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
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); Call 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 NCDAC&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&T; 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 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-ols 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.**

**Numbers of faculty, graduate students, projects, trials**

<table>
<thead>
<tr>
<th>Institution</th>
<th>Faculty</th>
<th>Graduate Students</th>
<th>Projects</th>
<th>Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC State University and NC A&amp;T State University Faculty</td>
<td>126</td>
<td>9</td>
<td>581</td>
<td>17</td>
</tr>
<tr>
<td>USDA Researchers Conducting Research on NC Research Stations</td>
<td>48</td>
<td>20</td>
<td>36</td>
<td>17</td>
</tr>
<tr>
<td>NC State University Research Projects</td>
<td>8</td>
<td>4</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>Graduate Students conducting research on research stations:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal Science (NCSU)</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biology (NCSU)</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crop Science (NCSU)</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entomology (NCSU)</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horticultural Science (NCSU)</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant Pathology (NCSU)</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Science (NCSU)</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poultry Science (NCSU)</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Doctoral &amp; Graduate Students (NC A&amp;T)</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Graduate Students</td>
<td>181</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Research is conducted on over 80 commodities produced in North Carolina.**
Research Highlights - NCSU

1. 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.

2. 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.

3. 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.

4. 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.

5. Peanut cultivars developed on Peanut Belt Research Stations, 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).

6. 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.

7. 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 laboratory at Lake Wheeler with the Williamsdale Biofuels Field Lab in Duplin County.

8. 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.

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

<table>
<thead>
<tr>
<th>Event Type</th>
<th>No. of Events</th>
<th>No. of Participants</th>
<th>% of Participants per Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Days</td>
<td>10</td>
<td>1,465</td>
<td>13%</td>
</tr>
<tr>
<td>Workshops/Training</td>
<td>50</td>
<td>2,050</td>
<td>19%</td>
</tr>
<tr>
<td>Education</td>
<td>32</td>
<td>721</td>
<td>7%</td>
</tr>
<tr>
<td>Tour</td>
<td>30</td>
<td>846</td>
<td>8%</td>
</tr>
<tr>
<td>Youth</td>
<td>26</td>
<td>4,637</td>
<td>42%</td>
</tr>
<tr>
<td>Other*</td>
<td>21</td>
<td>1,326</td>
<td>12%</td>
</tr>
</tbody>
</table>

* 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.

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.

Hosting Workshops
- 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.

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

North Carolina A&T State University
School of Agriculture
& Environmental Sciences
Dr. William M. Randle, Dean
1601 East Market Street
Greensboro, NC 27411
(336) 334-7979
www.ag.ncat.edu

North Carolina State University
College of Agriculture
& Life Sciences
Dr. Richard H. Linton, Dean
Patterson Hall 112, Box 7601
Raleigh, NC 27695
(919) 515-2668
www.cals.ncsu.edu

North Carolina
Department of Agriculture
& Consumer Services
Steven W. Troxler, Commissioner
2 West Edenton Street
Raleigh, NC 27601
(919) 707-3000
www.ncagr.gov