NATIONAL CONFERENCE ON NEXT-GENERATION SUSTAINABLE TECHNOLOGIES FOR SMALL-SCALE PRODUCERS

SEPTEMBER 7-9, 2022
Alumni Foundation Events Center | University Farm
North Carolina Agricultural and Technical State University, Greensboro

SPONSORS

North Carolina A&T State University
College of Agriculture and Environmental Sciences
The Interdisciplinary Waste Management Institute
Center for Environmental Farming Systems
Cooperative Extension Service
Extended Campus: Continuing Education
Small Farms Resource and Innovation Center
Division of Business and Finance

Alabama A&M University
Small Farms Research Center

Alcorn State University
The Socially Disadvantaged Farmers and Ranchers Policy Research Center

Virginia State University
Small Farm Outreach Program

Carolina Farm Stewardship Association

1890 Universities Foundation

U.S. Department of Agriculture (NIFA)
U.S. Department of Agriculture (ARS)
U.S. Environmental Protection Agency (EPA)
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELCOME AND HIGHLIGHTS</td>
<td>3</td>
</tr>
<tr>
<td>CONFERENCE PURPOSE</td>
<td>4</td>
</tr>
<tr>
<td>SPEAKER BIOGRAPHIES</td>
<td>5</td>
</tr>
<tr>
<td>AGENDA AT A GLANCE</td>
<td>11</td>
</tr>
<tr>
<td>FULL PROGRAM AGENDA</td>
<td>12</td>
</tr>
<tr>
<td>POSTER INFORMATION</td>
<td>17</td>
</tr>
<tr>
<td>EXHIBITORS</td>
<td>19</td>
</tr>
</tbody>
</table>

**ON THE COVER:**
Left image photo illustration by Cassandra Sherrill, Shutterstock and Unsplash photos.
Middle and right photos by N.C. A&T College of Agriculture and Environmental Sciences.
Welcome to North Carolina Agricultural and Technical State University for the National Conference on Next-Generation Sustainable Technologies for Small-Scale Producers.

North Carolina A&T, the nation’s largest historically Black college or university, is committed to exemplary teaching, learning, scholarly and creative research, effective engagement and public service. As an 1890 land-grant doctoral research institution with a distinction in STEM and commitment to excellence in all disciplines, A&T creates innovative solutions that address the challenges and economic needs of North Carolina, the nation and the world.

The National Conference on Next-Generation Sustainable Technologies for Small-Scale Producers is designed to provide a platform for developing and delivering the next generation of soil, air and water technologies in support of sustainable production systems. It also works to identify gaps and needs and make recommendations accordingly to the U.S. Department of Agriculture National Institute of Food and Agriculture.

On behalf of the university, thank you for attending the National Conference on Next-Generation Sustainable Technologies for Small-Scale Producers.

Harold L. Martin Sr., Ph.D.
Chancellor

CONFERENCE HIGHLIGHTS

- Workshops on Small Business Innovations in Agriculture
- Roundtable Discussions – Focus Groups
- Farmer-to-Farmer Interactions
- Networking Opportunities
- Field Demonstration of Next-Generation Sustainable Technologies

ATTENDEES

- Socially Disadvantaged Farmers
- Urban and Controlled-Environment Farmers
- Beginning Farmers and Ranchers
- Heirs, Property Holders and Absentee Landowners
- Underserved Rural Community Citizens
- Military Veterans and Retired Farmers
- Agricultural Professionals and Agribusiness Stakeholders
- Students, Researchers, Scientists and Agency Representatives
- Other
The purpose of the National Conference on Next-Generation Technologies for Small-Scale Producers is to bring together farmers, scientists, extension agents and the United States Department of Agriculture (USDA) National Institute of Food and Agriculture (NIFA) to share ideas about climate adaptation, computers and cyber security, farm justice and food security, planting and harvesting automations, small business innovations, and sustainable farming. The conference will teach next-generation farmers to be better question askers and create a road map that ensures access to sustainable technologies with consideration for affordability and applicability. There is a need for holistic understanding of how sustainable technologies – air, water, land and waste management – research leads to technology adoption and solution integration.

Thank you for supporting the National Conference on Next-Generation Technologies for Small-Scale Producers.

Godfrey A. Uzochukwu, Ph.D., LSS, PCCSL
Executive Chair, Organizing Committee

EXECUTIVE MEMBERS

CLIMATE ADAPTATION TECHNOLOGIES
Niroj Aryal, Ph.D.

ENVIRONMENTAL AND FARM JUSTICE
Godfrey Uzochukwu, Ph.D.

PLANTING AND HARVESTING AUTOMATION DEMONSTRATION
Sanjun Gu, Ph.D.

SMALL BUSINESS INNOVATIONS IN AGRICULTURE
Kathleen Liang, Ph.D.

SUSTAINABLE FARMING SYSTEMS
Godfrey Ejimakor, Ph.D.

FOOD AND BIOPROCESSING PRODUCTS TECHNOLOGY
Salam Ibrahim, Ph.D.
Reza Tahergorabi, Ph.D.
Mortimer Neufville, Ph.D.
President and CEO
1890 Universities Foundation

Mortimer Neufville is president and CEO of the 1890 Universities Foundation, which represents the 19 Historically Black Land-Grant Universities. Neufville has served in numerous positions in higher education, including executive vice president and director of federal relations for the Association of Public Land Grant Universities (APLU); dean of agriculture, vice president and president of the University of Maryland Eastern Shore; and president of Coppin State University.

He received his B.S. degree from Tuskegee University and his M.S. and Ph.D. from the University of Florida. Neufville built a distinguished 45-year career of service, mentorship, policy development and leadership, which has impacted the field of agricultural science and education on a national and global level. Neufville received numerous awards including an Honorary Doctor of Science from Tuskegee University and the Outstanding Alumnus Award from the University of Florida. He served as board chair for the International Institute of Tropical Agriculture and Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance (ACDI/VOCA), and was on the Board of International Fertilizer Development Center (IFDC). In 2002, he was elected to the International Adult and Continuing Education Hall of Fame, where he served as board chair. He was recently appointed to the prestigious Council of Advisors for the World Food Prize Foundation. Neufville was instrumental in creating the Food System Leadership Institute (FSLI), a noteworthy point of professional pride that will create a legacy and significant contribution to our land-grant universities.
Andrew Geller, Ph.D.
Senior Science Advisor and Office of Research and Development's Executive Lead for Environmental Justice and Lead Research Environmental Protection Agency (EPA)

Andrew Geller is senior science advisor and EPA’s Office of Research and Development’s executive lead for environmental justice and lead research. Geller was the primary author of EPA’s Environmental Justice Research Roadmap and incorporated environmental justice and multimedia assessment into the Sustainable and Healthy Research Program as acting national program director (NPD), deputy NPD and project lead. His research includes the development of community and tribal decision support tools, the impacts of environmental exposures on older adults, and neurotoxicological assessments of the impacts of environmental exposures on visual development and function. Geller received his undergraduate degree from the University of Pennsylvania and earned his master’s degree and Ph.D. in cognition and perception psychology at the University of Michigan. He did postdoctoral training in neurotoxicology at the University of North Carolina at Chapel Hill’s Center for Environmental Medicine and Lung Biology and with EPA through a National Research Service Award from the National Institute of Environmental Health Sciences (NIEHS).

Kevin Kephart, Ph.D.
Deputy Director
USDA NIFA’s Institute for Bioenergy, Climate and the Environment (IBCE)

Kevin Kephart is the deputy director of the Institute of Bioenergy, Climate and Environment (IBCE) in the USDA National Institute of Food and Agriculture. With a background in federal and state public research, technology transfer and industry R&D, Kephart has led the diverse team in IBCE since September 2021.
Tonya Smith-Jackson, Ph.D.
Interim Provost and Executive Vice Chancellor for Academic Affairs
North Carolina A&T State University

Tonya Smith-Jackson, Ph.D., CPE, is a research engineer with extensive academic leadership experience, including a stint as a program director at the National Science Foundation. She has worked for North Carolina A&T since 2013, originally as a professor and chair of the Department of Industrial and Systems Engineering, as well as the founder/director of the Human Factors Analytics Laboratory. She is currently serving as interim provost and executive vice chancellor for academic affairs. She presently serves on a variety of committees and boards.

Smith-Jackson earned an interdisciplinary M.S. in psychology and industrial engineering and Ph.D. in psychology/ergonomics from North Carolina State University. She earned a B.A. in psychology from UNC-Chapel Hill and graduated from the inaugural class of the North Carolina School of Science and Mathematics. She is a fellow in two professional societies: The Institute of Industrial and Systems Engineers and the Human Factors and Ergonomics Society. She is a professional development fellow of the AASC&U/AALI Becoming a Provost Academy, the Center for Advancement of STEM leadership and the HERS Leadership Institute. Her faculty positions include universities and community colleges in New York, North Carolina, Virginia and Germany.

Smith-Jackson has worked in the industry and government sectors as well serving as a usability engineer for IBM and Ericsson Mobile Communications (now Sony-Ericsson), and as an expert witness in systems safety, usability and accident analysis litigation. She has served as a manager in county, state and federal government agencies, including the European Command (Germany), a county public health department and the U.S. Consumer Product Safety Commission.

She has earned department, college, university, civil and community service awards for excellence and innovation in teaching, research, advising, diversity and inclusion, and outreach to communities. She has been awarded a university women’s leadership award; interdisciplinary collaboration awards; and a Command General’s Award for advancing women in the U.S. Army Command. Gov. Roy Cooper appointed her to the N.C. Board of Science, Technology and Innovation in 2020 and the Performance Management Advisory Committee in 2021.

She continues to champion HBCU excellence, inclusion, equity, diversity and belonging.
Mohamed Ahmedna, Ph.D.
Dean of the College of Agriculture and Environmental Sciences
North Carolina A&T State University

Mohamed Ahmedna is currently serving as dean of the College of Agriculture and Environmental Sciences at North Carolina A&T State University. Prior to rejoining N.C. A&T, he was a fellow of the American Association for the Advancement of Science (AAAS) at the National Institute of Food and Agriculture (NIFA), United States Department of Agriculture, Washington D.C. (2017-2018). Before his selection as a AAAS fellow, he spent seven years at Qatar University, where he served as the associate dean for research and graduate studies at the College of Arts & Sciences (2010-2016) and professor at the College of Health Sciences (2016-2017). During his previous tenure at N.C. A&T from 2000 to 2010, he served as the founding director of the university’s Center for Excellence in Post-Harvest Technologies, part of the North Carolina Research Campus in Kannapolis. Prior to that post, he moved through the faculty ranks as an assistant, associate and full professor in the food science and nutrition Program in the Department of Family and Consumer Sciences at N.C. A&T.

Ahmedna has 22 years of experience in teaching, academic administration and applied research. As principal investigator or co-principal investigator, Ahmedna has received over $28 million in competitive research grants and authored more than 200 publications and presentations over the course of his career. His research career focused on value-added product development with emphasis on functional foods for human health and lifestyle interventions for health promotion and disease prevention. His research has been covered by major national and international media outlets.

Ahmedna is the recipient of several awards of excellence including the 2008 Thurgood Marshall distinguished faculty award, the 2007 N.C. A&T outstanding senior researcher award and the 2005 U.S. Agency for International Development (USAID) George Washington Carver Agricultural Excellence Award. He also held membership in 11 professional and honorary societies.

Ahmedna holds a bachelor’s degree in fisheries and ocean engineering from the Institut Agronomique et Veterinaire Hassan II, Morocco. He has earned three master’s degrees: one in food science from Louisiana State University (LSU), one in applied statistics from LSU and one in business administration from the University of North Carolina at Chapel Hill. He received his doctorate in food science from LSU.
Eric Muth, Ph.D.
Vice Chancellor for Research and Economic Development
North Carolina A&T

Eric Muth is trained as an experimental psychologist and has over 20 years’ experience post-degree leading a wide variety of research and development projects both in the laboratory and in the field. Muth spent three years as a uniformed researcher in the U.S. Navy and performed data collection aboard ship, in aircraft and in ship and aircraft simulators. Muth spent 19 years of his career at Clemson University and has been associated with over $7 million in funded research and 100 publications, with the last portion of his career working on translational research in the area of mobile health technologies. At N.C. A&T, Muth now serves as the vice chancellor for research and economic development with the goal of helping others grow their research acumen and programs.

Muth’s graduate training was in gastrointestinal psychophysiology. He completed his dissertation at the Penn State University Hershey Medical Center. His dissertation and early publications were related to functional gastrointestinal disorders. Muth spent August 2008-2009 on sabbatical funded on a Humboldt Research Fellowship working at the Universität Tübingen in the Psychosomatic Medicine Department, working on projects associated with functional gastrointestinal disorders and obesity. In 2019, Muth was accepted as a member of the Academy of Behavioral Medicine Research. In addition to his behavioral medicine work, Muth is an internationally known expert in the area of motion sickness. His work over the years in this area focused on understanding the causes, symptoms, physiology and prevention of motion sickness with specific attention on user experience and performance while wearing head-mounted displays.
Barbara A. Board, Ph.D.
Interim Associate Dean/Administrator, Cooperative Extension
North Carolina A&T State University

Barbara A. Board completed her professional career with Virginia Cooperative Extension (VCE) and with Cooperative Extension at North Carolina A&T State University. At VCE she held positions at the local, district and state levels. At the local level, she served as extension agent for 4-H and family and consumer sciences in Charlotte and Amelia Counties. In Amelia County she served as unit coordinator. At the district level she was district extension director for the central and northeast districts. As district extension director, she provided leadership for local county and city extension offices in the districts. Specific responsibilities included direct supervision of district and field extension faculty and staff, fiscal administration, local and state government relations and support, and district program and volunteer development. At the state level, Board served as extension specialist, administrative projects and program compliance, 4-H specialist and extension specialist, program and leadership development. Upon her retirement from VCE, she was given the title of district director emerita by the Virginia Tech Board of Visitors. After retirement from VCE, she has served as administrator, cooperative extension and 4-H resource and partnership enhancement.

During Board’s tenure with Cooperative Extension at N.C. A&T she served as regional extension director for county operations and as interim associate administrator. As associate administrator she provided oversight for campus and county programming and county operations, and served as the N.C. A&T liaison to the county operations extension leadership team at North Carolina State University. She recently returned as interim associate dean/administrator, Cooperative Extension.

Board holds a B.S. degree from Virginia State University in textiles and clothing, an M.S. degree from Virginia Tech in consumer education and personal finance and a Ph.D. from Virginia Tech in adult learning and human resource development. She currently serves as president of the Friends of Booker T. Washington National Monument and is an active member of the Roanoke alumnae chapter of Delta Sigma Theta Sorority Inc.
AGENDA AT A GLANCE

**Wednesday, September 7, 2022**
ALUMNI EVENT CENTER / 200 North Benbow Road, Greensboro, N.C. 27411

- **8:00 a.m.** PRE-CONFERENCE
  - Alabama A&M University – Produce Safety Alliance Training Program

- **12:00 p.m.** Lunch

- **4:00 p.m.** Adjourn

- **5:00-7:30 p.m.** Registration

- **5:00-6:00 p.m.** Networking

- **5:30-6:00 p.m.** Session Chairs Meeting

- **6:00-7:30 p.m.** Reception

**Thursday, September 8, 2022**
ALUMNI EVENT CENTER / 200 North Benbow Road, Greensboro, N.C. 27411

- **8:00 a.m.-5:00 p.m.** Registration (Exhibits Open)

- **8:00-8:30 a.m.** Continental Breakfast

- **8:30 a.m.** Welcome and Greetings

- **8:45 a.m.** Keynote Speakers and Remarks

- **10:00 a.m.** Overview of Small Business Innovations in Agriculture

- **10:20 a.m.** Networking and Farmer-to-Farmer Interactions

- **10:30 a.m.** The Small Farm and Resource Innovation Center (SFRIC): A One-Stop Shop to Support Farmers and Rural Communities in North Carolina

- **10:50 a.m.** AAMU Small Farms Research Center Outreach Efforts and Resources Available

- **11:10 a.m.** Roundtable Discussions (Focus Groups)

- **12:10 p.m.** Lunch and Remarks

- **1:30-3:00 p.m.** Technical Presentations I (Concurrent Sessions)

- **3:00 p.m.** Overview of Small Farms Outreach Program – Virginia State University

- **3:20 p.m.** Small Farms Field Research, Applications and Profits

- **3:40 p.m.** Networking and Farmer-to-Farmer Interactions

- **4:00-5:30 p.m.** Technical Presentations II (Concurrent Sessions)

**Friday, September 9, 2022**
N.C. A&T FARM AND FARM PAVILION / 3020 McConnell Road, Greensboro, N.C. 27405

- **8:00 a.m.** Registration (Exhibits Open)

- **8:00 a.m.** Continental Breakfast (Great Room)

- **8:30 a.m.** Field Demonstrations and Tours

- **12:00 p.m.** Lunch and Remarks

- **1:00 p.m.** Roundtable Discussion

- **2:30 p.m.** Concluding Remarks
### Wednesday, September 7, 2022
#### ALUMNI EVENT CENTER
200 North Benbow Road, Greensboro, N.C. 27411

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m.</td>
<td><strong>PRE-CONFERENCE</strong> (Room 103)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Presiding:</strong> E’licia L. Chaverest</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alabama A&amp;M University – Produce Safety Alliance Training Program (Classroom Setting/Indoor Meeting)</td>
<td></td>
</tr>
<tr>
<td>12:00 p.m.</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>4:00 p.m.</td>
<td>Adjourn</td>
<td></td>
</tr>
<tr>
<td>5:00-7:30 p.m.</td>
<td>Registration</td>
<td>Room 102</td>
</tr>
<tr>
<td>5:00-6:00 p.m.</td>
<td>Networking (Room 102)</td>
<td></td>
</tr>
<tr>
<td>5:30-6:00 p.m.</td>
<td>Session Chairs and Presiders Meeting (Room 102)</td>
<td></td>
</tr>
<tr>
<td>6:00-7:30 p.m.</td>
<td>Reception (Room 102)</td>
<td></td>
</tr>
</tbody>
</table>

### Thursday, September 8, 2022
#### ALUMNI EVENT CENTER
200 North Benbow Road, Greensboro, N.C. 27411

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 a.m.-5:00 p.m.</td>
<td>Registration</td>
<td>Room 101</td>
</tr>
<tr>
<td></td>
<td>Exhibits Open</td>
<td></td>
</tr>
<tr>
<td>8:00-8:30 a.m.</td>
<td>Continental Breakfast</td>
<td></td>
</tr>
<tr>
<td>10:00 a.m.-5:00 p.m.</td>
<td>Poster Session (Exhibit Hall)</td>
<td>Exhibit Hall</td>
</tr>
<tr>
<td></td>
<td>Authors present from 10:00-11:30 a.m.</td>
<td></td>
</tr>
<tr>
<td>8:30-8:35 a.m.</td>
<td><strong>GENERAL SESSION</strong> (Middle Ballroom)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Remarks</strong></td>
<td></td>
</tr>
<tr>
<td>8:35-8:40 a.m.</td>
<td>Greetings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mohamed Ahmedna, Ph.D., dean, College of Agriculture and Environmental Sciences, North Carolina A&amp;T State University</td>
<td></td>
</tr>
<tr>
<td>8:40 -8:45 a.m.</td>
<td>Welcome</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tonya Smith-Jackson, Ph.D., interim provost and executive vice chancellor for academic affairs, North Carolina A&amp;T State University</td>
<td></td>
</tr>
<tr>
<td>8:45-9:05 a.m.</td>
<td><strong>Keynote Speakers</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mortimer Neufville, Ph.D., president and CEO, 1890 Universities Foundation</td>
<td></td>
</tr>
<tr>
<td>9:05-9:10 a.m.</td>
<td><em>(Recorded)</em> Kevin Kephart, Ph.D., deputy director, USDA NIFA's Institute for Bioenergy, Climate and the Environment (IBCE)</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
<td>Speaker(s)</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>9:10-9:30 a.m.</td>
<td><strong>Engaging Socially Disadvantaged Farmers and Ranchers – Policy Center Update</strong></td>
<td>Eloris D. Speight, Alcorn State University</td>
</tr>
<tr>
<td>9:30-9:40 a.m.</td>
<td><strong>Overview of Small Business Innovations in Agriculture</strong></td>
<td>Kathleen Liang, North Carolina A&amp;T State University</td>
</tr>
<tr>
<td>10:00-10:20 a.m.</td>
<td><strong>Networking and Farmer-to-Farmer Interactions</strong></td>
<td></td>
</tr>
<tr>
<td>10:20-10:30 a.m.</td>
<td><strong>The Small Farm and Resource Innovation Center (SFRIC): A One-Stop Shop to Support Farmers and Rural Communities in North Carolina</strong></td>
<td>Gregory Goins, Ph.D., and Mark Blevins, Ed.D., North Carolina A&amp;T State University</td>
</tr>
<tr>
<td>10:30-11:10 a.m.</td>
<td><strong>AAMU Small Farms Research Center Outreach Efforts and Resources Available</strong></td>
<td>Ms. E’licia L. Chaverest and Duncan M. Chembezi, Ph.D., Alabama A&amp;M University</td>
</tr>
</tbody>
</table>

**FULL CONFERENCE AGENDA THURSDAY, SEPTEMBER 8 CONTINUED**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:10 a.m.-12:10 p.m.</td>
<td><strong>Roundtable Discussions – Focus Groups</strong></td>
<td></td>
</tr>
<tr>
<td>12:10 p.m.</td>
<td><strong>Lunch</strong></td>
<td></td>
</tr>
<tr>
<td>1:30-3:00 p.m.</td>
<td><strong>Technical Presentations I</strong></td>
<td>Concurrent Sessions 1, 2 &amp; 3 (see page 14 for details)</td>
</tr>
<tr>
<td>3:00 p.m.</td>
<td><strong>Overview of Small Farms Outreach Program – Virginia State University</strong></td>
<td>Herbert Brown</td>
</tr>
<tr>
<td>3:20 p.m.</td>
<td><strong>Small Farms Field Research, Applications and Profits</strong></td>
<td>Sanjun Gu, Ph.D., North Carolina A&amp;T State University</td>
</tr>
<tr>
<td>3:40 p.m.</td>
<td><strong>Networking and Farmer-to-Farmer Interactions</strong></td>
<td></td>
</tr>
<tr>
<td>4:00-5:40 p.m.</td>
<td><strong>Technical Presentations II</strong></td>
<td>Concurrent Session 1 &amp; 2 (see page 15 for details)</td>
</tr>
</tbody>
</table>
## CONCURRENT SESSIONS I

### SESSION 1 (Room 104)
**Small Business Innovations in Agriculture**

**Chair:** Kathleen Liang  
**Presiding:** Mark Williams

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenter(s)</th>
<th>Institution(s)</th>
</tr>
</thead>
</table>
| 1:30 p.m. | Financial Impacts of Climate Resilient Practices on Three Small Farms in North Carolina  

### SESSION 2 (Room 103)
**Sustainable Farming Systems and Climate Adaptation**

**Chair:** Niroj Aryal  
**Presiding:** John Beck

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenter(s)</th>
<th>Institution(s)</th>
</tr>
</thead>
</table>
| 1:30 p.m. | Applying Conservation Practices on Small Farms through Technical and Financial Assistance Programs  
John Beck, NCD&A Division of Soil and Water Conservation, Raleigh, N.C. | John Beck, NCD&A Division of Soil and Water Conservation, Raleigh, N.C. | North Carolina A&T |

### SESSION 3 (Room 102)
**Food and Bioproducts Processing Technology**

**Chair:** Reza Tahergorabi  
**Presiding:** Satyanarayan Dev

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenter(s)</th>
<th>Institution(s)</th>
</tr>
</thead>
</table>
| 1:30 p.m. | Modular Eco-Efficiency Assessment for Production of Insects as a Food Protein Source  
Raphaela Spykman¹; Sayed Mahdi Hossaini²; Daniela A. Peguero³; Ashley Green⁴⁵; Volker Heinz⁶ and Sergiy Smetana⁷  
¹ German Institute of Food Technologies  
² Laboratory of Sustainable Food Processing, ETH Zurich, Switzerland  
³ Life Cycle Assessment Research Group, Agroscope, Zurich | Raphaela Spykman¹; Sayed Mahdi Hossaini²; Daniela A. Peguero³; Ashley Green⁴⁵; Volker Heinz⁶ and Sergiy Smetana⁷  
¹ German Institute of Food Technologies  
² Laboratory of Sustainable Food Processing, ETH Zurich, Switzerland  
³ Life Cycle Assessment Research Group, Agroscope, Zurich | North Carolina A&T |

2:00 p.m.

**The Meat Price & Yield Calculator Tool: Pricing for Profit**

Matthew N. LeRoux and Todd M. Schmit, Cornell University  
Lee Menius and Sarah E. Blacklin, N.C. State University

**A Review of Low-Cost Precision Agricultural Technologies: Implications for Sustainable Farming Systems**

Brianna B. Posadas, Kim L. Niewolny and Maaz Gardezi, Virginia Tech

**Utilization of Low-Value Apples to Produce Colorful, Nutrition-Fortified Apple Chips by Osmotic Dehydration**

Xiaojuan Wang, University of Illinois at Urbana-Champaign  
Hao Feng, North Carolina A&T

2:30 p.m.

**Increasing Farmers Market Sales through POS Data Collection and Analysis**

T.M. Schmit and M.N. LeRoux, Cornell University

**Small-Scale Cover Crop-Based No-Till: Finding the Right Termination Method and Equipment**

Mark A. Dempsey, Mary Carroll Dodd, Gena Moore and Karen McSwain, The Carolina Farm Stewardship Association, Pittsboro, N.C.  
Red Scout Farm, Black Mountain, N.C.

**Reducing Fat-Uptake in Fried Chicken Using Edible Coating and Sweet Potato Starch Batter**

Reza Tahergorabi, Lovie Matthews and Daniel Ananey-Obiri, North Carolina A&T

2:50 p.m.

**Small Agribusinesses’ Perception of Climate Change and Adaptation Strategies: A Case in Missouri**

Ye Su and Lan Tran, Lincoln University of Missouri

**Strategies for Improving Soil Health for Degraded and Damaged Soils**

Thomas F. Ducey, Coastal Plains Soil, Water and Plant Research Center, ARS-USDA, Florence, S.C.

**Made-To-Help-AI: Microwave Assisted Drying and Encapsulation Through Optimized Hybrid Electro Acoustically Levitated Photopolymerization Using Artificial Intelligence**

Satyanarayan Dev, Florida A&M University
### SESSION 1 (Room 104)

**ENVIRONMENTAL AND FARM JUSTICE**  
**Chair:** Godfrey Uzochukwu  
**Presiding:** Kara Woods

- **4:00 p.m.**  
  Enhancing Microbial Safety of Microgreens by Ultrasound and Organic Acid Combined Treatment as an Environment-Friendly Seed Sanitation Method  
  Mengyi Dong,  
  University of Illinois at Urbana-Champaign  
  Hao Feng,  
  North Carolina A&T

- **4:20 p.m.**  
  The Digital Agriculture Revolution: What to Consider Making It Work for Small or Marginalized Farmers?  
  Jenny Melo-Velasco and Mary Hendrickson,  
  University of Missouri

- **4:40 p.m.**  
  Emerging Pollutants in Drinking Water and Their Potential Impact on Animal Health  
  Priyanka Rahul Pande, Sarah Adjei-Fremah,  
  Mulumebet Worku, Sowmya Jagana, Navya Inupala and Dongyang Deng,  
  North Carolina A&T  
  Winston-Salem State University

- **5:00 p.m.**  
  Small Farmers Keep Resilient Through the COVID-19 Pandemic  
  Ye Su and Jasper Grashius,  
  Lincoln University of Missouri  
  University of Missouri, Columbia

- **5:20 p.m.**  
  Recovery of Value-Added Products from Swine Manure and Waste Peaches  
  Matias Vanotti, Ariel Szogi and William Brigman,  
  U.S. Department of Agriculture, Agricultural Research Service (USDA-ARS),  
  Coastal Plains Soil, Water and Plant Research Center, Florence, S.C.

- **5:40 p.m.**  
  Barriers faced by Socially Disadvantaged Farmers and Ranchers and Heir Property Owners—Policy Center Research Analyst Update  
  Kara A. Woods,  
  Socially Disadvantaged Farmers and Ranchers (SDFR) Policy Research Center (Policy Center)  
  Alcorn State University

### SESSION 2 (Room 103)

**SUSTAINABLE FARMING SYSTEMS AND CLIMATE ADAPTATION**  
**Chair:** Godfrey Ejimakor  
**Presiding:** J.D. Wulfhorst

- **4:00 p.m.**  
  Diversifying Agroecosystems Research for Small-Scale Producers and Sustainable Technologies  
  J.D. Wulfhorst,  
  University of Idaho

- **4:20 p.m.**  
  Adapting New, Sustainable Hydroponic Technology for Small-Farmers and Hobbyist  
  Chris Mullins,  
  Virginia State University

- **4:40 p.m.**  
  Effects of Plastic Layers of High Tunnel and Plastic Mulching on the Quality of Two Varieties of Tomatoes  
  Augustina Odediran, Jianmei Yu, Nona Mikiashvili,  
  Peter L. Coffey and Sanjun Gu,  
  North Carolina A&T

- **5:00 p.m.**  
  Effects of Different Inclusion Levels of Onion Peel on Total Gas Production and Methane Emission of High Concentrate and High Forage Diets  
  Lydia. K. Olagunju, Peter A. Dele, Olutreru E. Orimaye, Michael Wuaku, Rosetta Brice, Yasmine Shaw and Uchenna Y. Anele,  
  North Carolina A&T

- **5:20 p.m.**  
  Evaluation of Garlic Extracts for Sustainable Meat Goat Production  
  Sowmya Jagana, SreeNavya Inupala, Priyanka Pande, M. Rassel Uzzaman and Mulumebet Worku,  
  North Carolina A&T
Friday, September 9, 2022
3020 McConnell Road, Greensboro, N.C. 27405

FARM PAVILION
8:00 a.m. Registration
Exhibits Open

8:00 a.m. Continental Breakfast (Great Room)

UNIVERSITY FARM
8:30-8:35 a.m. Remarks
Godfrey Uzochukwu, Ph.D.,
North Carolina A&T State University

8:35 a.m.-12 p.m. Field Demonstrations and Tours
Chair: Sanjun Gu, Ph.D.,
North Carolina A&T State University
E’licia L. Chaverest and Duncan M. Chembezi, Ph.D.,
Alabama A&M University – Mobile Farm Innovation Facility (outdoor)
Fort Valley State University – Mobile Information Technology Center (outdoor)
Computers, Internet Access and Databases
Chris Mullins,
Virginia State University – Hydroponic Demonstration

FARM PAVILION
12:00 p.m. Lunch
Remarks
Barbara Board, Ph.D., interim director, Cooperative Extension
North Carolina A&T State University

12:20 p.m. Archie Hart, director
Small Farms Division, Office of North Carolina Agriculture Commissioner

1:00 pm Roundtable Discussion on Next Generation Sustainable Technologies for
Small-Scale Producers – Gaps, Needs, and Recommendations
Facilitators: Mark Williams, Ph.D., Virginia Polytechnic and State University, and
Godfrey Uzochukwu, Ph.D., North Carolina A&T State University

2:30 p.m. Concluding Remarks

DIRECTIONS TO UNIVERSITY FARM
From Marriott Greensboro Downtown:
Head south on Greene Street. Turn left on Market Street. Turn right onto English Street. Turn left onto McConnell Road.

From N.C. A&T campus:
Drive east on Market Street. Turn right onto English Street. Turn left onto McConnell Road.

From I-40 East:

From I-40 West:
Take Exit 226 for McConnell Road. Turn left onto McConnell Road.
1. CSA & SNAP: BUSINESS OPPORTUNITY FOR FARMERS, IMPROVED NUTRITION FOR THE COMMUNITY
Diane K. Smith,
Washington State University

2. ASSESSMENT OF DATE FRUIT-FLAVORED DRINKABLE YOGURT
Amira A. Ayad, Maria M. Ortiz de Erive, Guibing Chen and Leonard L. Williams,
North Carolina A&T State University

3. IN VITRO NUTRIENT DEGRADABILITY AND METHANE PRODUCTION OF TWO DAIRY DIETS AS AFFECTED BY NUTRACEUTICAL PLANT INCLUSION LEVELS
Peter A. Dele, Oluteru E. Orimaye, Michael Wauku, Kelechi A. Ike, Rosetta M. Brice, Lydia K. Olagunju, Yasmine A. Shaw and Uchenna Y. Anele,
North Carolina A&T State University

4. PRECISION AGRICULTURE (PA) TECHNIQUES FOR SMALLHOLDER FARMERS: REVIEW OF CURRENT TECHNOLOGIES, CHALLENGES, AND OPPORTUNITIES
Rajveer Dhillon, Qianna Moncur, Sakthi Kumaran, Alcinda Folck, Cadence Lowell and Deng Cao,
Central State University

5. CONTROLLING MAIZE WEEVIL IN STORED ORGANIC CORN GRAINS USING ESSENTIAL OILS
Sawo Eesiah, Jianmei Yu, Barbara Amoah, and Beatrice Dingha,
North Carolina A&T State University

6. GARLIC FOR SUSTAINABLE PRODUCTION OF HAIR SHEEP DIVERSIFIED PRODUCTION IN THE US
SreeNavya Inupala, Sowmya Jagana, Priyanka Pande, M Rassel Uzzaman and Mulumebet Worku,
North Carolina A&T State University

7. FAT UPTAKE REDUCTION BY USING OLEOGEL AND CITRUS PEEL FIBER IN DEEP-FRIED SURIMI PRODUCTS: A REVIEW
Joinul Islam and Reza Tahergorabi,
North Carolina A&T State University

8. FUNGICIDAL POTENTIAL OF ESSENTIAL OILS IN ORGANIC CORN GRAINS DURING STORAGE
Esther Iwayemi, Jianmei Yu, Nona Mikiashvili and Ivana Pedroso,
North Carolina A&T State University

9. SUSTAINABLE USAGE OF BIOCHAR AS SOIL AMENDMENT AND THE PROSPECTS FOR CLIMATE CHANGE MITIGATION
LaShaunda D. McDaniel,
Alcorn State University

10. WASTE TO WEALTH: RECYCLING AGRICULTURAL WASTES AS FEED ADDITIVES
Lydia K. Olagunju, Peter A. Dele, Yasmine Shaw, Rosetta Brice, Oluteru E. Orimaye, Michael Wuaku and Uchenna Y. Anele,
North Carolina A&T State University

11. DIFFERENTIAL EFFECTS OF GARLIC FOR USE IN NON-CHEMICAL DAIRY PRODUCTION
P. Pande, S. Inupala, S. Jagana, MD. Rasel and M. Worku,
North Carolina A&T State University

12. FAT REDUCTION IN DEEP-FRIED CHICKEN PRODUCTS USING OLEOGEL AND CITRUS PEEL FIBER: A REVIEW
Niaz Mahmud and Reza Tahergorabi,
Food and Nutritional Sciences Program,
North Carolina A&T State University

continued on next page
13. IDENTIFICATION OF SINGLE NUCLEOTIDE POLYMORPHISMS FOR SMALL RUMINANTS’ HEALTH AND ADAPTATION
Md. Rasel Uzzaman, Zewdu Edea, Rabiul Islam, Kwan-Suk Kim and Mulumebet Worku,
North Carolina A&T State University
Ethiopian Biotechnology Institute, Addis Ababa
Institute of Animal Science (IAS), Chinese Academy of Agricultural Sciences (CAAS)
Chungbuk National University, Cheongju, Chungbuk Province, Republic of Korea

14. NEXT-GENERATION AGRICULTURAL TECHNOLOGIES: ASSESSING MARKET AND POLICY IMPLICATIONS
Roger Vorsah, Godfrey Ejimakor and Obed Quaicoe,
North Carolina A&T State University

15. BARRIERS FACED BY SOCIALLY DISADVANTAGED FARMERS AND RANCHERS AND HEIR PROPERTY OWNERS — POLICY CENTER RESEARCH ANALYST UPDATE
Kara A. Woods,
Alcorn State University

16. NITROGEN: AN EFFECTIVE COMPONENT FOR THE GROWTH AND VIABILITY OF LACTOBACILLUS DELBRUECKII SUBSP. BULGARICUS
Raphael D. Ayivi, Salam A. Ibrahim, Philip J. Yeboah, Albert Krastanov, Abishek Somani, Shahida A. Siddiqui and Sayed M. Hossaini,
North Carolina A&T State University
University of North Carolina at Greensboro
University of Food Technologies, Plovdiv, Bulgaria
Ohly Gmbh, Wandsbeker Zollstrasse Hamburg, Germany
Technical University of Munich (TUM), Straubing, Germany
DIL e.V.–German Institute of Food Technologies, D-Quakenbrück, Germany

17. HIGH TUNNELS, A SUSTAINABLE TOOL FOR VEGETABLE PRODUCTION UNDER CLIMATE CHANGE
Sanjun Gu,
North Carolina A&T State University

18. PLASTICULTURE AND ITS TREND IN VEGETABLE AND STRAWBERRY PRODUCTION
Randy Fulk and Sanjun Gu,
North Carolina A&T State University

19. VEGETABLE GRAFTING, THE NEXT BIG THING IN SUSTAINABLE PRODUCTION OF FRUITING VEGETABLES
Sanjun Gu,
North Carolina A&T State University

20. CLIMATE MITIGATION AND ADAPTATION IS FOR THE FAINT OF HEART
Cynthia Rice, Buddhi Gyawali, Marion Simon and Whitney Maynard,
Kentucky State University

21. REMOVAL OF PATHOGENS IN AGRICULTURAL WASTEWATER USING PASSIVE BIOFILTER
James Pinkney Jr., Z. Tang and N. Aryal,
North Carolina A&T State University

22. REGENERATIVE, SUSTAINABILITY, PERMACULTURE, HOLISTIC: JUST WHAT IS A SUSTAINABLE FARMING SYSTEM
Cynthia Rice, Buddhi Gyawali, Marion Simon and Whitney Maynard,
Kentucky State University

23. THE FATE AND REMOVAL OF GLYPHOSATE IN CONSTRUCTED WETLAND MICROCOSMS
D. A. Smith, N. Aryal and Z. Tang,
North Carolina A&T State University

24. ENVIRONMENTAL CONCERNS ARE NOT AT CROSS PURPOSES TO FARM JUSTICE/FOOD SECURITY
Cynthia Rice, Buddhi Gyawali, Marion Simon and Whitney Maynard,
Kentucky State University

25. INTEGRATED CLIMATE SMART PRACTICES TO ENHANCE SOIL HEALTH AND CROP PRODUCTION
Leonard C. Kibet, Girish Panicker, Frank Mrema and Samuel Mwangi,
Alcorn State University
**Alumni Event Center**  
(Room 101 and Exhibit Hall)

Small Farms Research Center Outreach Efforts and Resources Available  
Alabama A&M University

The Small Farm and Resource Innovation Center (SFRIC): A One-Stop Shop to Support Farmers and Rural Communities in North Carolina  
North Carolina A&T State University

Engaging Socially Disadvantaged Farmers and Ranchers – Policy Center  
Alcorn State University

Small Farms Outreach Program  
Virginia State University

The Interdisciplinary Waste Management Institute  
North Carolina A&T State University

Center for Environmental Farming Systems  
North Carolina A&T State University

Center for Excellence in Post-Harvest Technologies

Carolina Farm Stewardship Association

NC AgrAbility Partnership

U.S. Department of Agriculture (ARS)

Lincoln University

Photo by N.C. A&T College of Agriculture and Environmental Sciences
NATIONAL CONFERENCE ON NEXT-GENERATION SUSTAINABLE TECHNOLOGIES FOR SMALL-SCALE PRODUCERS

NOTES