National Sweetpotato Collaborators Group

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The 47th Annual Meeting of the

NATIONAL SWEETPOTATO COLLABORATORS GROUP

January 20-21, 2023

Wilmington, NC

2023 TECHNICAL PROGRAM
&
2022 PROGRESS REPORT

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NATIONAL SWEETPOTATO COLLABORATORS GROUP
2023

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AGENDA AND TECHNICAL PROGRAM
National Sweetpotato Collaborators Group

Chairperson: Katie Jennings, North Carolina State University

Friday January 20, 2023

7:30 Registration and Continental Breakfast

8:00 Call to Order and Announcements

8:15 State Reports

8:45 Discussion

Master of Science Student Competition

Presiding: Michelle McHargue

9:00 Curing Duration and Temperature Effects on Covington Sweetpotato Over Time and Environmental Conditions of International Sweetpotato Shipments. Stuart Michel[1], Jonathan Schultheis[1], Keith D. Starke[1], and Lina Quesada-Ocampo[2]. [1]Department of Horticultural Science, North Carolina State University, Raleigh, NC, USA. [2]Department of Entomology and Plant Pathology and NC Plant Science Initiative, North Carolina State University, Raleigh, NC, USA. (swmichel@ncsu.edu)

9:15 Evaluating Sweetpotato Yield Response to Nitrogen Rates and Cover Cropping Systems. Mark Hall[1], Lorin Harvey[1], Mark Shankle[1], and Callie Morris[1]. [1]Mississippi State University, Pontotoc, MS. (mah1140@msstate.edu)

9:30 Advanced Sweetpotato Clone Observations of Yield, Quality, Storage Traits and Post Packing Evaluations. Brandon Parker[1], and Jonathan R. Schultheis[1]. [1]Horticultural Science Department, North Carolina State University, Raleigh, NC 27695. (bkparker@ncsu.edu)

9:45 Effects of Root and Slip Fungicide Applications on Sweetpotato Southern Blight and Pesticide Residue Levels Postharvest. [1]Jack Mascarenhas, [1]Hunter Collins, and [1]Lina Quesada-Ocampo. [1] Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC 27695. (jmmasca2@ncsu.edu)

10:00 Ornamental Sweetpotato and High-throughput Phenotyping. Mark Watson[1], Chris Heim[1], Marcelo Mollinari[1], Craig Yencho[1], Andres Salcedo[2], Kenneth Pecota[1], Christie Almeyda[2], and Lina Quesada-Ocampo[2]. [1]Department of Horticultural Science, North Carolina State University, Raleigh, NC 27695, [2]Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC 27695. (mtwatso2@ncsu.edu)

10:15 Break

PhD Student Competition

Presiding: Katie Jennings

10:45 Improved Phenotyping and Breeding Progress Towards Root-knot Nematode Resistant Sweetpotato Varieties for the Southeast. Simon Fraher[1], Mark Watson[1], Hoang Nguyen[1], Guilherme da Silva Peirera[2], C. Robin Buell[3], Marcelo Mollinari[1], Adrienne Gorny[4], Craig Yencho[1]. Department of Horticultural Science, North Carolina State University, Raleigh, NC 27695. [2]Guilherme da Silva Peirera, Federal University of Viçosa. [3]Crop and Soil Sciences, University of Georgia, Athens, NC 30602. [4]Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC 27695. (spfraher@ncsu.edu)

11:00 Effect of Postemergence Herbicides in Covington Sweetpotato. Stephen Ippolito[1], Katherine M. Jennings[1], David W. Monks[1], David L. Jordan[2], Sushila Chaudhari[3]. [1]Horticultural Science Department, North Carolina State University, Raleigh, NC 27695. [2]Crop and Soil Sciences Department, North Carolina State University, Raleigh, NC 27695. [3]Department of Horticulture, Michigan State University, East Lansing, MI 48824. (sjippoli@ncsu.edu)

11:15 Effect of Flumioxazin and *S*-metolachlor on Covington Sweetpotato Planted Vertically or Horizontally. Keith D. Starke[1], Katherine M. Jennings[2], David W. Monks[2], Jonathan R. Schultheis[2], Colton Blankenship[2], and Stephen J. Ippolito[2].[1]North Carolina State University Central Crops Research Station Clayton, NC 27520. [2]Horticultural Science Department, North Carolina State University, Raleigh, NC 27695.

11:30 Estimation of Sweetpotato Weight and Volume from 2D Images via Transfer Learning. Azizah Conerly[1*], Cranos Williams[1], Michael Kudenov[1], Craig Yencho[2], Michael Boyette[3], Khara Grieger[4], Daniela Jones[3], North Carolina State University. [1]Department of Electrical and Computer Engineering, Raleigh, NC 27606. [2]Department of Horticultural Science, Raleigh, NC, 27695. [3]Department of Biological and Agricultural Engineering, Raleigh, NC, 27695. [4]Department of Applied Ecology, Raleigh, NC, 27695. (azconerl@ncsu.edu)

11:45 Lunch

PhD Student Competition

Presiding: Katie Jennings

1:00 Development and Implementation of Two High-throughput Phenotype Scanners in the Post-harvest Pipeline of Sweetpotatoes (*Ipomoea batatas*). Enrique Pena Martinez, Michael Kudenov, and Hoang Nguyen. North Carolina State University, Raleigh, NC 27695. (eepena@ncsu.edu)

1:15 Evaluation of Slip Storage Conditions on Stand and Yield. Callie Morris[1], Lorin Harvey[1], Mark Hall[1], and Mark Shankle[1] Pontotoc Ridge-Flatwoods Branch Experiment Station, MS State University, Pontotoc, MS 38863. (cjw521@msstate.edu)

1:30 The Sweet Scents of Sweetpotato: Identification of Volatile Compounds Predicting Unique Flavors. Modesta N. Abugu*[1], Suzanne Johanningsmeier[2], Mariam Nakitto[3], Matthew Allan[2], Kenneth V. Pecota[1], Massimo Iorizzo[1,4], G. Craig Yencho[1]. [1]Department of Horticultural Science, NC State University, Raleigh, NC 27695, USA. [2]USDA_ARS, Southeast Area Food Science and Market Quality and Handling Research Unit, Raleigh NC, 27695 USA. [3]International Potato Center (CIP-SSA), Plot 47 Ntinda II Road, PO Box 22247, Kampala, Uganda. [4]Plants for Human Health Institute, Department of Horticultural Science, North Carolina State University, Kannapolis, North Carolina, USA. (mnabugu@ncsu.edu)

1:45 Building an Objective Model for Predicting Ideal Sweetpotatoes Using Shape, Size-related Features. Hangjin Liu[1], Cranos Williams[1], Michael Boyette[2], Michael Kudenov[1], Craig Yencho[3], [1]North Carolina State University. [1]Department of Electrical and Computer Engineering, Raleigh, NC 27606. [2]Department of Biological and Agricultural Engineering, Raleigh, NC 27695. [3]Department of Horticultural Science, Raleigh, NC 27695. (hliu25@ncsu.edu)

2:00 Effect of *S*-metolachlor and Flumioxazin Herbicides on Sweetpotato Treated with and without Activated Charcoal Applied Through Transplant Water. Colton D. Blankenship[1], Katherine M. Jennings[1], David W. Monks[1], David L. Jordan[2], and Stephen L. Meyers[3]. [1]Horticultural Science Department, North Carolina State University, Raleigh, NC 27695. [2]Department of Crop and Soil Sciences, North Carolina State University, Raleigh, NC 27695. [3]Department of Horticulture and Landscape Architecture, [4]Purdue University, West Lafayette, IN. (cdblank3@ncsu.edu)

2:15 Effectiveness of Anaerobic Soil Disinfestation on Weed and Nematode Control in Sweetpotato. Simardeep Singh[1], Will Rutter[1], Phil Wadl[1], Churamani Khanal[1] and Matthew Cutulle[1]. [1]Clemson University Coastal Research and Education Center. 2700 Savannah Hwy Charleston SC 29414. (ssimardeep70@gmail.com)

2:30 Root Architectural Response to Parasitism by *Meloidogyne enterolobii* and *M. incognita* in Sweetpotato Genotypes. David Galo[1], Arthur Villordon[2], Josielle Santos Rezende[1], Christopher A. Clark[1], Don R. Labonte[3], Tristan Watson[1]. [1]Department of Plant Pathology and Crop Physiology, Louisiana State University Agricultural Center, Baton Rouge, LA 70803, [2]Sweet Potato Research Station, Louisiana State University

Agricultural Center, Chase, LA 71324, [3]School of Plant, Environmental, and Soil Sciences, Louisiana State University Agricultural Center, Baton Rouge, LA 70803. (dGalo@agcenter.lsu.edu)

2:45 Understanding the Influence of Seed Generation on Potyvirus Load and Yield in Sweetpotatoes Across U.S. Production Areas. Rebecca Wasserman-Olin[1] and Miguel Gómez[2]. [1]Department of Agricultural and Resource Economics, Colorado State University, Fort Collins, CO 80523. [2]Charles H. Dyson School of Applied Economics and Management, Cornell University, Ithaca, NY 14850. (Rebecca.Wasserman-Olin@colostate.edu)

3:00 Unveiling NLR Gene Diversity in Hexaploid Sweetpotato Cultivars. Camilo H. Parada-Rojas[1], Kevin L. Childs[2], Monica Fernandez de Soto[3], Andres Salcedo[1], Kenneth Pecota[4], Christie Almeyda[5], David Baltzegar[3], G. Craig Yencho[4], and Lina. M. Quesada-Ocampo[1]. [1] Department of Entomology and Plant Pathology and NC Plant Sciences Initiative, North Carolina State University, Raleigh, NC 27695, USA. [2] Department of Plant Biology, Michigan State University, East Lansing, MI 48824, USA. [3] Genomic Science Laboratory, North Carolina State University, Raleigh, NC, 27695. [4] Department of Horticulture, North Carolina State University, Raleigh, NC 27695, USA. [5] Micropropagation and Repository Unit, North Carolina State University, Raleigh, NC 27695, USA. (chparada@ncsu.edu)

3:15 Break

PhD Student Competition

3:30 Variation in Gene Expression of Putative *PHT1;5* Gene Among Sweetpotato Cultivars in Response to Phosphorus Deficient Conditions. Lisa Arce[1], Don LaBonte[1], Cole Gregorie[2], and Arthur Villordon[2]. [1]LSU AgCenter School of Plant, Environmental, and Soil Sciences, Baton Rouge, LA 70803. [2]LSU AgCenter Sweet Potato Research Station, Chase, LA 71324. (larce3@lsu.edu)

Processing and Marketing

Presiding: Jonathan Schultheis

4:00 Composition and Sensory Attributes of Satsuma and Sweetpotato Juice Blends. David H. Picha, School of Plant, Environmental and Soil Sciences, Louisiana State University Agricultural Center, Baton Rouge, LA 70803. (dpicha@agcenter.lsu.edu)

4:15 Breeding Tasty Sweetpotatoes: Development of a Universal Sensory Lexicon for Characterizing Sweetpotato Appearance, Flavor, and Texture. Suzanne D. Johanningsmeier[1], Mariam Nakitto, Modesta Abugu, Elizabeth Khakasa, Matthew Allan, Kenneth Pecota, and Craig Yencho. (suzanne.johanningsmeier@usda.gov)

4:30 Effect of Temperature and Frying Time on Sweetpotato Saccharification. David H. Picha and Alvaro Pilla, School of Plant, Environmental and Soil Sciences, Louisiana State University Agricultural Center, Baton Rouge, LA 70803. (dpicha@agcenter.lsu.edu)

4:45 Classification of Sweetpotatoes Based on Size Characteristics with Machine Learning. Daniel Perondi[1], Sowjanya Srija Movva[1], Cranos Williams[1], Michael Kudenov[1], Craig Yencho[2], Michael Boyette[3], Khara[4], and Daniela Jones[3]. [1]Department of Electrical and Computer Engineering, North Carolina State University, Raleigh, NC 27695. [2]Department of Horticultural Science, North Carolina State University, Raleigh, NC 27695. [3]Department of Biological and Agricultural Engineering, North Carolina State University, Raleigh, NC 27695. [4]Department of Applied Ecology, North Carolina State University, Raleigh, NC 27695. (dperond@ncsu.edu)

Poster Session

Meloidogyne enterolobii Resistance Screening in Sweetpotato Germplasm. Catherine A. Wram. USDA ARS Charleston, SC. (catherine.wram@usda.gov)

Development of a High-throughput Screening Method for Detection of *Meloidogyne enterolobii* in Sweetpotato Storage Roots. Julianna Culbreath[1], W. Rutter[2], P. Wadl[2] and C. Khanal[1]. [1]Department of Plant and Environmental Sciences, Clemson University, Clemson, SC 29634. [2]USDA, ARS, Charleston, SC, 29414. (julianna.culbreath@usda.gov)

Sensory Evaluation Results for Specialty Sweetpotatoes. Mussoline, W.[1] and D. Dinkins[2]. [1]UF/IFAS Putnam County Agriculture Extension Agent, East Palatka, FL, 32131. [2]UF/IFAS Multi-County Community Development & Food Systems Extension Agent, Gainesville, FL, 32611. (wmussoli@ufl.edu)

Simultaneous Prediction of Beta-carotene, Anthocyanins, and Phenolics in Sweetpotatoes by Near-infrared Spectroscopy. Matthew C. Allan[1], Ragy Ibrahem[2], Suzanne D. Johanningsmeier[1], Kenneth V. Pecota[2], and G. Craig Yencho[2]. [1]Food Science and Market Quality and Handling Research Unit (Raleigh, NC) United States Department of Agriculture, Agricultural Research Service. [2]Sweetpotato and Potato Breeding and Genetics Programs North Carolina State University. (matthew.allan@usda.gov)

Effects of Stylet-oil on Pytotoxicity and Yield in *Ipomoea batatas*. Joshua Wilkinson, Lorin Harvey, Callie Morris, Mark Hall, and Mark Shankle.

Sweetpotato Response to Reduced Rates of Liberty Plus Enlist One. Donnie K. Miller and A.M. Barfield. LSU AgCenter, St. Joseph, LA. (dmiller@agcenter.lsu.edu)

A Sustainable Approach for Weed and Insect Management in Sweetpotato: Breeding for Weed and Insect Tolerant/Resistant Clones. John Coffey[1], Phillip Wadl[1], H. Tyler Campbell[1], William B. Rutter[1], Livy H. Williams III[1], Victoria Murphey[1], Julianna Culbreath[1], and Matthew Cutulle[1]. [1]Clemson University Coastal Research and Education Center. 2700 Savannah Hwy Charleston SC 29414m [2]USDA-United States Vegetable Lab (USVL). Savannah Hwy Charleston SC 29414. (john.coffey@usda.gov)

Saturday January 21

8:00 Call to Order and Announcements

Plant Biology and Crop Production

Presiding: Mark Shankle

8:15 Calculating Regional Water Use Efficiency for Sweet Potato. Amanda Nelson[1]. (amanda.nelson@usda.gov)

8:30 Data Collection for NCSU Sweetpotato Breeding Program. Russell Mierop. Horticultural Science Department, North Carolina State University, Raleigh, NC 27695. (ramierop@ncsu.edu)

8:45 Sweetpotato Yield and Quality Response to Potassium Carrier and Rate. J.R. Schultheis. Horticultural Science Department, North Carolina State University, Raleigh, NC 27695. (jonr@ncsu.edu)

9:00 New Paradigm in Gene Editing Methodology in Sweetpotatoes. K. Shefer. GeneNeer, Israel. (kinneret@geneneer.com)

9:15 No Time to Rot: *Ceratocystis fimbriata*-infested. Arthur Villordon· Christopher A. Clark, and Catherine DeRobertis. LSU AgCenter Sweet Potato Research Station, Chase, LA 71324 (avillordon@agcenter.lsu.edu)

9:30 Sweetpotato Yield Forecasting at the County Scale Through Machine Learning and Satellite Remote Sensing. Mariella Carbajal-Carrasco[1] and Natalie Nelson[2*]. [1] PhD Candidate, Biological and Agricultural Engineering, North Carolina State University, Raleigh, NC 27695. [2]Assistant Professor, Biological and Agricultural Engineering, North Carolina State University, Raleigh, NC 27695. (mcarbaj@ncsu.edu)

9:45 Update on SCRI Sweet ARMOR Project. Craig Yencho. Horticultural Science Department, North Carolina State University, Raleigh, NC 27695. (yencho@ncsu.edu)

10:00 Break

10:15 Genetic Diversity, Population Structure and Genome-wide Association of Root Traits in the USDA Sweetpotato (*Ipomoea batatas*) Collection. Phillip A. Wadl[1], Tyler J. Slonecki[1], William B. Rutter[1], Bode A. Olukolu[2], G. Craig Yencho[3], and D. Michael Jackson[1]. [1]USDA, ARS, U.S. Vegetable Laboratory, Charleston, SC 29414. [2]University of Tennessee, Knoxville, TN 37996. [3]Horticultural Science Department, North Carolina State University, Raleigh, NC 27695. (phillip.wadl@usda.gov)

10:30 Automated Phenotyping of Sweetpotato via Multispectral Imaging and Semantic Segmentation Convolutional Neural Networks. Tyler Slonecki[1], Phillip A. Wadl[1], and John Coffey[1]. [1]USDA, ARS, U.S. Vegetable Laboratory, Charleston, SC 29414. (tyler.slonecki@usda.gov)

Disease, Insect, and Weed Management

Presiding: Katie Jennings

10:45 Evaluation of Fungicides and Antibiotics for Management of Post-harvest Diseases of Sweetpotato. Hunter Collins and Lina Quesada-Ocampo. Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC 27605. (hunter_collins@ncsu.edu)

11:00 Chemical Nematicides for Management of (*Meloidogyne enterolobii*) in Sweetpotato in NC: Current Results and Future Prospects. Adrienne Gorny[1], Bennet Jeffrey[1], Hunter Collins[2], and Lina Quesada-Ocampo[2], [1]Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC 27606. (agorny@ncsu.edu)

11:15 Valuing Disease Resistance in Sweetpotato: Developing a National Survey Overview and Opportunity for Feedback. Daniel Tregeagle[1]. [1]Department of Agricultural and Resource Economics, Raleigh, NC 27695. (tregeagle@ncsu.edu)

11:30 Striving to Stay Clean: Detection of Sweetpotato Viruses on Multiple Seed Generations in North Carolina. Christie Almeyda, Tamara Abernathy, Chunying Li, Ken Pecota, and Craig Yencho. North Carolina State University, Raleigh, NC 27695. (cvalmeyd@ncsu.edu)

11:45 Chemical Control Option for the WDS Insect Complex. Fred Musser[1] and Rachel Morrison[1]. [1]Mississippi State University. (fm61@msstate.edu)

12:00 Rapid Propagation of Virus-free Sweetpotato Planting Materials Through

Controlled Environment. Kai-Shu Ling[1], Augustine Gubba[1,2], Bazgha Zia[1,3], Phillip Wadl[1], Matthew A. Cutulle[3], Christie Almeyda[4] and Christopher A. Clark[5]. [1]USDA Agricultural Research Service, U.S. Vegetable Laboratory, Charleston, SC. [2]School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, South Africa. [3]Coastal Research & Education Center, Clemson University, Charleston, SC. [4]Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC. [5]Department Plant Pathology and Crop Physiology, Louisiana State University, Baton Rouge, LA. (kai.ling@usda.gov)

12:15 Lunch

1:30 Call to Order and Review of 2022 Minutes Katie Jennings

1:40 Graduate Student Contest Results Michelle McHargue

1:50 National Impact Award Mark Shankle

2:00 Resolutions Resolutions Committee

2:10 Collaborator's Trial Discussion Jonathan Schultheis

2:20 Nominations Committee Report Nominations Committee

2:30 2024 Meeting Location Katie Jennings

2:45 National Stakeholder Group Update Tara Smith

3:00 CleanSEED Update Mark Shankle

3:15 Multistate Project Update David Monks

3:30 Adjourn

ABSTRACTS

Friday January 20, 2022

Master of Science Student Competition

Presiding: Michelle McHargue

9:00 Curing Duration and Temperature Effects on Covington Sweetpotato Over Time and Environmental Conditions of International Sweetpotato Shipments. Stuart Michel[1], Jonathan Schultheis[1], Keith D. Starke[1], and Lina Quesada-Ocampo[2]. [1]Department of Horticultural Science, North Carolina State University, Raleigh, NC, USA. [2]Department of Entomology and Plant Pathology and NC Plant Science Initiative, North Carolina State University, Raleigh, NC, USA. (swmichel@ncsu.edu)

In 2021, the U.S. was the top exporting country and was valued at 201.5 million USD. Postharvest quality remains a high priority and a major challenge for the sweetpotato industry. In 2022, a study examined the effects of time duration and temperature on the weight loss and disease incidence of Covington sweetpotato harvested from two locations; Clinton and Kinston. Treatments consisted of three time durations (½, 1, and 2 weeks) at four temperatures (70, 75, 80, and 85˚F). A control treatment was included; no curing (58˚F). Sweetpotato weight loss and decay were evaluated over a 12-month period. The roots from the Clinton and Kinston locations had an average weight loss of 13.3% and 11.0% across all treatments, respectively. The roots from the Clinton location in the 14 days at 75˚F treatment had the least amount of weight loss at 11.5%. The roots from the Kinston location in the 14 days at 80˚F treatment had the least amount of weight loss at 10.4%. In addition to examining the effects of the curing treatments, the internal conditions of international sweetpotato shipment containers were monitored for temperature and relative humidity. Seven shipments from North Carolina were monitored in 2022. Two monitors were placed in the containers, one in the middle and one at the back. Differences in temperature between the middle and the back of the container were similar and the average temperature varied less than 2˚F. On average, temperatures ranged from 52.2 to 55.6˚F. Average relative humidity was high, 95% or more, in at least one section of the container across all monitored shipments. In a few cases, 100% relative humidity occurred.

9:15 Evaluating Sweetpotato Yield Response to Nitrogen Rates and Cover Cropping Systems. Mark A. Hall[1], Lorin M. Harvey[1], Mark W. Shankle[1], and Callie J. Morris[1]. [1]Pontotoc Ridge-Flatwoods Branch Experiment Station, MS State University, Pontotoc, MS 38863. (mah1140@msstate.edu)

Cover crops have critical significance in sustainable agricultural production, and their use has increased substantially in the past 10 years. However, there are currently no Mississippi sweetpotato production acres that utilize a cover cropping system – due to a lack of research supporting the adoption of this practice. Past cover crop research, both grass and leguminous, has been shown to improve nitrogen (N) availability through reducing losses and improving soil health. In sweetpotato production, the slow release of N throughout the growing season requires efficient management and availability of N. Field research was

conducted at the Pontotoc Ridge-Flatwoods Branch Experiment Station in 2021 and 2022 to evaluate sweetpotato yield response to incremental rates of N fertilizer within three cover cropping systems. Incremental N treatments of Ammonium Sulfate, consisting of 25, 50, 75, and 100lbs/ac and an untreated check were established within a Split-Plot design with 4 replications, blocked by cover crop type. The three cover cropping systems consisted of fallow, wheat, and crimson clover. Cover crop biomass, soil samples, and sweetpotato leaf samples were collected from each plot and analyzed for nutrient content. Chlorophyll content, vine lengths, and sweetpotato biomass were collected to determine nitrogen effect on plant growth. Sweetpotatoes were harvested approximately 113 days after transplanting and graded according to USDA standards to determine US No. 1, Canner, Cull, and Jumbo yield grades. Total marketable yield was recorded as the sum of US No. 1, Canner, and Jumbo grade yields. Data has been collected and is currently being analyzed.

9:30 Advanced Sweetpotato Clone Observations of Yield, Quality, Storage Traits and Post Packing Evaluations. Brandon Parker[1], and Jonathan R. Schultheis[1]. [1]Horticultural Science Department, North Carolina State University, Raleigh, NC 27695. (bkparker@ncsu.edu)

New lines of sweetpotatoes are of high interest among sweetpotato growers in NC and across the U.S. in order to upgrade plant materials and provide a superior variety for farmers. In addition to yield and disease resistance clones must maintain a high quality in storage and hold up to the rigors of packing and shipping for consumers worldwide. Nine sweetpotato clones, along with three older released varieties for comparison, from the NCSU and LSU breeding programs were planted on the horticulture research station in Clinton NC to observe and measure respective yields. Marketable yields ranged from (770.87 bu. /acre or 1059.96 40lb.box/acre) to (463.13 bu./acre or 636.81 40lb.box/acre). Observations and quality data on relative maturity, shapes, flesh and skin color and various skin quality traits were also recorded. Postharvest qualities of each clone were evaluated for internal necrosis (IN) after storage, at temperatures of 58°F (no cure), 80°F and 90°F respectively. To further gain knowledge and compare new clones to older proven lines, a post packing storage evaluation to track weight loss and rot occurrence after packing due to rhizopus soft rot was also implemented by collecting weekly weight and rot loss over 7 weeks. Major differences were observed across clones and ranged from 1.5% to 26% loss after 7 weeks post packing. Additional post packing evaluations will be made three separate times from fall 2022 through summer 2023 to evaluate clones over time in storage. Evaluating advanced clones for storage capability and packing/shipping abilities is essential in developing new varieties so the sweetpotato industry can more confidently release varieties that have a better chance of acceptance by the industry.

9:45 Effects of Root and Slip Fungicide Applications on Sweetpotato Southern Blight and Pesticide Residue Levels Postharvest. Jack Mascarenhas*, Hunter Collins, and Lina Quesada-Ocampo. Vegetable Pathology Lab, Department of Entomology and Plant Pathology and NC Plant Sciences Initiative, North Carolina State University, Raleigh, NC. (jmmasca2@ncsu.edu)

Over the recent years, North Carolina, the top sweetpotato-producing state in the U.S., allocates roughly 40% of its sweetpotato production to export markets. These export markets are valuable to sweetpotato producers as they result in an estimated 6 times greater return than compared to the domestic market. However, recent changes in fungicide residue tolerances for imported crops by the European Union have reduced accessibility to the export markets for growers that use chemical control to manage pathogens. A fungus responsible for loss of marketable yield in sweetpotato is *Athelia rolfsii,* the causal agent of southern blight and circular spot. In order to manage this pathogen effectively while complying with the maximum residue restrictions set by our market base, research into the efficacy and residue levels of fungicides applied during sweetpotato production is crucial. Field and greenhouse trials were conducted to determine how several different active ingredients perform in managing *A. rolfsii* during the slip and root propagation stages of sweetpotato production. Samples were then collected from the trials to analyze the residue levels of these active ingredients post-harvest. The findings of this study will be used to determine if the active ingredients and application timings are effective in managing *A. rolfsii* in sweetpotato while remaining under the maximum fungicide residue threshold set by our market base.

10:00 Ornamental Sweetpotato and High-throughput Phenotyping. Mark Watson[1], Chris Heim[1], Marcelo Mollinari[1], Craig Yencho[1], Andres Salcedo[2], Kenneth Pecota[1], Christie Almeyda[2], and Lina Quesada-Ocampo[2]. [1]Department of Horticultural Science, North Carolina State University, Raleigh, NC 27695, [2]Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC 27695. (mtwatso2@ncsu.edu)

In addition to its predominant use as a food crop, sweetpotato is also a significant emerging ornamental species. Over the last 20 years, demand for ornamental sweetpotato (OSP) as a colorful, low-maintenance annual has led to a tenfold increase in the number of varieties patented in the United States. Over half of these were bred by the sweetpotato breeding program at NC State. In many ornamental breeding programs, including the NC State OSP breeding program, new cultivar release is constrained by breeders' ability to generate and assess large numbers of new potential varieties for aesthetic appeal. Traditionally, ornamental breeders use subjective visual ratings to identify release-quality and parental-quality lines, and while subjective visual ratings are recognized as the "gold standard" for identifying release quality lines, they can be problematic for identifying the best parents for incremental progress in quantitative ornamental traits like leaf color and leaf shape. Modern phenotyping approaches, including smartphone and UAV image collection and portable spectrophotometry, have the potential to generate large amounts of useful quantitative data at a low cost, but few methods for data collection and analysis exist for these approaches in the context of ornamentals breeding. Here, we describe quantitative phenotyping methods for leaf color and leaf shape and assess them using a subset of the NCSU OSP breeding population. For leaf color, we describe a method using a portable spectrophotometer to collect visible spectrum data on leaves in the greenhouse or field. Then we describe a set of analysis techniques to convert this highly quantitative data into useful information for selection decisions, including a metric for "color distance" that can be used to quantify how much plants differ in color, a metric for leaf color uniformity using multiple leaves sampled from the same plant, and a model to estimate anthocyanin and chlorophyll content in leaves from visible spectrum data. Validation of the anthocyanin/chlorophyll estimation method using HPLC-DAD is in progress. For leaf shape, we describe a method to capture high-contrast images of leaves in the field, followed by an image analysis/machine learning approach to quantify a leaf's percent fit to 5 leaf shape market categories. Finally, we also discuss the early steps of implementing UAV imagery for quantifying leaf color and plant vigor at a low cost. Next steps in this project include using the large quantitative datasets for leaf shape and leaf color generated so far in a GWAS study, and using the new leaf color and leaf shape phenotyping methods on future selections to determine if they improve response to selection compared to existing subjective rating methods.

10:15 Break

PhD Student Competition:

Presiding: Katie Jennings

10:45 Improved Phenotyping and Breeding Progress Towards Root-knot Nematode Resistant Sweetpotato Varieties for the Southeast. Simon Fraher[1], Mark Watson[1], Hoang Nguyen[1], Guilherme da Silva Peirera[2], C. Robin Buell[3], Marcelo Mollinari[1], Adrienne Gorny[4], Craig Yencho[1]. Department of Horticultural Science, North Carolina State University, Raleigh, NC 27695. [2]Guilherme da Silva Peirera, Federal University of Viçosa. [3]Crop and Soil Sciences, University of Georgia, Athens, NC 30602. [4]Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC 27695. (spfraher@ncsu.edu)

11:00 Effect of Postemergence Herbicides in Covington Sweetpotato. Stephen Ippolito[1], Katherine M. Jennings[1], David W. Monks[1], David L. Jordan[2], Sushila Chaudhari[3]. [1]Horticultural Science Department, North Carolina State University, Raleigh, NC 27695. [2] Crop and Soil Sciences Department, North Carolina State University, Raleigh, NC 27695. [3]Department of Horticulture. Michigan State University. East Lansing, MI 48824. (sjippoli@ncsu.edu)

Limited herbicides are registered for use in sweetpotato and yield can be reduced by weed competition. Therefore, field studies were conducted to determine the effect of herbicides applied postemergence to sweetpotato on sweetpotato growth, yield, and quality in Clinton, NC in 2021 and 2022. Treatments included linuron at 280 g ai ha^{-1}, linuron at 560 g ai ha^{-1}, linuron at 1120 g ai ha^{-1}; metribuzin at 210 g ai ha^{-1}, metribuzin at 315 g ai ha^{-1}, metribuzin at 420 g ai ha^{-1}, tolpyralate at 19.5 g ai ha^{-1}, tolpyralate at 29.2 g ai ha^{-1}, tolpyralate at 39.4 g ai ha^{-1}, pyridate at 530 g ai ha^{-1}, pyridate at 696 g ai ha^{-1}, and pyridate at 1050 g ai ha^{-1}. Methylated seed oil (MSO) at 1% v/v and NIS at 0.25% v/v were included in the tolpyralate and pyridate treatments, respectively. Treatments were applied to 'Covington' sweetpotato 28 days after transplanting. In 2021 total yield (sum of canner, no. 1, and jumbo grades) was similar for all treatments to the nontreated check. In 2022 linuron, pyridate, and tolpyralate did not reduce total yield at all rates applied. In 2022, metribuzin at 210 and 315 g ai ha^{-1} did not reduce total yield; however, metribuzin applied at 420 g ai ha^{-1} caused a significant reduction in total yield. Linuron, metribuzin, pyridate, and tolpyralate are not registered for use in sweetpotato and would represent new herbicides for in-season weed management.

Using Computer Vision to Assess Sweetpotato Root Development and Crop Yield Estimates. Shana McDowell[1], Daniela Jones[1], Michael Kudenov[2], and Shelly Hunt[1]. [1]Department of Biological and Agricultural Engineering, North Carolina State University Raleigh, NC 27695. 2Department of Electrical and Computer Engineering, Raleigh, NC 27606. (smmcdow2@ncsu.edu)

Sweetpotatoes vary widely in shape and size, and consumers prefer particular characteristics over others. Optimizing the yield of preferred sizes would reduce waste and increase grower's profits. However, little is known about what contributes to size variation. Therefore, we will use machine learning algorithms to highlight the environmental factors or conditions that contribute to sweetpotato shape and size throughout the growing season as well as gaining a better understanding of the sweetpotato supply chain. Root images of sweetpotatoes will be used as input into computer vision algorithms to compare and calculate the average root growth and to determine an optimal harvest window. Growth estimates obtained from this analysis will be compared to growth measurements of previous growing seasons. This analysis will aid in the development of farm-to-market decision models resulting in a data-driven agri-food supply chain, an optimized crop yield, and a better use of grower's resources.

11:15 Effect of Flumioxazin and *S*-metolachlor on 'Covington' Sweetpotato Planted Vertically or Horizontally. Keith Starke, Colton Blankenship, Katherine M. Jennings and David Monks. Department of Horticultural Science, North Carolina State University, Raleigh, NC 27695. (kdstarke@ncsu.edu)

The majority of commercial sweetpotato production in North Carolina is planted with a mechanical setter that orients plant slips vertically in the furrow, however, more recently some growers have begun to change the plant orientation in furrow by using a mechanical setter that will lay the plant slips horizontally. Two experiments were conducted to evaluate the effect of two herbicides (*S*-metolachlor at 12 or 24 oz/A or flumioxazin at 3 oz/A) and two planting methods (vertical or horizontal) on 'Covington' sweetpotato in 2021 and 2022. Experimental design was a randomized complete block design (RCBD) with four replications in each year. In 2021 the experiment was conducted on-farm with a commercial grower located in Nash County, North Carolina. In 2022 the experiment was conducted at Central Crops Research Station in Clayton, NC. In both years the treatments were arranged in a split-plot design with planting method as the whole plot and herbicide as the subplot. A nontreated (control) check was included for each planting method. Flumioxazin treatments were applied preemergence (PRE) one day prior to transplanting. *S*-metolachlor was applied postemergence (POST) to the crop 10 days after transplanting.

11:30 Estimation of Sweetpotato Weight and Volume from 2D Images via Transfer Learning. Azizah Conerly[1], Cranos Williams[1], Michael Kudenov[1], Craig Yencho[2], Michael Boyette[3], Khara Grieger[4], Daniela Jones[3], North Carolina State University. [1]Department of Electrical and Computer Engineering, Raleigh, NC 27606. [2]Department of Horticultural Science, Raleigh, NC 27695. [3]Department of Biological and Agricultural Engineering, Raleigh, NC 27695. [4]Department of Applied Ecology, Raleigh, NC 27695. (azconerl@ncsu.edu)

The value of a sweetpotato depends on its physical characteristics such as size and shape. Current methods of capturing sweetpotato weight use expensive, large machinery. To address this problem, we aim to estimate the weight and volume of a sweetpotato using a single 2-dimensional image using a Convolutional Neural Network (CNN) allowing simpler camera systems, like cell phone cameras, to be used for weight estimation. A limiting factor is the amount of available data, manually measuring the imaged sweetpotatos would be time-consuming. To address this problem, we generated weights and volumes for 13,911 NIR images using a previously verified 3-dimensional model, which uses two perpendicular images of the sweetpotato to approximate the true weight and volume. We used 20% of the generated data and 237 additional images with measured weights to test the performance. Four CNNs were chosen and modified to become multiple output regression CNNs: DenseNet201, ResNet152 V2, Xception, and MobileNet V2. The Xception model performed the best for the generated weight, generated volume, and measured weight with coefficient of determination (R^2) values of 0.9339, 0.9338, and 0.8509 and root mean square error (RMSE) values of 1.44 oz, 2.62 in^3, and 1.22 oz. Using our measured dataset, we compared our models to a linear regression model estimating the weight. The linear regression model achieved an R^2 value of 0.8645 and RMSE value of 1.54 oz. While the R^2 values show that the linear regression model fits the data better the Xception model has a lower RMSE value indicating the model is more accurate at estimating weight. We show that CNNs can be used to estimate the weight and volume of a sweetpotato using a single 2-dimensional image.

11:45 Lunch

PhD Student Competition

Presiding: Katie Jennings

1:00 Development and Implementation of Two High-throughput Phenotype Scanners in the Post-harvest Pipeline of Sweetpotatoes (*Ipomoea batatas*). Enrique Pena Martinez, Michael Kudenov, and Hoang Nguyen. North Carolina State University, Raleigh, NC 27695. (eepena@ncsu.edu)

Our goal is to facilitate traceability of sweetpotato phenotypes to current post-harvest operations. We have assembled two imaging scanners across an industrial post-harvest pipeline to track and estimate sweetpotato phenotype distributions on a high-throughput level. The first scans the top layer of bins carried by flatbed trucks, and the second scans most of the sweetpotatoes in the eliminator table immediately before sorting. We paired our top bin scanner with radio-frequency identification (RFID) and barcode technology to match our phenotype predictions with bin identification data such as GPS location, field name, and receiving date. Phenotype distributions from five fields are being examined to test the scanners. The data is yet to be fully analyzed, but preliminary results are promising. Successful completion of our work could provide farmers with the necessary tools to make informed decisions on storage and packing practices.

1:15 Evaluation of Sweetpotato Slip Storage Conditions on Stand and Yield. Callie J. Morris[1], Lorin M. Harvey[1], Mark W. Shankle[1], and Mark A. Hall[1] [1]Pontotoc Ridge-Flatwoods Branch Experiment Station, Mississippi State University, Pontotoc, MS 38863. (cjw521@msstate.edu)

Sweetpotato (*Ipomea batatas)* slips are traditionally cut from sweetpotato beds and transplanted the same day or placed in a shady area to harden off overnight. The need to store cut slips for a several days to a week could arise due to many factors including weather, equipment failure, and labor availability. A study evaluating slip stand and root yield of slips stored for 7 days after cutting was conducted at the Pontotoc Branch Experiment Station in 2021 and in two locations on the station in 2022. Four treatments were applied to 'Orlean' slips on day 0. Treatments included two different environments, ambient temperature under cover in a shady area (87°F day/67°F night) and chilled in a cooler set to 68°F. Two bins were placed in each environment, one with no water, the other with 3 inches of water, maintained daily. After being stored for 7 days, slips were transplanted into 2 row plots, 30ft long. Stand count was collected at least a week after transplanting. Roots were harvested and graded according to USDA standards to determine us no. 1, canner, cull and jumbo yield grades. Total marketable yield was recorded as the sum of us no.1, canner, and jumbo grade yields. Data has been collected and is currently being analyzed.

1:30 The Sweet Scents of Sweetpotato: Identification of Volatile Compounds Predicting Unique Flavors. Modesta N. Abugu*[1], Suzanne Johanningsmeier[2], Mariam Nakitto[3], Matthew Allan[2], Kenneth V. Pecota[1], Massimo Iorizzo[1,4], G. Craig Yencho[1]. [1]Department of Horticultural Science, North Carolina State University, Raleigh, NC 27695, USA. [2]USDA_ARS, Southeast Area Food Science and Market Quality and Handling Research Unit, Raleigh NC, 27695 USA. [3]International Potato Center (CIP-SSA), Plot 47 Ntinda II Road, PO Box 22247, Kampala, Uganda. [4]Plants for Human Health Institute, Department of Horticultural Science, North Carolina State University, Kannapolis, North Carolina, USA. (mnabugu@ncsu.edu)

Growing consumer demand for sweetpotatoes in the US has made flavor an important breeding target. Sweetpotato flavor is derived primarily from sugars and volatile organic compounds (VOCs). Prior studies identified ~75 VOCs in cooked sweetpotatoes. However, little is known about how these compounds influence specific sensory attributes. In this study, sensory and VOC profiles of fifteen baked sweetpotato genotypes were generated to identify potential predictors for phenotypic flavor traits. Trained sensory panelists (n=8) quantified specific flavor attributes, including sweetpotato, caramel/sweet aromatics, pumpkin/squash, cooked carrot, roasted chestnut, earthy, floral, fruity, and potato-like flavors. Non-targeted volatile compound analysis was conducted using headspace solid-phase microextraction, 2-dimensional gas chromatography coupled to time-of-flight mass spectrometry (SPME-GC×GC-ToFMS). A total of 384 volatile compounds were annotated in the 15 genotypes studied, with 100 unique compounds showing significant variation across genotypes. Based on hierarchical clustering, principal component analysis (PCA) and partial least square regression modeling (VIP > 0.8), potential predictors for characteristic

sweetpotato flavor included cis-geranyl acetate, 1-pentanol, pyrrole, pyridine, benzaldehyde, phenylethyl alcohol, and 1,2-dihydrolinalool. Flavor attributes, such as pumpkin and carrot like flavor, were related to cis-geranyl acetate, α-cedrene, 3-hexen-1-ol, 1-terpinenol, n-propyl acetate and terpinolene. A consumer panel will inform whether these attributes would be preferred among US consumers. This study enhances our understanding on the important traits to select for when developing high quality sweetpotatoes.

1:45 Building an Objective Model for Predicting Ideal Sweetpotatoes Using Shape, Size-related Features. Hangjin Liu[1], Cranos Williams[1], Michael Boyette[2], Michael Kudenov[1], Craig Yencho[3], [1]North Carolina State University. [1]Department of Electrical and Computer Engineering, Raleigh, NC 27606. [2]Department of Biological and Agricultural Engineering, Raleigh, NC 27695. [3]Department of Horticultural Science, Raleigh, NC 27695. (hliu25@ncsu.edu)

Crop quality analysis is a very important area of research. Low quality in crops can lead to food waste, decreased farm profits, poor consumer satisfaction, and inefficiencies across the supply chain. Many crop analysis techniques combine different features like shape, color, size, and texture to assign grade. Among them, shape and size are the main criterion to determine the products quality and grade, and in turn, its value to the consumer. We access crop grades based on these features and treat sweetpotato as an example. Sweetpotatoes are placed into certain grades primarily because of their size and shape. Given that beauty is subjective, identifying and describing the ideal sweetpotato is mostly a matter of individual choice. Current methods for evaluating sweetpotato size and shape are subjective, are neither scientifically rigorous nor repeatable and have very limited reliability. However, competition at agricultural fairs, USDA grade standards and apparent consumer preferences all tend to converge toward some nebulous archetype which can be described in general objective terms. Therefore, the goal of our work is to find a way to build a model for predicting ideal Sweetpotatoes. By providing a standard to quantitatively measure the distance between a sweetpotato and the ideal sweetpotato regarding their values, we can classify it to good or cull categories as an application. In many cases, supervised machine learning methods have been used for the automated grading of crops. Supervised methods, however, require labeled data, which need human experts to grade crops based on perceived value. The labeling process can be time-consuming, inconsistent, and inherently subjective. Moreover, many crop grading applications involve visual categorizations that do not have standard benchmark data sets. For instance, the sweetpotato grading has very loose standards associated with their values. A major obstacle, however, to implementing crop shape and size classification is the absence of accurate labeling data due to labor intensive and biased labeling process. For this project, we aim to build an objective model for predicting ideal sweetpotato weight using sweetpotato shape features (length, width, curvature, etc) without any labels. The steps are as follows: 1: Apply unsupervised machine learning approaches to grade sweetpotato storage roots based on different feature descriptors, such as elliptic Fourier descriptor and some non-homogeneity descriptor to extract features directly from 2D industrial imaging infrastructure. To have better result, we also applied the reconstruction error-based outlier detection model. 2: Select an optimization algorithm to minimize the error for predicted good sweetpotatoes while maximize the error for cull sweetpotatoes. 3: Investigate weight error distribution for each weight class and fit error distribution to two different distributions using expectation maximization algorithm. 4: Determine threshold to separate good and cull SPs using MAP Interpretation. We treated 20% of the dataset as testing data. The accuracy for classification results after optimization process for small and medium sweetpotatoes are 74 % and 76%, respectively. These were all higher than using unsupervised classification alone. We show that by building an objective model for predicting ideal sweetpotatoes using shape, size related features, we were able to grade sweetpotato storage roots more accurately. We anticipate that these approaches could be expanded for the grading of many other crops whose grades and consequently value, depend primarily on their shape and size.

2:00 Effect of *S*-metolachlor and Flumioxazin Herbicides on Sweetpotato Treated with and without Activated Charcoal Applied through Transplant Water. Colton D. Blankenship[1], Katherine M. Jennings[1], David W. Monks[1], David L. Jordan[2], and Stephen L. Meyers[3]. [1]Horticultural Science Department, North Carolina State University, Raleigh, NC 27695. [2]Department of Crop and Soil Sciences, North Carolina State University, Raleigh, NC 27695. [3]Department of Horticulture and Landscape Architecture, [4]Purdue University, West Lafayette, IN. (cdblank3@ncsu.edu)

Flumioxazin and *S*-metolachlor are widely used on conventional sweetpotato hectarage in North Carolina; however, some growers have recently expressed concerns about potential effects of these herbicides on sweetpotato yield and quality. Previous research indicates that activated charcoal can improve crop safety and reduce herbicide injury in some conditions. Field studies were conducted in 2021 and 2022 to determine whether flumioxazin applied pre-planting and *S*-metolachlor applied before and after transplanting negatively affect sweetpotato yield and quality when activated charcoal is applied with transplant water. The studies consisted of five herbicide treatments by two activated charcoal treatments. Herbicide treatments included two rates of flumioxazin, one rate of *S*-metolachlor applied immediately before and immediately after transplanting, and no herbicide. Charcoal treatments consisted of activated charcoal applied at 9 kg ha^{-1} and no charcoal. No visual injury was observed. There was no effect of herbicide or charcoal treatment on No. 1, Marketable (sum of No. 1 and Jumbo grades), or total yield (sum of Canner, No. 1, and Jumbo grades). Additionally, shape analysis conducted on calculated length-to-width ratio (LWR) for No. 1 sweetpotato roots found no effect from flumioxazin at either rate on sweetpotato root shape. However, both *S*-metolachlor treatments resulted in lower LWR of No. 1 sweetpotato roots in 2021. Results are consistent with those of prior research and indicate that flumioxazin and *S*-metolachlor are safe for continued use in sweetpotato at registered rates.

2:15 Effectiveness of Anaerobic Soil Disinfestation on Weed and Nematode Control in Sweetpotato. Simardeep Singh[1], Will Rutter[1], Phil Wadl[1], Churamani Khanal[1] and Matthew Cutulle[1]. [1]Clemson University Coastal Research and Education Center. 2700 Savannah Hwy Charleston SC 29414. (ssimardeep70@gmail.com)

Weeds and nematodes are limiting factors in sweet potato production. These pests can be difficult to control due to a lack of effective herbicides in sweet potatoes and rising nematicide resistance. Improved Integrated Pest Management (IPM) strategies are needed to control these pests in sweet potatoes. Anaerobic soil disinfestation (ASD) has the potential to fit into current pest management practices. ASD involves the application of a carbon source, irrigation to field capacity, and covering the soil with a plastic tarp. Changes in the soil microbial communities and the production of volatile organic compounds during anaerobic decomposition are the main mechanisms that kill biotic soil pests. Pests that would be a desirable target for ASD would include yellow nutsedge, Palmer amaranth, guava root-knot nematode, and southern root-knot nematode. A greenhouse study was conducted at the Clemson Coastal Research and Education Center in Charleston, SC, to specifically look at the impact of carbon source and soil type on cumulative anaerobicity, weed control, and sweet potato vigor. Five-gallon pots were filled with three different soil types (Charleston-loamy/native, Blackville-coarse high sand content, and Clemson-high clay content) and were mixed with cottonseed meal (CSM) or no carbon amendment. Each pot was inoculated with guava root not nematode. ORP, pH and temperature probes were placed in each pot and connected to a data logger. Tiff film was then sealed over the pots for 5 weeks. After five weeks, the plastic was removed, and sweet potato slips (Bayou Belle) were transplanted. Throughout the study, cumulative anaerobicity, weed counts, sweet potato vigor, weed biomass and nematode counts were taken. According to the findings of this study, higher organic soils are more conducive to longer periods of anaerobicity and have fewer weed species ($P < 0.05$). Plots that went anaerobic (<200 mv) generally had fewer weeds and nematodes when compared to plots that did not go anaerobic (>200 mv). Sweet potatoes grown in non-carbon source-treated pots had significantly higher gall percentages (>40%) than CSM-treated pots (0%). The yield of sweet potatoes planted in Blackville soil and treated with cotton seed meal was significantly greater ($P < 0.05$) than in control treatments.

2:30 Root Architectural Response to Parasitism by *Meloidogyne enterolobii* and *M. incognita* in Sweetpotato Genotypes. David Galo[1], Arthur Villordon[2], Josielle Santos Rezende[1], Christopher A. Clark[1], Don R. Labonte[3], Tristan Watson[1]. [1]Department of Plant Pathology and Crop Physiology, Louisiana State University Agricultural Center, Baton Rouge, LA 70803, [2]Sweet Potato Research Station, Louisiana State University Agricultural Center, Chase, LA 71324, [3]School of Plant, Environmental, and Soil Sciences, Louisiana State University Agricultural Center, Baton Rouge, LA 70803. (DGalo@agcenter.lsu.edu)

Root architecture (RA) response of five sweetpotato genotypes infected with *Meloidogyne enterolobii* (*Me*) and *M. incognita* (*Mi*) was evaluated in this study The sweetpotato genotypes 'Beauregard' (susceptible to *Me* and *Mi*), 'Jewel' (intermediate resistant to *Me* and tolerant to *Mi*), and LSU AgCenter breeding lines 'L14-31' (resistant to *Me* and *Mi*), 'L18-100', (susceptible to *Me* and resistant to *Mi*) and 'L19-65' (resistant to *Me* and susceptible to

Mi) were examined. Sweetpotato vine cuttings were inoculated with approximately 3000, 500, or no eggs of either *Me* or *Mi*. Three weeks after planting, entire root systems were scanned and analyzed using the software RhizoVision Explorer. RA attributes such as lateral root (LR) length, surface area, and volume were evaluated. Statistical analyses were conducted using analysis of variance and means were separated using the LSD test. There were inherent genotype effects (P<0.0001) observed in RA attributes, with 'L18-100' and 'L19-65' showing greater root length than the other genotypes. Within each genotype, nematode inoculated plants had greater LR length when compared to the non-inoculated controls, and plants inoculated with *Me* showed a greater increase in RA attributes compared to plants inoculated with *Mi*. A constant Genotype by Nematode interaction effect was observed, indicating that RA response to each nematode species varied according to sweetpotato genotype. This study provides similar results with previous studies on *Mi*, suggesting that sweetpotato genotypes exhibit compensatory LR growth in response to parasitism by *Me* or *Mi*. Overall, root architectural response to nematode feeding represents an important consideration in selection of suitable sweetpotato genotypes.

2:45 Understanding the Influence of Seed Generation on Potyvirus Load and Yield in Sweetpotatoes Across U.S. Production Areas. Rebecca Wasserman-Olin[1] and Miguel Gómez[2]. [1]Department of Agricultural and Resource Economics, Colorado State University, Fort Collins, CO 80523. [2]Charles H. Dyson School of Applied Economics and Management, Cornell University, Ithaca, NY 14850. (Rebecca.Wasserman-Olin@colostate.edu)

National Clean Plant Network (NCPN) centers sweetpotato programs aim to decrease the virus load and maintain the quality of harvested materials by providing disease free roots to be used for seed. While potyviruses are a well-established issue in sweetpotato production, the relationship between generation, virus load, and yield is still uncertain. Using data from the first year of an on-going two-year trial we analyzed the relationship between the generation of seed and both the infection level of four potyviruses and yield. Trial data was used from partners in Louisiana, Mississippi, North Carolina, California, and Arkansas, and included five varieties of sweetpotatoes. After controlling for trial location and cultivar type, generation had a statistically significant positive relationship with pre- and post-season virus rates for the potyviruses. Additionally, generation had a statistically significant negative relationship on yield and potentially threatens profitability of sweetpotato production. Results from this trial will be expanded upon with a second year of data. The research supports the mission of NCPN centers sweetpotato work and motivates research to further understand how potyviruses spread infield during sweetpotato production.

3:00 Unveiling NLR Gene Diversity in Hexaploid Sweetpotato Cultivars. Camilo H. Parada-Rojas[1], Kevin L. Childs[2], Monica Fernandez de Soto[3], Andres Salcedo[1], Kenneth Pecota[4], Christie Almeyda[5], David Baltzegar[3], G. Craig Yencho[4], and Lina. M. Quesada-Ocampo[1]. [1]Department of Entomology and Plant Pathology and NC Plant Sciences Initiative, North Carolina State University, Raleigh, NC 27695, USA. [2]Department of Plant Biology, Michigan State University, East Lansing, MI 48824, USA. [3]Genomic Science Laboratory, North Carolina State University, Raleigh, NC, 27695, USA. [4]Department of Horticulture, North Carolina State University, Raleigh, NC 27695, USA. [5]Micropropagation and Repository Unit, North Carolina State University, Raleigh, NC 27695, USA.

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Persistence and re-emergence of soilborne pathogens threatens sweetpotato success as a profitable export for United States farmers, who supply a large share of the global sweetpotato market. Fungi and nematode damage leads to severe yield loss without cultural and chemical management. From the farmer's perspective, host resistance remains a tool that provides flexible and sustainable management. However, breeding for resistance requires accelerating our understanding of sources of resistance within the sweetpotato genome. Plant intracellular immune receptors known as nucleotide-binding domain leucine-rich repeat receptors or NLRs represent a key component of the plant immune system by mediating plant immune responses to pathogen infection. We cataloged the NLR diversity in 33 sweetpotato cultivars and 3 diploid wild relatives using resistance gene enrichment sequencing (RenSeq), a genome reduction approach, to capture and sequence full NLRs. A custom designed NLR bait-library of 2,034 targets allowed us to enrich NLR genes with 97% target capture rate. We identified between 800 to 1,200 complete NLRs for all cultivars. To uncover the diversity of NLRs in sweetpotato, we employed a curated database of cloned and functionally characterized NLRs (RefPlantNLR) to assign sequenced sweetpotato NLRs to phylogenetic clades. A comparative phylogenetic analysis revealed a number of diverging NLRs in hexaploid sweetpotato. We obtained chromosome coordinates in both hexaploid (Beauregard) and diploid (*Ipomoea trifida*) genomes. Our study provides a catalog of NLR genes that will accelerate breeding and improve our understanding of evolutionary dynamics of NLRs in sweetpotato.

3:15 Break

<u>PhD Student Competiton</u>

Presiding: Katie Jennings

3:30 Variation in Gene Expression of Putative *PHT1;5* Gene Among Sweetpotato Cultivars in Response to Phosphorus Deficient Conditions. Lisa Arce[1], Don LaBonte[1], Cole Gregorie[2], and Arthur Villordon[2]. [1]LSU AgCenter School of Plant, Environmental, and Soil Sciences, Baton Rouge, LA 70803. [2]LSU AgCenter Sweet Potato Research Station, Chase, LA 71324. (larce3@lsu.edu)

Cumulative evidence supports the hypothesis that low inorganic phosphorus (Pi) availability modulates sweetpotato root architecture which in turn helps to determine storage root shape and yield in a cultivar-specific manner. Low Pi availability constrains plant and crop productivity in both natural and agricultural ecosystems. Substantial progress has been made on the characterization of Pi responsive genes in model systems. In particular, the phosphate transporter (*PHT1*) family has been associated with the uptake and translocation of Pi in low Pi conditions. In this work, we characterized the putative phosphate transporter sequence of three sweetpotato cultivars grown under conditions of low Pi availability. Basic local alignment of the sequence generated revealed high similarity with an inorganic phosphate transporter 1;5 in *I. triloba*, a gene belonging to the *PHT1* family. Expression data generated from this study revealed that at 5 and 10 days after planting (DAP), significant upregulation of the putative *PHT1;5* was observed in cv. Bayou Belle relative to cvs. Orleans and Evangeline grown under Pi deficient conditions. However, at 15 DAP, no significant difference in the relative fold expression was observed in plants grown under +Pi and –Pi treatments. The results suggest that Bayou Belle adopts to low Pi availability by upregulating putative *PHT1;5* during the establishment stage to remobilize shoot available Pi toward the developing adventitious root system. Findings from this work can lead to the evaluation of approaches to increase Pi efficiency in sweetpotato production as well as development of screening methods to identify Pi-efficient genotypes.

Processing and Marketing

Presiding: Jonathan Schultheis

4:00 Composition and Sensory Attributes of Satsuma and Sweetpotato Juice Blends. David H. Picha, School of Plant, Environmental and Soil Sciences, Louisiana State University Agricultural Center, Baton Rouge, LA 70803. (dpicha@agcenter.lsu.edu)

Consumer demand in the U.S. for both easy-peel seedless mandarins and sweetpotatoes has increased significantly in recent years. Satsuma mandarins (*Citrus unshiu*) have been the leading type of easy-peel mandarin grown in Louisiana for many decades and production area and volume is now significantly increasing in several other southeastern states. Combining both of these high nutritional value crops into a blended juice product has the potential to increase consumption and market growth for both crops. The wide range in sweetpotato cultivar characteristics, including color, texture, and flavor, make them a highly versatile vegetable for potential inclusion into satsuma juice blends. Juice composition and color was analyzed on 90:10 and 80:20 blends (% satsuma juice volume: % baked sweetpotato weight) and compared with 100% satsuma juice. Juice blends from sweetpotato cultivars with three different flesh colors were analyzed, including ‘Orleans’ (orange-fleshed), ‘Murasaki’ (white-fleshed), and advanced breeding line ‘1953’ (purple-fleshed). Juice % total soluble solids (% TSS) increased with increasing amounts of sweetpotato tissue. This correlated with the increased amounts of maltose in the juice blends with the higher amounts of sweetpotato tissue. The 80% satsuma: 20% ‘Murasaki’ blend had the highest % TSS and also the highest amounts of maltose. Juice blend pH increased with increasing amounts of sweetpotato tissue, while the citric acid content (the major organic acid) decreased. Preliminary taste panel evaluations indicated an improved texture perception of the blended juices, while perceived differences in other quality characteristics were variable.

4:15 Breeding Tasty Sweetpotatoes: Development of a Universal Sensory Lexicon for Characterizing Sweetpotato Appearance, Flavor, and Texture. Suzanne D. Johanningsmeier[1], Mariam Nakitto, Modesta Abugu, Elizabeth Khakasa, Matthew Allan, Kenneth Pecota, and Craig Yencho. (suzanne.johanningsmeier@usda.gov)

Sweetpotato is consumed globally as a nutritious, tasty food. Successful adoption of new varieties requires a better understanding of the sensory characteristics of sweetpotato with consumer-preferred traits. Through an international effort, we generated a universal sensory lexicon enabling quantitative descriptive sensory analysis of widely varying sweetpotato genotypes in different regions of the world. Ugandan panelists trained in the principles of descriptive sensory analysis participated in a 4-day workgroup for sweetpotato lexicon development. Sweetpotatoes from the National Crops Resource Research Institute that ranged in flesh color from cream to deep orange were steamed according to local customs and served warm. Thirty-six sensory terms were generated; a workflow was developed for scoring samples; and reference foods from the local market were identified for panel training and calibration. The lexicon was adapted for use with US sweetpotato genotypes by adding sensory terms inclusive to purple-fleshed sweetpotatoes and validation with a diverse set of genotypes (n=15) grown on three independent plots at the North Carolina State University research station. The universal lexicon contains 42 defined terms for profiling the appearance, aroma, flavor, and texture of steamed or baked sweetpotatoes. In the US study, orange-fleshed genotypes varied in intensity of carrot and squash-like flavors, while purple-fleshed genotypes varied in bitter taste and fruity or earthy flavors. Moistness and hardness varied the most among cream-fleshed genotypes. This lexicon is a valuable tool for objectively characterizing sweetpotato sensory quality traits, aiding global breeding programs in selection of new varieties.

4:30 Effect of Temperature and Frying Time on Sweetpotato Saccharification. David H. Picha and Alvaro Pilla, School of Plant, Environmental and Soil Sciences, Louisiana State University Agricultural Center, Baton Rouge, LA 70803. (dpicha@agcenter.lsu.edu)

French fry products have become an increasingly important component of total sweetpotato market sales. Saccharification of sweetpotato starch into sugars and dextrins during the heating process significantly alters the composition, flavor, and texture of the fries. Limited information is available on the effect of frying temperature and time on the individual sugar composition of the fries. Cured and stored roots of three orange-fleshed cultivars ('Beauregard', 'Covington', and Vermillion'), a white-fleshed cultivar ('Murasaki'), and a purple-fleshed advanced breeding line ('1953') were peeled and cut into 10 mm square strips. The strips were air fried at 7 different temperatures (70°, 150°, 200°, 250°, 300°, 350°, and 400° F) and 5 different durations of air frying (3, 6, 9, 12, and 15 minutes). Sugars were extracted from the air-fried strips in 80% ethanol and quantified by HPLC. The individual sugar concentrations and their order of importance differed among cultivars. Sucrose was the principal sugar in the fries of 'Covington' and 'Vermillion' at all frying temperatures and time durations. Maltose was the principal sugar in the fries of 'Beauregard', 'Murasaki', and '1953' at frying temperatures of 250° F or higher for durations of 6 minutes or longer. Glucose, followed by fructose, were the two main monosaccharides in the fries of all cultivars at all temperatures. 'Vermillion' had the highest concentration of monosaccharides, while 'Murasaki' had the lowest. Increasing frying temperatures and durations of frying generally resulted in a higher concentration of total sugars until a temperature of 350° F and 12 minutes of frying.

The starch to sugar conversion process during frying of sweetpotatoes, and therefore the perceived degree of sweetness in the fried product, is temperature dependent and significantly differs among genotypes.

4:45 Classification of Sweetpotatoes Based on Size Characteristics with Machine Learning. Daniel Perondi[1], Sowjanya Srija Movva[1], Cranos Williams[1], Michael Kudenov[1], Craig Yencho[2], Michael Boyette[3], Khara Grieger[4], and Daniela Jones[3]. [1]Department of Electrical and Computer Engineering, North Carolina State University, Raleigh, NC 27695. [2]Department of Horticultural Science, North Carolina State University, Raleigh, NC 27695. [3]Department of Biological and Agricultural Engineering, North Carolina State University, Raleigh, NC 27695. [4]Department of Applied Ecology, North Carolina State University, Raleigh, NC 27695. (dperond@ncsu.edu)

North Carolina produces the largest quantity of sweetpotatoes in the US where this product is used mainly for human consumption. In North Carolina, farmers cultivate sweetpotatoes across multiple counties where they are also classified in local processing factories based on weight. The weight classification of sweetpotatoes is usually performed based on estimations from the sorting machines and defined as small, medium, or large classes (among others). While a standard classification system of weight for sweetpotatoes has advantages for packers, the sweetpotatoes characteristics are usually not considered in this classification system. Consumers are known for having a preference for shape and size besides weight. To overcome these challenges and propose new classification methods, this study evaluated unsupervised machine learning methods coupled with computer vision models to estimate sweetpotato classes based on size characteristics such as length-to-width ratio and area. Camera systems were installed in a processing facility to take images from the conveyor belt where sweetpotatoes are transported. On top of these images, computer vision models were deployed to segment every sweetpotato and estimate its characteristics such as area, length, and width. On this dataset, unsupervised machine learning methods such as feature drift detection, KMeans, PCA, StreamKMeans, and Neural Networks were evaluated. A different set of classes was estimated across models, but the majority of the models established three classes of sweetpotatoes as being the optimum. This study also evaluated the underlying properties of unsupervised clusters that represent every new class of sweetpotatoes.

Posters

***Meloidogyne enterolobii* Resistance Screening in Sweetpotato Germplasm.** Catherine L. Wram[1], P. Wadl[1], P. Agudelo[2], W. Rutter[1]. [1]USDA-ARS US Vegetable Lab, Charleston, SC 29414. [2]Department of Plant and Environmental Sciences Department, Clemson University, Clemson, SC 29634. (catherine.wram@usda.gov)

Sweetpotato production is threatened by the emerging root-knot nematode, *Meloidogyne enterolobii*, which causes reduced crop yield and unmarketable sweetpotato storage roots. First reported in Florida in 2004, *M. enterolobii* has spread to Georgia, South Carolina, and North Carolina. The most effective way to manage *M. enterolobii* is with resistant crop

varieties. *Meloidogyne enterolobii* can overcome most of the current resistant genes found in crops, including sweetpotato, pepper, tomato, soybean, and cotton. There is an urgent need to identify new sources of sweetpotato germplasm that contain *M. enterolobii* resistance to combat this pest. To identify potential germplasm sources of resistance, 46 accessions of sweetpotato obtained from U.S. Department of Agriculture GRIN germplasm repository were screened in a greenhouse pathogenicity assay. The lines 'Beauregard' and 'Regal' were used as susceptible and resistant controls, respectively. Slips containing four nodal sections were planted in Deepot D25L containers filled with autoclaved 1:1 sand:potting soil mix, arranged in randomized complete block design and grown for 2 weeks before being inoculated with 10,000 *M. enterolobii* eggs from a SC population. After 8 weeks, plants were destructively harvested and rated for galling, number of egg masses, and number of nematode eggs per gram of dried root. Thirty-eight of the 46 accessions did not have a significantly different mean number of egg masses or mean percent galling from 'Beauregard' ($P > 0.05$, ANOVA, Tukey's HSD test). Seven accessions, including the resistant control 'Regal', averaged less than 10 egg mass across replicates, identifying 6 accessions as novel sweetpotato germplasm with resistance to *M. enterloboii.*

Development of a High-throughput Screening Method for Detection of *Meloidogyne enterolobii* in Sweetpotato Storage Roots. Julianna Culbreath[1], W. Rutter[2], P. Wadl[2] and C. Khanal[1]. [1]Department of Plant and Environmental Sciences, Clemson University, Clemson, SC 29634. [2]USDA, ARS, Charleston, SC, 29414. (julianna.culbreath@usda.gov)

Meloidogyne enterolobii is an aggressive root-knot nematode (RKN) species that has emerged as a significant pathogen of sweetpotato in the southeastern US. This nematode can be spread through the movement of infected 'seed' sweetpotatoes used for propagation, which has prompted regulatory agencies to impose quarantines on regions infected with *M. enterolobii.* Detecting RKN in sweetpotato by eye can be unreliable, and further distinguishing *M. enterolobii* from other RKN species that infect sweetpotato currently relies on molecular tests conducted on individual nematodes. To overcome these limitations, a novel high-throughput screening method to detect and identify *M. enterolobii* in batches of sweetpotato storage roots was developed. For this method, batches of storage roots were skinned and 10 ml samples of homogenized skinnings were collected and used for PCR-based analysis to detect the presence of *M. enterolobii* and other RKN species. Additionally, artificial inoculation of sweetpotato with *M. enterolobii* in greenhouse experiments and subsequent detection of the nematode in storage roots suggested that the screening method was both reliable and sensitive. In a dilution series using *M. enterolobii* eggs, as little as 2 eggs/10mL sample were detected. This screening method was also used to conduct survey of fresh market storage roots, which successfully detected *M. enterolobii* and other RKN species present in sweetpotatoes from local SC supermarkets. Our results indicate that this method could help to screen for and manage *M. enterolobii* in the US sweetpotato industry.

Sensory Evaluation Results for Specialty Sweetpotatoes. Mussoline, W.[1] and D. Dinkins[2]. [1]UF/IFAS Putnam County Agriculture Extension Agent, East Palatka, FL, 32131. [2]UF/IFAS Multi-County Community Development & Food Systems Extension Agent, Gainesville, FL, 32611. (wmussoli@ufl.edu)

Purple-flesh sweetpotatoes are a particular interest to a handful of specialty crop growers in North Florida. Harvest yields are comparable to traditional orange-flesh varieties, but marketing bottlenecks remain a challenge. As a part of a collaborative marketing effort, 100 pounds each of four varieties (Purple Majesty, Purple Splendor, Charleston Purple and Mursaki) were donated by the grower to the UF Food Science and Human Nutrition Department for sensory evaluations. One-oz servings of each variety were cubed, roasted and distributed to approximately 100 volunteers. Participants were asked to rate the appearance, flavor, texture and overall liking on a digital survey they could complete on their phone by scanning a QR code. The rating system consisted of nine categories ranging from "dislike it extremely" to "like it extremely." The names of the varieties were not provided and the order in which they were instructed to taste each variety was randomized among participants. Statistical differences among the varietal preferences were determined using two way ANOVA analyses followed by Tukey's HSD with a p-value less than 0.05. Among the four varieties, Purple Majesty scored the highest average rating for texture followed by Charleston Purple, Purple Splendor and Mursaki. A statistical difference between Purple Majesty and Mursaki was noted. Purple Splendor scored the highest average rating for appearance followed by Purple Majesty, Charleston Purple, and Mursaki. A statistical difference between Purple Splendor and Mursaki was noted. There were no statistical differences among the four varieties for overall flavor or liking.

Simultaneous Prediction of Beta-carotene, Anthocyanins, and Phenolics in Sweetpotatoes by Near-infrared Spectroscopy. Matthew C. Allan[1], Ragy Ibrahem[2], Suzanne D. Johanningsmeier[1], Kenneth V. Pecota[2], and G. Craig Yencho[2]. [1]Food Science and Market Quality and Handling Research Unit (Raleigh, NC) United States Department of Agriculture, Agricultural Research Service. [2]Sweetpotato and Potato Breeding and Genetics Programs North Carolina State University. (matthew.allan@usda.gov)

Sweetpotato compositions can be predicted using near infrared spectroscopy (NIRS) models developed with samples of known composition. β-carotene and anthocyanins are of interest in sweetpotatoes for their health benefits and impacts on appearance and flavor. However, predictions are conflated due to similar NIRS wavelength absorbances. Therefore, NIRS models that account for both chromophores in sweetpotatoes are needed. A sample set (n=100) was selected from the NCSU sweetpotato breeding program based on NIRS diversity and visual appearance. Anthocyanins and phenolic compounds were extracted using acidified methanol. Phenolic contents were measured by the Folin-Ciocalteu's phenol assay, and anthocyanins were measured by the pH differential method. Anthocyanidin quantities (peonidin, cyanidin) from acid hydrolyzed anthocyanins were separated and quantified using high performance liquid chromatography with photodiode array detection (HPLC-PDA). β-carotene was extracted using hexane and quantified by HPLC-PDA. Partial least squares (PLS) prediction models for each measured compound were trained using 75 randomly selected samples then validated with the remaining 25 samples. Validation set range (mg/100g fresh weight) with root mean square error of prediction (RMSEP) and R^2 were the following: phenolics, 918.0 to 5343.3 ± 269.4, 0.94; total anthocyanins, 0 to 673.0 ± 10.34, 0.97; cyanidin, 0 to 769.0 ± 36.39, 0.73; peonidin, 0 to 383.5 ± 19.24, 0.73; and β-carotene, 0 to 61.4 ± 4.3, 0.94. Total anthocyanins, β-carotene, and total phenolics in sweetpotatoes were accurately predicted by these models, which can be used by breeding programs to select for genotypes with specific phytonutrient profiles of interest.

Effects of Stylet-Oil on Phytotoxicity and Yield in Ipomoea batatas. Joshua Wilkinson[1], Lorin Harvey[1], Callie Morris[1], Mark Hall[1], Mark Shankle[1]. [1]Pontotoc Ridge-Flatwoods Branch Experiment Station, Mississippi State University, Pontotoc, MS 38863

Mineral oil has been used in the agricultural practices of several important crops, including *Solanum tuberosum* L. (potato), to impede transmission of stylet-borne viruses temporarily harbored by aphids. Several *Potyvirus* spp. are non-persistently transferred by aphids from infected cultivated and native/introduced morning glory species growing around farmland. To assist in the development of antiviral practices, phytotoxic effects of Stylet-Oil (mineral oil), as well as the oil's inhibitory properties of non-persistent viral transmission, on yield of *Ipomoea batatas* (L.) (sweetpotato) were assessed. The study was initiated in 2022 at the Pontotoc Ridge-Flatwoods Branch Experiment Station in Pontotoc, MS. Treatments consisted of five different stylet oil rates (0%, 1%, 2%, 4%, and 10%) applied to virus free sweetpotato slips in a RCBD design with 4 replications. Stylet oil treatments were applied starting at 3 weeks after planting and occurred weekly until 6 weeks after transplanting. Samples of proximal/medial/distal leaves were taken weekly to analyze using molecular methods to verify occurrence of viral transmission. Plant injury rating was observed throughout the study, and yield data was collected at harvest to assess effects of the application of Stylet-Oil on sweetpotato yield. Preliminary data using ANOVA has shown no significant difference ($p = 0.8904$) between any Stylet-Oil treatments and changes in sweetpotato yield. No phytotoxic effects were observed throughout the study regardless of the stylet oil treatment concentrations. If reduced viral transmission is also observed in this study, these results suggest stylet oil could be a viable control for virus transmission in sweetpotato production.

Sweetpotato Response to Reduced Rates of Liberty Plus Enlist One. Donnie K. Miller and A.M Barfield. LSU AgCenter, St. Joseph, LA.

A field study was conducted in 2022 at the LSU AgCenter Northeast Research Station near St. Joseph, La with the objective to evaluate impacts of reduced rates of co-application of glufosinate (Liberty 280 SL) and 2,4-D choline (Enlist One) on sweetpotato. A four-replication factorial arrangement of treatments was used and included herbicide application timing (Factor A: 10 or 30 d after planting (DAP)) and reduced use rate (Factor B: 0 (nontreated), 1/8, 1/16, 1/32, 1/64, 1/128, or 1/256 of the use rate). The use rate utilized in reduced rate calculations was 0.66 kg ai/ha^{-1} for glufosinate and 1.06 kg ae/ha^{-1} for 2,4-D choline. Treatments were applied to each 3 x 7.62 m plot at the scheduled timing following planting of 'Orleans" sweet potato on June 9. Parameter measurements included visual crop injury (chlorosis, stunting, twisting, leaf crinkling) 7, 14, and 28 d after application (DAT), NDVI reading 42 DAT, and yield (U.S. #1, canner, jumbo, and total).
A significant application timing by reduced herbicide rate interaction was observed for injury 7 DAT. At the 1/8 (75 vs 56%), 1/64 (20 vs 11%), and 1/256 (19 vs 4%) x rates, injury was greater at the earlier 10 DAP application timing. Injury was equivalent among application timings at the 1/16 (49 vs 43%), 1/32 (28 vs 21%), and 1/128 (18 vs 11%) x rates. At 14 DAT, a significant application timing by reduced herbicide rate interaction was observed.

Injury was greater at the 10 DAP application timing at all rates: 1/8 (73 vs 54%), 1/16 (43 vs 28%), 1/32 (24 vs 18%), 1/64 (23 vs 7%), 1/128 (14 vs 5%), and 1/256 (10 vs 3%) x rates. At 28 DAT, a significant application timing by reduced herbicide rate interaction was observed. Injury was greater for the 10 DAP application timing only for the 2 highest reduced rates (40 vs 9 and 15 vs 4%, respectively). Injury was no greater than 3% and equivalent at all other rates for both timings.
NDVI readings for treatments ranged from 0.876 to 0.889 and equivalent to the 0 rate (0.88). Averaged across reduced herbicide rate, US no. 1 yield was greatest at the 10 DAP application timing (197 vs 136 bu/A). Averaged across application timings, yield was only reduced at the two highest rates (63 and 44%, respectively). Averaged across reduced herbicide rate, canner yield was greatest at the 10 DAP application timing (115 vs 89 bu/A). Averaged across application timings, yield was only reduced at the highest rate (46%). Averaged across application timings, jumbo yield was only reduced at the two highest rates (92 and 78%, respectively). Averaged across reduced herbicide rate, total yield was greatest at the 10 DAP application timing (294 vs 197 bu/A). Averaged across application timings, yield was only reduced at the two highest rates (55 and 39%, respectively). Producers with multi-crop operations including sweet potato are cautioned to thoroughly follow all labeled sprayer cleanout procedures when previously spraying one of the combination herbicides evaluated or to devote separate spraying equipment. Producers are also cautioned to follow all label restrictions to prevent off target movement to adjacent sweet potato fields.

A Sustainable Approach for Weed and Insect Management in Sweetpotato: Breeding for Weed and Insect Tolerant/Resistant Clones. John Coffey[1], Phillip Wadl[1], H. Tyler Campbell[1], William B. Rutter[1], Livy H. Williams III[1], Victoria Murphey[1], Julianna Culbreath[1], and Matthew Cutulle[1]. [1]Clemson University Coastal Research and Education Center. 2700 Savannah Hwy Charleston SC 29414m [2]USDA-United States Vegetable Lab (USVL). Savannah Hwy Charleston SC 29414. (john.coffey@usda.gov)

Consumer Knowledge and Acceptability of Health, Biotechnology, and Sustainability of Sweetpotato Products - A Preliminary Survey". Rebekah Brown[1] and Jonathan Allen[1]. [1]Department of Food Science, North Carolina State University, Raleigh, NC 27695. (rmwilso2@ncsu.edu)

Saturday January 21

8:00 Call to Order and Announcements

Presiding: Katie Jennings

Plant Biology and Crop Production

Presiding: Mark Shankle

8:15 Calculating Regional Water Use Efficiency for Sweet Potato. Amanda Nelson. USDA ARS, Stoneville, MS 38776.

Although sweet potato is considered a drought tolerant crop, water plays an important role in its growth and yield. Water deficits reduce leaf water potential and total water use, and subsequently reduce stomatal conductance, leaf area, root mass, total plant mass and storage root yield. Climate change is leading to increased extremes in both frequency and intensity of droughts and floods. The uncertainty in water supply makes it necessary to understand the role water has in sweet potato cultivation, including water use (WU), water use efficiency (WUE), and runoff water quality and quantity. Very little research has been done on WU and WUE in sweet potato and field studies are rare. Likewise, the surface runoff water quality and quantity from sweet potato has not been examined thoroughly, except as part of a rotation in a larger system. To address this research need, we propose two research projects to be conducted on previously established sweet potato field experiments; 1. To measure and calculate water use and water use efficiency in the cultivar trials being conducted by the ARS, and 2. To measure runoff quality and quantity on one set of sweet potato field experiments. We also plan to use the results from both projects to inform a hydrologic crop model to help simulate future management possibilities.

8:30 Data Collection for NCSU Sweetpotato Breeding Program. Russell Mierop. Horticultural Science Department, North Carolina State University, Raleigh, NC 27695. (ramierop@ncsu.edu)

8:45 Sweetpotato Yield and Quality Response to Potassium Carrier and Rate.
Jonathan Schultheis*, Brandon Parker and Stuart Michel. Department of Horticultural Science, North Carolina State University, Raleigh, NC. (jonr@ncsu.edu)

Two potash studies were conducted in 2021 and 2022 at the Horticultural Crops Research Station, Clinton, NC to determine potash carrier and rate effect on sweetpotato yield and quality. Four potash carriers; muriate of potash (MOP), sulfate of potash (SOP), KMag, and Qrop (a potassium nitrate carrier marketed by SQM). The two studies were conducted in a soil that was low in potassium and should elicit a response when comparing a no potassium (control) treatment versus when potassium was applied. In 2021, yields were lower when no potassium was applied compared MOP, SOP, and KMag when they were the sole potassium fertilizer carriers. Qrop had some ameliorating properties to improve plant stands when mixed with other potassium carriers. Yield of No. 1 grade roots was similar regardless of potassium carrier and rate. Jumbo root production was numerically the highest with MOP at 200 lb/ac for the season. However, yield of jumbo roots was similar regardless of potassium carrier when 200 lb/ac was applied. Jumbo root yield was reduced when 100 lb/ac or no potassium was applied. Root sizing was improved when 200 lb/ac potassium was applied versus when 100 lb/ac or no potassium was applied. Rainfall was more limited during plant establishment in 2022 versus 2021, but supplemental irrigation was strategically applied to facilitate root development and size increase.

9:00 New Paradigm in Gene Editing Methodology in Sweetpotatoes. K. Shefer. GeneNeer, Israel. (kinneret@geneneer.com)

9:15 No Time to Rot: *Ceratocystis fimbriata*-infested Growth Substrate Alters Sweetpotato Root System Architecture and Storage Roots Develop Symptoms after Detachment. Christopher A. Clark[1], Catherine DeRobertis[1], and Arthur Villordon[2]. [1]Department of Plant Pathology and Crop Physiology, LSU AgCenter, Baton Rouge, LA 70803; [2]Sweet potato Research Station, LSU AgCenter, Chase, LA 71324. (avillordon@agcenter.lsu.edu)

There is very limited information about how the sweetpotato root system responds to *Ceratocystis fimbriata* inoculum presence in the growth substrate, especially at the onset of storage root formation. In this study, autoclaved construction sand was used as a growth substrate and was either unamended (control) or infested by adding a suspension of 2.0 x 10^6 (PD1) or 1.4 x 10^6 (PD2) endoconidia per ml of isolates WJM-11 and 18-BIP-1 in equal proportions to 1400 ml of sand per pot (final concentration = approx. 1,000 endoconidia per ml of sand). Cultivars Bayou Belle (BB) and Beauregard (BX) plants showed inherent cultivar and planting date (S) effects at the onset of storage root formation (15 days) as evidenced by the variation in second order lateral root (LR) length and number among and within treatments, cultivars, and S. At 49 days in S1, inoculated plants showed evidence of stem infection in both cultivars, with more lesions in BB relative to BX stems. However storage roots showed no evidence of lesions. Instead of discarding the detached storage roots, these were inadvertently stored in sampling bags and after 25 days roots from infested but not control treatments showed evidence of lesion development consistent with *C. fimbriata* infection. The results of this study suggest that by exposing developing plants to more natural inoculation processes, differences in storage root susceptibility may be found that were not observed in previous studies.

9:30 Sweetpotato Yield Forecasting at the County Scale Through Machine Learning and Satellite Remote Sensing. Mariella Carbajal-Carrasco[1] and Natalie Nelson[2,*] [1] PhD Candidate, Biological and Agricultural Engineering, North Carolina State University, Raleigh, NC 27695. [2]Assistant Professor, Biological and Agricultural Engineering, North Carolina State University, Raleigh, NC 27695. (mcarbaj@ncsu.edu)

Despite the fact that sweetpotato has become an important commodity for the U.S., little research has been devoted to developing a yield prediction model. Machine Learning (ML) algorithms are known to be excellent at predicting agricultural responses, often performing more efficiently than process-based models, making such approaches promising for driving yield forecasting systems. This study aimed to evaluate the feasibility of generating in-season yield predictions of sweetpotato using ML and publicly available data. Specifically, our objectives were to (1) screen two algorithms, Random Forest (RF) and Neural Network (NN), for their abilities to accurately predict sweetpotato yields at the county-scale, (2) identify optimal predictors from a suite of variables including vegetation indices, maximum temperature, minimum temperature, and precipitation, growing degree days, and soil properties, and (3) determine the earliest date in the growing season from which end-of-season yields can be reliably predicted. Yield data were sourced from the USDA Agricultural Survey from 2008 to 2021 and evaluated at the county scale in North Carolina. Annual CropScape land cover layers were used to validate the harvested sweetpotato areas reported by the USDA, as well as to extract satellite remote sensing information that was aggregated

fortnightly across the growing season. Preliminary results of a simplified approach showed that the RF algorithm performed reasonably well and better than the NN algorithm (R2, RF = 0.75, R2, NN = 0.43) in predicting yield. Both models had minimum temperature from early July and NDVI in mid-August, during the first growth stage when root storage initiation occurs, as the most important variables.

9:45 Update on SCRI Sweet ARMOR Project. Craig Yencho. Horticultural Science Department, North Carolina State University, Raleigh, NC 27695. (yencho@ncsu.edu)

Sweetpotatoes are an important specialty crop in the southeastern US. However, the emergence of the root-knot nematode (RKN), *Meloidogyne enterolobii* (*Me*) in the southeast has created significant problems. *Me* can result in severe sweetpotato yield loss and it has resulted in crop and seed quarantines across the US. It is also a zero-tolerance pest in Europe. There are no acceptable *Me* resistant varieties and growers have adopted aggressive soil fumigation and nematicide treatments to reduce infestations, and growers continue to struggle with the Southern RKN, *M. incognita* (*M.i.*), too. Sustainable sweetpotato RKN management requires a systems-based approach using strategies including timely diagnostics, crop rotation, weed management, resistant varieties, economic forecasting and precision pesticide applications. The SweetARMOR project is a 4-year $5.1 million multistate (NC, LA, MS, TN and CA) effort that incorporates all of these concepts in a comprehensive research and extension project that integrates short-term outcomes that rapidly respond to the emerging *Me* pest issue, with a longer-term genomic-assisted sweetpotato breeding strategy. The goals of the project are to develop, implement, and evaluate a sustainable RKN management program in sweetpotato that can be used as a model in other vulnerable US specialty crops. Achievement of these goals will deliver varieties that can be grown in a production system that maximizes yield, storage root quality and culinary attributes, thus enabling stakeholders along the US sweetpotato supply chain to maintain their competitive advantage in the US and global marketplace. Having recently completed Year 1 of the SweetARMOR project, this talk will highlight the most recent research developments of this project, and describe our research plans for the future.

10:00 Break

10:15 Genetic Diversity, Population Structure, and Genome-wide Association Study of Root Traits in the USDA Sweetpotato (*Ipomoea batatas*) Collection. Phillip A. Wadl[1], Tyler J. Slonecki[1], William B. Rutter[1], Bode A. Olukolu[2], G. Craig Yencho[3], and D. Michael Jackson[1]. [1]United States Department of Agriculture, Agricultural Research Service, United States Vegetable Laboratory, Charleston, SC 29414, USA. [2]Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN 37996, USA.
[3]Department of Horticultural Science, North Carolina State University, Raleigh, NC 27695, USA. (Phillip.Wadl@usda.gk)

Sweetpotato (*Ipomoea batatas*) is the sixth most important food crop and plays a pivotal role in preserving worldwide food security. Maintenance of sweetpotato germplasm collections and improvement in sweetpotato research breeding and genetics programs is essential for meeting nutritional needs and supply goals. Due to its polyploid genome, high heterogeneity, and phenotypic plasticity, sweetpotato genetic characterization and breeding can be difficult. Association studies, aimed atidentifying genetic loci underlying phenotypic variation, can provide important resources for breeders to improve breeding efficiency and effectiveness and facilitate germplasm diversity preservation. Here, we performed a genome-wide association analysis using a genotyping-by-sequencing platform (GBSpoly)-characterized 384 accession breeder subset derived from the United States Department of Agriculture (USDA), Agricultural Research Service (ARS), Plant Genetic Resources Conservation Unit (PGRCU) in Griffin, Georgia, United States. Using a custom R script and GWASpoly R package, genomic associations were discovered for various sweetpotato root traits. SNPs with significant associations were matched to the *Ipomoea trifida* genome and any genes within a 75Kb range were recorded. The links between genotype and phenotype generated by this study provide markers that breeders can use to make specific trait selections, improving breeding accuracy and efficiency. Additionally, specific markers of desirable traits can be used to maintain genotypic diversity in sweetpotato germplasm collections.

10:30 Automated Phenotyping of Sweetpotato via Multispectral Imaging and Semantic Segmentation Convolutional Neural Networks. Tyler J. Slonecki[1], Phillip A. Wadl[1], and John Coffey[1]. [1]USDA, ARS, U.S. Vegetable Laboratory, Charleston, SC 29414. (tyler.slonecki@usda.gov)

Sweetpotato plays a pivotal role in maintaining worldwide food security. To maintain supply and meet nutritional needs, sweetpotato germplasm collections and breeders must improve sweetpotato research breeding and genetics programs. Association studies aimed at linking genotype with phenotype can provide important resources for breeders to improve breeding efficiency and effectiveness and facilitate germplasm diversity preservation. We aim to identify genes associated with sweetpotato damage and undesirable traits (insect damage, cracking, rot, veins, etc.) to improve sweetpotato insect and damage resistance breeding. However, root phenotype collection (particularly insect damage rating) is often time-consuming and arduous. In this study we explore the use of multispectral imaging and semantic segmentation convolutional neural networks to automate the identification of sweetpotato damage. Using RGB images collected via the Phenospex Planteye and annotated with various regions of damage, we can identify regions of damage with reasonable accuracy. Automation of sweetpotato damage phenotyping will allow for more accurate, more consistent, and faster collection of physical traits, leading to more accurate and stronger associations with the genome. Additionally, techniques and methods used in this study should be easily translatable to other vegetable crops struggling with similar phenotyping bottlenecks.

Disease, Insect, and Weed Management

Presiding: Katie Jennings

10:45 Evaluation of Fungicides and Antibiotics for Management of Post-harvest Diseases of Sweetpotato. Hunter Collins[1] and Lina Quesada-Ocampo[1]. [1]Department of Entomology and Plant Pathology and NC Plant Sciences Initiative, North Carolina State University, Raleigh, NC 27606. (hunter_collins@ncsu.edu)

Post-harvest diseases are a major economic problem in the sweetpotato industry. Some of the most common postharvest pathogens in North Carolina are *Ceratocystis fimbriata* (black rot), *Rhizopus stolonifer* (Rhizopus soft rot), and *Dickeya dadantii* (bacterial root rot). Cultural practices alone are not sufficient for management. There are few fungicides or antibiotics that are labeled for use in sweetpotato, and many of those are not allowed for export use. Approximately 40 - 50% of North Carolina's sweetpotatoes are exported, thus, effective fungicides and antibiotics must also be approved for use in export markets. In the trials, sweetpotato roots were artificially inoculated with one of the pathogens and placed onto a miniature packing line for treatment applications. To identify fungicides or antibiotics to manage black rot, Rhizopus, and Dickeya, registered and unregistered products were evaluated for efficacy against a respective pathogen. The results of these trials are important for increasing the number of products available for the sweetpotato industry.

11:00 Chemical Nematicides for Management of *Meloidogyne enterolobii* in Sweetpotato in North Carolina: Current Results and Future Prospects. Adrienne Gorny[1], Bennet Jeffrey[1], Hunter Collins[2], and Lina Quesada-Ocampo[2], [1]Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC 27606. (agorny@ncsu.edu)

Meloidogyne enterolobii (colloquially, the guava root-knot nematode) is an invasive and emerging species of root-knot nematode in North Carolina. It is a highly aggressive species, having been reported to produce large and severe root galling. *Meloidogyne enterolobii* is known to have a broad host range, including sweetpotato and rotational crops such as soybean, tobacco, and cotton. The species is also known to overcome currently deployed host resistance, including the *Mi-1* resistance gene in tomato, making management of this species through crop rotation and use of resistant crop cultivars challenging. Due to this, current management of *M. enterolobii* relies heavily on chemical nematicides. In 2021 and 2022, fumigant and non-fumigant nematicides were evaluated in the field for efficacy in managing *M. enterolobii* in sweetpotato in North Carolina. Data on crop yield and storage root galling severity were collected, and nematode populations were quantified. Fumigant nematicides that reduced nematode damage included 1,3-dichloropropene and metam sodium products, while non-fumigant nematicides that reduced nematode damage included fluopyram products. These and future considerations for chemical management of *M. enterolobii* in sweetpotato will be discussed.

11:15 Valuing Disease Resistance in Sweetpotato: Developing a National Survey Overview and Opportunity for Feedback. Daniel Tregeagle[1]. [1]Department of Agricultural and Resource Economics, Raleigh, NC 27695. (tregeagle@ncsu.edu)

11:30 Striving to Stay Clean: Detection of Sweetpotato Viruses on Multiple Seed Generations in North Carolina. Christie Almeyda[1], Tamara Abernethy[1], Chunying Li[1], Ken Pecota[2] and Craig Yencho[2]. [1]Micropropagation and Repository Unit, Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC 27607. [2]Department of Horticultural Science, North Carolina State University, Raleigh, NC 27607. (cvalmeyd@ncsu.edu)

Under the National Clean Plant Network (NCPN) economic study, the sweetpotato clean centers started an experiment aiming to assess the value of clean seed in comparison to older generation seed. The goal of this study was to evaluate the performance and quality of foundation seed after it had been integrated into commercial sweetpotato operations. In NC, trials started in 2021 with Covington and Beauregard as evaluated varieties. G1 seed was used as a reference to compare the yield and virus incidence of growers' generation 2 (G2), generation 3 (G3) and generation 4 (G4) seed roots (grown in the growers' seed production fields 1, 2 or 3 years following the year of foundation seed production). This experiment was repeated in 2022 with Averre and Bayou Belle added to the initial pool of varieties as well as older generations (G5 and G6). It is known that the accumulation and perpetuation of viruses in sweetpotato is a major constraint for production of seed and the commercial crop. The potyvirus complex is prevalent in North Carolina and comprises Sweet potato feathery mottle virus (SPFMV), Sweet potato virus G (SPVG), Sweet potato virus C (SPVC) and Sweet potato virus 2 (SPV2). In 2021, virus data suggested a low incidence of viruses (mainly SPFMV) on G1 material. Potyviruses (mainly SPVG, SPVC and SPFMV) started to be prevalent on G2 and G3 material. In the older generation evaluated (G4), all potyviruses (SPVG, SPVC, SPFMV and SPV2) were detected. In 2022, the same trend was observed as the prevalence of four potyviruses was associated to higher seed generations. Yield data was not taken in 2022 due to field external factors. A third year of data will be needed to correlate viral infections and yield results.

11:45 Chemical Control Option for the WDS Insect Complex. Fred Musser[1] and Rachel Morrison[1]. [1]Mississippi State University. (fm61@msstate.edu).

Several new insecticides and application methods were tested for efficacy against the wireworm/Diabrotica/Systena (WDS) underground insect complex in Mississippi.

12:00 Rapid Propagation of Virus-free Sweetpotato Planting Materials Through Controlled Environment. Kai-Shu Ling[1], Augustine Gubba[1,2], Bazgha Zia[1,3], Phillip Wadl[1], Matthew A. Cutulle[3], Christie Almeyda[4] and Christopher A. Clark[5]. [1]USDA Agricultural Research Service, U.S. Vegetable Laboratory, Charleston, SC. [2]School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, South Africa. [3]Coastal Research & Education Center, Clemson University, Charleston, SC. [4]Department of Entomology and Plant Pathology, North Carolina State University, Raleigh, NC. [5]Department Plant Pathology and Crop Physiology, Louisiana State University, Baton

Rouge, LA. (kai.ling@usda.gov)

Sweetpotato is propagated using vegetative materials such as storage roots or cuttings (slips). Through this process, virus infection and accumulation can occur through efficient transmission of viruses (potyviruses and begomoviruses) by insect vectors (aphids and whiteflies) in vegetative propagation. National Clean Plant Network (NCPN) – Sweetpotato research centers (CA, HI, LA, MS, NC) have devoted significant efforts to generate virus-free planting stock of important cultivars for sweetpotato growers in their states. However, most of the virus-free materials generated through meristem shoot-tip culture can be rapidly re-infected again by one or more viruses within one growing season. Mass production of virus-free propagating materials of sweetpotato is a big challenge. The CleanSEED sweetpotato project was funded in 2022 to specifically address this problem. Controlled environment agriculture (CEA) technology might be a solution to achieving rapid propagation of a large number of virus-free materials from foundation stocks to grower fields in 6 – 12 months. Using a single virus-indexed 'Beauregard' *in vitro* plantlet generated from LSU, we were able to propagate 500 rooted plants in CEA in three months in comparison to three plants in tissue culture over the same period. Using those rooted plants for propagation, in another cycle (2-3 months), we were able to generate about 250,000 plants. This cycle of propagation could go on and on for nursery propagation, thus, providing growers unlimited number of clean and virus-free planting materials. Additional virus-free stocks from North Carolina have been received and experiments are underway to assess the efficiency of their propagation under CEA.

12:15 Lunch

Business and Planning Meeting

Presiding: Katie Jennings

1:30 Call to Order and Review of 2020 Minutes Katie Jennings

1:40 Graduate Student Contest Results Michelle McHargue

1:50 National Impact Award Mark Shankle

2:00 Resolutions Resolutions Committee

2:10 Collaborator's Trial Discussion Jonathan Schultheis

2:20 Nominations Committee Report Nominations Committee

2:30 2024 Meeting Location Katie Jennings

2:45 National Stakeholder Group Update Tara Smith

3:00 CleanSEED Update Mark Shankle

3:15 Multistate Project Update David Monks

3:30 Adjourn

State Report – Arkansas

Shaun Francis, Extension Specialist
University of Arkansas at Pine Bluff

Planted acreage in 2021 and 2022: 5,391 (2021); 5,437 (2022)

Harvested acreage in 2022: 100%

Percent of crop marketed for fresh and processing: 65/35

Anticipated acreage for 2023: 5,500

Varieties grown and estimated percent of acreage: Orleans – 60%; Beauregard – 40%; Other varieties - <1%

Percent of acreage irrigated: 10%

Major pest problems (weeds, insects, diseases): No major pest problems reported by commercial growers. However, yellow nutsedge proved to be a severe weed problem for some limited-resource/small-scale growers, who tend to produce their crop naturally (without the use of inorganic products). Morning glory was also observed in some of these fields during field visits. Growers were less worried about their ability to remove those from their fields.

Abiotic disorders (herbicide, nutrient, weather-related): An extremely dry period during the early season led to a slow down in the growth of plants in the field. This affected the in-field multiplication by those growers who received virus-indexed plants from UAPB's Sweetpotato Foundation Seed Program. When the rains arrived, growers reported growth cracks in the roots.

Other major challenges to production (lack or storage, labor issues, water rights, etc): An increase in the cost of labor is causing some concern for Arkansas producers. Also, the intensity of last season's dry spell has initiated some discussions among producers and other stakeholders regarding steps that can be taken to mitigate these conditions.

Other comments: Based on the operations of the commercial growers network in Arkansas, where planting material and other inputs are provided to the growers by a lead farmer who receives virus-indexed plants from UAPB, it is estimated that approximately 90 percent of the sweetpotato acreage in the state is propagagated using material originating from UAPB.

STATE REPORT- North Carolina - 2022

Jonathan R. Schultheis, Professor
North Carolina State University

Planted acreage in 2017, 2018, 2019, 2020, and 2021: 90,000 (2017); 82,000 (2018); 98,000 (2019); 106,000 (2020); ~104,700 (2021); ~81,000 (2022)

Harvested acreage in 2017, 2018, 2019 and 2020: 89,500 (2017); 78,500 (2018); 97,700 (2019); 105,300 (2020); 104,700 (2021); 81,000 (2022)

Percent of crop marketed for fresh and processing: 70/30

Anticipated acreage for 2023: 75,000, difficult to determine, but likely considerably less than 2022.

Varieties grown and estimated percent of acreage:

Covington: 91%
Beauregard: 2-3%
Bayou Belle: 2%
Muraski-29: 4-5%
Others: ~1% (Bonita, Evangeline, Purple Majesty, Purple Splendor) Very limited acreage for direct, fresh-market or specialty market sales

Percent of acreage irrigated: ~5%

Major pest problems:
Weeds: Palmer amaranth, Yellow nutsedge
Insects: Wireworm
Disease: *Meloidogyne enterlobii* (Guava root-knot nematode)

Other major challenges to production: Increased labor cost up 0.49/hr from 2021. Labor costs increased $1.01 from 2020 to 2021. Increased fertilizer costs of 200% to 300% from 2021 to 2022. Fertilizer cost was up 400% to 600% from 2020 to 2021. Increase cost of diesel fuels.

Other comments: The 2022 grower season was relatively hot and dry during planting in June but with some timely rain events in the summer and fall allowed the roots to size. Weather for harvest from August into November was excellent. Wireworm was a much bigger issue in 2022 than in previous years and was likely due to the loss of Lorsban. Damage up to 30% of crop occurred in some cases.

Yields generally averaged – 320 bu/acre (2021); 400 bu/ac (2022)

Meloidogyne enterlobii root-knot nematode continues to be of concern in North Carolina.

International sales have been reduced in 2021 to 2022.

TABLE 1. NATIONAL SWEETPOTATO COLLABORATORS ENTRY FORM
2023 Trial

ENTRIES	BREEDER	COMMENTS

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NATIONAL SWEET POTATO COLLABORATORS SUMMARY OF DATA

2022

BUSHELS PER ACRE (50 lbs.)

STATE AND LOCATION REPORTING: Mississippi State University, Pontotoc, MS

DATE TRANSPLANTED: June 24, 2022 DATE HARVESTED: October 12, 2022 NO. GROWING DAYS:110

DISTANCE BETWEEN ROWS (in.): 40" DISTANCE IN ROW(in.): 12"

PLOT SIZE: NO. OF ROWS: 1 row LENGTH (ft.): 30' NO.REPLICATIONS: 4

IRRIGATION (AMOUNTS AND DATES):June 21, 2022- 0.5-0.75"; June 28, 2022 0.75"

FERTILIZER: N 50 P_2O_5 75 K_2O 200(PER ACRE)

SELECTION	US #1'S	CANNERS	JUMBOS	TOTAL MARKETABLE	PERCENT US #1'S	CULLS
Purple Majesty	71.05 bc	42.73 -	23.98 bc	137.75 b	49.80 a	45.60 b
Purple Splendor	44.63 bc	27.83 -	43.20 b	115.98 bc	40.00 ab	44.18 b
B94-14	138.25 a	50.85 -	101.75 a	290.85 a	44.00 ab	113.78 a
Covington	109.93 ab	47.50 -	29.28 bc	186.73 b	57.3 a	84.00 a
Stokes Purple	25.93 c	28.33 -	0.00 c	54.25 c	37.3 ab	23.50 b
NC09-0122	19.68 c	24.95 -	7.70 c	52.30 c	29.3 b	23.05 b
Average	68.20	37.03	34.32	139.59	42.92	55.68
LSD (0.05)	65.51	29.72	30.37	75.92	23.65	37.09
CV,%	63.69	53.26	58.17	36.09	36.57	44.20

US #1's - Roots 2" to 3 1/2" diameter, length of 3" to 9", must be well shaped and free of defects.
Canners - Roots 1" to 2" diameter, 2" to 7" in length.
Jumbos - Roots that exceed the diameter, length and weight requirements of the above two grades, but are of marketable quality.
Percent US #1's - Calculated by dividing the weight of US #1's by the total marketable weight (Culls not included).
Culls - Roots must be 1" or larger in diameter and so misshapen or unattractive that they could not fit as marketable roots in any of the above three grades.

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Notes