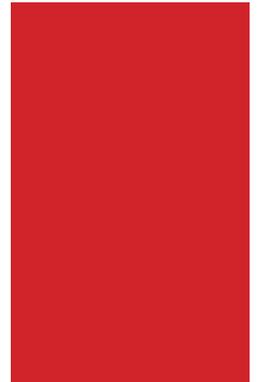




2012

RESEARCH STATIONS ANNUAL REPORT



North Carolina
Department of Agriculture
& Consumer Services

North Carolina State University
College of Agriculture
& Life Sciences

NC A&T State University
School of Agriculture
& Environmental Sciences

**NORTH CAROLINA
RESEARCH STATIONS**

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“ In order to meet the demand of the world’s burgeoning population, food production will have to at least double over the next 37 cropping seasons. ”



The mission of the Research Stations

in North Carolina is “to manage crop and livestock facilities at research stations to support agricultural research, extension and teaching programs conducted by university faculty across the state.” To that end, the research stations provide the testing ground for innovation and discovery that undergirds the \$71.6 billion industry that is North Carolina agriculture and agribusiness. Moreover, this innovation and discovery makes national and international contributions to food production and food security.



FEEDING THE WORLD BY 2050

World population is projected to reach 9 billion by the year 2050. In order to meet the demand of the world’s burgeoning population, food production will have to at least double over the next 37 cropping seasons. Food security quickly becomes a national security issue when scarcity occurs. So, the challenge of feeding the world’s growing population is critical to a healthy, prosperous, and stable state, country, and world.

AGRICULTURAL RESEARCH IS THE KEY

North Carolina Research Stations are on the front line of meeting this challenge. North Carolina is uniquely situated to be at the forefront of agricultural advances that will feed current and future generations. Along similar latitude, the Research Stations in North Carolina offer a wide variety in soils, climate, and cropping systems. Our diversity makes us an extremely attractive place in which to push the bounds of agricultural productivity through research. World-class faculty at NC State and NC A&T lead the way as new technology, crop varieties, better utilization of available resources, and gaining every possible efficiency is the focus of agricultural research on North Carolina’s Research Stations.

In 2009, the Research Stations initiated a strategic planning process in which four main goals were identified as critical to meeting the mission. The progress during 2012 for each goal is summarized, with key highlights in this report.

GOAL 2: ENSURE EFFICIENT RESEARCH STATION AND FARM MANAGEMENT



Our Goals

- Goal 1: Enhance Infrastructure for High-Quality Applied Agricultural Research
- Goal 2: Ensure Efficient Research Station and Farm Management
- Goal 3: Enhance Working Relationships and Communication
- Goal 4: Strengthen Outreach, Extension and Education

GOAL 1: ENHANCE INFRASTRUCTURE FOR HIGH-QUALITY APPLIED AGRICULTURAL RESEARCH



- **Precision Ag Investment:** Over \$300,000 was invested in precision agriculture on research stations. All 18 will be using FarmWorks to track field activities and 10 stations have new precision guidance equipment which allows data to be collected and transferred wirelessly. Fifty station staff received two days of training from Trimble on the technology.
- **Irrigation at Clinton and Peanut Belt:** Using funds from the sale of forest products, a new linear irrigation system with GPS tracking was installed at the Horticultural Crops Research Station at Clinton and more efficient pumps were put in place at the Peanut Belt Research Station at Lewiston Woodville.
- **Biodiesel Plant at Oxford:** The biodiesel processing unit at the Oxford Tobacco Research Station has been completed and staff received training on operation and maintenance of the new unit.
- **Training Programs:** A committee was formed to develop a training program for the Research Stations Division to include staff at all levels and to prepare future leaders. The training program includes team building, communication, performance management, and leadership development. An initial training for station superintendents was held

- on December 10th at Mount Olive College.
- **Forestry Program:** The forest management program generated over \$400,000 during the year from timber and pine straw harvesting. A portion of the funds generated were approved by the 2012 Legislative Session to support three projects: Greenhouse Expansion (Tidewater); Calf Barn Construction (Piedmont); Forest Road Construction (Tidewater)
- **Poultry House Renovations at Piedmont:** Changes in the poultry industry have resulted in modifications to practices in poultry production. Renovations to poultry houses built around 1985 are under way through a partnership of NCDA&CS, NCSU-CALS, USDA-ARS and the poultry industry.
- **Small Ruminant Upgrades at Upper Piedmont:** The sale barn holding paddocks were re-fenced through collaborative work with NCA&TSU; additional equipment and attachments were also added at Upper Piedmont and Cherry Research Farm; a herd of over 100 female meat goats was added at the A&T Small Ruminant Demonstration Site.
- **New equipment at Sandhills and Clayton:** New tractors were purchased for the Sandhills Research Station and the Central Crops Research Station to begin replacement of an outdated fleet.

“ Research is conducted on over 80 commodities produced in North Carolina. ”

Numbers of faculty, graduate students, projects, trials

NC State University and NC A&T State University Faculty	126
USDA Researchers Conducting Research on NC Research Stations	9
NC State University Research Projects	581
Graduate Students conducting research on research stations:	
Animal Science (NCSU)	17
Biology (NCSU)	2
Crop Science (NCSU)	48
Entomology (NCSU)	20
Horticultural Science (NCSU)	36
Plant Pathology (NCSU)	17
Soil Science (NCSU)	8
Poultry Science (NCSU)	4
Post-doctoral & Graduate Students (NC A&T)	29
Total Graduate Students	181



Research Highlights - NC A&T

1. Extension and faculty researchers collaborated to demonstrate and collect data on Heritage vs Commercial Cornish Cross meat birds in a pasture production and showed advantages to Cornish Cross birds.
2. Bioenergy research projects initiated include:
 - a novel reactive distillation process for upgrading crude bio-oils produced from animal wastes, municipal solid wastes and agricultural residues into transportation fuels and biodegradable plastics;
 - microalgae cultivation for treating swine wastewater and supplying biomass for the production of biofuels;
 - gasification of agricultural residues and woody biomass into high-quality syngas for the generation of heat and power and the synthesis of liquid fuels.
3. Researchers are evaluating the yield potential of two varieties of canola and sweet sorghum in piedmont soil and climatic conditions to improve seed yield of canola and sugar content of sweet sorghum with improved production practices.
4. Two varieties of bell peppers were planted in high tunnels and replicated outside to evaluate planting date, yield, and disease. Peppers were either trellised or not trellised in order to observe the effectiveness against sun scalding.
5. Use of SunnHemp to add nitrogen to soils prior to pasture renovation is being demonstrated. Before SunnHemp, soil tests indicated 50 lb of nitrogen were needed but after growing, no nitrogen was recommended.





Research Highlights - NCSU

- Ongoing work at Lake Wheeler Field Lab, Sandhills, and Mills River focuses on remediation of construction practices on soil quality resulting in basic recommendations for reducing runoff, improving soil health, and improving water quality.
- Soybean physiology research conducted at Tidewater, Caswell, and Upper Coastal Plain generated information to aid North Carolina producers in cultivar selection, row spacing, and growth regulators that translates into yield increases of 10 to 15 bushels per acre.
- Wheat research conducted at the Tidewater and Piedmont Research Stations found that the key to increasing wheat yield is the production of fall tillers. Better management of fall tillers resulted in a 15% increase in yield. Growers across the state are adopting practices such as precise timing of fall and spring nitrogen to help promote fall tillers.
- Corn research conducted at the Tidewater and Peanut Belt Research Stations found that growers could use El Niño/Southern Oscillation (ENSO) climate predictions to determine when to plant corn. By using the "La Nina" or "EL Nino" forecast growers could either plant corn in early April or Mid May and increase yield while reducing risk. Using this prediction method in 2012, growers planted earlier than normal, missed the hot, dry weather in early July and corn yields statewide were the third best in the history of corn production in North Carolina. Combined with higher prices and the Midwest drought, there was \$1.6 million dollars of additional income to corn growers.
- Peanut cultivars developed on Peanut Belt Research Station, and also tested at the Upper Coastal Plain Research Station and Border Belt Tobacco Research Station, are estimated to occupy 84% of peanut acreage in North Carolina in 2012 and 73% of the three-state region (NC, SC, and VA).
- Plant breeding conducted on research stations all over North Carolina has resulted in the development and recent commercial release of dozens of cultivars of fruits (blueberries, blackberries and peaches), vegetables (cucumbers, melons, sweetpotatoes and tomatoes), biofuels (grasses and sweet potatoes), and ornamental plants (butterfly bushes, redbuds, maiden grass, dogwood, hydrangea and flowering quince). These cultivars support NC horticulture industries, generating hundreds of millions of dollars of sales annually, as well as supporting national and international horticulture.
- Spotted Wing Drosophila (SWD), a new invasive insect, was first detected in North Carolina at the Upper Mountain Research Station in the fall of 2010. The pest was found in caneberry and strawberry breeding plots. The detection at the research station in late 2010 prompted the development of a SWD monitoring system to be instituted throughout the state in 2011.
- Organic egg production is a rapidly growing sector of the egg industry and is supplied on a local level by relatively small to very small producers. A baseline study looking at integrated rotation forages with dairy cattle followed by laying hens has been completed and had an impact on the training of interns at the CEFS Organic Small Crops Unit located on the Cherry Research Farm.



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ACADEMICS • RESEARCH • EXTENSION

Sharing of resources among stations:

- Stations continue to share resources such as staff support, trucks, tractors, implements and supplies essential to performing daily activities
- The Central Crops Research Station transferred five 4-rack tobacco barns to Kinston to support tobacco research

Administrative processes have been streamlined by combining the Mountain Horticultural Crops Research Station with the Mountain Horticultural Crops Research and Extension Center under one Director.

Administrative overhead was reduced by sharing a Research Operations Manager/ Superintendent position between the Horticultural Crops Research Station in Castle Hayne with the Williamsdale Biofuels Field Lab in Duplin County.

External Funding:

- Sponsored program awards through NCSU for FY 2012 were \$77,994,019. Funding from commodity organizations and tobacco totaled more than \$2 million.
- The School of Agriculture & Environmental Sciences at NC A&T received over \$6 million in external funding and an additional \$5 million grant from the National Science Foundation to establish an interdisciplinary Bioenergy Center for education and research of liquid biofuels.



GOAL 3: ENHANCE WORKING RELATIONSHIPS AND COMMUNICATION



Relationship with NC State Administration	Administration at NCDA&CS and NCSU meet at least monthly to facilitate effective management and strategic decision-making.
Communication with Faculty	A survey of faculty at NC State was conducted and communication between faculty and station personnel continues to improve.
Partnerships	Strategic partnerships between NCDA&CS, NCSU, NC A&T, USDA-ARS and commodity groups resulted in station upgrades, improvements and overall research capability.
Center for Environmental Farming Systems (CEFS)	The Cherry Research Farm continues to be a springboard for statewide initiatives such as the 10% Campaign aimed at increasing consumption of NC products.
Multi-State Projects	Research stations host a number of multi-state projects such as the SUNGrains breeding initiative for wheat, oats and barley as well as a integrated pest management programs.



GOAL 4: STRENGTHEN OUTREACH, EXTENSION AND EDUCATION

In 2012 there were 169 events attended by 11,045 individuals

Event Type	No. of Events	No. of Participants	% of Participants per Event
Field Days	10	1465	13%
Workshops/Training	50	2050	19%
Education	32	721	7%
Tour	30	846	8%
Youth	26	4637	42%
Other*	21	1326	12%

* Events and meetings related to station activities that included an opportunity to share information.



Field Days

- The Small Flock Field Days program was developed to provide current and applicable information to NC producers with small specialty and backyard egg flocks. This field day has been held for 4 years in September within different regions of the state in order to address local issues and problems which these producers face.
- During the Fall Field Day held at the Upper Piedmont Research Station on October 18 (A&T, NCDA and NCSU/County Extension collaboration), there was a demonstration of goat breeds at the farm, including Savanna, Spanish, Kiko and Boer goats for the site. Over 70 people attended. Integrated Parasite Management/FEC/FAMACHA* training was also offered during Field Day.
- Research Stations hosted field days focused on cotton, peanuts, tobacco, reduced tillage, small fruits, tree fruits, hay, and many other commodities.

* FEC stands for Fecal Egg Count. FAMACHA® is an acronym derived from the name of the creator of this system, Dr. Faffa Malan; CHA stands for chart. This is a system that helps farmers determine the need for deworming goats.

Ag and Science Teachers

- Rowan County High School Ag Teachers have students participating in applied research programs at Piedmont Research Station focused on strawberry production.
- Central Crops Research Station is working with a teacher and student from Clayton High School to collect 14 soil monoliths which will be preserved and utilized for future soils classes.
- The Northeast Region Biotechnology/Agriscience High School began its first year in the Vernon James Center located at the Tidewater Research Station in Plymouth. The school currently has 60 students who are provided the opportunity to interact with researchers located at the James Center in addition to their traditional classes.
- Bertie Early College High School students (14) had training on in March with faculty in fertility plots at Tidewater. They also participated in the laying out of test plots and making hand applications of fertilizers to individual plots.

- The A&T Farm hosted 2,248 students K-3rd grade for the Spring 2012 Discover Ag program and 1,285 students for the Fall 2012 Discover Ag program.
- The first FoodCorps Farm-to-School Day was held at the A&T Farm and Horticulture Unit in collaboration with Guilford County Extension. Over 340 3rd graders participated in the three day program.

Hosting Workshops

- Small grain faculty in multiple departments hosted a regional training program for growers on the Piedmont Research Station in 2012. Over 12 acres of station land was devoted to wheat production issues and demonstrations that were used for County Extension Agent Training and as the centerpiece for grower training. Close to 200 growers participated.

- The "Growing Change" group of 14-16-year-olds from Scotland County with juvenile justice system issues toured the A&T farm and campus. These young men have made great strides and have developed a leadership team to further youth initiatives in Scotland County.

Special Events

In September, the Tidewater Research Station and the Oxford Tobacco Research Station celebrated 100 years of support to agricultural research in North Carolina. The afternoon events provided station tours to highlight current research and comments from local individuals with long-term connections to the research stations. Five research stations have achieved the 100-year milestone.

NORTH CAROLINA RESEARCH STATIONS

* Items in bold are reasearch interests



BORDER BELT: Field Crops (**Tobacco**, Soybeans, Corn, Peanuts, Small Grains)

CASWELL FARM: Field Crops (**Soybeans, Corn, Wheat**), **Organic Crops** (Soybeans and Cotton), Invasive Weed Ecology, Native Grasses

CENTRAL CROPS: Field Crops (**Corn**, Soybeans, **Cotton**, Small Grains), Tobacco, Swine, Horticultural Crops (Melons, Peaches, Apples, **Strawberries**, Sweet Potatos, Squash), Canola

CHERRY FARM: Grass-based **Dairy**, Beef, **Antibiotic-free Swine**, Corn, Soybeans, Cotton, **Specialty Crops**, Organic Farming, Goats, Wetlands Restoration, Waste Composting, Riparian Buffers

CUNNINGHAM/LOWER COASTAL: Tobacco (**Flue-cured**, Burley, and Dark Air-Cured), Horticultural Crops (Brambles, **Melons**, Watermelons, **Sweetpotatoes**, Lettuce, Cabbage, Squash, Cucumbers), Corn

HORTICULTURAL CROPS, CLINTON: Horticultural Crops (**Cucumbers**, Melons, **Sweetpotatoes, Peppers**, Blueberries, Grapes, Strawberries, Watermelon, Tomatoes), Field Crops (Soybeans, Corn)

HORTICULTURAL CROPS, CASTLE HAYNE: **Blueberries**, Strawberries, Grapes, Cucumbers, Watermelon, Woody Ornamentals, Woody Fruit Species, **Sea Oats, Coastal Beach Grass**

MOUNTAIN: Specialty Crops, Christmas Trees, **Heirloom Tomatoes**, Forages, Beef, Wheat, Corn, **Burley Tobacco**, Alternative Crops

MOUNTAIN HORT: **Tomatoes**, Ornamentals, Apples, Peaches, Strawberries, Blueberries, Brambles, Peppers, Cucurbits, Soybeans, Corn, **Aquaculture, Greenhouse Production**



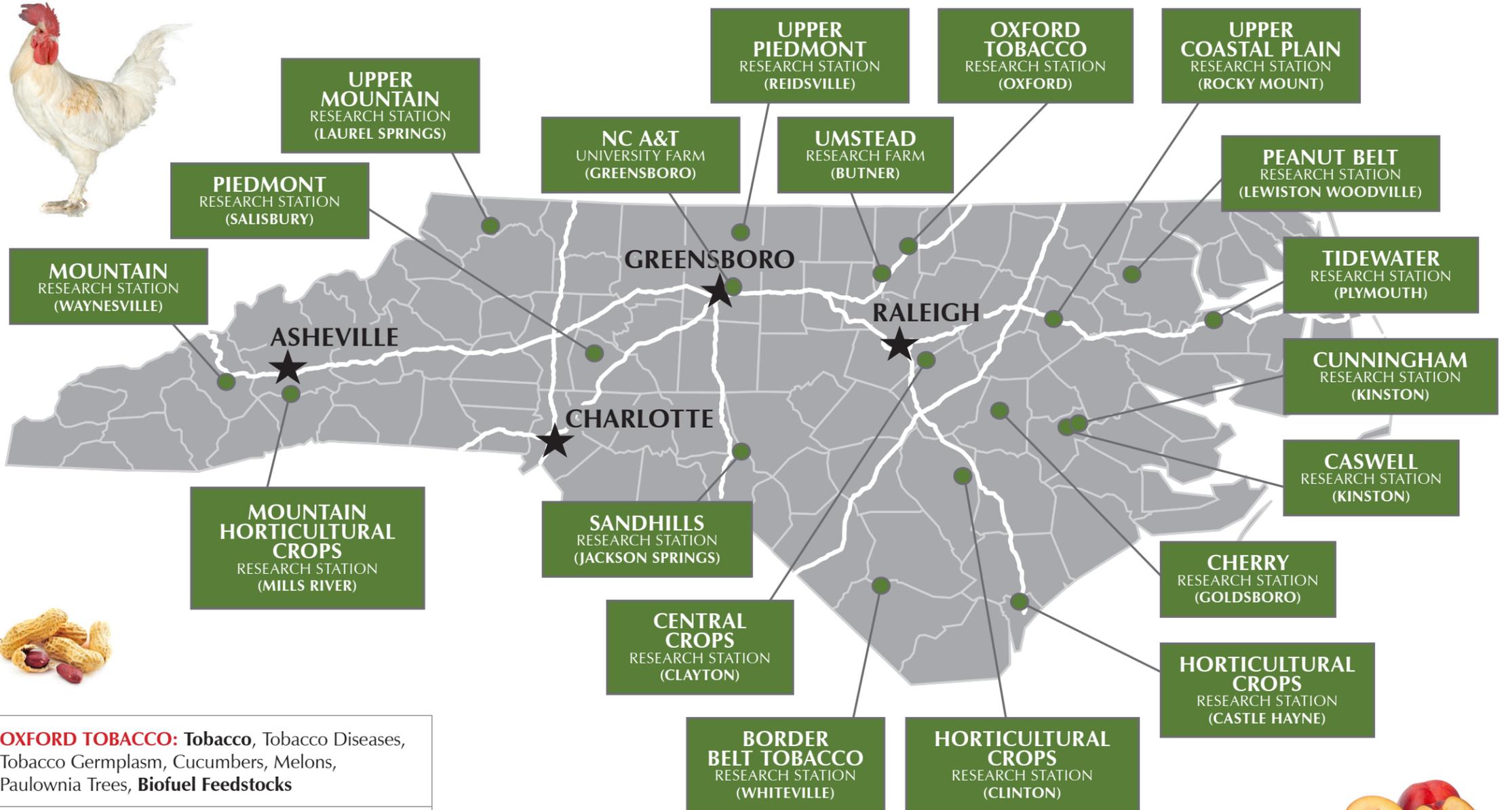
OXFORD TOBACCO: **Tobacco**, Tobacco Diseases, Tobacco Germplasm, Cucumbers, Melons, Paulownia Trees, **Biofuel Feedstocks**

PEANUT BELT: **Peanuts, Corn**, Cotton, Wheat, Soybeans, Cucumbers, Melons, Snapbeans, Sorghum, Sage, Fescue

PIEDMONT: **Poultry, Dairy**, Corn, Soybeans, Hay, **Small Grains**, Wheat, Tomatoes, Strawberries, Caneberries, Blueberries, **High Tunnel Production**

SANDHILLS: **Peaches**, Blueberries, **Turfgrass**, Corn, Soybeans, Caneberries, Peppers, Strawberries, Ornamentals, Peanuts, Sweetpotatos, Cotton, Rye

TIDEWATER: Soybeans, Corns, Cotton, Aquaculture, **Swine, Beef, Irish Potatoes**, Rice, Canola, Sweet Sorghrum, Small Grains



UMSTEAD: **Forestry, Water Quality**, Bio-fuel Feedstocks, Weed Management, **Forage Production**

UPPER COASTAL PLAIN: Peanuts, Cotton, Soybeans, Corn, **Tobacco**, Cucurbits, Small Grains, Switchgrass, Trees, **Weed Management**

UPPER MOUNTAIN: **Beef**, Goats, Christmas Trees, Strawberries, **Brambles** (Raspberries, Blackberries), Blueberries, **Burley Tobacco**, Small Grains, Mushrooms, Organic Crops, Ornamentals



UPPER PIEDMONT: Grapes, **Beef, Flue-cured, Burley & Dark Tobacco**, Paulownia Trees, Wheat, Canola, Biofuels, Turf, **Meat Goats**

A&T UNIVERSITY FARM: Swine, Poultry, **Specialty Crops**, Organic Crops, Goats, **Waste Management, Constructed Wetlands**, Soil Quality



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