

WINTER 2022

THE MAGAZINE OF
S P E S

SCHOOL OF PLANT AND ENVIRONMENTAL SCIENCES



**LEARNING DOWN UNDER:
EXPLORING AGRICULTURE IN AUSTRALIA**



COLLEGE OF AGRICULTURE AND LIFE SCIENCES
SCHOOL OF PLANT AND ENVIRONMENTAL SCIENCES
VIRGINIA TECH

14 COVER STORY**LEARNING DOWN UNDER:
EXPLORING AGRICULTURE IN
AUSTRALIA**

Australia is one of the major agricultural producers and exporters in the world. Students explore how the nation's farmers utilize resources and the challenges they face.

18**COLLABORATION, CONNECTIONS:
KEY THEMES FROM CEA SUMMIT
EAST**

Collaboration and connections are needed to drive the Controlled Environment Agriculture Industry. Those were the key themes discussed at the first-ever CEA Summit East.

20**VIRGINIA IS FOR PUMPKIN LOVERS
AND VIRGINIA TECH IS HELPING
FARMERS MEET THE DEMAND FOR
ALL-THINGS-PUMPKIN THIS FALL**

Virginia Tech researchers are supporting the spike in the state's pumpkin production by exploring the growth of specialty varieties and testing ways to stretch their shelf life.

22**BOXWOOD BLIGHT INSIGHT GROUP,
LED BY VIRGINIA TECH PROFESSOR,
WINS USDA AWARD**

The Boxwood Blight Insight Group was awarded a Partnership Award from the USDA's National Institute of Food and Agriculture in the Program Improvement through Global Engagement Category.



Preparing Students for 21st Century Agriculture



This fall semester, we opened enrollment into our new *Integrated Agriculture Technologies* major. This major focuses on the use of technologies such as drones, robotics, sensors, and data in agricultural applications. According to Forbes, robotics in agriculture is a \$5 billion business that is expected to double over the next five years. Internet connected devices and sensors are an \$11 billion market. McKinsey and Company proposed that, if the use of connectivity using artificial intelligence, data analytics, connected sensors, and other emerging technologies is implemented correctly in agriculture, it could add \$500 billion in additional value to the global gross domestic product. For food producers, the use of new precision technologies promises to help reduce the amount of water required as well as the amount of pesticides applied. Being able to reduce these inputs has environmental benefits and also reduces production costs.

This new major is designed to develop our students and allow them to take advantage of these current and future job opportunities. To support this new major, SPES hired new faculty and created new courses. We also renovated three teaching spaces including our Agriculture Technologies Learning Sandbox 1 and 2, as well as a Data Analytics Teaching Lab. We invested in new computer equipment, robotics, drones, 3-D printing, and other items to provide the opportunity for extensive hands-on experiential learning activities for our students in this major. We believe that it will be exciting in the coming years as new Hokies, pursuing this major, graduate and pursue their careers in this field, and make their mark on agriculture. You can read more about this new major on page four of this issue of *The Magazine of SPES*.

With the end of the year approaching, I want to thank you all for your continued support and wish each of you a happy holiday season and a safe and prosperous 2023.

Michael Evans
Director and Professor

Fall Field Trip to Tour Restoration Projects at Blue Ridge Discover Center

By: Jessica Zielske

On a crisp autumn day, a group of Virginia Tech colleagues took a field trip to the Blue Ridge Discovery Center in Troutdale, Va. The adventure was organized by Global Change Center (GCC) affiliate Leighton Reid, assistant professor in the School of Plant and Environmental Sciences. Reid, along with Interfaces of Global Change Ph.D. Fellows Melissa Burt and Jordan Coscia, all members of the GCC Ecological Restoration Working Group, was joined by undergraduate students in the Ecological Restoration major and the Society for Ecological Restoration Student Association at Virginia Tech (SER-VT) student group.

The group enjoyed a tour of ecological restoration projects at the Blue Ridge Discovery Center from landscape educator Ali Reilly, including a restored beaver meadow and a beautiful rain garden installation. The afternoon was spent botanizing on Whitetop Mountain in a globally unique Southern Appalachian Grassy Bald plant community. Foray highlights included *Hypericum mitchellianum* (Blue Ridge St.-John's-wort), *Gentianella quinquefolia* (eastern stiff gentian), and *Sibbaldiopsis tridentata* (mountain cinquefoil).

The Restoration Ecology Working Group is an interdisciplinary team of Faculty members and students reading, thinking, teaching, and researching about the most effective and equitable strategies for restoring biodiversity and environmental quality locally, regionally, and globally. Key activities included a reading and discussion group focusing on new restoration ecology research, interdisciplinary perspectives on restoration, and research proposal development.



Ecological Restoration, SER-VT and REWG students botanizing on Whitetop. Photo by Leighton Reid.

The *Magazine of SPES* is published four times a year for alumni, faculty, staff, students, and stakeholders by the School of Plant and Environmental Sciences at Virginia Tech.

© 2022, Virginia Polytechnic Institute and State University

EDITOR
Patrick McKee

CONTRIBUTORS
Michael Evans
Mary Hardbarger
Patrick McKee
Jessica Zielske

EDITORIAL OFFICE
The Magazine of SPES
185 Ag Quad Lane
249 Smyth Hall
Blacksburg, Va. 24061

DIRECTOR
Michael Evans

Virginia Tech is an equal opportunity and affirmative action employer. Women, minorities, individuals with disabilities, and protected veterans are strongly encouraged to apply. Anyone having questions concerning discrimination or accessibility should contact the Office for Equity and Accessibility.

TRAINING THE NEXT GENERATION

New *Integrated Agriculture Technologies* Major Introduced

The School of Plant and Environmental Sciences introduced the new *Integrated Agriculture Technologies* major this academic year.

The program was developed to prepare students to use technology to increase crop production.

According to projections, the population of the world may approach 10 billion by the year 2050. For food production to keep up with population growth, the United Nations Food and Agriculture Organization predicts crop production will need to increase by 50 to 70 percent.

“The program caters to students who have an interest in technology, but want to work outdoors to solve real-world problems in agriculture,” said Ben Tracy, associate director of undergraduate programs.

Those graduating with a Bachelor of Science degree will be able to work across disciplines, using a combination of technology and practical knowledge in the crop and soil sciences.

Students will receive training in crop and soil sciences, computer science, and math. In addition, they will receive training in precision agriculture, autonomous robots, drones, sensors, and data science.

Graduates of the major will be able to demonstrate economic and environmental benefits of integrated technologies, produce accurate digital maps of fields, and operate equipment and software to record and analyze crop-based field and greenhouse data.



A drone flies over the Virginia Tech Turfgrass Research Center.

Numerous career opportunities will be available for graduates in industries including agribusiness, biotechnology, commercial growers, federal research, regulatory agencies, and alternative energy.

To accommodate the new program, laboratory spaces were created.

The School purchased drones, robots, sensors, and powerful computers for the learning facilities.



One of the new Connected Technologies Learning Sandboxes.

LEARNING ON THE AG QUAD

Students in Assistant Professor Dan Sandor’s Turfgrass Management Class calibrate a drop spreader for applying granular fertilizer.



Job Outlook -- Agricultural and Food Scientists

- Expected Growth: 9% (other occupations 5%)
- Median Pay: \$74,160
- Average Pay Range: \$40,000-\$127,000

States with highest employment

- North Carolina
- California
- Iowa
- Illinois
- Washington

Source: U.S. Bureau of Labor Statistics

Life Lessons from Soils, Students, and the Classroom:
Ponderings of a (Loveable?!) Curmudgeon

The School of Plant and Environmental Sciences held its annual Research Symposium and Blaser Lecture at The Inn at Virginia Tech and Skelton Conference Center.

Nearly four dozen graduate and undergraduate students presented their research to a panel of judges.

The keynote address was presented by Neal Eash, professor in Biosystems Engineering and Soil Science at the University of Tennessee.

In his address, Eash noted the changes Land Grant Universities are undergoing and the impact on stakeholders.

Eash pointed out that first generation college students, especially those trying to escape poverty, can face additional roadblocks as they navigate rules and deadlines.

In an effort to keep his students on track, in one-on-one sessions with the nearly 8,000 undergraduate students he has advised, he asked them, “Where do you want to be in five, 10, or 30 years?”

Eash also noted the changes in agricultural practices and approaches to sustainability due to erratic weather patterns.

Dr. Roy Blaser was a University Distinguished Professor at Virginia Tech, where he dedicated his career and much of his charitable giving to crop and soil sciences and graduate education.

Blaser established the Roy E. and E. Catherine Blaser fellowship for graduate education, including a distinguished lecture series that continues to advance his lifelong commitment to responsible soil management.

Graduate winners

FIRST PLACE

Kelsey Reed

Cell-raiser: Regeneration

SECOND PLACE

Jordan Coscia

Floristics of Virginia Piedmont Grasslands

THIRD PLACE

Xiaoying Li

Screening Edamame Cultivars for Resistance to Damping-off Caused by *Rhizoctonia solani* and Southern Stem Blight Caused by *Sclerotium rolfsii*

Undergraduate winners

FIRST PLACE

Kiara Randhawa

Mungbean [*Vigna radiata (L.) Wilczek*] Potential as a Multi-Purpose Crop for Livestock Forage and Human Consumption

SECOND PLACE (tie)

Jonathan Ames

Identification and Validation of Quantitative Trait Loci for Methionine and Cysteine Concentrations in Soybeans

SECOND PLACE (tie)

Gabriel Mendelson

Characterization of Mutations in AHASS2 in Arabidopsis

Internships, Jobs on the Menu at Annual Horticulture Industry Dinner

By: Patrick McKee

Students in the Virginia Tech School of Plant and Environmental Sciences met with industry professionals at the annual Horticulture Industry Dinner and Scholarship Night.

Representatives from more than two dozen companies from across the country talked with students about their companies, internship opportunities, and careers.

“This is a great opportunity for our students to hear from the experts about the multitude of opportunities available to them,” said Instructor Scott Douglas.

More than 100 students attended the event with resumes in hand.

The event started with dinner, followed by 10-minute sessions, where industry representatives talked about their companies and learned about the student’s skills and interests.

“Our students were eager to hear about what awaits them in the real world,” said Undergraduate Student Coordinator Karen Drake-Whitney. “Their work in the classroom prepared them for the short interview sessions, which will lead to full interviews, and internship and career opportunities.”



(Left to right) Jeneah Jordan and Thomas Teklu at the Horticulture Industry Dinner.

Students who registered for the event were also entered into a drawing for scholarships.

Twelve students were awarded scholarships for \$250, \$500, or \$750. In total, \$5,000 was given out.

Some of the proceeds from the event will also go to the National Collegiate Landscape Competition Team as it prepares to travel to Starkville, Miss. to compete in March.

At the competition in March 2022, the Virginia Tech team placed 12th overall.

Juan Gonzales won the \$2,500 Stihl, Inc. Landscape Industry Scholarship.



Students listening to a presentation at the event.

Scholarship Winners



Forest Beegle
\$500



Bailey Connors
\$250



JohnPaul Escobar
\$250



Madeline Glanz
\$500



Samantha Gratta
\$250



Evan Jackson
\$250



Jeneah Jordan
\$500



Ava Lambert
\$500



McCullen Overton
\$500



Julia Pettus
\$500

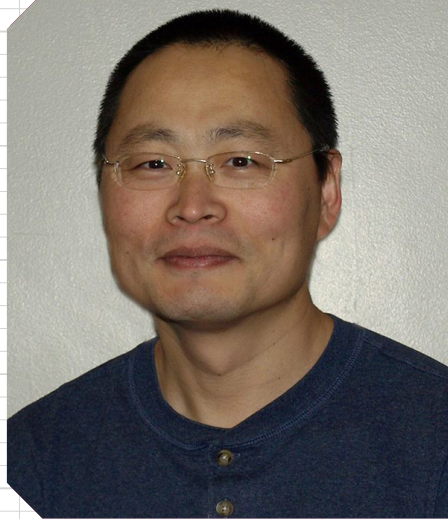


Matthew Smith
\$250



Thomas Teklu
\$750

NEW FACES



Aihua Wang
Research Associate

- Ph.D., China Agricultural University
- M.S., Shandong Agricultural University
- B.S., Shandong Agricultural University

Aihua Wang has worked at Virginia Tech for more than a decade. He now works as a Research Associate to assist and support scientific research that concerns chemical and biological analytical method development, validation, and implementation for analytes such as microorganisms, biomolecules, and organic contaminants.



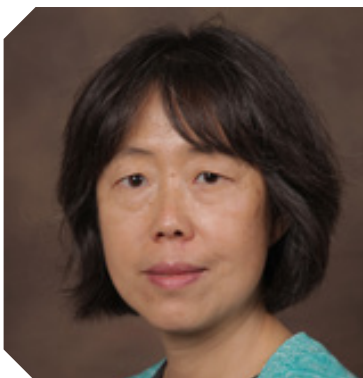
Daniel Smith
Post-doctoral Associate

- Ph.D., Bioical Sytems Engineering, Virginia Tech
- Civil and Environmental Engineering, University of Maryland, College Park

Smith's research interests revolve around how soil microorganisms can be utilized to influence large-scale processes like soil erosion and sediment transport. His career goal is to become an experienced research scientist and mentor, who studies and trains up-and-coming scientists to pursue "nature-based solutions" or "bio-inspired engineering" research.



Matthew Chappell was named new Associate Director for Extension Programs.



Professor Kang Xia was named Interim Associate Director of the Virginia Agricultural Experiment Station and Interim Director of the Center for Advanced Innovation in Agriculture.

Soil Judging Team Qualifies for National Competition

The Virginia Tech Soil Judging Team has qualified for the 2023 National Soil Judging Competition.

Fifteen students took part in the Southeast Regional Soil Judging Contest in October at Clemson University in South Carolina.

Team members had 50 minutes to describe and interpret each soil profile, which they described as bright red and clay-like, with some having clay textures to the surface.

In the individual contests, Clare Tallamy placed second with Bernie Frantz coming in fifth. Also placing in the top 20 were Madison Norris coming in 13th and Peter Arnold, 17th.

Overall, the team placed second, coming in just six points behind Auburn University.

The team won the national competition in 2022.

The 2023 contest will take place in Oklahoma.



The Virginia Tech team celebrates its second place finish. Photo by Jaclyn Fiola.



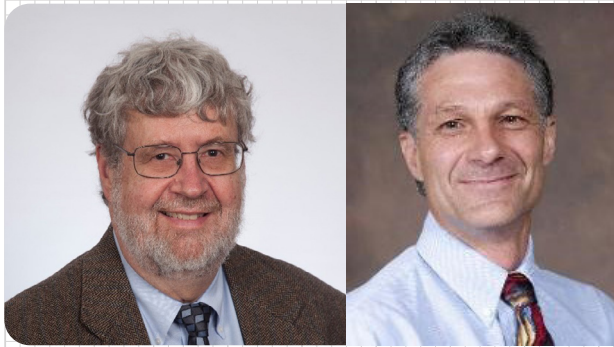
Clare Tallamy (left) placed 2nd, while Bernie Frantz (right) placed 5th in the regional contest. (Right column) Students taking part in the competition. Photos by Jaclyn Fiola.





Professor Ozzie Abaye was selected by the American Society of Agronomy and the Fellows Committee as an ASA Fellow. It is the highest recognition given by the society. Members are nominated based on professional achievements and meritorious service. Only 0.3 percent of the society's active and emeritus members are elected as Fellows.

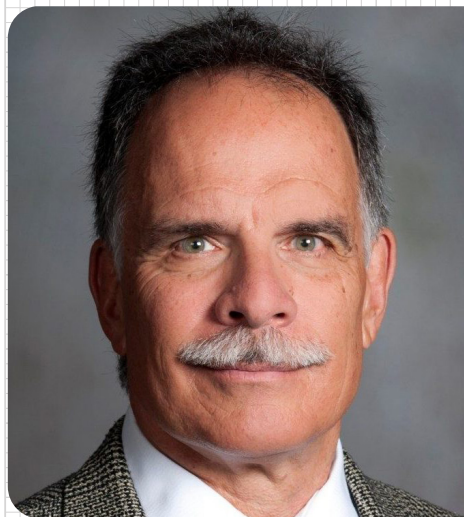
Abaye was also awarded a five-year, \$500,000 grant by the USDA to implement agricultural and educational activities to increase access to nutritional food through the production of mung beans.



W. Lee Daniels (left) and Gregory Evanylo (right) have each been conferred the title of professor emeritus by the Virginia Tech Board of Visitors. The title is granted upon retirement to those who gave exemplary service to the university and are recommended to the board by Virginia Tech President Tim Sands.



Horticulture Associate Laurie Fox was presented with the Volunteer of the Year Award from the Norfolk Tree Commission at the Arbor Day Festival in October.



Professor Alex Niemiera was presented the Excellence in Teaching Award by the Center for Excellence in Teaching and Learning at Virginia Tech.

The award recognizes a Faculty member's effective, engaged, and dynamic approaches and achievements as an educator.

Former student Forrest Brown described Niemiera as, "a dedicated and impactful professor who shows unwavering empathy and patience with his students."

Niemiera served for five years as Assistant Dean of Student Programs for the College of Agriculture and Life Sciences.



(Left to right) Professors John Fike, Liesel Ritchie, and John Munsell will work with farmers in the mid-Atlantic and Appalachia to increase the use of agroforestry in their operations. Photo by Marya Barlow for Virginia Tech.

Virginia Tech is part of a \$60 million, five-year grant led by The Nature Conservancy. The project, titled "Expanding Agroforestry Production and Markets for Producer Profitability and Climate Stabilization," aims to advance agroforestry in the eastern U.S. and Hawaii. It is funded by the U.S. Department of Agriculture's Climate-Smart Agriculture and Forestry Partnership Initiative.

The university will receive \$2.25 million to lead regional efforts to help farmers increase the use of agroforestry for economic, social, and environmental benefits.

"Virginia Tech was chosen as a partner for this effort because of our strong track record in agroforestry research and extension in the U.S.," Professor and Forage Extension Specialist John Fike said.

The multidisciplinary team is made up of Professor and Forest Management Extension Specialist John Munsell, Professor of Sociology Liesel Ritchie, and Fike.

Fike and Virginia Tech also received a \$195,000 USDA Conservation Innovation Grant to explore the potential production and environmental benefits of incorporating chicory and plantain into the state's cool season pasture systems.

Producers in certain regions of the state will be eligible to take part in the project, which involves implementing forb seeding treatments in targeted fields to increase pasture diversity.



Steve Heckendorn, manager of the Soil Testing Lab, hosted Mario Buch, Director of Research at ENCA Ing., an agricultural technical school in Villa Nueva, Guatemala. Buch was touring several Agricultural Research and Extension Centers across the Commonwealth of Virginia.

LEARNING DOWN UNDER: EXPLORING AGRICULTURE IN AUSTRALIA

By: Patrick McKee

Photos: Megan Pollok



Australia is one of the major agricultural producers in the world, generating \$155 billion a year and contributing 12 percent to the nation's gross domestic product.

To learn about the nation's practices and educational system, a group of students, led by Professor Ozzie Abaye, studied abroad there.

More than 60 percent of Australia's land is used for farming, producing a wide range of cereal crops, oil crops, and grain legumes.

Graduate student Owen Turner said this was a driving factor in choosing to take part in the program. "Their economy is heavily ag based," Turner said. "They are a big exporter. If you are going to study abroad anywhere while having an ag focus, Australia was a good choice."

Junior Megan Pollok signed up for the trip to see agriculture in action firsthand. "Learning in the classroom was very helpful," Pollok said. "It is nothing like seeing the real thing. Because their climate changes so much, there were so many opportunities to see so many different crops within the span of ten days, which would be very hard to do here."



On the Farm

To study the agricultural systems in Australia, the group toured several different farms in several regions in the country.

One thing they noticed was the different climates. "The climate in Australia is much more diverse than it is in the U.S.," said Pollok. "As you go along the coast, it changes a lot."

According to the World Bank, Australia is the driest inhabited continent in the world

with temperature and rainfall varying across the country from year to year.

The southeastern part of the country has an arid or semi-arid climate, with the northeastern section having a tropical savanna climate with high humidity and a distinct wet and dry season. The southern and western parts of the country have an arid climate with most of the rainfall happening along the southern coast.

This variability in climate allows for different crop production.

The students recalled learning about fava beans, legumes, and cotton in Temora, an interior city of New South Wales, about 300 miles from the coast. In Cairns, a coastal city in Queensland, they saw sugar cane, coffee, mangoes, and other fruit crops being grown.

Due to climate variability, water resources can be scarce.

According to the Australian Department of Climate Change, Energy, the Environment and Water, 60 percent of the water, available for human use, is utilized by irrigated agriculture.

Because of this, states and territories allocate water, with farmers, sometimes, having to decide whether to grow crops or sell water rights.

"Sometimes it is more profitable to sell water resources than to use resources to produce cotton," Pollok said. "That is not something we think about here on the east coast. I feel like it would be less common for them to sell and not produce at all. I feel like they would try to make other arrangements."

Students also observed how farmers are more engaged in research, as there is less government support than in the U.S.

"Farmers in Australia will take a percentage of some of the profits from their crops and put into these research organizations and institutions," Pollok said. "I think they have an even larger stake."

"Here in the U.S., we have land grant universities, Extension programs, and depending on the crop, more or less subsidies," Turner said. "We have all of these support structures funded by the government to help farmers survive and make a living."

Farmers told the students, the system in Australia spurs innovation and creativity.

They toured the Wagga Wagga Agricultural Institute, an experimental farm established in 1892. There, they were able to see researchers at work on 893 hectares of farmland.



“It was really interesting to hear how they involve their students in their research and the different projects they have been working on,” Pollok said.

In the Classroom

Students visited the University of Sydney and talked to faculty, staff, and students to get an in-depth look at university life there.

Due to its urban setting, some students were surprised to see that the school had an agriculture program. “When you think about agriculture and universities, you think about more rural areas,” Pollok said. “Sydney is a very large city.” Greater Sydney has a population of 5.2 million people, according to the Australian Bureau of Statistics.

Students observed that a college education in Australia differs from Virginia Tech.

“All of their students in the college of agriculture have to double major,” Pollok said.

“You get much more exposure to lots of things that are in ag, but not as specialized as it is here at Virginia Tech,” Turner said. “I don’t know if that is better or worse. I guess it kind of depends on what you want.”

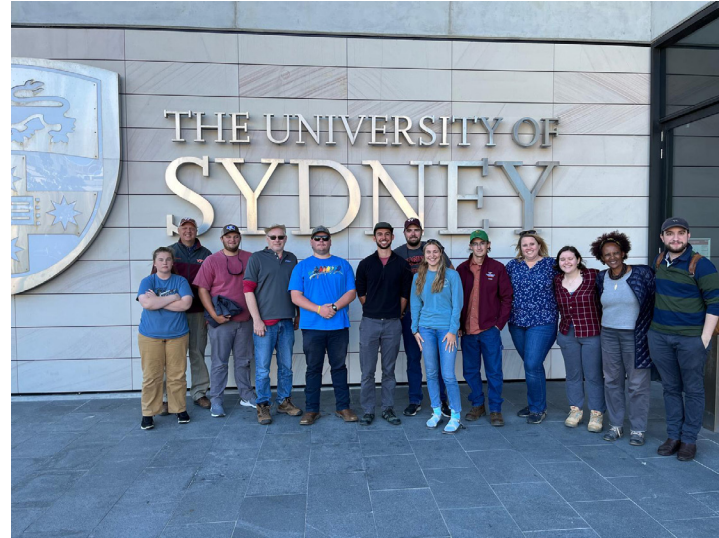
Great Barrier Reef

One of the seven wonders of the natural world, the Great Barrier Reef, spans more than 1,800 miles. It was listed by UNESCO in 1981 as a World Heritage Site.

While on their tour of Australia, students took time to explore the beautiful site.

“Going to see the great barrier reef was an incredible experience,” Turner said. “The fact that I got to see that, at least for me, was pretty important.”

“That was one of my favorite parts of the trip,” Pollok agreed. “It was really interesting to learn about the wildlife component. It is a once in a lifetime opportunity.”



There is concern that climate change could cause the coral reefs to disappear.

“With increasing CO₂ concentrations in the atmosphere, that will result in ocean acidification,” Turner explained. “That CO₂ will begin to absorb into the water and coral is pretty sensitive to that.”

While there are concerns about the future of reef, work is being done in an effort to preserve it. The Australian government has committed more than \$1.3 billion to address threats.

“It is exciting to see they are embracing those challenges and trying to combat that,” Pollok said.

Takeaways

Both students agree this was a once in a lifetime opportunity.

“It made me think beyond what I was thinking before and it made me more excited about agriculture and agronomy specifically,” Pollok said. “It was fulfilling and rewarding for me to learn about agriculture systems in another country. I feel like it is something you can read about and understand, but you can never fully grasp until you are there and you are having conversations with these people and you are speaking to them firsthand.”

She encourages everyone to consider future opportunities, saying, “Do anything you can to make that trip possible. Chances are, once you finish with your education, it is going to be more difficult for you to travel on your own.”



Turner was struck by how connected Australians are to the food chain, saying, “In the U.S., a large majority of the population is removed from that. In Australia, the general population as a whole is much more connected or intertwined with that. Even if they are not, they are very aware of what is involved to put food on their plate.”

Even though students noticed differences between Australia and the U.S., they say one thing remains the same.

“When I meet people from different parts of the world, it reinforces this idea that, no matter where you are from or what your background is, at the core, people are just people,” Turner said. “Any time you go and have an experience like this, it just kind of reminds you of that.”

Collaboration, Connections: Key Themes from CEA Summit East

By: Patrick McKee

Collaboration and connections are needed to drive the controlled environment agriculture industry. Those were the key themes discussed at the first-ever *CEA Summit East*.

The event was co-hosted by Indoor Ag-Con and the Controlled Environment Agriculture Innovation Center. The center is a joint project with the Virginia Tech School of Plant and Environmental Sciences, Virginia Seafood Agricultural Research and Extension Center, and the Institute for Advanced Learning and Research.

“An exciting thing about this conference is that it brought people from all over the United States together to share ideas and goals, which always feeds your own ideas,” said Michael Evans, director of the School of Plant and Environmental Sciences and co-director of the



Inside look at the Controlled Environment Agriculture Innovation Center.



(Left to right) Telly Tucker (IALR), Assistant Professor Kaylee South (SPES), Secretary Matthew Lohr, Director Michael Evans (SPES), Brian Sullivan (Indoor Ag-Con), Scott Lowman (IALR)

Controlled Environment Agriculture Innovation Center.

Virginia Secretary of Agriculture and Forestry, Matthew Lohr, spoke about the commonwealth’s desire to be the CEA capital of the world, saying, “Virginia will be a mecca for high-tech agriculture.”

To foster growth in Virginia, Lohr talked about the importance of workforce development and training programs at Virginia Tech and Virginia State University.

For the commonwealth and industry to be successful, he discussed how stakeholders need to work together. “It comes down to collaboration with the

whole commonwealth working together,” Lohr said. “We have made progress and I am even more excited about what the future of farming looks like.”

A success story in Virginia is AeroFarms. The company opened the world’s largest aeroponic smart farm in Danville, Va.

The facility is capable of growing more than three million pounds of leafy greens a year.

The summit featured three educational tracks, CEA Skills, Business Tips and Regulation, and Teaching, Extension, and Workforce Development.

Participants explored selecting technology, maximizing growth while reducing environmental impact, and building the best workforce.



Roger Buelow, Chief Technology Officer, of AeroFarms addressed participants.



Instructor Josh Kardos (right) participated in a panel discussion on recruiting and training.

Virginia Tech Instructor Josh Kardos was a panelist, discussing recruiting and training the next generation.

Assistant Professor Kaylee South discussed the need for the land-grant university Extension system.

Participants at the summit also heard from researchers on their findings. Topics included plant monitoring systems, sustainable production techniques, and workforce development strategies. Professor Bingyu Zhao presented his findings on breeding snacking peppers.

“We worked to create a conference program that offered something for everyone,” explained South. “It was rewarding to see how engaged our audience members were in the question-and-answer segments of all of our sessions.”

More than 200 people from 28 states, Puerto Rico, and Canada attended the two-day event at the Institute for Advanced Learning and Research in Danville, Va.

Professor Bingyu Zhao (right) gave a presentation on breeding snacking peppers for suitable for indoor agriculture.



Virginia is for pumpkin lovers - and Virginia Tech is helping farmers meet the demand for all-things-pumpkin this fall

By: Mary Hardbarger

Photos: Sarah Sharpe

During the crisp and cool fall season, pumpkins are a hot commodity, and the demand for this festive squash is on the rise thanks in part to their delicious taste and decorative traits. Pumpkin-spice-everything and pumpkins of all colors, shapes, and sizes greet consumers as soon as they enter the supermarket.

In response, Virginia growers produced an estimated 972,000 hundredweight – more than 108 million pounds - of pumpkins in 2020, ranking the state fourth nationally in pumpkin production, according to the Virginia Department of Agriculture and Consumer Services. The number of growers is also on the rise, doubling from 200 producers in 2018 to 400 in 2021.

This trend caught the attention of researchers in Virginia Tech's College of Agriculture and Life Sciences, who are now using a grant from the United States Department of Agriculture to help sustain this growth.

A team of faculty and Virginia Cooperative Extension agents received \$75,000 from the USDA Specialty Crop Block Grant Program to test the growth of specialty pumpkins across Virginia's diverse terrain, as well as different methods to extend their shelf life by reducing postharvest diseases.

"Pumpkins are an important crop in the commonwealth, with a value of \$17.6 million produced on 5,500 acres in 2020," said Steve Rideout, professor in the School of Plant and Environmental Sciences and principal investigator of the pumpkin grant. "To support this growing enterprise, we have been listening to growers and stakeholders across the state, and these are the most pressing issues with pumpkins they would like addressed."

Ugly pumpkins prove popular among shoppers

Greene County Extension agent Sarah Sharpe has seen first-hand the explosion of specialty pumpkin sales. A co-investigator of the grant, she is also the owner of Sarah's Pumpkin Patch, located in the central Piedmont region of the state.

Sharpe is quickly winding down her 13th season of growing and selling specialty pumpkins, the kind people most visually recall as the colorful, wart-dotted, oddly-shaped squash found jumping off the shelves of grocery stores and pages of lifestyle magazines.



"They are one of the reasons specialty pumpkins have become so popular," she said. "People are using them to decorate all season long, well beyond Halloween and into Thanksgiving. The first two weeks that I was open, people rolled out with wagonloads. They sell out of here like crazy."

Sharpe joins Extension agents from across the state, from the mountains to the beaches, who are either growing specialty pumpkins themselves or marketing them to growers. This effort is a key objective of the grant, spearheaded by Rideout, who specializes in plant pathology. "The first part of this project is to look for different pumpkin and gourd varieties - types that people have bred for

their desired traits – that are suited to production in Virginia," he said.

Virginia is a perfect testbed for specialty pumpkins because of the state's range of elevations and diverse soil and climate types, Rideout said.

About an hour northwest of Sharpe, commercial horticulture Extension agent Jason Cooper in the Shenandoah Valley is having success getting growers interested in testing these new varieties. Southwest Virginia Extension agent Ashley Edwards is seeing an increased interest also.

"I think this grant works out great because we are hitting almost every spot of the state, and each part of the state has a different growing season, with about four or five different zones," Cooper said. "Hitting all the different spots is beneficial as far as getting information and things that we need for our growers in our own personal coverage areas."

From Halloween treats to Thanksgiving eats

While specialty pumpkins may be the new craze, the beloved orange jack-o'-lantern remains a holiday staple. What would Halloween be without a spooky carved pumpkin, or a Thanksgiving table without pumpkin pie?

Pumpkins were historically targeted for distribution within October, however, commercial markets, fall festivals, and consumer demand have shifted this retail window. Earlier sale dates in September have increased the need for pumpkins to possess



longer shelf lives to ensure fruit quality to Halloween. In addition, many consumers desire pumpkins to retain soundness for fall displays and decorations until Thanksgiving.

"These new trends have stretched the

postharvest window for pumpkins, and growers are looking at options to increase fruit longevity," Rideout said. "Unfortunately, little research has examined postharvest treatments to extend pumpkin fruit quality. Research exploring pumpkin cultivars that produce fruit possessing longer shelf lives has not been conducted either."

That is, until now.

As part of the second objective of the pumpkin grant, the research team will compare postharvest qualities of these different cultivars over the 2023 and 2024 growing seasons. In addition to cultivar comparisons, trials comparing postharvest care of pumpkins will be conducted at Virginia Tech's Homefield Farm.

Once harvested, the pumpkins will be separated and subjected to different treatments, or none at all. Different methods include wiping them with water, wiping with bleach and chlorine, and spraying them with a hose.

"We understand that some of these practices may not be feasible for all growers, so their input in this project is going to be critically important," Rideout said. "If you grow 70 acres of pumpkins, you know you're not going to take each individual pumpkin and spray them off. There is some work to be done to exactly figure out this objective and what we can test, but our main goal is to explore what we can feasibly do that would extend their shelf life."

The pumpkin grant funding will stretch over two years, but Rideout said the research team will support Virginia's booming pumpkin production for years to come. The ultimate goal of any successful study is to share the results with growers and stakeholders, he said, and the team plans to do just that at field days, grower meetings, and through Extension publications.

"We are vested in this," Rideout said. "We want to see pumpkin production do well and continue to grow."

Boxwood Blight Insight Group, led by Virginia Tech professor, wins USDA award

By: Patrick McKee

The Boxwood Blight Insight Group (BBIG) was awarded a Partnership Award from the USDA's National Institute of Food and Agriculture in the Program Improvement through Global Engagement Category.

The group of researchers and collaborators from across the country, with partners around the world, was led by Chuan Hong, Plant Pathology professor in the Virginia Tech School of Plant and Environmental Sciences.

The group studied the emerging destructive disease of boxwood blight, which has destroyed entire crops, resulting in significant economic losses for garden centers and production facilities, as well as many historic boxwood plantings. Over the past three years, the scientists have collaborated with colleagues in Germany, Belgium, and the United Kingdom on the best ways to mitigate the spread of the boxwood blight.

Symptoms of blight include black, cloudy spots on leaves, which often get larger and cover the entire leaf, causing it to fall off of the plant.

"I am honored and excited and my first reaction was to share the great news with the entire BBIG team," Hong said, who is located at the Hampton Roads Agricultural Research and Extension Center.

According to the USDA, the award is given to a program that "strengthens U.S. agriculture through effective international engagement in research, education and/or Extension."

In an effort to study and look for ways to better contain and manage the disease, researchers took samples from three nurseries in Oregon, one of several states experiencing blight, noting it at two of the three nurseries. They found the cool, wet spring of 2022 led to new infections and outbreaks.

The researchers conducted experiments, looking at the impact of temperature on infection by two fungal pathogens, *Calonectria pseudonaviculata* (*Cps*) and *C. henricotiae* (*Che*).

They found the optimal temperature for *Cps* is dependent upon the substrate on which they are



Professor Chuan Hong examines a boxwood for blight. Photo by Zeke Barlow for Virginia Tech.

grown. For potato dextrose agar, it is 25 degrees Celsius, while malt extract agar grows better at 15 to 20 degrees Celsius.

In the lab, the reaction of six boxwood cultivars were tested to see the reaction to *Cps* and *Che* at four temperatures.

They found that it is possible that temperature contributed to observed variable response.

To better manage the disease, three antidesiccant products were tested. Virginia Tech researchers worked with state partners and growers in North Carolina, another impacted state, applying the solutions at two sites every four weeks.

After careful analysis, researchers found that *SSG*, a boxwood endophyte, induces various defense priming in boxwood plants, but it did not survive well on the foliage surface, suggesting its survival is critical to realize the full potential of the bacterial strain.

In addition, they found *Bacillus methylotrophicus* BP1024, a biocontrol agent, had the potential to control blight and promote growth.

Going forward, the group plans to test whether higher nitrogen levels contribute to increased susceptibility and if higher calcium levels will lead to a decrease.

To make the research done in Europe and elsewhere available for the U.S. horticulture industry and the public, the group conducted an International Boxwood Seminar Series, which was attended by people from the U.S. and twenty other countries on five continents.

They have presented their findings to more than 13,000 people at seminars in five countries, written more than 50 journal articles, and presented at nearly 200 Extension and outreach events.

Due to their research, the group has adapted mulching as a means for blight mitigation, identified effective and cost-effective fungicides and analyzed the spread of the disease in the U.S.

Findings have also caused growers to shift their production to less susceptible cultivars, which they believe will fast track the nation's sustainability of boxwood production and gardening.

Through outreach efforts, growers have implemented blight mitigation and boxwood crop health management systems, working to detect accidental introduction early, and contain and eradicate the disease.

As a result, boxwood production has shifted to states less-affected by the disease, resulting in a 25 percent increase from 2016 to 2021.

Boxwood blight was first discovered in the 1990s in the United Kingdom and New Zealand, spreading to continental Europe in the late 1990s and early 2000s, and the U.S. in 2011.

Boxwoods have been featured in American landscapes since 1653 and is the nation's leading evergreen ornamental shrub crop.

Designing the Perfect Yard



Students in the Residential Landscape Design class presented their designs to a homeowner.

Early in the semester, the class visited a home in Blacksburg to see the space they would design for, took measurements, and learned from the homeowners what they would like to see.

Over the next six weeks, students refined their designs, using existing features, while also picking the plants and hardscape features that will brighten the space and increase functionality for the homeowners.

Once the work was complete, the students presented their designs to the homeowners, giving them ideas to spruce up their property.

Homeowner Annie Hesp was pleased with the designs, saying, "This is the most excited I've been about our yard in the 10 to 12 years we've lived here."

Local residents who are interested in participating in the future can contact course Instructor Scott Douglas (dsd1@vt.edu).



Madison Redmond (upper left), Carter Goodrich (upper right), Ty Bloomer (lower left), and Julia Pettus (lower right), present their designs to the homeowners.

Harvesting in the Greenhouse



Students in the Greenhouse Management class harvested their lettuce crop.

Throughout the semester, under the leadership of Instructor Josh Kardos, the class grew lettuce and cucumbers.

They started the seeds in rockwool for the first two weeks before transplanting them into hydroponic systems, where they grew for the next four to five weeks.

Each week during lab, the students would measure and adjust EC and pH, and record water temperature and dissolved oxygen levels.

After watching their crop grow, they harvested the lettuce, which the students were able to take home and enjoy. The cucumbers took several additional weeks.



Creating Beauty

Students in Advanced Instructor Barbara Leshyn's Floral Design class make their own arrangements during a free design lab.





Podcast, *4 The Soil: A Conversation*, was launched as a collaboration between several agencies and departments, including the Virginia Tech School of Plant and Environmental Sciences and the Virginia Cooperative Extension.

The podcast builds on the concept that we can all be *4 The Soil* and follow the four core soil health principles, promoted by the Virginia USDA-Natural Resources Conservation Service and the Virginia Soil Health Coalition. Those principles are keep soil covered, minimize soil disturbance, maximize living roots, and energize with diversity.

Jeff Ishee of *On the Farm Radio* serves as host, with School of Plant and Environmental Sciences Faculty members Eric Bendfeldt and Mary Sketch Bryant serving as co-hosts.

Topics covered in the nearly three dozen episodes produced include farming and soil health, cover crops, and keeping water clean.

New episodes are published bi-weekly. You can find them by scanning the QR code above or on Google Podcasts, Apple Podcasts, Spotify, Audible, and Castbox.

STAY CONNECTED

Make sure the university has your up-to-date mailing address and email.

You can easily check your information online and make updates.

You can also email your updates to alumnidata@vt.edu. Make sure you include your full name and class year.

Visit alumni.vt.edu/contact.

UPCOMING EVENTS

Fall Commencement

Friday, December 16th

University
Commencement Ceremony
10:30 a.m.
Cassell Coliseum

Graduate School
Commencement Ceremony
2:30 p.m.
Cassell Coliseum

Study Abroad: South Africa

January 2nd-15th, 2023

Follow the SPES social media channels for updates and pictures, as students explore Cape Town, Johannesburg, Robbin Island, Table Mountain, and more.

FOLLOW US



Virginia Tech School of Plant and Environmental Sciences



VT SPES



VT School of Plant and Environmental Sciences

Virginia Tech Giving Day 2023

Noon, February 15th - Noon, February 16th

Make a difference for future generations of Hokies.

Support students, faculty, and programs of the School of Plant and Environmental Sciences.

- Scan the QR code or visit apps.es.vt.edu/onlinegiving
- For area, select 'College of Agriculture and Life Sciences'
- For fund, select 'School of Plant and Environmental Sciences Annual Fund'





COLLEGE OF AGRICULTURE AND LIFE SCIENCES
SCHOOL OF PLANT AND
ENVIRONMENTAL SCIENCES
VIRGINIA TECH.

185 AG QUAD LANE
249 SMYTH HALL
BLACKSBURG, VA 24061

