot resistance genotypes under reduced or non-sprayed conditions. All of these genotype/reduced spray production combinations resulted in higher net revenue per acre in comparison to Georgia-06G under a full fungicide regime. Most of these differences were over $300 per acre.

Development and Characterization of Interspecific Peanut Hybrids for the Enhancement of Genetic Diversity within Cultivated Peanut and Deposition into Germplasm Banks.

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Cultivated peanut, *Arachis hypogaea*, is known to have gone through a genetic bottleneck event between 8,000 – 10,000 years ago. Spontaneous chromosome doubling of an interspecific cross between 2 distinct wild species, *A. duranensis* and *A. ipaensis*, is believed to have constituted this bottleneck. There are over 80 wild species belonging to the section Arachis and nearly all are diploid. These wild species contain many valuable resistance traits and tolerances that should be utilized. There is also potential of other value-added traits such as drought tolerance, increased yield, and oil content, flavor, etc. Due to the diploid nature of most wild peanuts, introgressing these traits into cultivated peanut is both difficult and time consuming. A strategy has been in place for some time to create interspecific crosses of the wild species and doubling their chromosomes, thus creating a new fertile allotetraploid, but this has been done in a random manner. Here we present a strategy for a structured production new allotetraploids, based on the phylogenetic placement of the diploid parents, thus covering as much as possible the genetic diversity of the section Arachis. These allotetraploids are being genetically, phenotypically, and cytogenetically characterized and deposited in public genebanks. It will be of great benefit to peanut breeders to have at their disposal a variety of these new fertile allotetraploid peanuts representing much of the Section Arachis genetic diversity to use in their programs.

Genetic Dissection of the Crop Maturation Trait in Peanut

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Crop maturation is one of the most recognized characteristics of peanut, and it is crucial for adaptability and yield. However, not much is known regarding its genetic and molecular control. We studied the molecular-genetic components that control the maturity level in three segregating populations derived from the crosses of Virginia X Virginia (HH), Virginia X Runner (RR) and Virginia X Valencia (CC). Crop maturation was studied directly by phenotyping the maturity level and through other “component traits” such as flowering pattern and branching habit. Genotyping was performed using the Axiom_*Arachis*2 SNP-array. 13 QTLs were found for maturity level in total, with the phenotypic explanation ranging in 5.3%-9.9%. Common QTL were found between maturity level and harvest index (in RR and CC), branching habit (in HH), flowering pattern (in CC) and pod size (in CC). Further investigations were done to identify genes that control maturity level and the component traits. A map-based cloning approach was performed based on the HH population, identifying a major candidate gene for branching habit, a novel *AhMADS-box* gene (*AhMADS*). Sequence alignment between the parental lines found SNPs in *AhMADS* that cause exon/intron splicing alterations. Another candidate gene was identified for the flowering pattern trait, a *Terminal Flowering 1-like* (*AhTFL1*) gene, located within a small segment in chromosome B02. A 1492 bp deletion was found in *AhTFL1* that completely co-segregated with the flowering pattern phenotype in the CC population and in two independent EMS-mutagenized M_2 families. *AhTFL1* was significantly less expressed in flowering than non-flowering branches. Field trial showed that a Hanoch-based EMS line mutagenized in *AhTFL1* with a sequential flowering pattern had a higher maturity level (~18%) than the parental line Hanoch. The results revealed new insights into the molecular basis for crop maturity in peanut and generated new information that will promote informed targeting of peanut idiotypes by marker-assisted selection.

Advances in Genomics-Based Tools for Peanut Breeding

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We will discuss new Genomics-based research tools that have been developed for peanut as a part of collaborative efforts, including a new high-quality genome for Virginia-type peanut and downstream efforts to build a peanut pan genome using multiple high-quality genome reference sequences produced for all main cultivated peanut types. The new genome is the highest quality of those tetraploid peanut genomes produced thus far and provides an insight into differences specific to Virginia-type peanut. These tools show promise in revolutionizing peanut breeding, including development and implementation of genomic selection (GS) methods within specific breeding programs.

High and Normal Oleic Runner-Type Peanut Cultivar by Year Effects on Seed Germination and Vigor Response to Temperature

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Experiments conducted from 2013 to 2018 evaluated the cultivar by year effects on breeder seed germination and vigor of five high oleic (HO) and five normal oleic (NO) runner-type peanut (*Arachis hypogaea L.)* cultivars grown under similar production practices. Seed germination and vigor were evaluated using a thermal gradient at temperatures of 12 to 36 C (1.0 C increments) over 7 days, and included growing degree day (GDD) accumulation. Germination across six years of seed testing over all temperatures were phenotypically similar for HO's: Florida-07 (59 to 86%), FloRun 107 (71 to 85%), Georgia-09B (73 to 87%), Georgia-14N (58 to 79%), Georgia-13M (72 to 88%) and NO's: Georgia-06G (65 to 88%), Georgia Greener (65 to 86%), Tifguard (65 to 85%), Georgia-12Y (61 to 83%), and Georgia-07W (60 to 91%). Lorentzian distribution models established the temperature and time (hours) to maximum germination. Analysis indicated the maximum germination across all temperatures: Georgia-14N (HO) 50.5 hr < Georgia Greener (NO) 53.2 hr < Tifguard (NO) 54.4 hr < Georgia-07W (NO) 54.6 hr < Georgia-13M (HO) 56.5 hr < Georgia-06G (NO) 58.9 hr < Georiga-09B (HO) 60.4 hr < Florida-07 (HO) 67.8 hr < FloRun 107 (HO) 69.7 hr < Georgia-12Y (NO) 72.0 hr. Peanut cultivar vigor varied by year with respect to overall GDDs to reach Germ_{80} and maximum germination (*b0*). Overall vigor was similar for HO and NO runner-type peanut cultivars. Peanut seed were consistent in germination, $\text{Germ}_{80,}$ and *b0* among the ten evaluated cultivars over the six years of testing.

Extension and Aflatoxin in Groundnuts: Awareness, Incidence, and Good Management Practices in Sub-Saharan Africa

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This study considers the association between agricultural extension, aflatoxin, and good management practices among smallholder groundnut farmers in sub-Saharan Africa. The first part examines extension and self-reported knowledge and perceptions of aflatoxin for three countries. This is done using pooled survey data (n=1388) collected from 2014 to 2016, beginning with Uganda (n=480) in 2014, Ghana (n=537) in 2015, and Mozambique (n=335) in 2016. Results from Probit regressions suggest that aflatoxin knowledge and perceptions are related to village extension services, household head education, farm size, groundnut production area, and experience with aflatoxins. To build upon these findings, additional information on aflatoxin levels and good management practices for a sub-sample of the 2015 Ghana survey (n=134) is analyzed. Negative binomial regression estimates indicate aflatoxin levels that are significantly lower for households that (i) follow good management practices and (ii) are in receipt of village extension services, with the lowest average aflatoxin level from the combination of (i) and (ii). These findings underscore the role of extension in combating the incidence of aflatoxin in groundnut value chains. In this way, extension is associated with greater knowledge and perceptions, as well as lower levels of aflatoxin, that can be further reduced with good management practices.

Phenotyping of QoI Sensitivity in *Aspergillus* section *Nigri* from Peanut Fields in Georgia.

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Crown rot, caused by *Aspergillus* section *Nigri*, is a highly destructive disease of peanut (*Arachis hypogaea*) seed and seedlings. Control of crown rot relies heavily on seed treatment with azoxystrobin, a quinone outside inhibitor (QoI), and problems with crown rot even when seed or in-furrow applications of azoxystrobin were used have increased in recent years. Reductions of sensitivity have been reported in other pathosystems and previously we found mutations in isolates of the pathogen that are associated with QoI resistance. Given the high dependence of azoxystrobin as seed treatment, reductions in sensitivity of *Aspergillus* section *Nigri* populations to azoxystrobin are suspected. In 2017, 288 isolates were collected from seed and seedlings across the state of Georgia. The field isolates were screened against ten concentrations of azoxystrobin amended APDA plates ranging from 0.001 µg/ml to 30 µg/ml for spore germination. Responses of the isolates to rate of azoxystrobin and correlation with mutations in the cytochrome b gene will be discussed. Dependence on azoxystrobin as seed treatment may be selecting for the occurrence of non-sensitive isolates, which can contribute to the reduced fungicide efficacy observed in the field.

Determining the Most Effective Time Interval for Fungicide Sprays Following Miravis plus Elatus or Convoy

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Protection of peanut from leaf spot disease by Miravis (pydiflumetafen) is longer than the traditional 2-week interval recommended for most fungicides with control lasting up to 4 weeks. However, peanut growers and their advisors are concerned about the risk associated with relying on 4 weeks of control from Miravis. Research was conducted from 2019-2021 in North Carolina (10 site-years) with the varieties Bailey or Baily II when Miravis plus either Elatus or Convoy were applied as the second spray in a comprehensive program following chlorothalonil. These fungicide program (sprays 1 and 2) were followed by no additional fungicide for the remainder of the season or with a spray of chlorothalonil plus either Abound or generic tebuconazole at 3, 4, or 5 weeks after Miravis plus Elatus or Convoy. Additional fungicide sprays were included on a bi-weekly schedule until the end of the season. A non-treated control was included. In 2021, the same treatments were applied to the cultivars Bailey II, Emery, and Sullivan at 3 locations. Leaf spot incidence (percent of leaves with lesions), canopy defoliation caused by leaf spot disease, and peanut pod yield were recorded near harvest.

When pooled over 10 site-years, applying Miravis plus either Elatus or Convoy resulted in less canopy defoliation and similar peanut yields when follow up sprays were initiated three, 4, and 5 weeks after Miravis plus Elatus or Convoy was applied. Canopy defoliation lower and pod peanut yield greater when follow up sprayers were included compared with non-treated peanut and when follow up sprays were not included. Applying Miravis plus Elatus or Convoy without follow up sprays had less disease and greater yields than non-treated peanut. In 2021, leaf spot incidence, canopy defoliation caused by leaf spot disease, and pod yield were similar for non-treated peanut and Miravis plus Elatus without follow up treatments. While leaf spot incidence and canopy defoliation were similar when follow up sprays were initiated 3, 4, or 5 weeks after Miravis plus Elatus, peanut yield for Baily II and Emery decreased when follow sprays were initiated 4 weeks after Miravis plus Elatus compared with initiation of sprays at 3 weeks. A further decrease in yield was noted when sprays were delayed until 5 weeks. No difference in yield for the variety Sullivan was noted when follow up sprays were initiated 3 or 4 weeks after Miravis plus Elatus: yield was lower when sprays were initiated 5 weeks later. These data suggest that the interval between a Miravis plus Elatus spray may need to be 3 weeks rather than 4 weeks, especially given the significant yield loss observed in 2022 when delayed until 5 weeks after Miravis plus Elatus compared with 3 weeks.

Weed Control with Gramoxone plus Basagran with Residual Herbicides in North Carolina

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Protection of peanut from weed interference early in the season is important in optimizing peanut yield. Research was conducted during 2020 and 2021 in North Carolina to determine weed control and peanut response to Gramoxone (8 oz/acre) plus Basagran (8 oz/acre) applied alone or with Dual Magnum (16 oz/acre), Warrant (48 oz/acre), Outlook (13 oz/acre), Zidua (2.5 oz/acre), and Anthem Flex (2.7 oz/acre) when weeds were less than 3 inches tall. Non-ionic surfactant at 1 pint/100 gallons spray solution was included. Herbicides were applied in 15 gallons water/acre at 31 psi using CO_2-pressurized backpack spray equipment. Visual estimates of percent weed control and crop injury were recorded at various intervals after application using a scale of 0 to 100% where 0 = no control or peanut injury and 100 = complete control or peanut death.

Common ragweed and Palmer amaranth control was similar for all residual herbicide by the end of the season and greater than Gramoxone plus Basagran. Texas panicum control was similar when Gramoxone plus Basagran was applied with Dual Magnum, Outlook, Zidua, and Anthem Flex and exceeded that of Gramoxone plus Basagran alone or with Warrant. Pod yield was the same regardless of residual herbicide and in most cases exceeded yield of non-treated peanut and Gramoxone plus Basagran alone.

Chemical Composition of Kernels in Virginia Market Type Cultivars Based on Pod Mesocarp Color

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Pod mesocarp color is used to determine relative maturity of pods and subsequently to estimate kernel development and mass. Expression of the oleic acid content can be influenced by pod maturity in some cultivars. Research was conducted over two years in two separate fields each year to determine if expression of the high oleic trait in the cultivars Emery, Sullivan, and Wynne was maintained across pods expressing yellow, orange, brown, and black mesocarp colors. The main effect of cultivar and the interaction of cultivar by pod mesocarp color were not significant for oleic acid concentration in kernels and percent of maximum pod mass. However, the main effect of pod mesocarp color was significant for these measurements. When pooled over cultivars, percent of maximum pod mass was 36%, 61%, 74%, 83%, and 92% for pods expressing yellow, orange no. 1, orange no. 2, brown, and black pod mesocarp color designations, respectively, based on official USDA standards. Oleic acid content was similar for brown and black pods, and expression exceeded that of pods expressing yellow, orange no. 1, and orange no. 2 colors. The order for oleic acid expression for other pod mesocarp colors was orange no. 2>orange no. 1>yellow. Regardless of pod mesocarp color, oleic acid expression was adequate for peanut to be considered high oleic based current industry standards.

Evaluating Alternatives to Chlorothalonil for Managing Peanut Diseases in Alabama

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Early Leaf Spot (*Passalora arachidicola*), Late Leaf Spot (*Nothopassalora personata*) and White Mold (*Sclerotium rolfsii*) are the most destructive, fungal diseases of peanuts in Alabama. These diseases are managed by fungicide spray programs that include one or more applications of the multi-site fungicide chlorothalonil to mitigate the development of fungicide resistance in the leaf spot pathogens. Chlorothalonil was recently banned by the European Union due to toxicity concerns, which could potentially impact US peanut production and export to EU. Thus, the goal of this study was to evaluate alternatives to chlorothalonil for leaf spot and white mold control. A total of 13 spray programs, including a nontreated control, were applied at two-week intervals containing one or more of the following fungicides (active ingredient; FRAC code): Abound (azoxystrobin; 11), Alto 100SL (cyproconazole; 3), CuproFix Ultra (copper sulfate; M1), Elast (dodine; U12), Elatus (azoxystrobin + benzovindiflupyr; 11+7), Fontelis (penthiopyrad; 7), Microthiol Disperss (sulfur; M2), Miravis (pydiflumetofen; 7), Muscle ADV (chlorothalonil + tebuconazole; M5+3), Oranil (chlorothalonil; M5), Provost Silver (prothioconazole + tebuconazole; 3 +3), Topguard EQ (azoxystrobin + flutriafol; 11 + 3), and Vacciplant (laminarin; P4). Spray programs were evaluated in a randomized complete block design consisting of six replications in Headland, Alabama. All spray programs significantly reduced leaf spot and white mold incidence when compared to the nontreated control. Six spray programs, Elast + Muscle ADV, Elast + Provost Silver, Elast + MTD/Muscle ADV, MTD + CuproFix Ultra + Vacciplant, CuproFix Ultra + MTD/Muscle ADV and Elast/ Topguard EQ + MTD, significantly reduced leaf spot severity when compared to the chlorothalonil only control. All the treatments provided similar control as chlorothalonil for white mold. These results indicate that at least six of the thirteen spray programs could serve as potential alternatives to chlorothalonil for leaf spot management.

Twenty-Five Years Later: How Risk to Tomato Spotted Wilt Virus was Addressed in the Southeastern U.S.

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Tomato Spotted Wilt Virus (TSWV) quickly became a major production problem for peanut producers in the Southeastern U.S. during the 1990s. With little scientific data, researchers and extension specialists struggled to provide growers with solutions. Quickly designed and executed research programs began to describe several variables that impacted TSWV severity, but none of those were strong enough to elicit economic control independently. The TSWV Risk Index was a unique method of communicating the relative value of significant variables and the value of combining multiple management techniques. The numeric index was tested with intense on-farm validation program and modified as necessary. For twenty-five years, the index has been adjusted and expanded to include other diseases. Growers in the Southeastern U.S. have come to accept the index, now known as Peanut Rx, as a guide to their production systems. This symposium will review twenty-five years of using this methodology.

Peanut Rx: Still A Dynamic Risk Management Tool to Refine Disease Control.

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Peanut Rx is an example of how research, Extension, and Industry efforts blend for the benefit of the growers. Peanut Rx is a risk management tool developed to provide growers in the southeastern United States with the opportunity to reduce threat to Tomato spotted wilt, leaf spot diseases, and southern stem blight by pre-plant assessment of 10 factors. These factors include variety, planting date, plant population, at-plant insecticide, row pattern, tillage, use of Classic^{TM} herbicide, crop rotation, field history, and irrigation. Peanut Rx resulted from the merger of the long-established UGA Tomato Spot Wilt Risk Index and the more recent UGA Fungal Disease Risk Index. Syngenta Crop Protection was at the forefront to refine recommended fungicide programs based upon disease risk as determined through use of the risk index. Peanut Rx is refined annually as researchers continue to explore ways to make the index a more effective and accurate resource for peanut producers. Researchers and Extension specialists from five land grant universities to include the University of Georgia, the University of Florida, Auburn University, Mississippi State University, and Clemson University meet annually to discuss results from the previous season, to refine risk assessments, to adjust risk points, and to consider addition of new factors. In its original format, weather, climate, and assessment of the thrips vector were not included. However, subsequent research has demonstrated that prediction of risk to Tomato spotted can be improved with inclusion of winter ENSO phases and/or use of Thrips Infestation Predictor for Cotton. Peanut Rx remains an important tool by which growers can reduce threat from four diseases (Tomato spotted wilt, late leaf spot, early leaf spot, and southern stem blight) by managing10 factors. Today, Peanut Rx is not only available to growers through traditional Extension bulletins, but also online at Peanutrx.org and through “Peanut Rx” fungicide program materials developed by seven agrichemical companies.

A Novel Image Analysis Strategy for Peanut Maturity Assessment

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Determining optimum maturity for peanut harvest can make or break profitability of a crop. Because pod mesocarp color is an excellent indicator of pod maturity, determining optimum digging time for a given field can be accomplished through maturity sampling. Clemson recommendations for maturity sampling involve hull scraping or pod blasting (pressure washing) of sampled pods, followed by sorting the pods into piles, according to mesocarp color. While this method has proven over years of research to be a reliable method of optimizing digging date to maximize revenue, it can be time consuming to process multiple samples and human subjectivity can result in slightly different counts from one observer to another.

This study discusses an image analysis system capable of producing consistent maturity results at high throughput. From a digital image of a pod-blasted sample, pixels in the image are analyzed to distinguish pod pixels from background pixels and algorithms are applied to predict percent of pods in each of the color categories: white, yellow, orange, brown, and black. Results are available within seconds of taking the photo. Algorithms were developed from manual counts of over 1,400 pod-blasted samples across more than ten peanut varieties. Average prediction accuracies were +/- 4% for orange-brown-black pods and +/- 3% for black pods.

QTL Mapping of Drought Tolerance in Virginia Type Peanut

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Drought is one of the major constraints in peanut production in Virginia Carolina (VC) region because 90% of peanut production is under rainfed conditions. To mitigate drought effects, the most reliable solution for peanut growers is to adopt drought-tolerant cultivars; but, for this, development of molecular and phenotypic markers to use in selection is needed. Therefore, our research focused on phenotyping and genotyping of recombinant inbred lines (RILs) population derived from the cross between ‘N08086olJCT’ and ‘PI 585005’ (ICGV 86015) for drought tolerance. The RILs were phenotyped at the Tidewater Agricultural Research and Extension Center in Suffolk, VA, and the Peanut Belt Research Station in Lewiston-Woodville, NC, in 2018, 2019, and 2020. Measurements included plant height, lateral branching, normalized difference vegetation index (NDVI), canopy temperature depression (CTD), wilting, disease rating, and pod yield. Based on phenotypic data, drought and irrigated conditions revealed significant differences among entries for NDVI, CTD, SPAD, wilting, and pod yield. These entries performed better than checks used for drought and irrigated conditions. Genotyping was done using genotyping-by-sequencing approach (GBS) approach to identify single-nucleotide polymorphisms (SNPs) for genetic mapping. QTL analysis using genetic map along with precise phenotyping data traits collected over the seasons use to identify SNP markers. Major and minor QTLs will be identified in this study to provide new insights by adding markers for drought tolerance that may aid in breeding new cultivars for drought tolerance to Virginia-type peanut.

Estimation of Double Reduction in Segmental Allotetraploid Peanut

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Polyploidy can confer evolutionary advantages and seems to be favored during crop evolution and domestication. Such advantages are evident for tetraploid peanut (*Arachis hypogaea* L.), which has increased adaptability attributable to the heterotic state fixation. However, polyploidization also reduced peanut genetic diversity by isolating it from its wild diploid relatives, limiting its improvement in breeding programs. Some polyploid genetic mechanisms spontaneously generate genetic diversity circumventing the bottleneck associated with polyploidy, such as double reduction, which occurs when an individual carrying a locus in a single dosage can produce gametes disomic for this locus. For double reduction to manifest, three events need to happen during meiosis: multivalent pairing, non-sister chromatids cross-over and non-disjunctional chromosomal separation. In plants, polysomic inheritance and multivalent pairing are typical of autopolyploids. Conversely, allopolyploids are characterized by disomic inheritance and bivalent pairing. Thus, double reduction has only been inferred in autopolyploid plants. The allotetraploid peanut, however, follows a third genetic model, segmental allopolyploidy: it mostly exhibits disomic paring, but significant levels of multivalents. We estimated the rate of double reduction in a BC_1 peanut population of 184 individuals. This population has the neotetraploid [*A. magna* x *A. stenosperma*]^{4X} as the donor parent, and *A. hypogaea* as the recurrent parent. Surprisingly, about 20% of the studied individuals showed double reduction in the male parent, resulting in unbalanced genomic compositions in the progeny. All these events occurred in chromosomes 4 and 6. This is the first time that the rate of double reduction is estimated in an allotetraploid organism.

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Reinventing Peanut: Origin, Evolution and Domestication of [*Arachis ipaënsis* x *Arachis duranensis*]^{4x} neopolyploids

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Allotetraploid peanut (*Arachis hypogaea* L.; 2n = 4x = 40; AABB), originated less than 10,000 years ago from the spontaneous hybridization of two diploid wild *Arachis* species, *A. duranensis* (2n = 2x = 20, AA) and *A. ipaënsis* (2n = 2x = 20, BB), and a consequent whole genome duplication event. The polyploidization process, given the narrow origin base, generated reduced genetic diversity in peanut, which also found itself isolated from the other diploid *Arachis* species due to ploidy inequalities. On the other hand, the merging of different genomes during peanut origin caused in peanut a genetic shock, which in return produced different types of genetic and epigenetics rearrangements in the peanut genome and gene expression alterations. These genetic instability phenomena increased the overall peanut phenotypic variability and conferred to peanut the phenotypic plasticity and adaptability characteristics typical of polyploid plants. Therefore, regardless of the adverse initial conditions, peanut evolved morphologically diverse, colonized different environments, and become the candidate species for domestication in the *Arachis* genus. In this study, we are recreating the evolution and domestication processes of peanut in controlled greenhouse conditions using colchicine induced [*Arachis ipaënsis* x *Arachis duranensis*]^{4x} (IpaDur) neopolyploids. IpaDur plants have been advanced for about ten generations and showed increased variability for several agronomic traits, such as stem length, flower color, flowering time, seed weight, seed number, growth habit, leaf shape and leaf color. Selection for contrasting phenotypes such as heavy and light seed weight has been carried out for four generations with IpaDur plants and wild diploid ancestors to investigate early peanut genomic plasticity and recreating human domestication process. Increased allelic variability was identified in IpaDur plants and opposite selection was effective.

New Fungicide Tank-mix Options and Spray Timings for Reducing Losses to Late Leaf Spot and Sclerotinia Blight in Virginia Peanuts

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Field trials were conducted at two locations in 2020 and 2021 to evaluate fungicides, fungicide tank-mixes and spray timings for managing late leaf spot (*Nothopassalora personata*) and Sclerotinia blight (*Sclerotinia minor*) of Virginia-type peanut.

Late leaf spot was significantly reduced by all fungicide programs at both locations in 2020. Sclerotinia blight was severe in both trials (location 1 and 2) with significant control of Sclerotinia blight observed in all treatments containing Miravis, Miravis/Elatus tank-mixed, and Miravis and Omega in a spray program compared to the non-treated check at location 1. Location 2 demonstrated a similar trend but with no statistical differences among treatments for Sclerotinia blight. At location 1, significant yield improvement compared to non-treated plots was only observed with Miravis/Elatus and Miravis/Omega 500 treatments. A similar trend, but not statistically significant, in yield improvement was also observed at location 2 with Miravis, Miravis/Elatus and Miravis/Omega fungicide programs.

Trials in 2021 focused on fungicide timing of the Miravis/Elatus tank mix with and without Omega 500 in the same field locations as 2020. Late leaf spot was significantly reduced by all fungicide programs except Omega 500 alone at both locations in 2021. At both locations, Sclerotinia blight AUDPC (area under disease progress curve) was significantly reduced and yield improved by all fungicide programs with a significant advantage observed in programs where the Miravis/Elatus tank mix was applied prior to 90 DAP (days after planting).

These data demonstrate that control of late leaf spot and Sclerotinia blight can be achieved simultaneously with tank-mix applications of Miravis/Elatus. The cost-benefit of fungicides and spray programs will be discussed.

Results from On-Farm Testing in 2021: First Year with a New Dump Cart and Weigh Scale

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Peanut growers and NC State Extension agents conducted nine large-plot, replicated trials on farms in 2021. In one set of trials, the varieties Bailey II, Emery, and Sullivan (three locations) and Bailey II, Emery, Sullivan, Wynne and Walton (one location) were planted. Peanut response to Apogee was evaluated at two locations with a final set of trials comparing three seeding rates was conducted at three locations. No differences in peanut yield were noted when comparing Bailey II, Emery and Sullivan in Chowan, Columbus, and Martin Counties and Bailey II, Emery, Sullivan, Wynne and Walton in Bertie County. Peanut yield at in-row seeding rates of four, 5, and 6 seed per foot did not differ in Bertie and Martin Counties or when seeded at 5.1, 5.5, and 6 seed per foot in Northampton County. Two applications of Apogee increased peanut yield over non-treated peanut in Columbus and Martin counties. Digging at 4.0 mph with a KMC digger resulted in lower yields compared with digging at 2.6 mph in Columbus County.

Evaluation of Stem Rot Resistance Components in Peanut

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For quantification of stem rot resistance in the peanut mini-core collection genotypes, incubation period, as a major epidemic parameter indicating disease development rate (as a measure of resistance) was estimated through inoculation experiments under semi-controlled conditions.

Three basic relative resistance components *viz;* incubation period in terms of sclerotial germination rate (IP_{50}), lesion length (LL) and Infection rate (IR), were estimated in the present study for resistance evaluation against stem rot pathogen, *Aethalia rolfsii,* in the peanut mini-core collections at Agricultural Science Center at Clovis under greenhouse conditions.

The Combined relative resistance/Resistance index (RI) estimated based on these three resistant components found to be very effective in expression of the resistance nature of peanut cultivars tested against stem rot pathogen and it can be used in population dynamics model for estimation of varietal resistance characters of mini-core collection.

Further, it was observed that the simulation model based on the resistance components utilized in present study is effective in estimating the disease progression in relation to the disease reaction against stem rot pathogen in peanut mini-core collection for utilization in further breeding programs.

Identification and Validation of Wild Introgressions Affecting Pod Constriction in Peanut

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Pod constriction is considered an undesired agronomic trait affecting peanut acceptability, especially for the in-shell industry. Deep pod constriction is a trait of wild peanut species which can be observed in the progeny from cultivated x wild crosses in peanut breeding programs. The use of wild peanut relatives enables the introgression of new traits such as pest and disease resistance into elite lines, however deep pod constriction can also be incorporated due to linkage drag. Because of its agronomic undesirability, selection against this trait is crucial. The identification of wild genome segments that confer pod constriction can enable DNA marker selection to aid this process. For this, we used a BC_3F_2 backcross population (n=72) derived from a cross between cultivated peanut (*Arachis hypogaea*) and the synthetic allotetraploid BatSten1 ([*A. batizocoi* K9484 x *A. stenosperma* V10309]$^{(2n=4x=40)}$). This population was genotyped with the Axiom_Arachis v02 SNP array and was scored for pod constriction with a scale of 1-5, being 1 - very deep constriction, 2 - deep, 3 - moderate, 4 - no constriction and 5 - single pods. The association analysis performed using 419 SNPs and the phenotypic analyses done with GAPIT (v.3), allowed us to identify a significant QTL on the top of chromosome 18, derived from *A. batizocoi*. The lines with the wild segment were found to have a deeper pod constriction in comparison with lines carrying the *A. hypogaea* allele. We also identified two BC_3F_2 backcross families harboring this wild allele in a homozygous state and four with the heterozygous allele. For validation of the QTL, BC_3F_3 progenies from these families were planted in the field and the harvested seeds (BC_3F_4) were evaluated for pod constriction. We found that all progenies from the two backcross families having the wild allele in homozygous state had severely constricted pods (average pod constriction= 2.25 and 2.26 respectively) and the families did not segregate for pod constriction. In contrast, the progenies from other four backcross families which had the allele in a heterozygous state segregated for pod constriction, validating the QTL and its effect on pod constriction. KASP assays are in progress to further validate the QTL in other segregating families. These markers will be useful to accelerate the breeding process by allowing marker selection against this allele whilst maintaining other traits of interest.

Proteomic Analysis of *Arachis hypogaea* Seeds from Different Maturity Classes

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Physiological maturity impacts seed quality through a variety of mechanisms including vigor, desiccation tolerance, dormancy induction, synthesis of raw materials including seed storage proteins, and reorganization of metabolism. Peanut seed development can be classified into seven classes with four incremental stages in each class. Based on the color of the mesocarp, the final three stages are commonly referred to as “orange”, “brown”, and “black”, respectively. In 2017, freshly harvested pods from one specific genotype of runner market-type peanuts grown under conventional cultural practices were obtained from the University of Georgia research facility. Pods were removed from the plant material, and ‘pod blasted’ to reveal the mesocarp. The blasted pods were separated by color into three different maturity classes, orange, brown, and black. After separation, the remainder of the pod outer layer was removed, and the seeds segregated for proteomic analysis. Raw peanuts were analyzed by bottom-up LC-MS/MS proteomics, conducted by the Proteomics Resource Center at The Rockefeller University, to identify significant protein composition differences in each maturity class. MS Data was queried against a peanut gene model (November 17, 2015) FASTA protein database with 78,603 entries using Proteome Discoverer™ Software 1.4, ThermoFisher Scientific™ / Mascot 2.4. Proteomic data revealed differentially expressed proteins as a function of maturity class. The differentially expressed proteins were classified according to function including heat shock proteins (HSPs), late embryogenesis abundant (LEA) proteins, seed storage proteins, transporter proteins, and transcriptional regulation proteins. Analysis of the proteomic data identified proteins which displayed large magnitude fold changes as well as high statistical significance changes across maturity classes.

Anthem Flex Herbicide Systems for Weed Management in Peanut

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Palmer amaranth, sicklepod, Texas panicum, and annual morningglory are important weeds in peanut production fields in South Carolina and they rank among the most common and troublesome weeds in the Southern US. Attributes including rapid growth, high seed production, drought tolerance, and delayed and/or extended emergence throughout the growing season allow these weeds to persist in peanut production fields. Resistance to herbicides, including the ALS-inhibitor group, are common in Palmer amaranth populations in South Carolina. Anthem Flex was recently introduced to the peanut market by FMC. Anthem FLEX efficacy data resistant weeds, such as Palmer amaranth, and other common broadleaf/grass weed in peanuts is lacking. This research project seeks to generate new control data on Palmer amaranth, sicklepod, Texas panicum, and annual morningglory. Field studies were conducted at Clemson University's Edisto Research and Education Center near Blackville in 2021. The study area contained a naturally high density of broadleaf and grass weeds. The herbicide treatments for the field study are shown in Table 1. The experiment design was a randomized complete block design with 4 replications and plot dimension of sizes will be 4 rows by 40 ft long. Standard production practices were followed prior to peanut planting (disking the field followed by strip till the peanut rows). Herbicide treatments were applied at planting, 5/25/21, POST1 6/10/21 and POST2 6/25/21 at the optimum weed growth stage, most weeds ranged in size of 2 to 4 inches in height. Adjuvants (Crop oil or NIS) were added to each herbicide program according to the recommended label requirements for optimum activity. Percent visual weed and crop injury ratings will be collected 14, 28, and 42 days after each application (DAA) timing. At the end of the season, peanuts were dug, inverted, and harvested 5 days later. Visual control ratings for Palmer amaranth, pitted morningglory, and Texas panicum were collected at 14,28 and 42 DAA. Overall, the herbicide programs provided excellent (98-100%) control of all three weeds at the selected rating periods. In terms of peanut response to the herbicide treatments, there was significant injury observed in the paraquat and Anthem Flex at 3.5 fl oz/A applied at the POST1 application timing. However, this visual injury was not observed at 42 DAA. No stunting was observed with Anthem Flex PRE. The at-plant residual treatments were similar in efficacy (Valor, Prowl, and Anthem Flex) on Palmer amaranth, pitted morningglory and Texas panicum. These herbicide programs demonstrated the benefits and utility of overlapping residuals in peanut weed management programs. Peanut yield, overall, was numerically higher across the treatments in 2021 compared to 2020 (some were close to 3 tons per acre). In treatment 5,6, and 9, we observed a significant reduction in peanut yield (however, there was high variability in the yield data). In the remaining treatments, there were no differences observed which were significantly greater than the untreated check (1690 lb/A). More research is needed to understand the effects of Anthem Flex on end of season peanut yield. The overlapping residuals are the key to effective and sustainable herbicide programs in peanut production. Anthem Flex contains two modes-of-action in one product. This aides in resistance management. When targeting broadleaf weeds and grasses, size is important. Treat these weeds when they are small and actively growing.

Genetic Variants in the Peanut Transcriptome in Response to *Aspergillus* Infection

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We have generated RNA sequencing (RNA-seq) data and characterized gene expression changes in the peanut-*Aspergillus* interaction at early stages of infection. The study included resistant and susceptible genotypes from the wild diploid species *Arachis cardenasii* and *A. duranensis*, and the tetraploid species *A. hypogaea* subspecies *hypogaea* and *fastigiata*. The overall sequencing project generated 3.1×10^9 paired end reads of total RNA from 24 libraries, with an average of 136 million reads of total RNA per library, ranging from 114 to 211 million reads. To leverage these genomic resources, RNA-seq reads from libraries of inoculated and non-inoculated seeds of wild diploid species were analyzed for variant discovery, primarily single nucleotide polymorphisms (SNPs) and small insertions/deletions. Preliminary results indicate that SNPs are abundant within and between transcriptomes when compared to the reference genome of *A. duranensis* V14167. Among them, novel variants were found in genes which are differentially expressed in response to *Aspergillus* infection. Selected SNPs are being validated using rhAmp assays. Genetic variants unique to aflatoxin resistant genotypes are candidates for marker development.

Quantifying Acetochlor Thermal Stability

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Acetochlor, the active ingredient in Warrant®, is a chloroacetamide herbicide, has a water solubility of 230mg/L, is broken down in soil through microbial degradation, and provides residual control of various small-seeded broadleaf and grass weed species. Warrant® is formulated as a slow-release, polyurea microencapsulated herbicide that, depending on the amount of irrigation or rainfall received, could provide weed control for up to 30 days after application. While acetochlor is known to cause injury to peanut during cold and wet weather, Georgia growers can include Warrant® in EPOST or POST tank-mixtures, which coincide with soil temperatures of 27 - 40°C. Studies were conducted using a thermal gradient table to determine the effect of temperature on the behavior of the micro-encapsulated formulation of acetochlor. Acetochlor thermal stability was evaluated over a temperature gradient of 20 - 50°C for 11 days. Samples were pulled from the table at 0, 6, 12, 24, 48, 144, and 240 hours after the start of incubation and analyzed for acetochlor concentration. Data indicated that temperature had a direct effect on the amount of acetochlor released into solution. Although acetochlor has shown injury in cold and wet environments, this data also indicates that the release of acetochlor into solution was increased as temperature increased. Further research is needed to evaluate the degradation of acetochlor once released from micro-encapsulation at these varying temperatures over time.

First Steps to Develop a Peanut Dryer Muffler to Meet OSHA Noise Requirements

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Peanut dryers when operating produce a very loud noise which prompted a request to engineers at the USDA-ARS National Peanut Research Laboratory (ARS-NPRL) to investigate if the noise level could be abated. Inquiries by ARS NPRL engineers led to a collaborative investigation between the engineers at the ARS NPRL and engineers of the Structural Acoustics Branch at the National Aeronautics and Space Administration Langley Research Center. The objective of the collaborative investigation was to determine if new tuned noise damping materials could be used to design an economical muffler to reduce noise levels of an operating peanut dryer to meet US Occupational Safety and Health Administration (OSHA) requirements.

The ARS NPRL engineers first conducted a series of tests to determine baseline noise levels of an operating peanut dryer without and with a muffler. The ARS NPRL engineers designed a muffler that would attach to either the inlet or outlet of a peanut dryer and could be lined with fiberglass batting. The series of tests were conducted using a Blue Line model 2407 peanut dryer with a 0.6m (24 in) fan. The tests were conducted with the peanut dryer connected to a peanut wagon filled with in-shell peanuts. The dryer and wagon were located in a drying shed with a metal roof, one side wall and a concrete slab floor. The first tests were conducted without a muffler to provide baseline noise levels that could be compared to noise levels of various muffler configurations. Noise levels were measured on a logarithmic scale in decibels (dBA).

The next tests were conducted with the peanut dryer attached to various muffler configurations. The five muffler configurations tested were:

1. The air intake of the peanut dryer was fitted with an empty unlined muffler.
2. The air intake of the peanut dryer was fitted with a muffler lined with fiberglass.
3. The air exhaust of the peanut dryer was fitted with a muffler lined with fiberglass.
4. The air intake and air exhaust of the peanut dryer were each fitted with a muffler lined with fiberglass.
5. The air intake of the peanut dryer was fitted with two inline mufflers lined with fiberglass.

Muffler test results indicated two inline mufflers with fiberglass linings fitted to the air intake of an operating peanut dryer provided the best noise suppression of the tested muffler configurations. Two inline mufflers reduced sound levels from 101.3 dBA without a muffler to 90 dBA at a distance of 4.5 m (14.7 ft) directly in front of the intake. The baseline data collected by the ARS NPRL engineers is being used by the engineers at the Langley Research Center to configure a muffler using tuned noise damping materials.

Effect of Boron and Calcium Fertilizer Application, Harvesting Dates and Storage Technique on Seed Quality and Yield of Peanut *(Arachis hypogaea L.)*

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An experiment on the effect of boron and calcium fertilizer application and harvesting dates on peanut seed quality and yield was conducted at Horizon Farms and Chitedze Research Station, Lilongwe, Malawi in the 2020/2021 cropping season. In the field, boron and calcium was applied at the rate of 560g/ha and 200kg/ha, respectively. After a 4-month storage of peanuts in-shell or shelled, peanut seed quality was assessed under a screenhouse study at Bunda College, Lilongwe, Malawi. CG9 (ICGV-SM 08503) and Chitala (ICGV 99568) peanut varieties were used in the study.

The results showed that, the interaction between harvesting time and storage had an effect on germination percentage, seedling vigor and speed of germination of the two peanut varieties ($P<0.05$). The in-shell stored peanuts had higher seedling vigor, germination percentage and speed of germination as compared to the shelled peanut. Both boron and calcium fertilizer application had a significant effect on seedling vigor, germination percentage and speed of germination ($P<0.001$). Boron and calcium fertilizer application had an effect on grain yield of peanuts ($P<0.05$). Higher grain yields were observed in peanuts treated with boron and calcium than the untreated.

Effects of Aflasafe Application and Management Practice Combination on Yield and Aflatoxin Levels in Groundnut

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Low yield and aflatoxin contamination in groundnut are important quantitative and qualitative issues posing a threat to food safety and productivity. Consequently, aflatoxin contamination has become an important precondition for access to global food markets and increasingly for high-value domestic markets in developing countries. Strategies such as biocontrol agents, crop management practices and increased plant densities have been employed to increase kernel yield and to prevent and/or reduce pre-harvest aflatoxin contamination in groundnut. On-site and farmer managed trials were conducted in Central and Northern regions of Malawi in the 2020/2021 cropping season, to evaluate effects of Aflasafe application and management practice combination on groundnut yield and aflatoxin contamination.

The results have shown that management practice combination had a significant effect on yield and yield components ($P<0.05$) such as plant pod number, dry pod yield, kernel yield, plant biomass and harvest index. The higher number of pod per plant was observed in farmer practice. Double zigzag row only, double zigzag row with inoculant-fertilizer combination, double zigzag row fertilized at planting or with crop residue incorporation dominantly had higher plant biomass, harvest index, kernel and dry pod yield respectively. Additionally, the interaction of aflasafe application and management practice combination had a significant effect on the plant pod number compared to double zigzag row with seed inoculated, fertilized and gypsum applied.

Effects of Fungicides and Herbicides on Performance of Peanut (*Arachis hypogea)* Varieties at Different Densities

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Peanut (*Arachis hypogea)* is one of the grain legumes that is widely grown in Malawi for food, income and soil fertility. However, productivity is constrained by a number of biotic and abiotic factors including weeds, diseases, pests, unpredictable rainfall; low seed quality, and plant population. Field studies were conducted over two cropping seasons in 2019/2020 and 2020/2021 at two locations in Lilongwe, Malawi. The main objective was to evaluate the effects of fungicides and herbicides on productivity of two peanut varieties (CG9- Virginia type; and Chitala-spanish variety) at different plant densities. Lilongwe is in the mid altitude agro-ecological zones. The soils are largely medium textured ranging from sandy clay to sandy clay loams; and with low to medium levels of soil organic matter. In the fungicide trial, the treatments included two peanut varieties, fungicide (Chlorothalol) application and control (no fungicide). For the herbicides trial, two peanut varieties were planted at low and high densities; and four weed management options as follows: pre emergence herbicide only (Harness), post emergence herbicide only (Bentazone); pre and post emergence herbicides, and the control (untreated). Results over two seasons showed the benefits of inputs (fungicides and herbicides) on peanut productivity. There were variations in grain yield depending on variety and location. In the herbicide trial, the results on grain yield showed a significant variety x weed management interaction; and variety x density interactions. Application of herbicides increased peanut yield over the control with more benefits observed in Chitala variety than CG9. The findings also indicate that investments in herbicides should be made at high peanut densities. However, no differences were observed in grain yield among the herbicide treatments. In this paper, we also present results on weed diversity, the costs associated with different weed management options and implications on investments in weed management. Based on the results, we recommend the use of fungicides and pre-emergence herbicides at high peanut densities to optimize peanut productivity.

Risk Reduction – A Third Party Perspective

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In his seminal piece published in 1921, Frank H. Knight formalized the classic distinction between risk and uncertainty. In his view, risk describes a situation where multiple outcomes are possible and the odds of any one of the outcomes occurring is measurable. Conversely, uncertainty exist when insufficient information is available to estimate the probability of any outcome taking place.

Since 1990, JLA has partnered with various segments of the US and international peanut industry to reduce risk associated with peanuts as a food ingredient. JLA has put measurement systems in place to estimate the probability of various outcomes related to food safety and food quality assurance to assist the industry with providing the safest, most nutritious, and flavorful peanut products to the consumer.

Peanut Response to Diclosulam in the Southwest

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Diclosulam (Strongarm®) is a WSSA Group 2 herbicide used for the control of broadleaf and nutsedge weeds in peanut (*Arachis hypogaea* L.) when applied preplant incorporated, preplant surface, preemergence, or after planting through ground-crack. In the launch year for diclosulam 20 years ago, severe instances of peanut stunt and yield loss were observed in West Texas. This injury was hypothesized to be a result of FlavorRunner 458 sensitivity, which was introduced during this period. Per the current Strongarm® label, applications of diclosulam are prohibited in New Mexico, Oklahoma, and Texas. Studies were conducted across three growing seasons from 2018 through 2020 in South Texas and Texas High Plains area, and in 2020 in Oklahoma to evaluate the response of modern peanut cultivars to diclosulam. Diclosulam at 0.026 (1X) and 0.052 (2X) kg ai/ha was applied at-planting (preemergence, PRE) or at-ground crack (CRACK). In South Texas, Georgia-13M was planted in 2018 and Georgia 09B was planted in 2019 and 2020. Georgia 09B was planted all three years in the Texas High Plains locations while Ole' was planted in Oklahoma. Irrigation systems differed between locations. No stunting was observed at 30 and 90 days after planting (DAP) across each trial year in South Texas, and in 2018 in the High Plains. Conversely, a diclosulam rate by application timing interaction was observed in 2019 in the High Plains (30 DAP). Stunting increased with increasing diclosulam rates and diclosulam applied PRE resulted in greater injury than the CRACK application. Diclosulam applied PRE caused 14% stunting, whereas diclosulam applied at CRACK caused no visible injury at Oklahoma in 2020. All treatments in the High Plains caused ≤ 5% peanut stunt (90 DAP) except diclosulam at 0.052 kg ai/ha applied PRE. No injury was detected 90 DAP in Oklahoma. In South Texas, peanut yield was unaffected by any diclosulam rate or application timing. Peanut yield in 2018 and 2020 in the High Plains were not affected by diclosulam; however, peanut yield in 2019 decreased with increasing rates of diclosulam regardless of application timing. In Oklahoma, peanut yield reductions were greatest with diclosulam at 0.052 kg ai/ha applied PRE. No difference in peanut grade was observed across each trial location except in 2019 in South Texas, where grade was reduced by increasing rates of diclosulam. Despite the different cultivars tested, peanut stunt and yield loss was still observed when using diclosulam in Texas and Oklahoma. Even so, diclosulam applications at CRACK appeared to allow for a better peanut establishment over diclosulam applied PRE. Based on these results, diclosulam applied at CRACK will result in minimal peanut injury with no reduction in yields when using modern peanut cultivars in the southwest peanut growing region.

Risks to Availability and Efficacy of Pesticides

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The success of any agricultural commodity depends on key factors that include: 1) productivity at the grower level and 2) having a viable market for the final product. During the historical peanut quota system (prior to major changes in Federal farm legislation in 2003), peanut production was heavily tied to domestic needs resulting in stable market for peanuts and consequently consistent and predictable financial returns for growers. After the elimination of the quota system, peanut acreage increased along with yield in some states, especially Georgia, due to the release of more productive cultivars and more effective pesticides. Economic return of peanut has often been greater for peanut than crops like corn or cotton that are often grown in rotation with peanut. This dependence on peanut for the last 10 years has pushed growers to depend more on pesticides to manage pests and to remain highly productive. With acres and productivity at higher levels, the peanut industry has expanded export markets to deal with large peanut carryovers and to maintain reasonable peanut prices. A downside to expansion of peanut exports market has created greater scrutiny of production and pest management practices for peanuts grown in the United States in the European Union (EU) and other markets. This has allowed some of the peanut industry to prohibition on certain pesticides being applied due to little to no detectible residue levels being allowed on peanuts exported to select countries. Another issue peanut growers are facing in the US is the lack of new chemistries being developed to take the place of older chemistries because of the limited market in peanut compared with corn, cotton, and soybean. The development of resistance is becoming more prevalent as growers are shortening rotations causing entrenched pests and subsequent reliance on pesticides and increased selection pressure relative to resistance. This review is aimed at providing information on the current economic and production situation peanut growers are facing as it relates to effectively managing pests in a global marketplace.

Mapping Iron Deficiency Chlorosis Tolerance in Peanut

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Iron deficiency chlorosis (IDC) under calcareous and alkaline soils is a significant abiotic stress affecting the growth and yield of peanut. We have mapped the genomic regions governing IDC tolerance using a recombinant inbred line (RIL) population derived from TMV 2 (susceptible to IDC) and TMV 2-NLM (tolerant to IDC), which was phenotyped during the rainy seasons of 2019 and 2020 in the iron-deficient calcareous plots. The best linear unbiased prediction (BLUP) values for IDC tolerance traits like visual chlorotic rating (VCR), and SPAD chlorophyll meter reading (SCMR) were used for QTL analysis along with a genetic map carrying 700 GBS-derived SNP, AhTE and SSR markers. In total, 11 and 12 main-effect QTLs were identified for VCR and SCMR, respectively. Among them three QTLs were major with the phenotypic variance explained (PVE) of 10.3–34.4% for VCR, and two QTL were major for SCMR with PVE of 11.5–11.7%. A region (159.3–178.3 cM) on chromosome Ah13 carrying two QTLs (one each for VCR and SCMR) was consistent with the previous report. A SNP marker, Ah14_138037990 identified from single marker analysis for VCR was located in the intronic region of the gene *Arahy.QA0C1,* which is important for protein binding. Overall, this study identified new QTLs and also validated QTL for IDC tolerance. These genomic resources could be useful for genomics-assisted breeding of peanut for IDC tolerance.

Biological Nitrogen Fixation and Yield of Groundnuts in Response to Plant Density, Inorganic Fertilizer and Rhizobia Seed Inoculation

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Plant density and nutrition are among the factors that affect crop productivity. On-station experiments were conducted at two sites in Lilongwe, Malawi, during the 2019/20 and 2020/21 growing seasons to evaluate the effect of plant densities, inorganic fertilizer application and rhizobia seed inoculation on yield and biological nitrogen fixation of two groundnut varieties, Chitala (Spanish) and CG-9 (virginia).

The results over two seasons indicate that application of D compound fertiliser increased peanut productivity. In both varieties, inorganic fertilizer increased nodule weight and total amount of N fixed by 20 to 35%; while application of inoculant increased nodule numbers per plant. The study also revealed that doubling plant density increased peanut grain yield, biologically fixed N and net income. Similarly, application of inorganic fertilizer and rhizobia inoculant increased grain yield of for both peanut varieties. However, the Spanish variety (Chitala) is more responsive to inputs (inorganic fertilizer and rhizobia seed inoculants) than virginia variety (CG-9).

Weed Management Using Diode Laser Treatments

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Herbicides have been the main weed management scheme in agriculture fields for several decades. However, due to environmental, health, and economic concerns on the impact of applying excessive amount of these chemicals, and the fact that certain weed species are becoming herbicide resistant, alternative approaches must be investigated. Advances in robotics and deep learning technologies provide an opportunity to explore alternative approaches to weed control, like using a robotic platform to detect and remove weeds in the field. One of the alternative methods of removing weeds is using blue diode lasers because of their portability, availability, low power demand, and cost effectiveness. Two weed species response to diode laser treatments was investigated in three experiments. The first experiment involved treating the two weed species with four different laser powers to determine the time it takes to completely cut the weed stem. The second experiment involved monitoring status of two species of weeds for a week after treating them with two different laser dosages at constant application times of 1s, 2s, and 3s. The third experiment was like the second, but with two lasers (5.1W, and 6.1W) at constant treatment times of 0.5s, 1s, and 1.5s. The results showed that the diameter of weed stem, laser power, treatment duration, and distance between the laser and weed had a significant role in elimination of the weed, with weed species having no significance. Furthermore, the results showed promise in killing the weeds by exposing the stem to laser beam without necessarily cut it completely, with 75% effectiveness at 0.5s treatment time, and 100% effectiveness at 1.5s treatment time using a 6.1W blue diode laser.

Mitigating Groundnut Rosette Disease Infections in Northern Ghana: The Importance of Planting Dates, Insecticides and Varieties

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A major limiting biotic constraint in groundnut cultivation in many Sub-Saharan African countries is the groundnut rosette disease (GRD). In northern Ghana, many farmers in major groundnut growing communities abandon their farms because of this disease. To mitigate crop losses caused by GRD, a field trial was conducted to assess the effects of planting time, insecticide application and variety on GRD severity and yield. A split-split plot experimental design with 4 replications was used. The main plot factor was planting time (mid-May, early June, mid-June) while insecticide application (no spray, one spray, two sprays) was the sub-plot factor. The sub-sub plots contained the groundnut varieties (Chinese, Sarinut 1, Sarinut 2, Nkatiesari). Data was collected on aphid (*Aphis cracivora*) and rosette disease scores, haulm weight, pod maturity and yield. The scale for aphid scores ranged between 0 (i.e., aphids completely absent) and 5 (i.e., > 80% of groundnut plants covered by aphids). Also, GRD severity was assessed using a scale that ranged from 0 (i.e., no visible symptoms on the leaves) to 5 (i.e., severe disease symptoms on > 70% of the leaves with stunting of plants). Aphid infestations were highest (3 = aphids spread on all stems and new trifoliate leaves) in groundnut planted in mid-May without protection from aphids. In contrast, early June plantings that were either sprayed once or twice had fewer aphids (1 = early instar nymphs present). For GRD, severity was highest in groundnut planted in mid-May and lowest in those planted in mid- June. As expected, the severity of GRD was highest in unprotected groundnut and lowest in those sprayed twice with insecticide. There was a strong positive correlation between aphid and rosette scores ($r^2 = 0.616$). Pod yield was significantly affected by the varieties only ($p = 0.030$) but not insecticide treatment for aphid control. The highest yield was recorded for Sarinut 2 while Chinese yielded the lowest with yield of the other varieties intermediate. These findings suggest that mitigating haulm and pod yield losses due to GRD requires spraying against aphid infestations and selecting appropriate improved varieties. While insecticide treatment reduced GRD, variety resistance was a more important contribution to GRD management.

Comparison of Technologies for Assessing Leaf Spot Severity

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The most economically threatening diseases to Virginia-type peanuts are Early Leaf Spot (ELS) and Late Leaf Spot (LLS) which are caused by *Cercospora arachidicola* (Hori) [syn. *Passalora arachidicola* (Hori) U. Braun] and *Cercosporidium personatum* (Berk. & M.A. Curtis) Deighton [syn. *Passalora personata* (Berk. & M.A. Curtis) S.A. Khan & M. Kamal] respectively. ELS and LLS manifest as tissue lesions that cause eventual plant defoliation. In mature Virginia-type peanuts, it has been shown that significant yield losses will result when plants reach 25% defoliation. The accurate quantification of disease symptoms is imperative to breeding peanuts with enhanced disease resistance. The established rating system for ELS and LLS is the Florida severity scale, which is a visual scale with possible values of 1-10. It is meant to capture both lesion and plant defoliation levels. Drawbacks of using the Florida severity scale include, subjectivity and rating two separate disease symptoms simultaneously. In this project, ELS and LLS were quantified by leaf scans, consumer-grade UAV RGB imaging, enterprise-grade UAV RGB and 10-band multispectral imaging, and visual rating with the Florida severity scale for the purposes of method comparisons. In 2020, 220 *A. hypogaea* genotypes were grown and evaluated at the Peanut Belt Research Station (Lewiston-Woodville, NC). In 2021, the same genotypes along with 45 additional genotypes were planted and evaluated at both the Peanut Belt Research Station and the Upper Coastal Plains Research Station (Rocky Mount, NC). From the data collected in 2020, results were compiled from comparing visual ratings to the objective evaluations of leaf spot percentage on the leaf surface (tissue), the defoliation percentage (consumer-grade UAV), and a combination of the two ratings using the first principal component (PC1). In each instance, the evaluation type was highly correlated with the visual rating (Tissue: 0.637, $P<0.001$; Drone: 0.713, $P<0.001$; PC1: 0.756, $P<0.001$). Additional pairwise comparisons using data from all years and technologies will be presented.

This project will provide information about what objective measure can be used as a proxy for the Florida scale. Correlations between lesion characteristics [count and area] detected by the leaf scans and plot-level defoliation detected by UAV imaging will be presented, which will provide information about how the two disease symptoms are related. The optimal ELS and LLS rating method, technology and time point at which to capture the data will be discussed. The findings of this study will allow for unbiased, efficient rating of ELS and LLS across locations and programs, which will ultimately facilitate high accuracy breeding activities.

Maintaining Consumer Demand for Peanut Products

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Peanuts are very nutritious, possess unique roast-nutty flavor and taste consumers love. Overall, the consumption peanuts, peanut butter and peanut-containing products has been on the increase in the past few years, especially the last two years. The increase in consumer demand for peanut products could be attributed to manufacturers producing products that consumers love to buy. This is true, but a closer look at the entire supply chain reveals the contribution of the various segments towards increasing demands of peanut consumption.

The objective of the presentation is to show contributions of various segments and encourage such to maintain and even continue to grow consumer demand for peanut products.

Identification of Two New Bacterial Pathogens of Peanut, Causing Early Seedling Decline Disease in the Texas Panhandle

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In 2020 we identified in Spanish-type peanut varieties a new disease of peanut in the Texas Panhandle caused by two bacterial pathogens. The observed disease symptoms included seed rot, pre- and post-emergence damping-off, poor seedling vigor, poorly developed root systems with little or no nodule formation, and whole-plant death. Subsequent diagnosis of symptomatic seedlings recovered two bacterial species identified by BLAST using 676- and 661-bp 16S rRNA fragments as a *Ralstonia* sp. and a *Pantoea* sp., respectively. Investigations conducted under greenhouse conditions, using a Valencia-type peanut variety, relying on Koch's postulate established a causative role for both bacteria in the observed disease with the successful reproduction of field symptoms. Symptoms observed on inoculated plants included seed-rot, pre- and post-emergence damping-off, poor seedling vigor, and poorly developed root systems. Given the early onset of symptom development in affected seedlings, a potential seedborne origin of the disease described as *B*acterial *Early Decline Disease* (BEDD) was investigated in the same batches of seeds planted and seeds later harvested in the affected fields. In both seeds, identical bacterial species, on the basis of 16R rRNA identity, were recovered indicating that the bacteria are both seedborne and seed-transmissible. Multi-locus sequence analysis involving six genes (*dnaK*, *fumC*, *gyrB*, *murG*, *trpB*, and *tuf*) showed the bacteria are most closely related to *R. pickettii* and *P. dispersa*, but also phylogenetically distinct and thus have been designated *Ralstonia* sp. strain B526 and *Pantoea* sp. strain B270. Losses from the disease in affected fields in 2020 averaged 50% (US $1.12 million). Findings from this study provide evidence for two new bacterial pathogens of peanut capable of infecting Spanish and Valencia peanut varieties.

Australian Peanut Breeding, 44 years of History. Where to Now?

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After a long history of domestic peanut production in Queensland, NSW and the Northern Territory, the first formal peanut breeding program began in the Department of Primary Industries at Kingaroy in 1977. Prior to this formal program, the Australia industry was based around two introduced varieties, Virginia Bunch and Red Spanish with a smaller area planted to an unofficial release of White Spanish. Crossing began in 1977 and study tours to ICRISAT and US breeding programs in the following two years establishing important links to international programs that remain fruitful to this day. The first release from the program was McCubbin, a red Spanish variety with significant yield improvement, in 1985. Significant events throughout the program's life included; the release of varieties nominated for irrigated production, the successful release of early season maturing varieties to reduce aflatoxin risk the dryland region, the introduction of high oleic oil composition and the development of Sutherland, a foliar disease tolerant variety that permeates throughout releases post-2017. Domestic peanut production has changed dramatically since the inception of the program, with the bulk of domestic peanuts now grown under irrigation, with a significant area as a sugarcane rotation crop. Consequently, peanut breeding has also undergone significant change to meet both grower, processor and consumer requirements. What lessons can we learn from both the successes and failures over the past 44 years and how can we use those lessons to guide future peanut breeding programs to underpin a prosperous and viable domestic peanut industry? The transfer of Grains Research & Development Corporation funding from peanut breeding to peanut agronomy and crop protection provides a catalyst to answer these questions and promote new ideas and technologies to continue the development of successful commercial peanut varieties.

Bio-Fungicide Seed Treatments on Valencia Peanut Yield and Grade

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Peanut (*Arachis hypogaea* L.) is prone to soil-borne diseases, mostly transmitted through seeds, such as Aspergillus crown rot, Verticillium wilt, black hull, limb rot, Phymatotrichum root rot, and pod rot. Seeds treated with fungicides reduce the incidence of seed-transmitted and soil-borne diseases in peanut and increase peanut production. Yield and stand loss of more than 50% with non-treated seed is possible. Three field studies were conducted on organically managed grower's fields in western Texas and eastern New Mexico. The experimental design was a Randomized Complete Block with four replications. We evaluated the effectiveness of bio-fungicides as a seed treatment and its effect on peanut yield, grade, net return, and plant stand. This study evaluated four bio fungicides: Neem combo, AKX-602, AKX-612, and mycostop, along with chemical check Azoxystrobin seed treatment (Dynasty), and an untreated control. The application of Bio-fungicides increased peanut yield up to 65% compared to an untreated control group. Among organic seed treatments, neem combo resulted in a significant higher yield than non-treated seed. Also, net return generated by bio-fungicides treatments over a three year period was greater by 70% compared to control untreated check. Mean plant populations across years were significantly greater than the un-treated control. The average plant population across all locations were 55% higher for neem combo. Our results suggest that the use of bio-fungicide have potential in increasing plant population, yield, quality, and net return in organically grown peanuts in eastern New Mexico and west Texas. They can be used as alternatives to chemical fungicides which could minimize the negative effects on the environment.

Performance and Utilization of African Groundnut Core Set in East and Southern Africa

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Groundnut genetic diversity is low and breeding programs have until recently utilized a limited portion of the existing diversity within and outside the allotraploid gene pool. This has hampered breeding efforts to deploy desirable alleles to meet the end users' needs in their adapted environments. A collection of 1500 germplasm nominated by African groundnut breeders were genotyped using the V2 Axiom-Arachis. A core set of lines (200 lines) were phenotyped in four (4) countries in Eastern and Southern Africa (Zambia, Malawi, Mozambique and Uganda). Valuable sources of resistances to biotic and abiotic stresses and superior yield related traits were identified for direct deployment as varieties and breeding lines. Adaptability trials are being conducted and different introgression pipelines initiated for recombinant inbred lines developments for desired traits. Nutrient profiling of these lines are ongoing and data will be freely available. Multiplication efforts for this core set representing diversity in Africa is ongoing to freely share these resources with any interested NARS in Africa.

Delineation of the Relationship between RGB-based Indices and Conventional Scores for Early and Late Leaf Spot Diseases in Peanut Lines

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The use of photogrammetry as a field-based high throughput plant phenotyping (HTPP) technique offers a non-invasive approach for simultaneously collecting many data points per observation, and on several genotypes within a short period. In Ghana, we have successfully applied RGB-based HTPP on a population of short duration peanut genotypes and found consistent relationships between the variable atmospheric resistance index (VARI), and normalized green red difference index (NGRDI) and the area under disease progress curve (AUDPC) for early leaf spot (ELS) and late leaf spot (LLS) diseases. However, the direction of the relationship between canopy cover (CaC) estimated using photogrammetry and the AUDPC for ELS, and LLS was not consistent. The relationship was positive at early stages and negative at latter stages. It has therefore become important to understand the dynamics of the relationship between photogrammetry indices and the AUDPC for ELS and LLS. This would assist in determining the ideal time to apply these tools when phenotyping for tolerance to leaf spot diseases. In this study, we used photogrammetry techniques to monitor peanut performance from the beginning flowering (R1) to beginning maturity (R7). The number of indices used to assess plant performance were increased from three to six and include NGRDI, VARI, canopy cover (CaC), green area (GA), greener area (GGA) and crop senescence index (CSI). ELS and LLS severity were manually recorded at beginning seed (R5) and R7. The disease severity scores were respectively converted into AUDPC which is a quantitative summary of the scores recorded at R5 and R7. Relationships were established between the photogrammetry indices estimated at the various stages and the AUDPC for ELS and LLS. Results showed that the relationship between photogrammetry-derived vegetation indices and AUDPC for ELS, and LLS depended on the time of disease onset, the level of tolerance among the genotypes, and the physiological traits the indices were associated with. In 2020, when the disease was observed to have set in late, at the beginning seed stage (R5), NGRDI and VARI derived at beginning pod (R3) had a positive relationship with the AUDPC for ELS, and LLS. On the other hand, NGRDI and VARI derived at R5 and R7 had negative relationship with AUDPC for ELS, and LLS. In 2021, when the disease was observed to have set in early (at R3), a negative relationship was observed. We found a consistently negative relationship between NGRDI, and VARI and AUDPC for ELS, and LLS within the short duration population in both years. Canopy cover (CaC), green area (GA), and greener area (GGA) only showed negative relationships with AUDPC for ELS and LLS when the disease caused yellowing and defoliation of leaves. The rankings of some genotypes changed for NGRDI, VARI, CaC, GA, GGA and crop senescence index (CSI) when lesions caused by the infections of ELS and LLS became severe, although that did not affect groupings of genotypes when analyzed with principal component analysis. Nevertheless, genotypes that were consistently considered less disease susceptible based on the HTPP indices were also the best when ranked based on traditional observations of ELS, LLS tolerance, haulm and pod yield across locations. This proves that the indices were effective in capturing true genetic effects amid environmental contribution to phenotype.

SNP Array Technology in Peanut

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Association of molecular markers with a trait through genotyping of populations and statistical analysis of linkage is a precedent for application of marker assisted selection (MAS) in breeding. MAS reduces the time, effort and cost of incorporating a trait into improved germplasm. While numerous molecular marker types have been developed for peanut, the most abundant molecular marker type in genomes is the single nucleotide polymorphism (SNP), and SNP assays enable cost-effective genome-wide genotyping. The Axiom_Arachis2 SNP array has been the most extensively used genome-wide SNP genotyping platform to date for peanut. The array, designed by Josh Clevenger and Walid Korani and provided through ThermoFisher Scientific, can assay over 48K SNPs for a cost of $28 per sample. It has been widely used for assaying diversity (mini core, core, African germplasm), mapping populations for disease resistance, seed size, and maturity traits, and quantifying the dynamic interaction of subgenomes in interspecific hybrids. These applications have greatly advanced our knowledge of peanut genetics and accelerated breeding.

Comparison of FAD2 KASP Markers and Near Infrared Spectrometer for Selection of the High Oleic Oil Trait in Peanut

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Seeds of breeding line accessions grown in Texas in 2020 and 2021 were tested for the high oleic trait using a Thermo Scientific Nicolet iS10 near infrared (NIR) spectrometer (Thermo Fisher Scientific, Waltham, MA) and FAD2 KASP markers. The objective of our study is to identify if there is an association between the testing results obtained from the NIR spectrometer and FAD2 KASP marker methods. Seed chips were extracted for DNA that was then quantified using the Quantifluor dsDNA System (Promega, Inc, Madison WI) kit on a Tecan Infinite F200 plate fluorometer. Genotyping for the *Ma-1* locus was performed using KASP markers developed by Chopra *et al.* for the *FAD2A* and *FAD2B* alleles. PCR reactions were run on a Roche LightCycler 480 II, and breeding lines were grouped using the LightCycler software. High oleic checks (OLin and Schubert) were scored as high oleic lines (YY). Low oleic checks (Tamspan90 and 55-437) were scored as low oleic lines (XX). Breeding lines were scored as belonging to one of these groups or intermediate (mid oleic (XY)). High oleic, mid oleic, and low oleic breeding lines for oleic acid were observed. These lines were evaluated by the above methods to determine the concordance of the two of them.

Physiological Components of Seed Quality in Peanut

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Using seeds with high quality is crucial for development of more vigorous seedlings with uniform growth and improved capacity to withstand adverse biotic and abiotic conditions as well as achieving desired plant density in peanut (*Arachis hypogaea* L.) production. Physiological seed quality consists of four components: germination, vigor, desiccation tolerance, and longevity. Maximum physiological quality is achieved when all four components reach their maximum potential during seed formation. This information has been reported for several crops; however, it is still lacking for peanut. The objective of this study was to develop the acquisition curve for the physiological components of seed quality in runner-type peanut. A two-year field study was conducted in 2020 and 2021 using the cultivar Georgia-06G. Plants were inverted when growing degree days reached 2500 for both fields, and maturity board profile was used to classify the peanut pods into the maturity classes. Water content, germination, vigor, desiccation tolerance, and longevity test were performed in the seeds. Germination and vigor reached maximum values between ‘brown 1’ and ‘brown 2’. Maximum desiccation tolerance was observed in ‘brown 2’, and maximum longevity was achieved in ‘black 2’. Examining all physiological components, peanut seeds achieved the maximum physiological quality during ‘brown’ class.

On-going Fungicide and Growth Regulator Research in Louisiana Peanut

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At the request of growers and with funding from the National Peanut Board, we have begun investigations into fungicide application timing and efficacy as well as growth regulator effects in peanut in Louisiana.

On-farm efforts at three locations during 2021 included comparisons of two applications of tebuconazole (7.2 fl oz/A) against one application of Elatus (9.5 oz/A) for stem rot management. Two applications of the growth regulator, Kudos (5.4 oz/A), also were compared to non-treated plots. Preliminary results indicate similar significant reductions of stem rot with both fungicides compared to the non-treated plots. Plots treated with Kudos had significantly higher row definition than non-treated plots. Yields were significantly higher than non-treated controls in plots treated with Elatus only or Kudos only.

Small plot fungicide and growth regulator efficacy trials were initiated in Winnsboro and St. Joseph, LA during the 2021 growing season. Eleven labeled fungicides were applied to GA-06 plots at both locations. Stem rot incidence and severity was low and highly variable at both locations; therefore, results were inconclusive. Five rates of Kudos ranging from 1.8 to 9.0 fl oz/A were applied twice to GA-06 at both locations. In St. Joseph, row definition significantly increased with growth regulator rate, and in Winnsboro data trended the same. Unfortunately, harvest was unsuccessful at both locations due to equipment issues. On-farm and small plot research will continue during the 2022 and 2023 seasons.

Evaluating Peanut Fungicide Programs for White Mold and Leafspot Control

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Peanut production in Cook County, Georgia comprised $9,450,000 of the county's total $94 million-dollar farm-gate value in 2020. White Mold (WM) (*Sclerotium rolfsii*) is considered by growers to be the most destructive disease in peanut production. To generate local data for peanut growers upon which to base their disease management decisions and to increase economic returns on production investments, Cook County Extension, a local grower, and a UGA Extension Plant Pathologist collaborated to establish a trial evaluating peanut fungicide programs for WM and leafspot (LS) control. Ten fungicide programs were tested in the replicated trial using programs common among peanut producers in the southeastern United States. Disease ratings and yield for each treatment were recorded. Local Agri-suppliers provided data on cost of fungicides. Incidence of white mold in this study was low (WM < 5.3%); LS severity in the trial was also low (LS < 2.5) and was assessed using the Florida 1 to 10 scale (1 = no disease, 10 = complete defoliation). The Priaxor; Umbra 2X; Provysol; Tebuconazole program had the lowest % incidence of WM (.33) and produced the greatest yield (7,175 lbs./A) among all treatments. The Priaxor; Convoy; Umbra; and Muscle ADV 3X programs had the lowest incidence of LS (1). The Muscle ADV 4X resulted in the highest profit per acre ($1,158/A) among all treatments, however previous year's data show a correlation between fungicide input costs and WM control. From a trial here in 2020, a 4 block tebuconazole / chlorothalonil program cost $5,500 while a 3 block Elatus program cost $10,200. Despite the added expense, the 3-block Elatus program resulted in a 32% increase in profit over the tebuconazole program.

Classic® (chlorimuron) Effects on New Peanut Cultivars

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Over the last several years, interest in the use of Classic® (chlorimuron) for the control of late-season Florida beggarweed (*Desmodium tortuosum*) has increased. Historically, peanut cultivar tolerance to Classic has been variable and the use of Classic has resulted in minor increases (≤10%) in the incidence of tomato spotted wilt virus (TSWV). Little information is known about the tolerance of newer peanut cultivars since the last cultivar research conducted in Georgia was in 2012. Thus, research was conducted in 2021 near Ty Ty, Georgia to evaluate the tolerance of new peanut cultivars to Classic. The trial was arranged in a randomized complete block design with a 5 (cultivar) by 4 (timing) factorial arrangement of treatments. Peanut cultivars included the following: GA-18RU; GA-20VHO; AUNPL-17; TIFNV High-O/L; and FLORUN 331. Using a backpack sprayer calibrated to deliver 15 GPA using AIXR-11002 nozzles, Classic 25G @ 0.5 oz/A + Induce @ 0.25% v/v was applied at 63, 75, and 88 days after planting (DAP). A non-treated control was also included. Each cultivar X timing treatment was replicated 3 times and the plot area was maintained weed-free. Data collected included peanut plant heights (110 DAP), TSWV incidence (110 DAP), and yield. All data were subjected to ANOVA using PROC GLIMMIX and means separated using the Tukey-Kramer method ($P<0.10$). No interactions were observed between cultivar and timing ($P>0.56$). When averaged over timing, the following cultivar effects were observed: GA-20VHO was 15%-27% shorter in height than all other cultivars; AUNPL-17 and GA-20VHO had 15% less TSWV than FLORUN 331; and GA-20VHO had 18% lower yields than AUNPL-17. When averaged over cultivar, the following timing effects were observed: peanut heights were significantly reduced by 13% when Classic was applied at either 75 or 88 DAP; Classic applied at 88 DAP resulted in a 10% increase in TSWV; and peanut yields were not reduced by any timing ($P=0.4778$).

Screening of Valencia Breeding Lines for Drought Tolerance

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New breeding materials with high oleic traits were screened at three locations on a research farm of USDA, Cropping System Research Lab, Lubbock, Texas, on a commercial grower's field in Portales, New Mexico, and Morton – Texas. The plots were planted outside the center pivot irrigation span at Morton and Portales to mimic drought conditions with less water during each irrigation. At USDA, Cropping System research lab in Lubbock, the plots are not given any irrigation following 60 days after planting. Ten breeding lines and two check cultivars (a susceptible check – Valencia C and a tolerant check C76-16) were evaluated in a randomized complete block design with three replications. Among all ten breeding lines, three lines, namely V7, V21, and V4 were comparable in yield to the tolerant check C76-16. The average yield for the trial was 2500 kg per hectare. The yield for the susceptible check was 1959 kg per hectare, while for the tolerant check, C76-16 was 3056 kg per hectare. The yield for three breeding lines was above 3000 kg per hectare.

High-throughput Phenotyping of Organic Peanuts

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The demand in organic peanut is increasing nationally. However, peanut cultivars adapted to organic production remain limited. Unmanned Aerial System (UAS) is a promising tool that can accelerate peanut breeding. The use of sensor mounted on a drone is known as Unmanned Aerial System (UAS). In this study, we aimed to collect UAS data from 20 peanut accessions grown on a certified organic plot at Texas A&M AgriLife Research-Vernon. Peanut accessions were provided by the Peanut Breeding and Genetics program from Texas A&M AgriLife Research-Stephenville. The experiment was laid out in a randomized complete block design with 3 replications. Drone was flown on July 27, 2021 and September 07, 2021 at 30 meters above soil surface with 85% overlap. Five narrow and high-resolution spectral bands were collected: red, blue, green, near-Infrared, and red edge. Image orthomosaics were obtained using Pix4D and plot-level mean value of each spectral band was extracted using QGCIS. A total of 23 vegetation indices were used using spectral band values. Results showed significant genotypic differences in the computed vegetation indices. The findings can be used to establish a high-throughput phenotyping platform to accelerate organic peanut breeding.

Evaluating Georgia Peanut Production Scenarios Using the Field to Market Fieldprint Platform Sensitivity Analysis

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As growers begin or continue to implement improved on-farm management practices, the use of new technologies has allowed growers to quantify their sustainable impacts. Field to Market: The Alliance for Sustainable Agriculture, a multi-stakeholder initiative (MSI), has been at the forefront of this movement in quantifying on-farm sustainability. With the use of their Fieldprint Calculator, researchers and growers can convert yearly crop management practices into quantifiable scores based on eight sustainability metrics. In Georgia, peanut is an essential row crop grown and is considered the official state crop. As the peanut industry continues to spotlight the importance of sustainability and implementing improved management practices, researchers have identified a need to measure sustainability trends in the peanut crop. Additionally, sensitivity analyses can be conducted with the use of the Fieldprint Calculator to simulate different production scenarios. Simulations can be used to determine optimum production changes for maximizing sustainability. Therefore, the main objective of this project is to evaluate sensitivity analyses using the Field to Market Fieldprint Calculator to evaluate ways that sustainability metrics can be improved upon in peanut production and how they vary from year-to-year. Data collection began in 2014 with one grower and has grown to 45 growers in 2021. Evaluation of the data identified trends in the energy use and greenhouse gas emissions metrics. These trends will serve as a base-layer for growers making improved management decisions to better their on-farm sustainability. Thus, we have begun running simulations specifically on tillage and irrigation management. These simulations will help us to determine the effects of changing production practices on these two sustainability metrics. By running the simulations, we will be able to better advise producers as to which production practices will have the greatest impact on these metrics.

Fungicide Program Evaluation in Berrien County, Georgia

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Several fungicide programs were evaluated in an on-farm irrigated peanut field with a 2-year rotation in 2021 in Berrien County GA. Programs evaluated represented chemical recommendations from the following companies: Sipcam, Syngenta, Valent USA, Bayer CropScience, FMC Cooperation and Nichino America. Results gathered from the study included leaf spot rating, white mold incidence and yield.

The results here show that the Syngenta program had the highest yield but was statistically similar to the Sipcam, Valent or Bayer programs. The Nichino program had the lowest yield but was statistically similar to the FMC program. Additionally, the Syngenta program had a statistically higher leaf spot rating than all other programs. Lastly, white mold pressure in this trial was low. The Bayer program had the most white mold hits but was not significantly different from any of the other programs except Syngenta, which had the numerically least amount.

Challenges with Establishing and Maintaining Effective Seed Systems: A Global Perspective

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Seed systems for peanut have several unique factors that create challenges to establish and sustainably maintain. However, the continued introduction of improved varieties remains a critical tool to increase the productivity and quality of the crop worldwide. Biophysical attributes specific to the crop, such as low multiplication rates, limited ability to use processing and handling equipment for other crops, relative fragility, and bulky storage and transport constitute additional economic and social costs for the seed system. Peanut is grown commercially and as a subsistence crop in hundreds of countries, leading to a diversity of solutions to these challenges often unique to each context. Through dozens of interviews with experts across the globe, I have gathered descriptions and impressions of diverse seed systems and developed typologies and evaluations of these systems to better understand peanut seed systems with the intention of offering insight for improvements and risk reduction.

Evaluation of Peanut Development Using Plant Growth Regulators as Seed Treatment and Flumioxazin Application

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Georgia produces the majority of the peanuts cultivated across the US. Proper weed control techniques allied to plant growth regulators (PGRs) can improve plant establishment and development within the season to increase yield. This study aimed to evaluate the effects and interaction of flumioxazin and treatments with plant growth regulators (PGRs) on peanuts. A split split-plot in a completely randomized block design was established in Plains and Ty Ty in mid-April of 2020 and early-mid May of 2021. The treatments were the following: six cultivars (TifNV-HO, GA 20VHO, GA 14N, GA 06G, GA 16HO, GA 18RU); three plant growth regulators as a seed treatment (non-treated control, 0.063 g a.i. ha^{-1} of 3-indolebutyric acid (IBA) and 0.011 g a.i. ha^{-1} of cytokinin, 14.82 g a.i. ha^{-1} of gibberellic acid); and herbicide (non-treated control and flumioxazin 105 g a.i. ha-1). Seeds were PGR treated one day before planting. Flumioxazin was sprayed right after planting. Measures included injury (0 – 100%), stand counts (1 meter of row), plant height and width, and yield. Data were analyzed by year using Agroestat®.

Peanut at Ty Ty and Plains showed no injury regarding herbicide treatments in both years. For stand counts, plant height, and width, differences were observed at both locations during the 2020 and 2021 seasons. In 2020, the stand counted for GA 18RU in Ty Ty were benefited from the application of gibberellic acid, whereas for TifNV-HO, both PGR treatments reduced the number of plants per meter compared to the non-treated control. Plant height and width demonstrated no differences for both locations during 2020. However, in Ty Ty, the cultivar GA 16HO, when treated with gibberellic acid, had a higher width than the non-treated seeds.

In terms of yield, only in 2021 the cultivar GA14N treated with IBA increase in % the final yield in Plains. Overall, the 2021 differences compared to the 2020 season could be related to the planting date, which was performed later, in early-mid May. The PGR treatments resulted only in minor improvements of the parameters evaluated, and different methods of seed treatments should be investigated.

Photosynthetic Efficiency, Leaf Spot Control, and Yield of Peanut Plants Treated with Dodine

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Peanut plants are susceptible to many foliar diseases. One of the most spread diseases in Georgia is leaf spot (caused by *Nothopassalora personata* and *Passalora arachidicola*) which can reduce considerably the final yield. Chlorothalonil is one of the most widely used fungicide in the control of intensity of this disease. However, in 2020 European Union banned this chemistry due to its high risk to amphibians and fish. Dodine is an alternative fungicide with a similar range of activity. However, this chemistry was reported to suppress photosynthesis in some species (e.g. pecan). The lack of information on the effects of dodine on the photosynthetic activity of peanut plants led to study the impact this chemical has on peanut physiology before recommending its application. The objectives of this research were to evaluate the effects of dodine on leaf photosynthetic activity of peanut and assess the potential of dodine as a replacement of chlorothalonil. The experiment was conducted at the University of Georgia Lang Farm in Tifton using the cultivar Georgia-06G. The experimental design was a randomized complete block with 5 replicates. Treatments consisted of four fungicides, 1) chlorothalonil (Bravo 720 g/L) at 1.2 L/ha (full rate), 2) chlorothalonil at 0.6 L/ha (half rate), 3) dodine (Elast 400 g/L) at 1.7 L/ha ml (full rate), and 4) dodine at 0.8 L/ha (half rate). Total chlorophyll and total carotenoid were collected every two weeks from 33 days after planting (DAP) until 124 DAP. Net photosynthesis rates were obtained biweekly using a LI-6800 portable photosynthesis system connected to a fluorometer chamber. Yield was collected at harvest and pod maturity profile was assessed using the Peanut Profile Board. Leaf spot rating was collected the day of digging. There were no significant differences in net photosynthesis among the four treatments over the season. Similarly, total chlorophyll and total carotenoids as well as maturity profile were not significantly different between the treatments, indicating that these parameters were not affected by the fungicides and rates. Significant differences were observed in leaf spot rating, with highest leaf spot incidence in plots treated with half rate of chlorothalonil and lowest in plots treated with full rate of dodine. Yield did not show significant differences among the treatments fungicides and also by their rates. In summary, results demonstrated that the use of both rates of dodine did not have a negative impact on the photosynthetic activity of peanut plants, pod maturity profile, and final yield. Moreover, full rate of dodine reduced the intensity of leaf spot, hence, this chemical could be considered as a potential replacement of chlorothalonil in the control of leaf spot in peanut.

An Examination of Downforce Settings at Varied Planting Speeds in Peanut

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Planting speeds have traditionally faced a hard limit of about 5 miles per hour, which is the speed most drive-wheel planters have been designed for. Without advances in metering technology, relatively few options remain to increase the threshold for planting in peanut. One of these options is adjusting the downforce, as theoretically higher downforces would stabilize the planter row units. Trials took place at the UGA Lang-Rigdon Farm in Tifton, GA and the UGA South Eastern Research Center in Midville, GA in 2021. The Tifton trial consisted of a Low(3mph) and a High(6mph) speed, repeated at each downforce setting available on the Monosem NG 4 Plus planter used, from 0lbs to 400lbs in 100-pound increments for a total of 5 downforce settings. The Midville trial had an equal matrix of a Low(3mph), Medium(5mph), and High(7mph) speeds paired with Low(0lbs), Medium(200lbs), and High(400lbs) downforces using the same planter. Each Speed-Downforce setting had a single pass which was separated into 4 40-foot plots in both Tifton and Midville, and planting took place in freshly tilled Tift series loamy sand. Emergence counts took place regularly post-cracking in Tifton while Midville has a final average, and yields were collected at the end of the season. In both trials, higher speeds had heavy penalties to final emergence at higher speeds, with Tifton showing a difference of ~50 percentage points lower than the low speed. Higher downforces did have some buffering effect which boosted emergence but compared to the speed penalty it is considered mostly negligible. Final yields were somewhat closer between the lower and higher speeds, though this may be attributed to the good soil condition at planting and during the year which encouraged compensatory growth in the treatments with poor emergence.

Using Photosynthetic and Isotopic Techniques to Identify Different Drought Tolerant Mechanisms in Peanut

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Drought is the main abiotic stress in peanut that can cause significant yield loss and reduce seed quality. Peanut is very sensitive to droughts during the pod filling periods which in the Southeastern U.S happens at the same time that flash droughts that can last between two to four weeks. Drought tolerant cultivars for mid-season drought exist but the mechanisms behind the tolerance are still fairly unknown. In experiments performed in rain-out shelters at the National Peanut Research Laboratory, we tested 36 drought tolerant and sensitive cultivars with the objective of finding different mechanisms of drought tolerance. We used photosynthetic and isotopic measurements to estimate the water use and nitrogen fixation of the tested cultivars. We found that among the drought tolerant cultivars there is two clear mechanisms of drought tolerance: (1) Cultivars that show low stomatal aperture under drought and therefore higher water use efficiency (WUE) and (2) Cultivars that maintain the stomata open and therefore show more efficient use of water (EUW). Although in other crops cultivars with high EUW have been demonstrated to produce more under drought conditions, this was not the case in this research for this set of cultivars. High N2-Fixation under drought was very related with the capability of the plant to maintain a good water status. More research needs to be done to determine the dependency of N2-fixation on water related traits such as WUE and EUW.

Spray Deposition and Quality as Affected by Ground Speed for a Boom Sprayer without a Rate Controller

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Proper selection of application rate, also referred to as spray or carrier volume – is an important consideration for achieving adequate coverage, efficacy and pest control in peanut. For conventional boom sprayers without a rate controller, target application rate is achieved by maintaining a consistent ground speed – selected during sprayer calibration – for the given nozzle size and pressure. However, ground speed variations are common in the field during pesticide applications. In order to understand the effect of ground speed, and consequently reduced volume, on spray deposition and quality, field tests were conducted with a commercial boom sprayer in 2021. The sprayer was calibrated to deliver an application rate of 20 gallons per acre with at 6 mph and spray pressure of 30 PSI. The spray boom (54-ft wide) was split into three sections with each section representing a different nozzle type/droplet size – medium, very coarse and ultra coarse. During testing, herbicide applications in peanut were made at five different ground speeds of 6, 8, 10, 12 and 14 mph, keeping the same nozzle size and pressure selected during calibration to evaluate the influence of increased speed on coverage and spray quality. Each sprayer pass consisted of three different nozzle types (representing droplet sizes) split evenly across the boom (54 ft length) and the length of each sprayer pass was approximately 600 ft long. Spray deposition and quality was collected by placing water sensitive paper at three different locations across the boom on the ground during application. Weed counts were recorded at 10-14 days after application while yield data was collected by harvesting all six rows within each plot. The study results showed that an increase in ground speed influenced both spray coverage and quality across all three nozzle types. Regardless of the nozzle type, the highest ground speed of 14 mph had the lowest coverage whereas the 6-mph speed had the highest coverage, which was expected as an increase in ground speed without changing nozzle size and/or pressure resulted in reduced application rate than the target, which consequently lead to decreased coverage. For the same nozzle type, spray quality also differenced among the ground speeds again due to influence of reduced spray volume with an increase in ground speed. Pesticide applications are critical to protect peanut yield and ground speed variations during pesticide applications are inevitable. This study highlights the importance of integrating a simple spray technology i.e. a rate controller on peanut sprayers to maintain the target application rate and uniformity across the field despite changes in ground speed.

Influence of Application Volume and Droplet Size on Spray Penetration into Peanut Canopy

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Peanut, unlike the other row crops, has well-developed and dense canopy growth at late vegetative growth stage. The lower portions (middle and bottom) of the canopies become a major region for disease and pest infestation. Adequate spray coverage and penetration into the peanut canopy is critical for effective pest management. For fungicide applications, both spray volume and droplet size are important application parameters that can influence both coverage and spray penetration into the peanut canopy. The objective of this study was to assess spray penetration into peanut canopy at three application volumes (10, 15 and 20 gallons per acre; GPA), with each spray volume applied using three nozzles that produced medium, very coarse and ultra-coarse spray droplets. The study was conducted in plots that measured 4-rows wide (12 ft) by 80 ft long. Fungicide applications were made with a 6-row boom sprayer (5.5 m) equipped with a rate controller and individual nozzle control capabilities. To assess spray coverage and penetration, water sensitive paper was placed at three different heights (top, middle and bottom) in the canopy in the center two rows during fungicide applications at 47, 62, 92 and 122 days after planting. Canopy measurements and leaf area index (LAI) were also collected in the center two rows prior to each application. Visual disease ratings (for leaf spot and white mold) were recorded at pre-determined intervals throughout the season while yield was collected by harvesting center two rows in each plot. The study results showed that spray coverage was influenced by both spray volume and droplet size. Higher volume (20>15>10 GPA) and smaller droplet size (Medium > Very Coarse> Ultra Coarse) increased spray coverage during all applications. Both spray volume and droplet size had a significant interaction with position within the canopy. Higher spray volume increased spray penetration up to middle of the canopy while both medium and very coarse droplets provided comparable coverage in the middle of the canopy. Spray penetration at the bottom of the canopy as well as disease ratings and peanut yield did not differ among the application volumes or droplet sizes. The results from this study suggested that fungicide application efficiency can be improved by utilizing a combination of higher spray volume and/or smaller droplet size. Future research needs to investigate the influence of these applications parameters on spray coverage, penetration and efficacy in fields with high disease/pest pressure in the season.

Does Peanut Maturity Impact Roasting Chemistry?

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A Gerstel TDU (Thermal Desorption Unit) was used to roast two different runner peanut maturity samples (orange and black pod) and subsequently analyze the formation of volatile compounds in real time using GC/MS. The data collected from these experiments tracked 15 different volatile compounds formed during the roasting process and calculations were made to determine relative rates of formation for these compounds. When roasting temperatures were increased from 190 °C to 200 °C the mature peanut samples formed significantly more pyrazines (roasted peanut positive compounds) than immature peanuts. The Q_{10} (ratio of reactions rates at the two temperatures) for pyrazines formed during the roasting of mature peanuts was 80% higher than found when roasting immature peanuts. These results suggest that peanut maturity is critical to maximizing roasted peanut flavor.

Examining Peanut Response to Photo-Intensity for Application in Speed Breeding

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Arachis hypogaea ‘Bailey II’ will be exposed to differing light intervals in order to examine whether photo-intensity has an effect on peanut pod set, seed count, and post-harvest germination percentage. Data will be utilized for application in a peanut speed breeding program, which aims to decrease time between generations, allowing for faster cultivar development and release. Using a blocked design, peanuts will be evaluated at 0, 200, 400, and 600 umol//m^2/s of additional light provided by two LG LED panels over each treatment. Four harvest intervals (70, 80, 90, and 100 days), will be employed in each treatment to see whether photo-intensity influences maturity.

Going forward, this research will enable better usage of time and space to develop germplasm for breeding and improvement.

Integrated Effect of Fertilizer, Variety and Management Practices on Insects and Disease Infestations, Yield and Quality of Peanut in Ghana

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Peanut (*Arachis hypogaea* L.) is an important food and cash crop in Ghana although it suffers low yields in farmer fields due to pest damage, low fertility, and limited genetic ability in traditional varieties. A study was conducted to determine the influence of fertilizer, variety, and management practice on yield and quality of groundnut over two cropping seasons in Ghana. A split-split plot experimental design with fertilizer (no fertilizer versus 375kg/ha of YARA legume fertilizer) as the main plot, variety (Chinese versus Sarinut 2) as the sub-plot, and management practices including the traditional farmer practice (FP) versus improved practices (IP). The IP included one additional weeding, insecticide spray to suppress foliar insects, and applying local potassium-based soaps to suppress arthropods and pathogens. In both years, arthropod pests recorded were white grubs, millipedes, termites, wireworm, and aphids. In general, pest numbers, damage, leaf spots and rosette disease severity were highest on plots planted to Chinese under the FP compared with the IP with Sarinut 2. As expected, yields were lowest (1634 kg/ha) on FP-managed plots with no fertilizer and greatest (3155kg/ha) for IP-managed plots with fertilizer. Pearson correlation analyses showed positive relations between grain yield and yield components but negative correlation between grain yield and insect pest populations, damage and disease severities. Hence, cultivating improved groundnut varieties such as Sarinut 2, applying fertilizers and adopting the improved practices tested in this study is key to farmers increasing their yields per unit area.

Effect of Variety and Management Practices on Soil Arthropod Management, Yield, and Aflatoxin Contamination in Peanut Production across Three Geographical Locations of Ghana

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Peanut (*Arachis hypogaea* L.) yields are often low among smallholder farmers in Ghana. To address low yields, field experiments were conducted in the 2020 and 2021 cropping seasons to evaluate the effect of location (Nyankpala, Wa, and Kumasi), variety (Chinese and Sarinut 2), and two approaches to pest management including: 1) traditional farmer practices (FP) and 2) improved practices (IP)) on soil arthropod abundance, pod damage,and yield of peanut. Farmer practices consisted of the farmer management such as weeding the field once without any protection, while improved practices comprised an additional weeding, insecticide spray to suppress foliar insects, and applying local potassium-based soaps to suppress arthropods and pathogens. Severity of leaf spot disease, the number of aphids and soil arthropods at harvest, and scarification and pods penetration by soil arthropods were higher on the FP compared with the IP. Pest incidence and damage were higher for Chinese than Sarinut 2. For locations, leaf spots and aphids were higher at Tanina and lowest at Fumesua. Peanut yield and yield related parameters were greater for IP than FP in all trials. Yield was also greater for Sarinut 2 than Chinese. Among the locations, yield at Nyankpala and Fumesua were higher than Tanina. Pearson correlation analyses showed positive relations between grain yield and yield components but negative correlation between grain yield and insect pest populations and damage. Therefore, farmers will obtain optimum yield of peanut with minimum damages when the IP used in this study are adopted, especially with the improved variety (Sarinut 2) regardless of location. The combination of IP and Sarinut 2 proved to be the most effective approach to peanut production in northern Ghana.

Drought Tolerant and Seedling Vigor Screening in Groundnut (*Arachis hypogaea*) using Photogrammetry in a Breeding Program in Ghana.

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Drought is the main abiotic factor limiting groundnut production in Ghana. Accurate selection of drought tolerant genotypes will therefore increase the quality and quantity of groundnut production. A field trial consisting of 58 groundnut genotypes selected from the African germplasm collection together with 2 checks from the groundnut breeding program from CSIR-SARI was conducted at Golinga in the Northern Region of Ghana during the 2021 dry season. The aim of this study was to assess the effectiveness of using photogrammetry for phenotyping seedling vigor and drought tolerance traits in groundnut breeding program in Ghana. Well-watered and water-stress were the growing conditions created for the experiment. The genotypes were arranged in a 2 × 30 row-column design in three replications. The investigated parameters were seedling vigor, days to 50% flowering, canopy temperature, red-green-blue imaging, canopy wilting, dry biomass weight, pod weight/plot and pods/plant. Data was analyzed using the mixed linear model with R statistical program, version 4.0.2. Differences were observed in how the accessions responded to drought imposition. Tog-HG08:201909, Sen-ICGV 96894:201909 and CHINESE exhibited low canopy temperatures with higher yields under water-stress condition. On the other hand, Nig-ICGVIS 07890:201909, Nig-ICGVIS 79103:201909, Oug-KadonokhoX3590 Tan:201909 and Zam-ICGV-SM-06637:201909 showed higher canopy temperature values and low yields under water-stress condition. Positive and significant associations were observed between canopy temperature and canopy wilting ($r = 0.58$, $p < 0.000$) and between crop senescence index and canopy wilting ($r = 0.47$, $p < 0.000$). Green area, number of green pixels with Hue angle between 60 and 120 °, was significantly associated with seedling vigor at 21 days ($r = 0.76^{***}$) and 30 days ($r = 0.78^{***}$) after planting. Greener area, number of green pixels with Hue angle between 80 and 120 °, was also significantly associated with seedling vigor at 21 days ($r = 0.70^{***}$) and 30 days ($r = 0.61^{***}$) after planting. Dry biomass weight was best associated with greener area at 90 days after planting ($r = 0.55^{***}$). Green area, greener area, and their ratio had broad sense heritability values ranging from 62 to 73% under genetic control, thus they were less influenced by environment. Traditional traits (dry biomass weight, and wilting) had smaller broad sense heritability values of 51 and 54%, thus they were more influenced by the environment than the photogrammetric traits.

Peanut Maturity Workshop Results and the Adoption of Recommended Cultural Practices in Pitt County, North Carolina Contributing to Peanut Yields from 2021

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Six workshops were conducted in September to assist Pitt County peanut farmers in determining optimal maturity and to gain perspectives on factors contributing to peanut yields and adoption of recommended cultural practices. Based on surveys representing 84% of county peanut farmers, the average reported gain per acre was 468 pounds compared to the 2020 production year. Among the factors perceived by growers contributing to higher yields were improved weather patterns (44%) and pod maturity workshops (33%). The percentage of peanut farmers reporting improved peanut yields in 2021 compared with 2020 was 86%. The percentage of producer indicating that digging at optimal maturity was 93%. Among the recommended practices adopted by growers, 60% applied Apogee (89% making a single application), improved variety selection (47%), and higher seeding rates (42%).

Identifying the Alternative Host(s) of Groundnut Rosette Disease Virus Complex and the Vector Role in Disease Spread and Carryover

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Groundnut crop losses due to Groundnut rosette disease (GRD) are endemic across Sub-Saharan Africa. The disease causes significant economic losses, jeopardizing food security and the livelihoods of groundnut farmers. To date, no alternative host plants have been identified that could act as a source of inoculum. subsequently, the epidemiology of the disease is poorly understood, creating gaps in disease management options. GRD is caused by an interaction of 3 agents; groundnut rosette assistor virus (GRAV), groundnut rosette virus (GRV), and the satellite RNA (satRNA) of GRV. The disease is transmitted persistently by the aphid, *Aphis craccivora* Koch.

In this study, we have surveyed 3 GRD hotspots and 1 major growing district in the different agro-ecological zones of Uganda for GRD. In each zone, plants showing GRD symptoms and/or having colonies of *Aphis craccivora* were identified and samples were collected.

Using RT-PCR, in addition to the groundnut ratoon/groundkeeper plants, we have identified 2 alternative hosts with all the 3 GRD agents and the other 6 with both GRAV and satRNA. We have also established the to and from vector transmission possibility of the 3 GRD agents between groundnuts and 4 of the alternative hosts inclusive of *Crotalaria incana* L, *Cassia hirsuta* L, *Physalis peruviana* and *Sesamum angustifolium.*

Our study also examined the distribution and diversity of the vector in relation to the different hosts and the GRD agents within the described study area and identified 4 aphid species majority (63/98) of which were *Aphis craccivora, which* were also diverse with 10 haplotypes that exhibited specificity to particular hosts. With RT-PCR, GRD agents were mainly detected among *Aphis craccivora*. *Aphis citricidus* and *Aphis gossypii* were also diagnosed with GRV and satRNA.

Evaluation of Peanut Rx Spray Programs for Peanut Disease Control in Southeast Alabama

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Twelve peanut Rx spray programs designed for low-, medium-, and high-risk fields were evaluated for their efficacy in controlling early leaf spot (*Passalora arachidicola*), late leaf spot (*Novopassalora personatum*), and white mold (*Athelia rolfsii*) in southeast Alabama at the Wiregrass Research and Extension Center (WGREC) in Headland, AL on 'Georgia-16HO' peanuts. Three spray programs containing chlorothalonil designed for low-, medium-, and high-risk fields were used as controls. Treatments were arranged in a randomized complete block design with six replications and peanuts were planted on May 28th, 2021. Leaf spot intensity was evaluated using the Florida 1-10 leaf spot scoring system. White mold incidence was assessed immediately after plot inversion by counting the number of disease loci per row. Yields were reported at 9.88% moisture.

Leaf spot severity was significantly lower for the twelve peanut Rx spray programs and the high-risk chlorothalonil spray program when compared to the nontreated control, which suffered considerable premature defoliation. Among the fungicide spray programs, the low-, medium-, and high-risk peanut Rx spray programs containing azoxystrobin + benzovindiflupyr + pydiflumetofen/chlorothalonil and the low-risk spray program containing tebuconazole + trifloxystrobin/ tebuconazole + prothioconazole/chlorothalonil had significantly higher leaf spot severity when compared to the high-risk chlorothalonil only spray program. The lowest leaf spot defoliation values were observed with the low-, medium-, and high-risk peanut Rx spray programs containing chlorothalonil/flutolanil + flutriafol, the high-risk spray program containing fluxapyroxad + pyraclostrobin/chlorothalonil + tebuconazole/mefentrifluconazole + tebuconazole/chlorothalonil, and the medium- and high-risk spray programs containing tebuconazole + trifloxystrobin/ tebuconazole + prothioconazole/azoxystrobin + benzovindiflupyr/chlorothalonil. All twelve spray programs significantly reduced white mold incidence and increased yield when compared to the nontreated control. The high-risk spray program containing tebuconazole + trifloxystrobin/ tebuconazole + prothioconazole/azoxystrobin + benzovindiflupyr/chlorothalonil had the highest yields in this trial and was significantly higher than the chlorothalonil high-risk spray program. Yields among six additional peanut Rx spray programs were statistically similar to that observed with the chlorothalonil high-risk spray program. Thus, these results demonstrate the importance of utilizing the Peanut Rx guide to determine the risk of a field and select the best spray program to control leaf spot diseases.

Evaluation and Standardization of Stem rot Inoculation Techniques for Resistance Selection in Peanut

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Inoculation techniques were evaluated to develop and standardize a high throughput screening technique for resistance to stem rot pathogen (*Aethalia rolfsii* Sacc.) in peanut (*Arachis hypogaea* L.) mini-core collection under greenhouse studies at Agricultural Science Centre at Clovis, New Mexico. A total of five different inoculation techniques were screened by using susceptible Valencia genotype. The techniques involved inoculation of four-week-old peanut plants raised in pots by spreading mycelial propagules of *A. rolfsii* grown on Potato Dextrose Broth (PDB) on soil surface, slurry method, pathogen inoculated peanut shells spread on the soil surface in pots, Inoculum placed around the collar region and Inoculum mixed in the soil. Further, measured volumes of mycelia mat along with matured sclerotia were powdered and the mass was coated to the peanut seeds and were planted to quantify the most effective inoculum levels and to estimate the effect on germination. Among these evaluated techniques *Aethalia rolfsii* inoculated with peanut shells applied at the base of the stem was found to be most efficient in getting highest percent incidence of stem rot (73.8%) followed by inoculation of pathogen around the collar region by way of either PDA or slurry methods. Further, it was observed that, seed coating with sclerotia at higher quantities resulted in decreased germination of peanut accessions under greenhouse conditions.

Reduced-Cost Genotyping in Peanut Breeding Programs Using Genotyping by Resequencing

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Next-generation sequencing (NGS) has been used broadly for genomic analysis. NGS usually generates thousands of single nucleotide polymorphism (SNP) markers and can help identify useful markers that benefit some genomic projects such as genome-wide association studies (GWAS). However, the number of SNPs generated from NGS data are far more than needed for most breeding programs, instead, breeders focus on the use of hundreds of polymorphic molecular markers for analysis. One limiting factor is that the statistical power is decided more by the population size instead of the number of markers. When the breeding population is large, the cost of genotyping could become too high. Therefore, developing a more economical genotyping system of marker analysis in breeding populations can help make use of molecular markers a routine tool for breeding programs. In this research, we used previous NGS data, including SNP Chip, RAD-Seq, transcriptome, WGS, and other sources. Then we extracted the sequences flanking each SNP for BLAST against the Tifrunner reference sequence and searched for homoeologs and/or paralogs. Our goal was to select the true SNPs that are distinguishable from their homoeologs and paralogs. Selected SNPs polymorphic among different tetraploid accessions were sent for designing custom primers using the Tecan Allegro system. We have received 2,384 primer sets and are testing these on 48 selected accessions, which include some closely related sister lines as well as other accessions. An additional 144 accessions will also be tested afterwards. We expect to identify some SNP markers that are polymorphic among closely-related genotypes and breeding populations. The information of markers we designed will be uploaded for use by the peanut community, where the data can be used for genotyping by resequencing for breeding programs with reduced cost.

Cost-Effective Genotyping by Resequencing Using Tecan Allegro Targeted Genotyping V2

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Genotyping has been used broadly for years in multiple scientific programs to provide DNA information by detecting sequence variations. These genetic variations can be designed into molecular markers and are useful for linkage mapping and genome-wide association studies. Traditional ways of genotyping use molecular markers by running gel electrophoresis, which is now considered low-throughput due to its limitation of sample numbers per run, the need of larger amount of DNA, extra time, and effort. Recent years, it has been popular to use high-throughput approaches such as next-generation sequencing (NGS) and single nucleotide polymorphism (SNP) chip DNA microarray for generating thousands of SNP markers. However, it could be expensive for labs that require frequent use as a routine tool, such as breeding programs that need to perform genotyping on large populations with hundreds of individuals. We aim to develop a cost-effective genotyping system by using Tecan Allegro Targeted Resequencing V2 kit. It provides customed probes design, which indicates that all the DNA fragments synthesized are known targets. In one of our peanut projects, polymorphic fragments that are distinguishable from possible homologs were designed into 5,154 probes for 2,770 SNP targets. This can help increase the rate of true SNPs with reduced chance of misalignment due to short reads, poor quality SNP calls, or low read depth. One of the projects in NCSU were done by using this kit with around 15K probes, and the results showed that 79 percent of targets were recovered. The kit is compatible with Illumina HiSeq, MiSeq, NextSeq, and NovaSeq, and can help lower the price from $28 (SNP chip and GBS) to $15. This kit has been used for many different species; besides peanut, TAMU has used in for rat, turkey, and cotton projects with customed probes. The information of validated target primers from our project will be public for the peanut community to use and become useful tools for peanut breeding programs.

Conidia Production of *Nothopassalora personata* on Media

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In vitro studies with *Nothopassalora personata,* the cause of late leaf spot disease of peanut, have been limited due to slow growth and poor reproducibility of spore production in culture. A study was conducted at Valdosta State University to evaluate the effect of isolate age and morphology on conidial production. Isolates of *N. personata,* originating from single spores transferred from dried late leaf spots in January 2021 and fresh sporulating lesions in October 2021, were cultivated on potato dextrose agar (PDA) at room temperature under continuous light. In both trials, conidia were observed when germlings were 5 to 10 days old, and sporulation ceased shortly thereafter. For all isolates, nonsporulating tissues were uniformly melanized and stromatic with a crust-like texture for 2 to 3 months, after which one or more new morphological forms emerged. The most frequently observed forms presented reddish-brown hyphal fragments, light gray hyphal fragments, and smooth stromata with red pigmentation. All dark brown, reddish-brown and smooth red tissues produced conidia 10 to 14 days after homogenization for isolates less than 5 months old. Across forms, approximately 500 conidia per mm^2 tissue were produced. Spore production decreased for all forms when isolates were older than 6 months. Homogenization of the light grey stromata failed to produce conidia regardless of isolate age. This study demonstrates that isolate age and morphology are important factors to consider when attempting to induce sporulation of *N. personata* on media. Isolates that are younger than 5 or 6 months old without light gray hyphal fragments are optimal.

Evaluating the Effect of Elemental Sulfur with Demethylation Inhibitors (DMI) and Quinone Outside Inhibitors (QoI) On Germination and Growth of *Nothopassalora personata*

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Late Leaf Spot (LLS) of peanut, caused by the fungal agent *Nothopassalora personata,* is an important foliar disease of peanut that can lead to premature defoliation and yield loss if not controlled. In fields with a history of late leaf spot, the disease is managed using frequent applications of fungicides. A recent study demonstrated that adding micronized elemental sulfur to DMI fungicides with reduced efficacy can enhance LLS suppression in fields with DMI-resistant populations of *N. personata*. To understand the role of sulfur in the mixtures, conidia of *N. personata* were exposed to six fungicide treatments on the surface of water agar plates in the laboratory. The fungicide treatments evaluated were 200 μl of 1) water (nontreated control), 2) elemental sulfur (0.044mg/ml), 3) tebuconazole (0.3 mg/mL), 4) sulfur (0.044mg/ml) with tebuconazole (0.3 mg/mL), 5) azoxystrobin (0.3 mg/mL), and 6) sulfur (0.044mg/ml) with azoxystrobin (0.3 mg/mL). After the treatments had dried, 1x1 cm sections of a sporulating culture of *N. personata* were pressed, sporulation side down, against the treated surface to transfer conidia. Assay plates were incubated at room temperature under continuous light for 48 hours. There were three replications, and the experiment was conducted twice. Treatment effects on germination and growth were observed for at least 30 individuals per assay plate using a compound microscope. Results showed that sulfur alone or as a mixing partner did not affect fungal germination or germ tube length ($P=0.095$), but sulfur did significantly reduce germ tube number ($P<0.05$). Sulfur reduced the incidence of germ tube branching by more than half compared to the nontreated control, as did tebuconazole and azoxystrobin ($P<0.01$). From this experiment, we saw that sulfur effects some of the growth variables measured for *N. personata* but not germination.

Mutmap and Whole Genome Re-Sequencing to Identify Gene(s) Controlling Peanut Resistance to Early Leaf Spot and/or Late Leaf Spot Diseases

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Early leaf spot (ELS) (*Passalora arachidicola*) and late leaf spot (LLS) *(Nothopassalora personata*) are two devastating foliar diseases in peanut (*Arachis hypogaea*) wherever peanuts are planted. Quantitative trait loci (QTLs) associated with peanut resistance to ELS and/or LLS have been reported but often were inconsistent. We developed a MutMap population derived from a crossing of a susceptible mutant 71-2 to the parental line Tifrunner, used for TILLING (Targeting Induced Local Lesions IN Genomes) mutagenesis. The objectives are to identify the associated gene(s) controlling the resistance/susceptibility to ELS or LLS or both by whole genome sequencing of the segregating population and phenotypic evaluation of the parent and mutant lines in the greenhouse by controlled inoculation and field study. This MutMap population consists of 97 segregating $F_{2:3}$ lines (TL) which were sequenced at low coverage along with the parent, two mutants, the susceptible mutant 71-2 and the retained resistance mutant 90-1, including 12 lines derived from the cross of 71-2 x 90-1 (TM). We used a highly accurate sequence analysis pipeline called KHUFU, allowing for low coverage sequencing that can be used to genotype these two “TL” and “TM” populations with increased power and precision. Single nucleotide polymorphisms (SNPs) were called using the KHUFU pipeline, and SNPs specific for each line ranged from 5 to 8118. These sequencing data and SNPs have been analyzed to visualize genetic variation across the populations and initially to identify mutations in corresponding genome regions of resistance or susceptibility from published QTLs. We have found that there is increased SNP density in Chromosomes A02 to A06 and the “TL” and “TM” populations are similar enough to cluster together in phylogenetic trees, but diverse enough from each other to create a 4th group in structure analysis, meaning these populations can be used to aid in identifying the resistance gene(s) or genome regions harboring the genes or mutations causing the susceptibility. Phenotyping in the field and greenhouse are currently in progress. The associated genes, SNPs, and markers will be used for molecular breeding for ELS and LLS resistant peanut cultivars.

The Peanut Shell as a Barrier and Target in Breeding Peanut to Resist Aflatoxin

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After the severe late-season drought accompanied by high temperatures in 2019 that resulted in record levels of aflatoxin contamination in the southeastern US peanut crop, the peanut industry responded with a renewed initiative to minimize aflatoxin. Breeding cultivars that can resist aflatoxin has long been a goal, because, if achieved, resistant cultivars would be widely deployable and apparently stable means to reduce aflatoxin in eatable peanuts. Since the early 1970's researchers have worked to identify and develop resistant germplasm and cultivars. In a 2009 review article summarizing efforts at ICRISAT, the authors concluded "The lack of high levels of resistance to aflatoxin contamination in the cultivated peanut germplasm places a ceiling on the progress that can be made following conventional approach in resistance breeding."(1). It is clear that there are gains to be made in developing peanut genotypes that resist *Aspergillus*, but it is also clear that the task is complicated. Early work in breeding for aflatoxin resistance focused on the seed coat as a barrier to aflatoxin contamination (2) and identified two PI lines with significantly reduced *Aspergillus* contamination. Testa attributes that have been linked to resistance (4) include physical ("thickness and density of palisade layers, presence of wax layers, and absence of fissures and cavities" [from 1]) as well as chemical (tannin [3,4]) attributes. Subsequent work investigated the pod shell as a barrier to aflatoxin contamination (5). From this work they concluded that the pod shell was an effective barrier to *Aspergillus* colonization of the seed, but there were complicating factors including GxE that made it difficult to pinpoint the pod shell as a primary target for breeding for resistance to aflatoxin. Others have commented that changes in the pod aimed to reduce *Aspergillus* contamination might be detrimental to shelling characteristics that would render the cultivars economically non-viable (from 1). However, the potential for chemical and physical changes in pod shell and that could aid in resisting *Aspergillus* have not been investigated. Chemical properties of the pod shell could obviate potential detrimental physical changes and or complement minor changes in the physical properties of the shell that could be an acceptable tradeoff if aflatoxin contamination were reduced. This presentation will summarize the literature regarding breeding for aflatoxin resistance relative to pod characteristics in peanut and theorize about gaps in knowledge that may be investigated.

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Biochemical Characterization of *Arachis* Induced Allotetraploids and their Parent Wild Species

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Several diploid *Arachis* wild species have been identified as sources of resistance to diseases that commonly afflict cultivated peanut, *A. hypogaea* L. Successful introgression of resistance alleles into peanut cultivars may reduce yield losses. To do this, wild species are crossed, and their chromosome number is chemically doubled to generate allotetraploids that are fertile and compatible with cultivated peanut. Some biochemical data has been collected previously for various *Arachis* species, but no information is available for the allotetraploids. To characterize the effects of hybridization and tetraploidization on seed traits, we measured oil content, protein content, and fatty acid composition and compared them to their diploid parents as well as cultivated peanut references. There were significant differences in oil and protein between and among the wild species and allotetraploids, but the trends were mixed, with some allotetraploids showing increased oil and lower protein while others resulted in less oil and higher protein. Grain oleic acid content, an important dietary and oil stability trait, was slightly lower in the allotetraploids on average. But one specific hybrid, IpaDur2 from a cross between *A. ipaënsis* and *A. duranensis*, showed a wide range among the seeds tested from 34.7% to 59.0% indicating that there could be new genetic variation introduced during the hybridization process. Characterizing these important genetic resources is important for their use in peanut breeding programs to develop disease resistant, nutritionally desirable cultivars.

The Effects of Paraquat Use on Peanut in the Southwestern United States

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Weed pressure in peanut [*Arachis hypogaea* (L.)] is a problem that persists throughout the growing season. Peanut compete with weeds for sunlight, water, and nutrients, leading to plant stunting and yield loss. During harvest, increased weed density can have a negative effect on the entire harvest process from digging to theshing. yield losses in excess of 40% have been observed under heavy weed densities. Timely weed control is vital to maximum peanut yield. One herbicide option available to peanut producers for controlling troublesome weeds is paraquat. Paraquat is labeled for application within 28 days after emergence, but not afterwards due to the possibility for crop injury. Trials were conducted in 2021 in Oklahoma and two locations in Texas to evaluate the response of peanut to paraquat n. Treatments included paraquat applied at either 10.8 fl oz/A or 21.6 fl oz/A alone or applied in combination with S-metolachlor (Dual Magnum) applied at either 1.33 pt/A or 2.66 pt/A.Treatments were applied 14 days after cracking (DAC), 28 DAC, or 14 DAC followed by 28 DAC. Stand reduction never exceeded 5% with any treatment at any location throughout the growing season. The only treatment applied 14 DAC that injured peanut less than 10% (6 weeks after crack) was Gramoxone alone (1X) at both Fort Cobb and Lubbock. Gramoxone (2X) was the only 28 DAC applications that exceeded 10% at Fort Cobb. While injury was 20% or more at Lubbock with all 28 DAC treatments except Gramoxone + Dual Magnum (1X). Applications made at both 14 and 28 DAC injured peanut 11-20% at Fort Cobb and 40-70% in Lubbock. Visual injury was a combination of necrosis and stunting. Injury at Fort Cobb (8 weeks after crack) did not exceed 10% for any treatment applied at 14 or 28 DAC. Peanut injury exceeded that at Lubbock (15-40%) with all treatments except for Gramoxone (1X) applied 14 DAC. Applications at both 14 and 28 DAC injured peanut 9% (Gramoxone 1X) to 25% (Gramoxone + Dual Magnum 2X) at Fort Cobb and 33% (Gramoxone 1X) to 72% (Gramoxone + Dual Magnum 2X) at Lubbock. Injury at Yoakum was 15% or greater, 6 weeks after crack, and 20% or greater, 8 weeks after crack, with all treatments. Yields at Fort Cobb were not significantly different among treatments, with the exception of Gramoxone applied at a 2X rate alone and in combination with Dual Magnum, both yielding lower than the weed free check. No yield difference between treatment was observed at Lubbock. This research indicates that while visual injury may be observed with paraquat this does not necessarily translate to yield losses. These same trials are being conducted at for a second year to confirm the results from the 2021 growing season.

Seeding Rate as Affected by Planting Date for Three Peanut Cultivars

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Peanut (*Arachis hypogaea* L.) responds in different ways to various management practices. Two highly influential factors include seeding rate and planting date. Early planting is more heavily dependent on soil temperature and slows emergence, and is more susceptible to tomato spotted wilt virus (TSWV) compared to later planting, although late planting can result in the crop not reaching full maturity. Denser seeding rates typically result in reduction in TSWV incidence compared to sparser seeding rates, but it is more expensive to plant more seed. However, there are not studies that test seeding rates in interaction with planting date. Since seeding rate recommendations vary for single and twin row patterns, each were used as separate trials. Experiments were conducted in Tifton, GA from 2018-2020 to evaluate seeding rates of approximately 16.4, 19.7, 22.5, and 26.2 seed/m at different planting dates. In 2018, three planting dates were used (early May, mid May, and early June). In 2019 and 2020, an earlier planting date was added (mid April), as well as the three dates from the first test. Three cultivars were used in all tests (Georgia-06G, TifNV-HiOL, FloRun^{TM} 331). A split plot design was used with planting date as the main treatment effect, and a split involving a two-factor factorial of seeding rate and cultivar. In all years, yield was maximized at the early May planting

Efficacy and Economics of Precision Soil Sampling Strategies for Site-Specific Soil pH Management in Peanut

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Soil pH affects the amount of nutrients that are available to all plants. Peanut perform best in a soil pH range of 6.0 - 6.5, where soil nutrients are readily available. Most agriculture fields in Georgia have a significant amount of soil variability including soil type and texture. Precision soil sampling strategies, grid- or zone-based, are commonly used to determine areas in the field for site-specific application of soil amendments and nutrients. Grid size and spatial layers used to delineate zones for soil sampling can impact the accuracy of soil pH map and consequently the prescription map used for variable-rate application. This study compares the efficacy of commonly used grid sizes (1.0, 2.5, 5.0, 7.5, 10.0 ac) in Georgia, as well as two different spatial data layers, Electrical Conductivity (EC) and Soil Brightness Index (SBI), for zone-based strategies to determine the most cost-effective precision soil sampling strategy. The study was conducted in four production fields across South Georgia in 2022. Sampling grids were created for all fields in sizes of 1.0, 2.5, 5.0, 7.5, 10.0 ac. Soil samples were collected within each grid size using a point sampling method. Zones were created using spatial data layers and soil samples were collected within each zone. The zone maps were used to create six different sampling scenarios, where 50%, 25%, 20%, 15%, 10% and 5% of the total amount of soil sampling points were used. For example, in Field 2 there were 163 total sampling points across all strategies, and for EC 50% 81 of those 163 points were used to create the prescription map. Correlation analysis was conducted to determine relationships between all grid sizes and zones compared to the combination of all grid points (assumed as actual spatial variability). Economic analysis was conducted to determine the strategy that was most cost-effective, while also capturing the maximum spatial variability in the field. The 1.0 ac, EC 50%, EC 20%, SBI 50%, and SBI 25% sampling methods all produced a prescription map that was at least 90% on target to the actual spatial variability, on average. The single composite sample method was found to be the least economical as it resulted in only 34% of lime on target to the actual needs of the field. Choosing the most efficient soil sampling method for variable rate lime in peanuts is important to the grower’s bottom line. Soil sampling may seem to be an easy way to cut cost, but this research shows grid soil sampling conducted at 1.0 ac grids reduced the amount of over or under fertilization. Management zones prove to have potential to be both efficient and economical as even as low as 5% of the total soil sampling points resulted in nearly 80% of the lime being applied correctly. Future research will be conducted to expand on the creation of management zones using other spatial layers.

Comparison of Peanut White Mold Fungicide Programs in Bulloch County, Georgia

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White mold is a critical problem for peanut producers in Bulloch County and must be addressed with additional on-farm research to establish “best management” practices. The producers’ current best line of defense to combat the problem involves selection of more-resistant varieties and judicious use of fungicides. Further research is needed to provide recommendations to growers with regard to use of newer fungicides and application strategies for the management of white mold. In this demonstration conducted in 2021, the effectiveness of nine different fungicide programs was evaluated. The experimental design was a complete block design with four replications. Data collected throughout this study included severity of leaf spot and incidence of white mold. Means were separated using Fisher’s protected LSD. From this research, the effectiveness of the fungicide treatments in reducing the incidence of white mold was evaluated as part of a disease management program to improve yield and quality. This data will play an important role in recommendations for future use of peanut fungicide selection to reduce white mold in Bulloch County and the Southeast.

Evaluating Accuracy and Distribution Uniformity of Gypsum Application in Peanut for a Spinner-Disc Broadcast Spreader

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Gypsum application in peanut is important to provide calcium in the pegging zone and to ensure high peanut yield and quality. Spinner-disc spreaders are the common application equipment to broadcast apply gypsum in peanut. Application issues with spinner-disc spreaders are common and several recent studies have reported the non-uniformity issues when spreading dry granular fertilizer with spinner-disc spreaders. Similar research on gypsum application is limited, therefore the objective of this study was to evaluate the application accuracy and distribution uniformity across the swath for gypsum applied using a spinner-disc spreader. Field tests were conducted in a large-scale peanut field at the Southwest Research and Education Center in Plains, GA in 2021. Before making a spreader pass, collection pans – spaced 6 ft. apart – were placed along the spread swath at three different transects (approx. 100 ft. apart) within the same pass and gypsum applications were made at three different spreader settings (flow divider position 1", 4" and 7" where 4" was the nominal setting used by the farm manager). The target application rate for gypsum was 900 lbs/ac while the spreader was set up to apply at a spread width of 36 ft. swath. After each spreader pass, material from each collection pan for all three transects was collected and weighed to determine the actual applied rate as well as the uniformity of distribution across the swath as represented by coefficient of variation (CV). Results showed that the actual application rate attained in the field was always lower (354 – 646 lbs/ac) than the target rate (900 lbs/ac) and it also varied among the spreader settings. The results also indicated that gypsum application was highly non-uniform (CV = 30% - 65%) across the swath with a heavy material deposition directly behind the spreader for all three spreader settings. Considerable differences in spread uniformity (30 – 50%) were also observed for the material collected in the three transects within the same spreader pass. This study highlights the inconsistencies associated with achieving accurate application rate and uniform material distribution when spreading material with spinner-disc spreaders. While application errors due to equipment limitations and material properties are completely unavoidable, proper spreader setup and calibration is important to attain acceptable application accuracy, especially for peanut seed growers. Future research will also evaluate the similar application data for large self-propelled high clearance broadcast spreaders.

Influence of Within-Field Soil pH Variability on Peanut Growth and Yield: A Case Study to Demonstrate the Benefits of Variable-Rate Lime Applications

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Proper fertilization in peanut requires adequate lime application to maintain a soil pH between 6.0 and 6.5 as nutrients such as P and K are more readily available in this range, and to ensures high peanut yield and quality. In most agricultural fields in the southeastern US, soil pH can vary within the fields. Thus, precision soil sampling strategies for site-specific management of soil pH are recommended but still not widely utilized by the growers. This case study was conducted to show the effects of uniform lime application in a field with soil pH variability with a goal of demonstrating the need and benefits associated with variable-rate lime applications in peanut production. A 37.5-ac field in Tifton, GA was soil sampled on 2.5-ac grids to map soil pH variability within the field. Three different soil pH zones (zone 1: 5.5 – 6.0, zone 2: 5.0 – 5.5, and zone 3: 4.5-5.0 soil pH) and the corresponding lime application rates (0.5, 1.0 and 1.5 ton/ac for zone 1, 2, and 3 respectively) were determined for the field. However, based on the traditional single composite soil sampling approach utilized by the grower, a single rate of 0.5 ton/ac of lime was applied uniformly across the whole field. Plant tissue samples, crop growth assessments in the season and yield at harvest were recorded in all three zones. All data were statistically analyzed using an alpha value of 0.10. Results showed that plant nutrient levels and crop growth in the season was considerably lower in soil pH zones 2 and 3 representing low soil pH areas in the field. When compared to zone 1, peanut yield was reduced by 1,262 and 4,577 lbs/ac in zone 2 and 3, respectively. An economic analysis to compare uniform and variable-rate lime application was performed which indicated that implementing grid sampling and variable-rate lime application could increase the gross revenue by $37/ac in this field. The potential increase in revenue would also cover the additional cost of grid-sampling ($6.5/ac) and the additional lime ($4/ac) needed in the low soil pH areas. This case study demonstrates how variable-rate lime application can help in addressing soil pH variability in the fields while paying for the precision soil sampling approach and the cost of variable-rate technology.

Efficacy and Economics of Precision Soil Sampling Strategies for Site-Specific Soil pH Management in Peanut

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Soil pH affects the amount of nutrients that are available to all plants. Peanut perform best in a soil pH range of 6.0 - 6.5, where soil nutrients are readily available. Most agriculture fields in Georgia have a significant amount of soil variability including soil type and texture. Precision soil sampling strategies, grid- or zone-based, are commonly used to determine areas in the field for site-specific application of soil amendments and nutrients. Grid size and spatial layers used to delineate zones for soil sampling can impact the accuracy of soil pH map and consequently the prescription map used for variable-rate application. This study compares the efficacy of commonly used grid sizes (1.0, 2.5, 5.0, 7.5, 10.0 ac) in Georgia, as well as two different spatial data layers, Electrical Conductivity (EC) and Soil Brightness Index (SBI), for zone-based strategies to determine the most cost-effective precision soil sampling strategy. The study was conducted in four production fields across South Georgia in 2022. Sampling grids were created for all fields in sizes of 1.0, 2.5, 5.0, 7.5, 10.0 ac. Soil samples were collected within each grid size using a point sampling method. Zones were created using spatial data layers and soil samples were collected within each zone. The zone maps were used to create six different sampling scenarios, where 50%, 25%, 20%, 15%, 10% and 5% of the total amount of soil sampling points were used. For example, in Field 2 there were 163 total sampling points across all strategies, and for EC 50% 81 of those 163 points were used to create the prescription map. Correlation analysis was conducted to determine relationships between all grid sizes and zones compared to the combination of all grid points (assumed as actual spatial variability). Economic analysis was conducted to determine the strategy that was most cost-effective, while also capturing the maximum spatial variability in the field. The 1.0 ac, EC 50%, EC 20%, SBI 50%, and SBI 25% sampling methods all produced a prescription map that was at least 90% on target to the actual spatial variability, on average. The single composite sample method was found to be the least economical as it resulted in only 34% of lime on target to the actual needs of the field. Choosing the most efficient soil sampling method for variable rate lime in peanuts is important to the grower's bottom line. Soil sampling may seem to be an easy way to cut cost, but this research shows grid soil sampling conducted at 1.0 ac grids reduced the amount of over or under fertilization. Management zones prove to have potential to be both efficient and economical as even as low as 5% of the total soil sampling points resulted in nearly 80% of the lime being applied correctly. Future research will be conducted to expand on the creation of management zones using other spatial layers.

Allele-specific Expression of a Transcription Factor Gene Influences Peanut Nodulation

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Peanut as a legume species can establish a symbiotic relationship with rhizobia to fix nitrogen from the atmosphere. Over a hundred genes involved in legume symbiosis have been identified. A GRAS family transcription factor gene, *nodulation signaling pathway 2* (*NSP2*) plays a critical role in the symbiotic signaling pathway. Through a map-based cloning approach previously, two homoeologous genes, *AhNSP2-A08* or N_a and *AhNSP2-B07* or N_b were identified to control peanut nodulation. Interestingly, some peanut plants with $n_a n_a N_b n_b$ genotype produce nodules (Nod+ phenotype) and some not (Nod– phenotype). To further understand the genetic mechanism of Nod– phenotype of the $N_b n_b$ plants, allelic expression was investigated in peanut roots and flowers. The results showed that only a single allele at $\mathrm{N_b}$ locus was expressed in the peanut roots. In Nod– $N_b n_b$ plants, only a mutant allele n_b was expressed. In peanut flowers, N_b gene expressed significantly low in ovary than in pollen. The results indicated that the expression of N_b gene in ovary was inhibited or maternally silenced. This study firstly reported an allele-specific expression in tetraploid peanuts, which provided fundamental knowledge of epigenetic regulation in ploidy plants.

Crop Yield and Financial Investment of Sub-Surface Drip Irrigation over the Life of the System

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Historically, information in North Carolina has been limited comparing corn (*Zea mays* L), cotton (*Gossypium hirsutum* L.), and peanut (*Arachis hypogaea* L.) response to sub-surface drip irrigation (SDI) and the financial viability this approach to water delivery. A SDI system was installed in North Carolina on a Norfolk loamy sand soil near Lewiston-Woodville in 2001 to determine response of these crops to SDI in various trials through 2013. In this abstract we discuss results over the life of the system (13 years) when comparing SDI to dryland production. Over the life of the system (e.g., 13 years), the number of crop cycles for corn, cotton, and peanut was 5, 11, and 7, respectively. Peanut in North Carolina often are grown in rotation with corn and/or cotton with at least 2 years between peanut plantings. The ratio of years of corn and cotton to peanut was 2.3:1 over the 13 years. However, plantings during the 13 years were not designed to represent a consistent rotation sequence of these crops and reflect individual experiments that were important at the time.

Cost of installing the system was estimated at $1,619/acre with cost of installation annualized over 13 years for a yearly cost of $125/acre. Annual maintenance was set at 3% of installation cost for a yearly cost of $49/acre. Total cost of SDI was $174/acre. Fixed and variable costs other than SDI for corn, cotton, and peanut was set at $453/acre, $613/acre, and $925/acre, respectively. Low, medium, and high pricing structures were compared for corn, cotton, and peanut. Low, medium, and high price for corn was $3/bushel, $5/bushel, and $7/bushel, respectively. Prices for cotton in these respective structures was $0.6/lb lint, $0.8/lb lint, and $1/lb lint. The low, medium, and high price for peanut was $0.24/lb, $0.27/lb, and $0.3/lb, respectively. Estimated financial return for each pricing structure was calculated as the product of crop yield and price, minus total cost of production including SDI.

Corn yield was 150 to 240 percent greater in years 2008 to 2011 under SDI compared with dryland production while cotton yield under SDI was 130 to 220 percent greater than dryland production in six of 11 years. Peanut yield was 120 to 150 percent greater under SDI than grown without irrigation in four of 7 years. When pooled over years, corn yield was 85 bushels/acre under dryland production and 136 bushels/acre under SDI. Cotton yield for these respective irrigation treatments was 800 pounds/acre and 1050 pounds/acre. Peanut yield increased from 3010 pounds/acre to 3600 pounds/acre when SDI supplemented rain. No significant difference in estimated financial return was noted regardless of pricing structure when comparing dryland and SDI systems. When estimated financial return was pooled over years and crops, there was also no difference noted for the low and medium pricing structures. Total revenue in the SDI system across crops and years was $-4589/acre (low prices), $-89/acre (medium prices), and $4386/acre (high prices). Revenue across crops and years for dryland production was $-3974/acre, $-668/acre, and $2616/acre for these respective pricing structures.

Impact of In-Furrow Fertilizers on Peanut Germination in Multiple Locations

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Uniform stands are important to reduce disease risk and sustain high yield potential in peanut production. In an effort to achieve this desired start to the growing season, industry has begun to recommend at plant in-furrow fertilizers with minimal research available to support their recommendations. Riser products applied in-furrow were evaluated on peanut seed germination in a greenhouse trial in Tift County, Georgia, two on-farm trials in Worth County, Georgia and multiple states across the peanut belt. States included Florida, Alabama, South Carolina, North Carolina, and Virginia. The effects of Riser (7-17-3+micronutrients) at rates of 4.7, 9.4, 18.7, 28.1 l/ha and a non-treated check were evaluated on seed germination. Treatment responses were accessed at 6, 8, 10, 12, and 14 days after planting in most trials. Germination percentage was higher in the untreated check and the 4.7 and 9.4 l/ha rate of Riser. In-furrow application of Riser at 18.7 and 28.1 l/ha reduced emergence from 6-14 days after planting. Similar results were observed in the two on-farm trials as well as the other states where the two highest rates of fertilizer significantly reduced emergence rates compared to the untreated control from 10-15 days after planting. In all experiments, Riser reduced the rate of emergence for majority of the rates and final plant stands at the rate of 18.7 and 28.1 liters per hectare compared to the untreated check.

Evaluating Peanut Varieties for Early Maturity in North Mississippi

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Northern and mid-Mississippi regions have shorter growing seasons, cooler nights, and lower thermal unit accumulation than Florida and southern Georgia. This environment results in slower crop development and delays in harvest maturity. Georgia-06G did not reach full harvest maturity in recent years, resulting in sub-optimal harvest yields and decreased grade potential. Delaying harvest to increase pod maturity increases the risk of unfavorable harvest conditions later in the year. Our team has evaluated advanced runner market type varieties for early maturity and agronomic suitability in north Mississippi. This research was completed in 2020 and 2021 and examined harvest mesocarp coloration, pod yield, and grade of 12 peanut cultivars, including Georgia-06G. This study shows that earlier maturing (7-14 days) runner market-type peanut cultivars can be developed for production in this region without significant reductions in pod yield potential.

Determining Optimal Digging Time in North Mississippi Peanut Production Systems

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Success during peanut harvest can be one of the most important factors determining profitable peanut production. If peanut is harvested too early, reductions in yield and grade can occur from the crop not reaching its full potential. Late harvesting of peanut can also result in significant loss of over-mature pods, and delays in harvest from unfavorable weather conditions increase the risk of diminished crop quality. Additionally, little information exist on maturity progression and optimal harvest timing for the midsouthern U.S. region. Research was completed across six site-years in north Mississippi quantifying mesocarp color, pod yield, and grade progression of Georgia-06G across five digging times. Digging times where standardized across site years by digging at specific accumulated growing degree days (base 13.3° C). Across all six site-years pod yield reached its maximum close to 1875 °C days. This corresponded to 72% black, brown, orange pods. These results provide additional methods than can be utilized with the peanut profile board to determine optimal peanut digging time within the northern latitudes of Mississippi.