



2012 ANNUAL REPORT

Agency 229

Partners for Progress

Virginia Cooperative Extension and
Agricultural Experiment Station Division



Virginia Cooperative Extension



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“Through the collaborative efforts of Virginia Agricultural Experiment Station and Virginia Cooperative Extension, we are able to address problems and share solutions that impact agriculture, natural resources, the economy, and the health and well-being of our citizens. The challenges facing our country have changed since passage of the Morrill Act 150 years ago, but Virginia Tech remains steadfast in its commitment to overcome these obstacles through research, innovation, and extension. Thanks in large part to the funding provided by the Commonwealth of Virginia, Virginia Tech is applying high quality, relevant research to enhance the vitality of Virginia’s economy and its people.”

— Mark G. McNamee, Senior Vice President and Provost,
Virginia Tech

What is Agency 229?

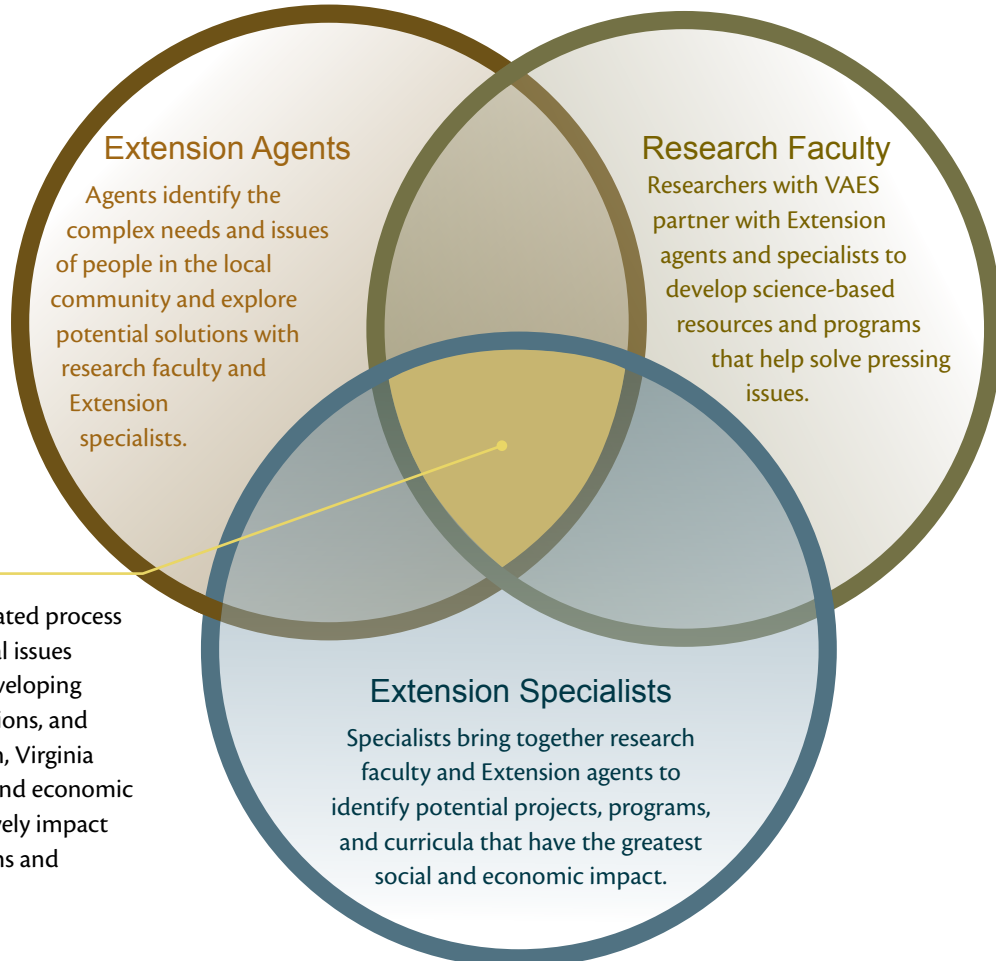
The Virginia Cooperative Extension and Agricultural Experiment Station Division is composed of Virginia Cooperative Extension and the Virginia Agricultural Experiment Station — organizations that conduct research and disseminate practical solutions to address rural and urban problems.

The Commonwealth of Virginia allocates funds to the two groups through Agency 229. The Administrative Council for Extension and Experiment Station Research was created by Virginia Tech to establish direction and coordination across the three colleges that make up Virginia Cooperative Extension and the Virginia Agricultural Experiment Station: the College of Agriculture and Life Sciences, the College of Natural Resources and Environment, and the Virginia-Maryland Regional College of Veterinary Medicine.

Virginia Cooperative Extension helps lead the engagement mission of Virginia Tech and Virginia State University — the commonwealth’s land-grant universities. By building local relationships and collaborative partnerships, Extension helps people put scientific knowledge to work through learning experiences that improve economic, environmental, and social well-being.

Virginia Agricultural Experiment Station’s faculty members in Blacksburg and at the 11 Agricultural Research and Extension Centers across the state support basic and applied research activities on agricultural, environmental, natural, and community resource issues related to the current and future needs of Virginia, the region, the nation, and the world.

Working together to create social and economic impact

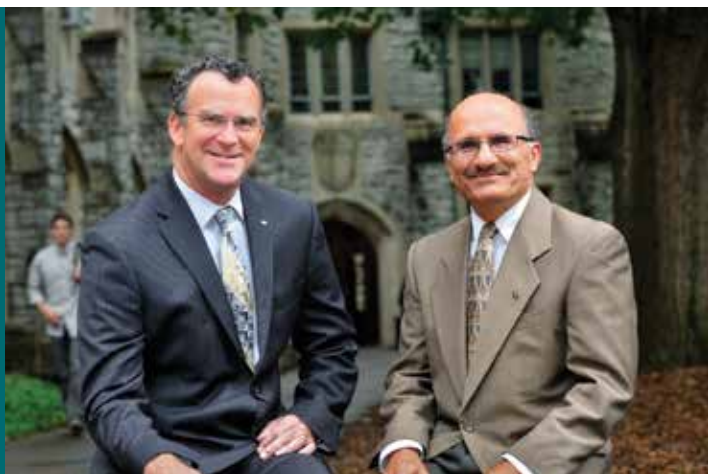


Benefits

Through this integrated process of identifying critical issues in communities, developing science-based solutions, and providing education, Virginia Tech fosters social and economic changes that positively impact the lives of Virginians and beyond.

Partners in Progress

A message from the directors



Edwin J. Jones (left), associate dean and director of Virginia Cooperative Extension, and Saied Mostaghimi, associate dean and director of Virginia Agricultural Experiment Station.

The 1862 Morrill Act established the framework for the land-grant system that led to the creation of Virginia Agricultural and Mechanical College, now called Virginia Tech. Along with other land-grant institutions across the country, Virginia Tech has transformed the landscape of higher education by preparing farmers, engineers, educators, and scientists to find solutions to today's most challenging problems.

Virginia Cooperative Extension and the Virginia Agricultural Experiment Station — the two organizations that make up Virginia Agency 229 — play integral roles in Virginia's land-grant system. They work closely together to generate research-based knowledge that addresses critical societal needs and

to share these discoveries with the public through education, extension, and outreach efforts.

Through a network of faculty members representing three colleges — the College of Agriculture and Life Sciences, the College of Natural Resources and Environment, and the Virginia-Maryland Regional College of Veterinary Medicine; 107 county and city offices; 11 Agricultural Research and Extension Centers; and six 4-H educational centers, we are putting research-based information into the hands of Virginia's citizens.

This process cannot happen without strong support from our federal, state, and local partners. We are able to leverage the federal and state funds we receive to garner additional external funding support that allows us to expand our programs while keeping them relevant and dynamic. Through cooperation with our sister land-grant institution, Virginia State University, we make a greater impact and reach more Virginians. Local governments provide support in the form of crucial facilities, salaries, and fringe benefits for the local agents and administrative support in Extension offices across the commonwealth.

Our success depends on people working together toward common goals to improve the standard of living and quality of life for Virginians — both now and in the future. These invaluable partnerships keep the network strong and viable, allowing us to focus on important societal issues that include protecting the environment, creating a safe and affordable food supply, promoting nutrition and health, encouraging youth development, finding new energy sources, sustaining agriculture, encouraging community viability, and more.

You can read about a few of the programs in this publication, and we encourage you to visit our websites — www.ext.vt.edu and www.vaes.vt.edu — to learn more about our programs and how Virginia Cooperative Extension and the Virginia Agricultural Experiment Station work together to make Virginia a better place for this generation and the next.

Sincerely,

Edwin J. Jones, Associate Dean and Director, Virginia Cooperative Extension

Saied Mostaghimi, Associate Dean and Director, Virginia Agricultural Experiment Station

A man with glasses, wearing a light blue button-down shirt, a red patterned tie, and blue jeans, stands in a cornfield. He is holding a large ear of corn in his left hand and a leaf in his right. The corn plants are tall and green, with some ears of corn visible. The background is a dense field of corn.

Fueling the world and the economy

When Virginia Tech Associate Professor Percival Zhang looks at the forests and vast swaths of agricultural land around Virginia, he doesn't just see trees and crops — he sees energy.

Zhang leads a research program to create renewable energy from the trees, biomass, and agricultural waste that are plentiful across the state. His work could help to discover a new form of energy to power the world and also bring much-needed jobs to Southwest Virginia.

“One of the great aspects of this type of renewable energy is that it is inherently local,” said Zhang, who works for the College of Agriculture and Life Sciences’ Department of Biological Systems Engineering.

Zhang and his colleagues are working to extract cellulose from plants and turn it into energy. To ensure efficiency, the feedstock must be processed within 100 to 200 miles of where it was grown. If it travels any farther, the efficiency of developing the energy source is lost. Virginia is ripe for such development because of its ample forest and agriculture lands, he said.

The impacts of his work are already being seen around the state. In 2011, OptaFuel announced that it would build a pilot plant in Southwest Virginia to put Zhang’s research to the test. OptaFuel’s parent company, Biomethodes, licensed Zhang’s technology, which brings money back to Virginia Tech and the commonwealth.

The Virginia Tobacco Indemnification and Community Revitalization Commission approved more than \$2.5 million to build the pilot plant in the first year of the three-year project. Biomethodes is providing additional first-year funds. About \$10 million more in funding is expected in the coming years, which Biomethodes will match. As the project grows, so will its economic impact on the region.

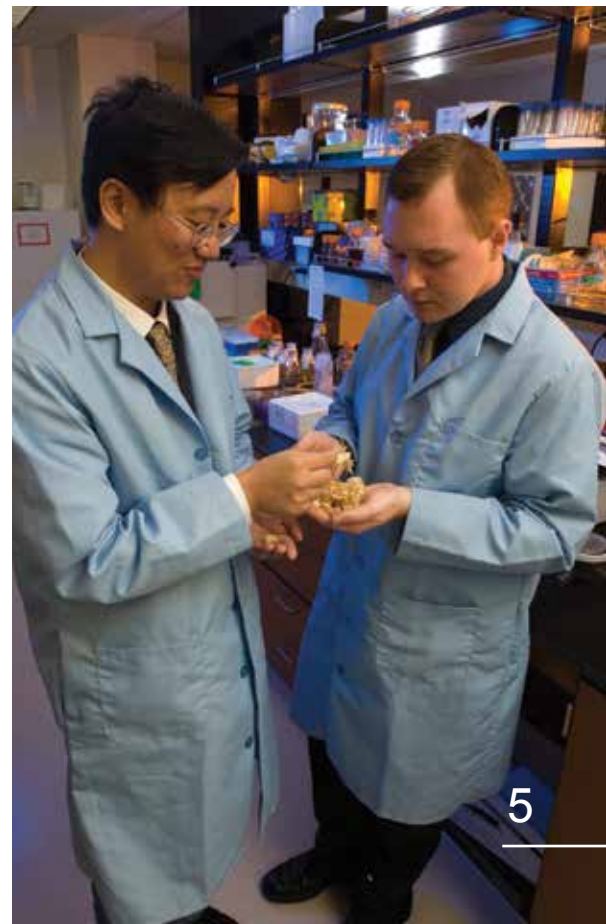
“We want to hire local graduates to fill the roles of scientists, technicians, engineers, and a host of other positions as our company matures,” said OptaFuel CEO Anthony Scime. “When you also consider the indirect jobs we will help create in construction, timber, and other fields, we could have a significant impact on the region.”

Zhang’s work isn’t limited to Wise County. He currently has more than 15 patents pending and runs a start-up energy company at Virginia Tech. And along with scientists from Oak Ridge National Laboratory, he received a U.S. patent for sugar-to-hydrogen technology, which could have a tremendous impact on the sustainable energy revolution.

“There is a huge potential for growth in renewable energy in Virginia,” Zhang said. “This work doesn’t just power the world. It powers the local economy, too.”

“There is a huge potential for growth in renewable energy in Virginia,” Zhang said. “This work doesn’t just power the world. It powers the local economy, too.”

From his Virginia Tech laboratory, Associate Professor Percival Zhang (left) develops new sources of renewable energy from the state’s agricultural byproducts and forests.



Training helps farmers minimize risk and expand markets



Recent reforms of U.S. food safety laws have left farmers and growers scrambling to comply with new regulations. With training created and provided by Virginia Cooperative Extension, farmers in Virginia and adjoining states are proactively writing their food safety plans and having their farms audited for U.S. Department of Agriculture Good Agricultural Practices certification.

“More and more buyers and supermarket chains are requiring that farms be GAP-certified,” according to Wythe Morris, agriculture and natural resources Extension agent in Carroll County. Morris has been developing and implementing the farm-based GAP educational training since 2008.

To be certified, handlers and packers must create a written food safety plan unique to their farm or business. The plan covers all aspects of their enterprise — from the field to the distribution center — and includes worker sanitation, water quality, harvest, and packaging, among other topics. Farms also need to be audited annually by a third party to ensure compliance.

“We provide hands-on training during every session. We work through the farm plan as we go through the materials,” Morris said. “Before participants complete the training, they will have 75 to 80 percent of their written plan completed. When they leave, they have ownership of the program.”

The thought of completing the certification process can be overwhelming for some growers, according to Amber Vallotton, agriculture and natural resources Extension agent in Rockingham County. But through group meetings with growers, produce buyers, and Virginia Tech food safety experts; hands-on training; and one-on-one support, Vallotton has successfully ushered growers through the process.

“We provide hands-on training during every session. We work through the farm plan as we go through the materials,” Morris said. “Before participants complete the training, they will have 75 to 80 percent of their written plan completed. When they leave, they have ownership of the program.”

“This is a big time investment, and having others reinforce their success and showing that the process is doable lends a lot of creditability to the program,” said Vallotton.

To date, more than 300 individuals representing 220 farms in Virginia, North Carolina, South Carolina, and Kentucky have completed the training. Since 2011, 48 Extension agents have been trained to assist and teach farmers in other parts of Virginia.

According to Morris, “food safety” and “locally grown” are marketing points that allow growers to reach broader markets.

“If I hadn’t gotten my GAP certification, I would have been out the door with some of my buyers because they are requiring growers to be certified in order to do business with them,” said James Light, owner of Lights Farm in Laurel Fork, Va.

Once a grower is certified and verified by the USDA, their name goes into a national database that buyers can search by state or commodity.

“It is not only a food safety tool but an excellent marketing tool as well,” said Morris. “Three years ago, there were six Virginia growers in the database. Now there are more than 50, with more to come.”



A Virginia Department of Agriculture and Consumer Services inspector speaks with farmers during a GAP certification audit.





Veterinarian Dee Whitter (second from right) provides information about beef cattle health management to Virginia Cooperative Extension agriculture and natural resources agents.

Adding value to Virginia's agricultural products

The Virginia-Maryland Regional College of Veterinary Medicine contributes to the success of Virginia's beef and dairy producers through programs that add value to the state's livestock while safeguarding its food supply.

Veterinarians Dee Whittier and John Currin — Virginia Cooperative Extension faculty members in the Department of Large Animal Clinical Sciences — are training Extension agents and livestock producers across the commonwealth through the Virginia Beef Quality Assurance Program. The program adds \$1.5 million to \$2 million to the value of cattle on Virginia's certified farms, according to data compiled annually by Extension specialists and agents.

"Through the certification program, producers learn about best management practices that improve the safety and quality of their beef," Whittier said. "We provide training and education on a variety of veterinary topics, such as herd health and the proper administration of vaccines."

Under the umbrella of the national Beef Quality Assurance Program that is administered by the National Cattlemen's Beef Association, the Virginia program has certified about 4,500 producers, accounting for half of the commonwealth's cattle. With such a large number of participants, Virginia is one of the leaders in beef quality assurance. Program leaders prepare materials and organize training in cooperation with other Mid-Atlantic states.

Extension veterinarians also collaborate with faculty members on campus, agents in the field, the Virginia Cattlemen's Association, the Virginia Department of Agriculture and Consumer Services, and local cattlemen organizations to help producers market the health and genetic management used to produce feeder calves. The Virginia Quality Assured Feeder Cattle Program encourages the use of scientifically based cattle health and management procedures for feeder cattle. It adds about \$30 in value per head of cattle to the 17,000 calves marketed through the program in a typical 12-month period. The program has returned an estimated \$3.3 million premium to producers over the past 12 years.

Veterinarians assist in Extension's efforts to control and prevent Johne's disease, a chronic gastrointestinal disease in ruminants that has a significant economic impact on dairy and beef cattle operations in Virginia. They also work to safeguard animal health through disease traceability, teach skills to beginning to mid-level beef producers through a cow-calf management course, and train Virginia's food animal veterinarians and producers to utilize the Society for Theriogenology's bull breeding soundness evaluation.

“Through the certification program, producers learn about best management practices that improve the safety and quality of their beef,” Whittier said. “We provide training and education on a variety of veterinary topics, such as herd health and the proper administration of vaccines.”



We have the commonwealth covered



Virginia Cooperative Extension and Agricultural Experiment Station Division

● Virginia Cooperative Extension offers resources in 107 offices located in every county and in 12 cities. See <http://ext.vt.edu/offices>.

◆ Eleven Agricultural Research and Extension Centers provide facilities for scientists to conduct field experiments under the state's various climate conditions. Soil type, terrain characteristics, climate, water supply, marketing opportunities, and human and natural resources are integrated to make this site-specific research responsive to the distinct needs of every part of our diverse state.

■ Six 4-H Educational Centers provide dynamic, research-based, hands-on learning experiences for youth and adults that will enable them to become self-directed, contributing, and productive members of society.

★ Virginia Tech, Blacksburg Campus

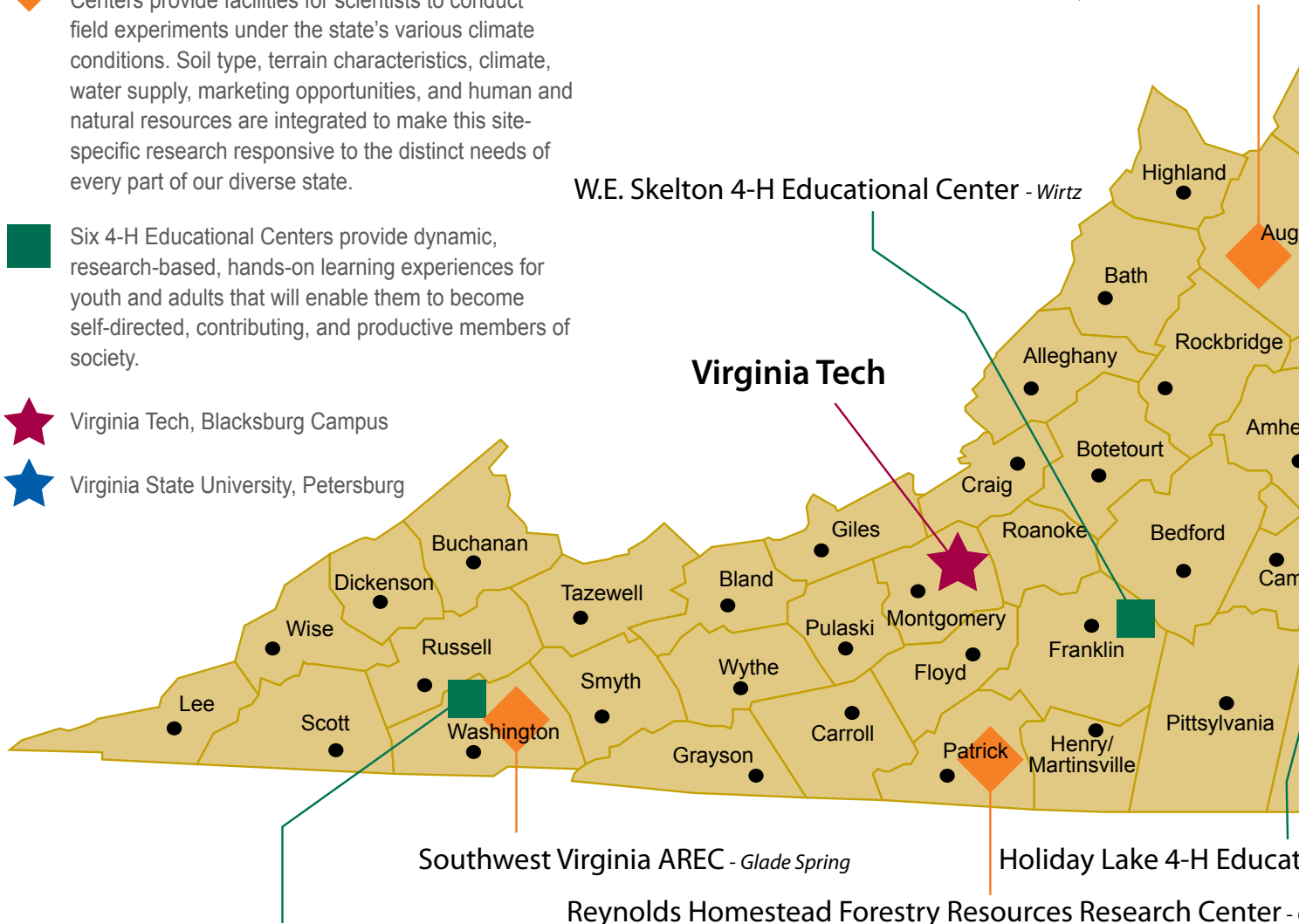
★ Virginia State University, Petersburg

Northern Virginia 4-H Educational Center - *Wentz*

Shenandoah Valley AREC - *Steeles Tavern*

W.E. Skelton 4-H Educational Center - *Wirtz*

Virginia Tech

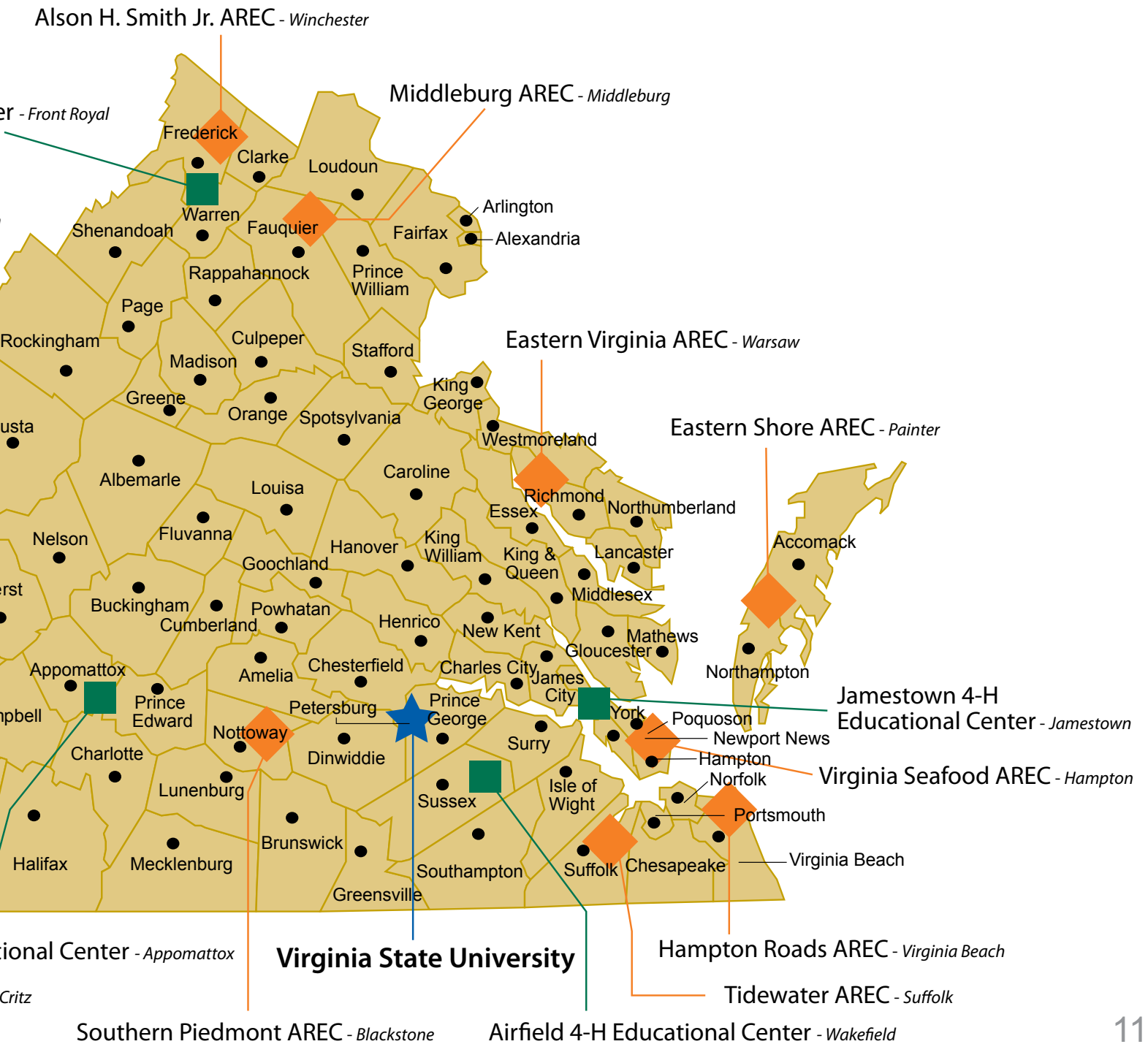


Southwest Virginia AREC - *Glade Spring*

Holiday Lake 4-H Educational Center - *Wentz*

Reynolds Homestead Forestry Resources Research Center - *Wentz*

Southwest 4-H Educational Center - *Abingdon*





Professor Carl Griffey's research to develop new strains of wheat does more than help the nation's grain producers compete in the global market. His work also generates millions of dollars for the commonwealth and Virginia Tech.

Griffey — the W.G. Wysor Professor of Crop Genetics and Breeding in the Department of Crop and Soil Environmental Sciences — focuses on small-grains genetics and breeding. His research emphasizes improving disease resistance and producing traditional and specialty wheat and barley cultivars for the Mid-Atlantic states. In 2011, Griffey's small-grains varieties were planted on more than half a million acres.

Wheat and barley diseases frequently result in yield losses. In Virginia, powdery mildew can result in losses of 5 to 10 bushels per acre. If resistant varieties such as Griffey's were not available, two-thirds of Virginia producers would need to apply fungicides at a cost of \$2.4 million annually.

Increased yields also support Virginia's agribusiness export market.

With more than 25 percent of farm cash receipts attributable to export sales, Virginia's export trade reached a record \$2.3 billion in 2011 — an increase of more than 6 percent from 2010.

Wheat was one of Virginia's top exports in 2011 and is likely to remain in the top 10 through 2012. The U.S. Department of Agriculture estimated that Virginia's producers would harvest 270,000 acres of wheat in 2012 — 20,000 acres more than were produced in 2011.

Research yields economic benefit for farmers and Virginia Tech



Professor Carl Griffey showcases new crop varieties at a field day at the Eastern Virginia Agricultural Research and Extension Center in Warsaw, Va. Seedsmen, producers, and grain exporters benefit from Griffey's research because they rely on small grains for their livelihoods.



Griffey's small-grains breeding program is considered one of the best on the East Coast. Virginia Tech's 42 wheat varieties are now grown in 16 states and Canada, and the university continually releases new wheat varieties to help increase production. In addition, seven varieties of Virginia Tech's barley are grown in eight states.

"Carl listens to what Virginia growers want and need to remain profitable," said Bruce Beahm, manager of the Virginia Crop Improvement Association's Foundation Seed Farm. "He is developing two types of wheat — the durum varieties that are used in pasta and the hard varieties that are used in bread. These wheats are typically grown outside the Mid-Atlantic region."

Griffey and Wade Thomason, associate professor and Virginia Cooperative Extension grains specialist, are looking for new ways to produce higher yields without increasing fertilizer use. The researchers also want to use DNA markers to identify the presence of desirable genes such as plant height, insect resistance, grain quality, and yield.

"Our research facilitates training for a new generation of plant breeders in the most advanced technologies, which is critical for wheat research development in the coming decades," Griffey said.

Over the past two decades, the work of Griffey and his colleagues has produced nearly \$8 million in royalties and more than \$3.3 million in sponsored research funding to the university. The royalties help fund research and extension efforts.

"These dollars will return significant economic benefits to local and national wheat growers who continually seek to improve yield potential and the quality of their crop," Griffey said.

"Our research also facilitates training for a new generation of plant breeders in the most advanced technologies, which is critical for wheat research development in the coming decades," Griffey said.

Empowering children to lead healthy lives



Over the past nine years, Virginia Cooperative Extension has pioneered a research-based program that has motivated 30,000 Virginia children to lead healthier lives through good nutrition, physical activity, and body-image awareness.

Healthy Weights for Healthy Kids reassures children that there is no perfect body size and teaches them that a body weight that fosters growth, learning, development, fitness, and well-being is a healthy one.

The program is having tangible results. The children, ages 7 to 14, who participated in the program reported improvements in their eating habits and activity levels.

Survey results showed that:

- 94 percent exercised more
- 84 percent chose more nutritious snacks
- 80 percent ate more vegetables
- 74 percent drank more milk and less soda.

“These positive behaviors break the vicious cycle of weight gain, poor grades, inactivity, and low self-esteem,” said Elena Serrano, an Extension nutrition specialist who developed the program.

Research shows that school-aged children with healthy diets and vigorous physical activity have higher grades. They are also less likely to suffer from high blood pressure, high cholesterol, asthma, and sleep disorders, according to Serrano, who is also an associate professor of human nutrition, foods and exercise in the College of Agriculture and Life Sciences.



Extension takes the Healthy Weights for Healthy Kids program to schools, camps, 4-H clubs, and parks and recreation centers. The agents rely on a variety of resources to deliver science-based messages that emphasize proper portions of fruits, vegetables, grains, proteins, and dairy products.

“We expose children to new foods so when they go to the grocery store with their moms, they will ask for a yogurt fruit crunch instead of grabbing frozen pizza rolls,” said Mary McFerren, project director for Extension’s Family Nutrition Program. FNP helps low-income families and children eat healthier on a budget, make smarter food purchases, and prepare meals at home.

For Doris Perkins, a single mom from Richmond, Va., and an FNP participant, the days of eating fried chicken with mashed potatoes and gravy are gone. She now prepares baked chicken served with a side of spinach and mushroom salad for her family.

“We now add more vegetables and fruits to our meals and we exercise more,” Perkins said. “I know how to treat my body, and I have a lot more energy. I’m setting an example for my kids.”

“These positive behaviors break the vicious cycle of weight gain, poor grades, inactivity, and low self-esteem,” said Elena Serrano, an Extension nutrition specialist who developed the program.

The Virginia 4-H Healthy Weights for Healthy Kids Program launched its Eat Smart, Move More initiative in 2011 to help children throughout Virginia develop healthy eating habits and increase their activity levels. Virginia Cooperative Extension distributed 65,000 posters to schools and community-based 4-H clubs, and the same message has appeared on billboards and buses in major metropolitan areas throughout the state.



Protecting Virginia's landscapes

The trees that line the streets and sidewalks of Virginia do a lot more than make the commonwealth's cities beautiful — they help create a more vibrant and healthier place to live. The College of Natural Resources and Environment at Virginia Tech is a leader in ensuring that these urban forests are protected and continue to be a vital part of our landscape.

Through research and the efforts of Virginia Cooperative Extension, the college is studying the impact and value of urban forests while instructing everyone from new landowners to planning officials on the best ways to manage and protect them. About 166 million trees make up more than 1,300 square miles of urban and community forests in the state.

“Research shows that the value of urban forests is wide-ranging, from the benefits of cleaning the air and water to increasing tourism and creating jobs,” said John McGee, an Extension geospatial specialist. “We want to give as many people in the commonwealth as possible the knowledge of how they can care for the forests that they love.”

The Virginia Geospatial Extension Program trains clients to use the most cutting-edge research and technology — including geographic information systems, global positioning systems, and remote sensing — to map out forests. Through partnerships with the Virginia Community College System and the Virginia Space Grant Consortium, Extension provides geospatial workshops that focus on training people who will share what they've learned with their schools, agencies, and businesses. Participants take their knowledge about mapping systems back to their communities so they can make informed decisions regarding forest management, urban development, and land-use issues.

Benefits of these programs are far-reaching and include assistance in managing coastal resources, tourism development for the Blue Ridge Parkway, and assessing cities' urban tree canopy.

Researchers are also using knowledge gained from this program to examine the potential for developing biofuels around the state. Virginia's forests could be a valuable source of alternative energy in places such as the tobacco region, where development could spur economic growth.



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The Virginia Geospatial Extension Program trains tree stewards and others to use technology to map the state's forests.



“We were unaware that there could be problems with the private drinking water supply that our family and cattle rely on until our local Extension agent helped us test it for *E. coli*. Thanks to this Extension program, we now have a clean, reliable source of water.”

— Joel Pugh of Marion, Va., who participated in the Virginia Household Water Quality Program drinking water clinic. The statewide program offers affordable water testing services and educational information to residents to help ensure their private drinking water sources are safe.



“4-H has helped shape who I am today. I raised and showed lambs and beef cattle and participated in public speaking competitions. These activities helped me build confidence and leadership skills and discover my career interest in agribusiness. I’m using these skills to advocate for agriculture and to help the public better understand what we do.”

— Adlyn Abell, third-year 4-H State Cabinet member and a first-year student at Virginia Tech studying agricultural and applied economics.

“I have attended two of your programs and they are outstanding. The instructors and the material are great. This hands-on approach is so much better than the canned programs. For the professionals who are serious about knowing the facts, these are the best lectures I have taken in my 40 years of real estate experience.”

— A South Boston, Va., resident who attended the Real Forestry for Real Estate class that assists landowners to achieve their land-management goals while also helping real estate agents increase sales by improving their knowledge of rural land.





“We are better managers of our livestock because of the Beef Quality Assurance Certification Program. Virginia producers, like all producers around the country, want to do a good job taking care of their animals. Animal health and well-being are such an essential part of our economic survivability.”

— Bill McDonald is the owner-operator of McDonald Farms, located in Blacksburg, Va. McDonald, a seventh-generation cattle producer, relies on Virginia Tech and Virginia Cooperative Extension to provide him with science-based information and training, such as the Virginia Beef Quality Assurance program, so his operation can remain profitable and viable for the next generation.

“With the counselor’s help, I was able to set up a payment plan to repay my taxes, accumulate enough points as required by the IRS to retire, and settle debts to purchase a condo. I am really grateful for the assistance.”

— An Arlington County, Va., woman who participated in a Virginia Cooperative Extension program that teaches personal financial management and advises citizens on spending and credit issues.

“FIT Extension brought a camaraderie to the team, and it encouraged us to meet the daily challenges of eating well and keeping fit. From day one, my team and I took on and met the challenge. We continue to stay active and eat lots of fruits and vegetables. We eat nutritious salads once a week at work, too. Each year, the team looks forward to FIT and its new ideas to help us live healthy lives.”

— Margaret Hoover of Manassas, Va., who participated in FIT Extension, an exciting eight-week physical activity program from Virginia Cooperative Extension that motivates people to improve their diets and overall quality of life.



“When we needed answers to real-world problems, we turned to Virginia Tech. The faculty’s deep knowledge and ability to do applied research is helping our industry overcome the potentially serious challenge of improving water quality.”

— A.J. Erskine with Bevans Oyster Company in Kinsale, Va., and Cowart Seafood Corporation in nearby Lottsburg, Va. Erskine and others in Virginia’s multimillion-dollar oyster aquaculture industry reached out to the university to research water quality issues in the Chesapeake Bay.

Funding Sources

Virginia Cooperative Extension and the Virginia Agricultural Experiment Station receive significant funding from government sources. A combination of federal, state, and local funds highlights the cooperative partnership that allows the agency to develop and deliver high-quality, science-based programs.

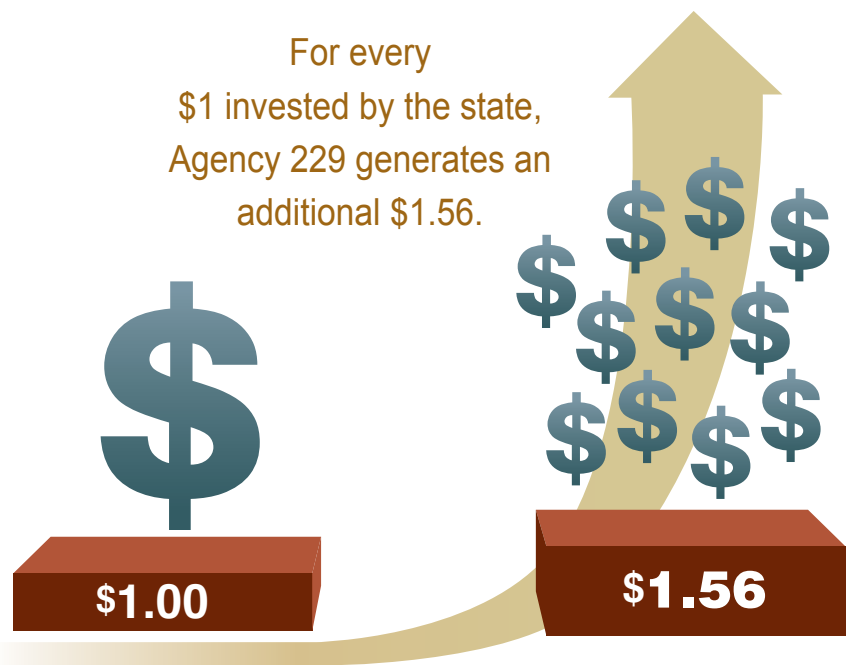
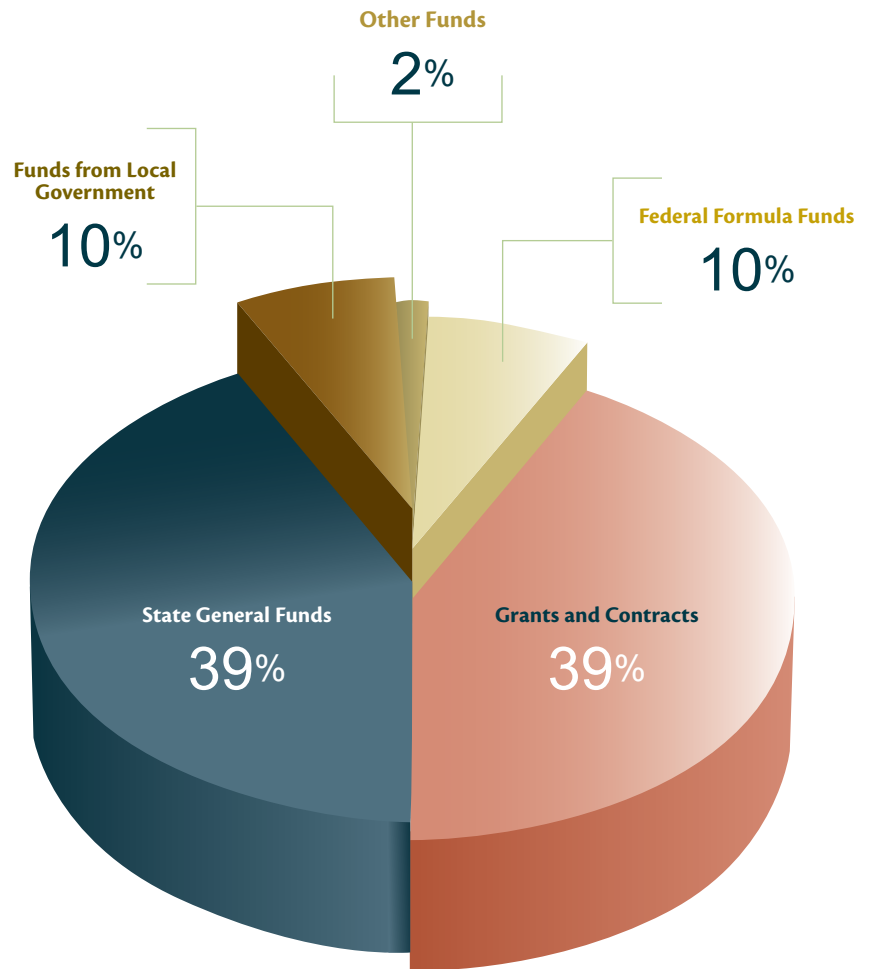
In fiscal year 2012, Agency 229 used \$60.2 million of state general funds to support its integrated research and extension programs. An additional investment of \$15 million of federal formula funds (Smith-Lever, Hatch, and McIntire-Stennis acts) and \$15.6 million of local funds (direct support, local reimbursement, and local agency funds) provided the primary financial resources for these programs.

In addition, research and public service grants and contracts contributed \$60.4 million for basic and applied research in areas that will greatly benefit the commonwealth. For the first time in the agency's history, expenditures from grants and contracts surpassed expenditures from Virginia's general funds in fiscal year 2012.

Agency 229's return on investment continues to be outstanding. For every dollar from the state's general fund invested in Virginia Cooperative Extension and Virginia Agricultural Experiment Station, the agency receives an additional \$1.56 in resources from external partners (grants, federal formula funds, and local governments).

Federal agency grants from the National Science Foundation, National Institutes of Health, and U.S. Department of Agriculture's National Institute of Food and Agriculture continue to increase.

Meanwhile, local and federal government partners have maintained a constant level of support. State funding has stabilized after a five-year downward trend and is expected to increase slightly in fiscal year 2013.



Administrative Council for Extension and Experiment Station Research

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Middleburg Agricultural Experiment Station, Middleburg, Va.

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