



2019 - 2020
RESEARCH
STATIONS
ANNUAL
REPORT

On the Frontlines of Growth

Our Mission

To manage crop and livestock facilities that serve as a platform for agriculture research to make farming more efficient, productive and profitable while maintaining a sound environment and providing consumers with safe and affordable products.

Our Vision

As leaders and advocates for research and innovation on all farming platforms, we will inspire farmers with comprehensive education and new technology as we face the charge to feed North Carolina and the growing world population. Our work will not stop.



From the Commissioner and the Dean



“Our growing global population means farmers will need to produce 75 to 100 percent more food by 2050 just to meet the demand. This will be a challenge, especially as we lose prime farmland to development. Research conducted at these 18 stations will be critical in helping us produce more food with fewer resources. I am grateful for the stations’ innovative work that has helped keep North Carolina on the cutting edge of agricultural production and advances.”

**– Steven W. Troxler, N.C. Commissioner
of Agriculture**



“North Carolina is blessed to have one of the most diverse research station networks in the nation, with a great partnership among NC State and the NC Department of Agriculture. This research station infrastructure will help support the research, innovation, and education needed by our farmers and agribusiness stakeholders to propel agriculture and food systems forward. The partnership and research platform will help provide opportunities for North Carolinians, and help to provide solutions for our nation and our world.”

**– Richard H. Linton, Dean of the College of
Agriculture at NC State University**

The Lifeblood of North Carolina

Agriculture is by far the largest industry in our state, the lifeblood of rural North Carolina. North Carolina's research stations are an essential resource, standing on the front lines of growth in this important sector of our economy.



from the director
Teresa Lambert

2020 A Year of Uncertainty

The Research Stations are committed to excellence even in the most unprecedented of times. To say that 2020 was a challenging year, is an understatement. With stay-at-home orders, shutdowns and disruptions in food distribution, agriculture again proved to be the backbone of our great country. The research stations remained active and viable. Station personnel were committed to the mission of agricultural research, all while practicing strict biosecurity protocols. These biosecurity protocols were created to protect livestock units, but were modified to protect station employees at the onset of COVID-19.

In developing strategies for continued operations, North Carolina State University and North Carolina Department of Agriculture created a simple accountability matrix that would track movement across the 18 research stations and field labs. This "Project Exemption" process proved to be a very valuable tool for station superintendents and administration. "The show must go on" was the Modus Operandi and strict protocols for social distancing and PPE were outlined in the exemption process, allowing for the continuation of critical research projects. By being proactive, Research stations provided the platform for 454 completed projects, 74 initiated projects, 121 Project Leaders and multiple virtual field days.

Although research activity was decreased from the previous year by approximately 25%, providing timely, relevant information remained the gold standard. The North Carolina Department of Agriculture and North Carolina State University remain committed to the citizens of North Carolina and providing the research platform to feed a growing population.

Teresa Lambert





This is not just history,
this is our story



and this is how it started

Dating back to 1877...

Agriculture research in North Carolina dates back to 1877, April 19, 1877 to be exact was the first Agriculture Experiment Station in a one room Chemistry lab at UNC. This Station was the first in the South and Second in the Nation. This is also when state legislation established the North Carolina Department of Agriculture along with "Experiment Stations" as a division of the department.

it should be noted...

The Experiment Station at that time was a little more than a one-man operation. About 1900 the Department of Agriculture rented an experiment farm and in 1901 purchased a farm for this purpose in Edgecombe County. In the First 47 years if its existence the Experiment Station was removed from Jurisdiction of the Board of Agriculture and returned to it again numerous times. The causes were many and varied. Finally, in 1924 the Experiment Station was transferred to the North Carolina State University and placed under the jurisdiction of the College Board of Trustees where it still remains. July 1, 1949, upon recommendation of the Director of the Experiment Station, the administrative and operational responsibility for the College-budgeted stations was assigned to the Division of Research Stations of the North Carolina Department of Agriculture.

Since that time, the North Carolina Department of Agriculture and Consumer Services' (NCDA&CS) Research Stations Division, in partnership with the College of Agriculture and Life Sciences at North Carolina State University and School of Agriculture and Environmental Sciences at NC A&T State University, has established 18 statewide locations. Each facility has unique climate and soil conditions, giving researchers a living laboratory in which to investigate a variety of regional crops, forestry concerns, livestock, poultry and aquaculture. The Division supports these studies by providing land, water, equipment, buildings, and staff who work around the clock to help build a stronger foundation for the future of agriculture.

this is where
the shoes were left
and the bar was set.



Research is Creating New Knowledge - Neil Armstrong



Dr. Kenneth Anderson
Extension Poultry Specialist (Comm Eggs & Pullet Rearing)

Research at the Piedmont Research Station-Poultry Unit has continued on at a steady pace. When the COVID-19 Lockdown started we had 2 research projects associated with plasma proteins in pullet rearing diets to mitigate heat stress and the other associated with oregano derivatives which would improve gut health. We were able to complete the studies and will assist the industry to improve layer performance. Two range studies were started examining methods to mitigate internal parasites in range layers. We were able to continue on with scheduled 4 new projects with chicks slated for delivery. We had to apply for all of the research exemptions to complete the projects and get the new ones started.

It was a trying time and I greatly appreciate the dedication of the staff at the Piedmont Research Station-Poultry Unit. With travel limited and the number of individuals we could have in a vehicle their help during data collection times was invaluable. We were able to continue and expand our research efforts to enhance hen welfare and improve egg quality for the industry. We are now expanding work to include animal behavior and stress physiology and the impact on egg safety with new PhD students and researchers in the department



Dr. Deidre Harman
Extension Livestock Specialist, Animal Science

The Mountain and Piedmont Research Stations have been instrumental in helping the Amazing Grazing team continue research programs in spite of the challenges brought about by COVID-19. Specifically, the Mountain Research Station housed 5 different research projects and the Piedmont Research Station housed 2 in 2020. Without the cooperation and support of the field staff at the stations, these projects would not have happened. At each location, NCDA staff helped execute the day to day management activities, helped collect samples, and occasionally helped process samples for further analysis, even if that meant working long and extra hours until the job was done. Their cooperation and willingness to jump in to help was especially appreciated this year because of limited staff availability of the Amazing Grazing team due to COVID-19. The old saying "it takes a village" could not have been more true this year and I will be forever grateful for the partnership between NC State and NCDA staff. Our team is looking forward to the continued collaboration between the two entities to solve real-world problems for our state's livestock producers.

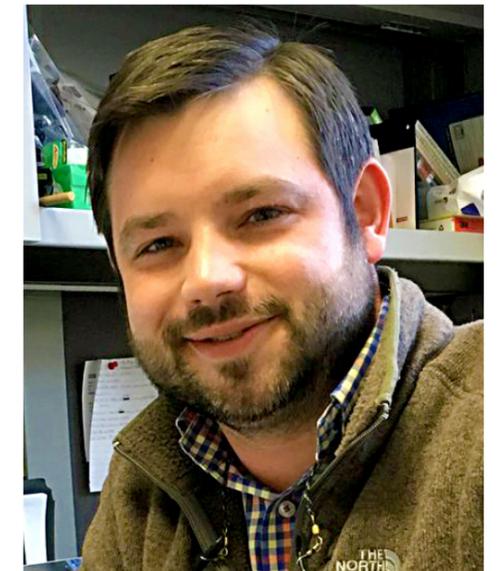
Projects completed at MRS

1. Cool-season annual grass and grass-legume mixtures for grazing and silage
2. Crabgrass variety trial and Tall fescue variety trial
4. Establishing perennial forages with nurse crops
5. Determining Milk EPD's in beef cattle

Projects completed at PRS

1. Tall fescue variety trial
2. Establishing perennial forages with nurse crops

2020 presented many grand challenges. We were fortunate to have such a long-standing history of collaboration with the research stations in North Carolina, as it gave us great confidence and assurance for our field trials. We successfully worked with nine research stations on a wide-range of experiments that focused on tobacco variety evaluations, pesticide residue quantification, plant nutrition (tobacco and hemp), and sucker control - among other things. While the means in which we operated were very different than we were accustomed to, the field season progressed smoothly and safely. We are thankful for the continued relationship with the Research Stations and the impact we can have together in pushing the boundaries of modern tobacco production.



Dr. Matthew Vann
Assistant Professor & Tobacco Extension Specialist

Great Minds Think Alike

The Research Stations Division is responsible for the administration of two competitive grant programs to help support and grow North Carolina's agricultural industry:

The Bioenergy Research Initiative and the New and Emerging Crops

impact calls for collective wisdom

The Bioenergy Research Initiative

supports the research and development of forestry and agriculturally based feedstocks for bioenergy production, agribusiness development, and cooperative research for biofuels production. In 2020, the Bioenergy Research Initiative funded seven new research projects.

Through these projects, progress continues to improve the genetics of energy canes and bioenergy grasses. Unexpected positive data has proven beneficial to the poultry industry by heating the poultry houses with wood pellet burning furnaces. Innovative technology is being developed for heating small-scale greenhouses in niche areas in the Appalachia region that also creates a by-product for enhancing soil physical properties. Support continues for loblolly pine biomass production.

The staff developed and administered a new grant program funded by the CARES Act. Through IMPEC (Increasing Meat Processing Efficiency & Capacity) \$20,250,000 was awarded to 22 meat and 35 seafood processors in 31 counties from the mountains to the coast. Owners are already reporting positive impacts in their facilities.



The New and Emerging Crops Program

was created in 2018 with the objective of identifying new crops, value added products and agricultural enterprises and providing the agricultural research, marketing support, and education needed to make these crops or products commercially viable and profitable for North Carolina growers.

During the first two years the NECP grant program funded 13 research projects focusing on 6 different crops. Through these projects, researchers are developing production recommendations for industrial hemp, identifying a replacement for the no longer available sprite melon, releasing new purple sweet potato varieties, growing purple carrots for the food colorant industry, identifying new crops for ethnic markets, evaluating new seedless muscadine varieties and growing hybrid poplar trees for veneer production. In 2019 and 2020, the New and Emerging Crops Program also collaborated with industry partners to plant research and demonstration plots to determine the feasibility of sesame production in NC, evaluate carrot varieties for processing markets, and evaluate red beets grown for the food colorant industry.

Covid19 prevented staff from promoting programs in traditional venues; however, with assistance from the Marketing Division, a 2020 virtual field day was created for each program and posted on the Departments YouTube page. Despite the pandemic and restrictions on research, travel and in person meetings, BRI and the NECP continue to grow and make positive impacts on North Carolina agriculture.



People are Talking About Us.



For generations, the beef cattle industry in North Carolina has greatly benefited from the impact of the NC Research Stations—which help provide current, science-based information to help advance NC agriculture.

Breakthrough research boosting our cattle farmers—and their bottom-lines—is made possible by well-staffed and well-designed research stations. Such programs include:

- Upcycling research designed to add value to crops and reduce waste
- Utilizing low or no-value crop by-products as feed
- Prevention and reduction of fescue toxicosis—a debilitating condition in cattle caused by fungus in fescue grass

NC Research Stations play a pivotal role in the North Carolina beef system, which is respected and emulated nationwide. These stations enable our researchers to identify solutions to existing issues, along with challenges we may not even know about today. Moving forward, they'll continue to provide resources and support to help farmers stay in business, enhancing the environment and the overall economy of North Carolina.

- Bryan Blinson, Executive Director, North Carolina Cattlemans Association



In the 1990's, following boll weevil eradication, cotton returned as a major crop in North Carolina. In 2019 North Carolina farmers planted 496,000 acres of cotton across 55 counties producing approximately 980,000 bales of cotton and 240,000,000 tons of cottonseed with combined production value over \$370,000,000.

With ever increasing production cost and tight profit margins cotton farmers rely on research to make crucial management decision. Each year North Carolina Cotton Producers Association allocates significant funds to such research. Most projects are conducted by North Carolina State University researchers on farms within the North Carolina Department of Agriculture and Consumer Services research station system. On average 5 researchers will conduct 77 trials across 7 different research stations. Simply put, the number and diverse locations within the research station system is an invaluable resource to North Carolina cotton farmers.

- David Parrish, Chief Executive Officer, NC Cotton Producers Association



Agriculture and agribusiness are ready for harvest when it comes to economic development. Recruitment and expansion of companies is extremely competitive and requires a lot of tools to be effective. We offer a great growing climate, close proximity to markets, a farm and business friendly atmosphere, but we're set apart from competition by a strong ag infrastructure, which includes a top-notch research facility right in the backyard. Agribusiness has become high-tech and along with it comes high-tech challenges that require expert and speedy support. Mountain Horticultural Crops Research facility and its qualified staff fit this need and progressive, sustainable agribusiness recognizes this value asset as they make decisions on where to locate. Because of this, as AgHC entertains prospect companies, a visit to the Research Station is always on the tour. There is no doubt that having these facilities has paid off in recent projects we've landed, which include over \$100 Million in capital investment and 200 plus new jobs.

- Mark Williams, Executive Director, Agribusiness Henderson County



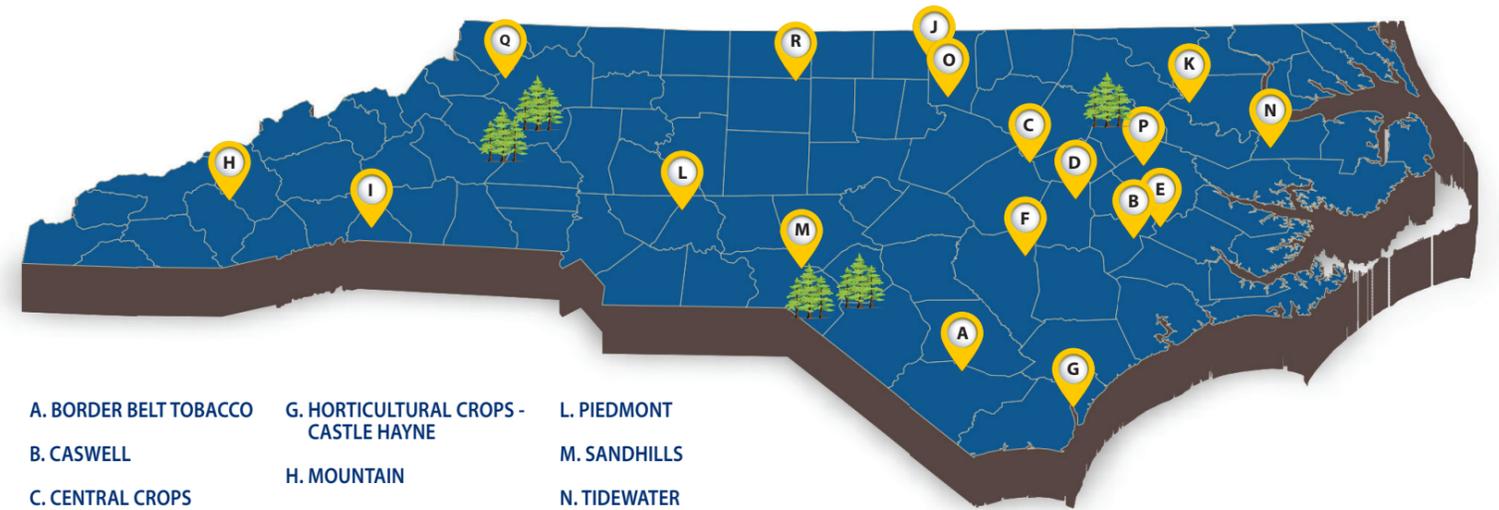
North Carolina's 18 agricultural research stations are an incredible resource that contribute greatly to our state's economic growth and development. Not only do the research stations assist existing farms and industry with a direct economic impact in excess of \$1.5B, but they also provide our state with a tremendous advantage in our efforts to recruit new agtech companies to the state.

- Ryan Combs Executive Director, Research Triangle Regional Partnership.

It's a good thing.



North Carolina's Research Stations



- | | | |
|----------------------------------|--|------------------------|
| A. BORDER BELT TOBACCO | G. HORTICULTURAL CROPS - CASTLE HAYNE | L. PIEDMONT |
| B. CASWELL | H. MOUNTAIN | M. SANDHILLS |
| C. CENTRAL CROPS | I. MOUNTAIN HORTICULTURAL CROPS & EXTENSION CENTER | N. TIDEWATER |
| D. CHERRY | J. OXFORD TOBACCO | O. UMSTEAD/BUTNER |
| E. CUNNINGHAM/LOWER COASTAL | K. PEANUT BELT | P. UPPER COASTAL PLAIN |
| F. HORTICULTURAL CROPS - CLINTON | | Q. UPPER MOUNTAIN |
| | | R. UPPER PIEDMONT |

It's no wonder Agriculture is the #1 industry in North Carolina

We're one of the most diverse states in the Nation thanks to it's natural ability to produce. Take note, NC's variety of soils, climate, rainfall, elevation ranges, cropping systems and, you guessed it... research and trials from our own research stations. North Carolina agriculture is thriving, to say the least

Welcome to your State, Our State, that has the capabilities to grow, produce, research and try, then grow and produce more.

You should be proud, because we sure are. Our State, citizens, our Country and beyond are at the forefront of our mission. The State of NC is depended on and we will not let down.

Are we pushing the boundaries of agriculture? The answer is Yes, and we wouldn't have it any other way.

Our work will not stop.



What Put NC on the Map?

Tobacco is what put North Carolina on the map. North Carolina is known for producing the highest-quality tobacco because our soils and climate produce the richest, most flavorful leaf in the world. Nearly 80% of flue-cured tobacco grown in the United States is grown in our state. Though North Carolina has produced tobacco for more than 100 plus years, it continues to be one of our largest cash crops. The process in growing tobacco has not changed much but the use however continues to astonish people every year. From research on biomass, pharmaceuticals, transgenic and agronomic. Tobacco will not be going anywhere for a long foreseeable future.

What Keeps the Wheels Turning?

successful trials...
that's what

BORDER BELT TOBACCO RESEARCH STATION, Whiteville

In 2019 and 2020, the station's tobacco crop, test plots and other crops were successful. Cotton and peanut crops thrived. A partnership with BASF chemical company to grow some cotton plots generated revenue for the station. In 2020, the station met its receipts with sale of crops and help from Duke University and BASF. In addition, a research specialist was hired. 2020 saw the completion of some projects, including the remodeling of a tobacco pack house, digging of a retention pond and fencing of a 10-acre area for a quarantine site. Also in 2020, a guava root knot nematode project began.

CASWELL RESEARCH FARM, Kinston

Caswell staff used Trimble's Field Level II digital design system to reshape one of the station's research fields – a new process for the station and the Division. Caswell hosted a successful Syngenta Grow More Event. Staff rallied ahead of Hurricane Isaias and harvested tobacco at the Cunningham Station and the 500-plus acres of corn before the storm. In 2020, total acres were down 30% for Caswell, Cunningham and Lower Coastal. Heavy rains took their toll on some crops or delayed planting dates. The station saw high yields and successful research projects for small grain, corn, tobacco. The station hosted virtual field days for small grains, wildflowers and hemp.



CHERRY RESEARCH STATION, Goldsboro

With 40 research projects conducted involving 22 project leaders and 21 graduate students, 2019 was a very busy year for Cherry Research Station. Major events included a Silvopasture/Agroforestry Field Day and a Planting Technology Field Day. Other workshops and tours conducted focused on small farm production practices, pasture-based livestock operations, food safety and general agricultural practices. In 2020, the number of research projects was down, with 28 active projects involving 19 project leaders completed. Staff members dug in and took the precautions necessary to protect each other and continue the essential work. A new hay shelter was constructed with FEMA funding.

HORTICULTURAL CROPS RESEARCH STATION, Clinton

Despite a global pandemic and several weather-related challenges in 2020, staff at the Horticultural Crops Research Station successfully completed a wide range of plant breeding, agronomic and IR4 research projects. In addition, several new station infrastructure and improvement projects were initiated. In 2020, HCRS collaborated on 36 research projects with 11 project leaders and 5 graduate students. The station grew a range of crops including sweet potatoes, stevia, sprite melons, cucurbit crops, brassica crops, peppers, tomatoes, corn and soybeans. The station also partnered with the New and Emerging Crops Program to conduct research and demonstration trials growing beets for the food colorant industry, evaluate carrots varieties for the processing industry, and evaluate the potential of sesame as a new crop for North Carolina.



PEANUT BELT RESEARCH STATION, Lewiston-Woodville

In 2019, the station equipped two additional tractors with Trimble's autosteer systems. Staff soon noted the impact on the peanut breeding program when the technology was attached to the planter. The peanut breeding program's new precision planter was connected to the GPS system on the tractor and plots the alleys between the plots, the combination of the two greatly reduces the need for personnel to drop seed and greatly reduced time needed to plant the plots. At the beginning of the 2021 growing season, the station farm manager Creig Deal doubled up duties in that role for Upper Coastal Plain Research Station. The research conducted for both tobacco and field crops was down because of COVID-19. Station staff worked together as a team and overcame obstacles presented because of the virus.

PIEDMONT RESEARCH STATION, Salisbury

The station saw 2019 as a challenging yet productive year, hosting over a dozen field days and numerous events and tours with a total of 3,000-plus visitors. Piedmont broke ground and completed construction on a 40 x 50' produce packing house as well as completed construction on the robotic feeding system calf barn. Amidst a global pandemic and above average rainfall, 2020 proved to be a challenging year for Piedmont Research Station. The station staff adopted bio-security protocols for protecting the human aspect that had been in place for many years for the livestock units. These biosecurity protocols enabled the station to continue operations in a somewhat normal capacity. Research projects were implemented successfully by following Covid guidelines and good hygiene and distancing.

MOUNTAIN RESEARCH STATION, Waynesville

The station experienced a successful first year of black carrot research with the highest yield of the three locations and good quality. The first year of research and production of cigar wrapper tobacco and binders was challenging but rewarding in the end. The station's truffle orchard began to pay off with over 30 truffles harvested. Research continues on Christmas tree production and adelgid resistance in hemlocks. With a few adjustments the Mountain Research Station was able to operate as close to normal as possible in 2020. The MRS livestock/forage unit had as many, if not more, projects this past year. Work with beef cattle continue, which included breeding, calving, daily husbandry tasks, production of hay and corn silage, and pasture management. Research projects are estimated being down 10% from previous years.

OXFORD TOBACCO RESEARCH STATION, Oxford

The 2019 growing season presented numerous challenges, most notably, the weather. While these challenges negatively impacted crop yields, fortunately, the quality of research was not compromised. In 2020, COVID-19 presented added challenges, but the station was able to continue operations and produce quality research especially in the tobacco program. Receipt revenue was good and exceeded goals. The station saw personnel turnover in 2020, but still maintained exceptional research and revenue.

TIDEWATER RESEARCH STATION, Plymouth

Station improvements continued, including the installation of fiber optic cable and wi-fi availability on the station. This will increase the efficiency of data collection, thus improving the recommendations researchers make to growers. In 2020, Tidewater implemented an ID scanning system using barcodes on pig ear tags. These will identify individual pigs and allow staff to use a computer system to record data. The station began using a variable rate application program to take soil samples. This program allows staff to spread fertilizer on a two-acre grid, matching the correct amount of fertilizer to the soil sample recommendations through GPS technology.

UMSTEAD RESEARCH FARM, Butner

The year 2020 will be a year to remember. Umstead completed a corn variety trial. Staff looked at 10 varieties from several seed companies. Disease and insect damage was logged throughout the trial. Part of the crop was harvested for silage and analyzed at the N.C. Department of Agriculture and Consumer Services Food and Drug Protection Division Laboratory. The second trial was a sorghum variety trial. Seven different varieties were planted with observation of disease and pest damage. Renovations to a hay field continued with new field planting improving forage quantity and quality. Phase 3, a forestry to pastureland project, continued. In addition, work was done to install power to the area and make preparations to run water lines and fence.

UPPER COASTAL RESEARCH STATION, Rocky Mount

Research projects involving about 30 project leaders and numerous graduate students were successfully completed by dedicated staff members. Cotton and tobacco project leaders presented very useful material at the Cotton Field Day and Tobacco Tour. The Peanut Research Tour, consisting of attendees from Argentina, and around the world and led by David Jordan was well received. The station exceeded its expected receipts despite mixed commodity prices. As with many stations, little temporary labor was employed due to COVID restrictions. Staff worked together to meet project needs.

UPPER MOUNTAIN RESEARCH STATION, Laurel Springs

The station welcomed the beginning of a resident on-site herd with the arrival of the first calf born to the foundation cows. Improvements were made to the livestock platform with the addition of two new loadouts, new fencing, new fence line feeding system and frost-free drinkers. The station's Fraser Fir seed orchard is fully established and waiting for the trees to mature enough to produce cones. The outdoor Fraser Fir Nursery was expanded to house more containers, and improvements were made to an area for seed handling. Additionally, modifications to our tobacco infrastructure were made due to the addition of cigar wrapper tobacco. During the pandemic, staff were able to support 100% of the research requests we were given, and also support the livestock programs in Western N.C.





Out of Adversity Comes Opportunity

- Benjamin Franklin

Since 1992 the Society of St. Andrews Carolinas has drove statewide in North Carolina with the help of amazing volunteers that coordinates with local farmers to provide food to a number of agencies for the people in need. Some of our Research stations have partnered with the Society of St. Andrews Carolinas. In 2019 some stunning produce Piedmont Research stations were able to donate was 3,300 lbs of tomatoes. Horticulture Crops in Clinton was able to lend out 100,000 servings of produce, 80 lbs of grapes and 200 lbs of muscadines.

In 2020 Piedmont Research Stations had given 21,000 lbs of watermelon, 90 families received fresh vegetables and 390 dozen eggs. A few of the places these produces went to were Refugee Support Services, International School, Families First in Cabarrus County, Caterpillar ministries, Dilworth soup kitchen, and Main street Mission. We are thrilled to continue contributing to this magnificent organization.



Teresa & Lisa:

THANKS SO MUCH FOR THE WHITE EGGS these past few months! Providing this awesome form of protein to our refugee clients/ friends who are struggling so much during this Coronavirus crisis has been extremely helpful!

Just wanted to share a few pics of our "process" with you! I wish we could go inside the homes of our refugee friends and show you how much they are enjoying them! One young lady who helps us every week told me that her brother loves eggs and cooks five of them for himself whenever he can!

We usually put the eggs in the back corner of the "Food + More" boxes we pack up — and protect it with a bag that contains 3 rolls of toilet tissue and a roll of paper towels, so you can't see the egg cartons inside the boxes! I'll try to take a photo next month before the egg carton is covered up!

Have a wonderful Independence Day holiday! I'll touch base with you on June 29 to see if any brown eggs are ready yet — otherwise, we look forward to receiving them next month sometime!

Marci Mroz
General Program Coordinator, Refugee Support Services



In memory of
Mr. Silvester Brown

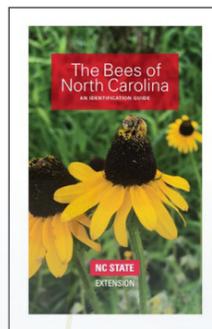
Creating a Buzz About the Bees



Hannah Levenson

Graduate student in the Department of Entomology and Plant Pathology and ecology and evolutionary biology

NC STATE EXTENSION



Look for Hannah's recent publication "*The Bees of North Carolina*" on Amazon or in a bookstore near you.

Hannah Levenson, She's the Bees Knees

Bees Are Nature's Perfect Pollinators—And They're In Big Trouble. Bee populations are in steep decline. Not just in here North Carolina, but around the world. For Hannah Levenson, that means there's a lot of work to be done.

Hannah, a PhD candidate in Entomology at NC State University, is studying wild bee populations statewide. This work became possible when in 2016 the state mandated planting of pollinator habitat at all North Carolina Research Stations.

From the mountains in the west, across the piedmont to the Atlantic coastal plain, the habitat connected by NC Research Stations is extensive and diverse—a vibrant outdoor laboratory that serves as a living model for larger geographic regions.

Hannah's work is multifold, and includes a statewide survey of native bees—assessing how bee populations respond to the quantity and quality of habitat. The goal of this work is to conduct the most detailed survey of native bees ever done in the state. In addition, she is evaluating how the presence and health of this habitat impacts yield in a nearby crop system, soybeans.

Perhaps most importantly, since bees are a barometer of environmental health, Hannah is measuring the effects of pathogens on local bee populations, and monitoring pollinator health over time. Because of the scale and scope of Hannah's work, her research will be used in future studies around the country.

Closer to home, Hannah helps conduct educational field days at NC farms, sharing the vital role pollinators play in growing healthy crops, and their effect on a farmer's bottom line. She is also integral to the annual Bugfest at NC Museum of Natural Sciences.



got milk? We do.

Research at the PRS Dairy Unit is steadily increasing, especially with updates and new facilities, but Elizabeth and her team have had no trouble keeping up. Elizabeth has helped implement updates such as the automated calf feeders, new AfiMilk and AfiFarm systems, and new feeding system. These and continued upgrades help researchers at NC State and NC A&T stay competitive for funding and make it easier to serve the dairy industry in the best way.



Stephanie Ward

Dairy Science Extension Specialist

NC STATE EXTENSION

COVID-19 and 2020, in general, brought a whole new set of challenges. Biosecurity is always a top priority on dairy farms, so social distancing and wearing PPE are not new concepts to Elizabeth. But, restrictions in place to ensure safety, such as limited travel and interaction, could have derailed the research progress. Because the staff at PRS and leaders at NCSU recognize the importance of what the Dairy Science Extension does to serve the industry, they were able to move on with multiple projects. As a result, there was successful completion of three graduate student projects. From that, Elizabeth lead the Extension to utilize the new data generated from the AfiFarm system to gain a better understanding of how cows respond to dietary changes, especially in terms of making milk fat and rumen health. This and future work will make it possible to identify animals headed for illness, weeks prior to showing symptoms.

In addition, the Extension gathered data on calf growth and performance in an autofeeding group setting. Results will tell how many days a calf should be backgrounded (3 or 10) prior to entering into groups. This work and research allows Elizabeth to start sharing what they have learned with dairy farms in NC and the southern region.



Not Your Typical “Field Day”

Kids may not be as excited about this kind of Field day

The Upper Coastal Plain Cotton Field Day which is held every other year, is a large event that included all involved in the NC cotton industry. This field day showcased the latest cotton research from NC State University cotton research and extension faculty and covered a broad array of disciplines, including agronomics, weed science, cotton diseases, insect management, soil fertility, and much more.

Mountain Research stations 2019 field day consisted of educational sessions on forage fertility and alternative lime sources. Two field tours: Beef & Forage including winter feeding areas, crabgrass variety trial, hemp grain variety trial, and bull test and scoring. Crop Production including tomato disease management, tomato breeding, and cucurbit downy mildew.

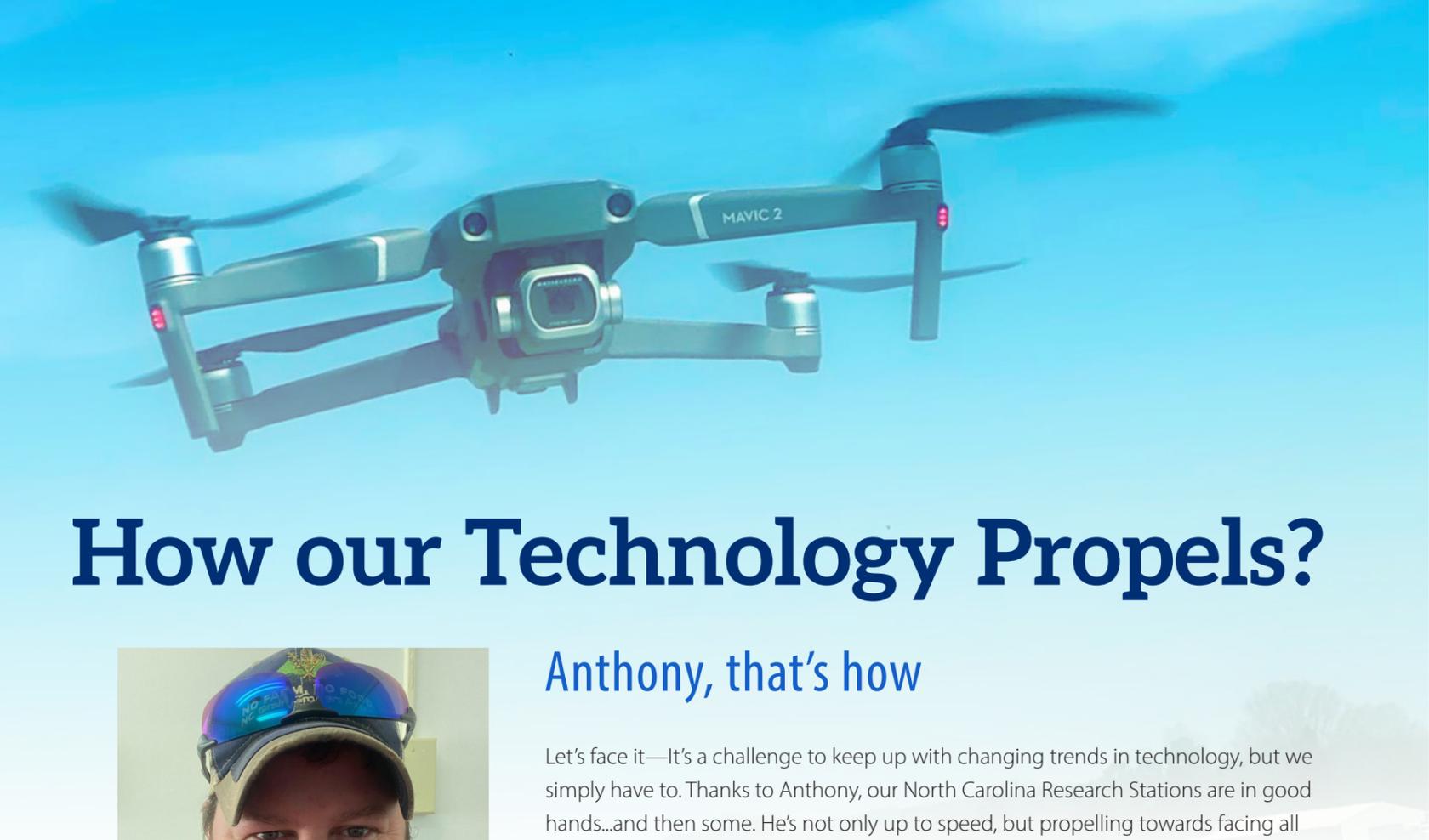
Peanut Belt held it's 61st North Carolina Annual Peanut Day where Peanut Growers had an opportunity to check out the latest research and Extension information along with Breeding and Variety Development with Tom Isleib, a peanut breeder in the Crop Science Department at North Carolina State University. Disease Management with Barbara Shew, a plant pathologist at North Carolina State. Insect Management with Rick Brandenburg, an entomologist at North Carolina State. Agronomy and Weed Management, with David Jordan.

Border Belt Research Station held its 2nd annual Peanut Field Day. Peanut Variety Development, Insecticide Programs to Manage Thrips, Comparison of Virginia and Runner Market Types, Peanut Response to Prohexadione Calcium, In-Season Fungicide Programs and Vydate Performance was all the wonderful information presented.

Peanut Belt Research Station had 2019 “CHROME” Regional Agriculture Expo with samples of corn fertility, Thrip controls of Cotton and Peanuts, Weed control for Cotton post- emergence and Peanuts at cracking.



Kilgore the Director in 1924 wrote in the station annual report, stated “that one of the interesting developments relating to the research program that year had been the increased popularity of the branch stations among the people of the section adjoining the farms.” These farms are rapidly becoming community centers which people may visit to study the investigations being made and at which they may gather for picnics and field days.



How our Technology Propels?



Anthony
Research Specialist at North Carolina Department
of Agriculture and Consumer Services

Anthony, that's how

Let's face it—It's a challenge to keep up with changing trends in technology, but we simply have to. Thanks to Anthony, our North Carolina Research Stations are in good hands...and then some. He's not only up to speed, but propelling towards facing all new trends and challenges that come our way.

Anthony handles all of the NCDA stations with installation, maintenance, troubleshooting. Upgrading new technology will improve production, productivity and communication. His implementation of Ubiquiti devices (<https://www.ui.com/>) for total farm coverage is more than notable...it's remarkable. This technology will help reach the goal of making certain that all NCDA stations are properly equipped.

In addition, Anthony is in the process of installing Meraki security devices on all NCDA stations which raises the bar in terms of protection and defense (<https://meraki.cisco.com/>). He's also working on training licensed remote pilots to have drones at 4 stations that can be used for different projects.

But there's more... QR codes. Anthony is implementing the use of QR codes to access all inventory of pesticides, greenhouse plants, any and all products. QR codes will also be used to sign in so that information can be accessed from anywhere and in real time. The Station portals are underway to get up and running for each location, along with Wi-Fi access and Internet.

it's about shaping the future

Forestry Management Units



David Schnake
Forest Research Operations Manager,
NCDA&CS Research Stations Division

Forest Fires Can be good

Field operations associated with the Forest Management Program proceeded more or less as usual in spite of COVID-19. Wet weather presented more of an obstacle as it slowed timber harvest operations. However, the program nonetheless achieved its annual revenue goals and successfully completed all planned reforestation, prescribed burning, and invasive species control projects.

The Forest Management Program was also able to maintain existing forest research projects on Division lands, and is hosting an exciting new project on the Picture Creek Unit of the Umstead Research Station exploring methods of augmenting the populations of federally-endangered plants through outplanting.

Our most noticeable challenge from COVID-19 was limited in-person student and conservation group visits to forestlands. These are typically the program's main form of public outreach and technology transfer. To overcome this obstacle, the Forest Management Program created videos of our annual forest management tours using a high-definition 360-degree video camera. This technology allowed the public to view our forest management work virtually. The videos have also been used by North Carolina State University, Duke University, and Stephen F. Austin University, and several other institutions for online instruction. "To date, the Forest Management Program has posted over 80 videos and has received nearly 6,500 views on YouTube."



"Drone imagery of a prescribed burn being conducted at the Picture Creek Unit of the Umstead Research Station in Butner, NC. Regular use of prescribed fire is a key component of the ongoing restoration efforts at Picture Creek aimed at maintaining and expanding populations of several rare, threatened and endangered understory plant species."



Dr. Justin Whitehill
Assistant Professor, Christmas Tree Genetics Program
College of Natural Resources
Department of Forestry and Environmental Resources

#1 CHRISTMAS TREE SALES IN THE NATION

Dr. Whitehill notes that climate change will be a significant challenge for trees of all species due to increasing temperatures. Dr. Whitehill plans to apply modern methodologies to generate pest and pathogen resilient Christmas trees that are better prepared for a changing climate, which will be critical for the continued success of North Carolina's Christmas Tree industry.

#1 INDUSTRY IN NORTH CAROLINA

Agriculture and agribusiness, including food, forestry and fiber, contributes \$91.8 billion to the state's economy.

#1 PRODUCER OF SWEET POTATOES IN THE U.S.

North Carolina farmers produced about 54% of all sweet potatoes grown in the country.

#1 PRODUCER OF TOBACCO IN THE U.S.

North Carolina remains the top producer of tobacco in the U.S.

Agriculture and agribusiness, including food, forestry and fiber, contributed \$91.8 billion to the state's economy and accounted for 17% of North Carolina jobs.

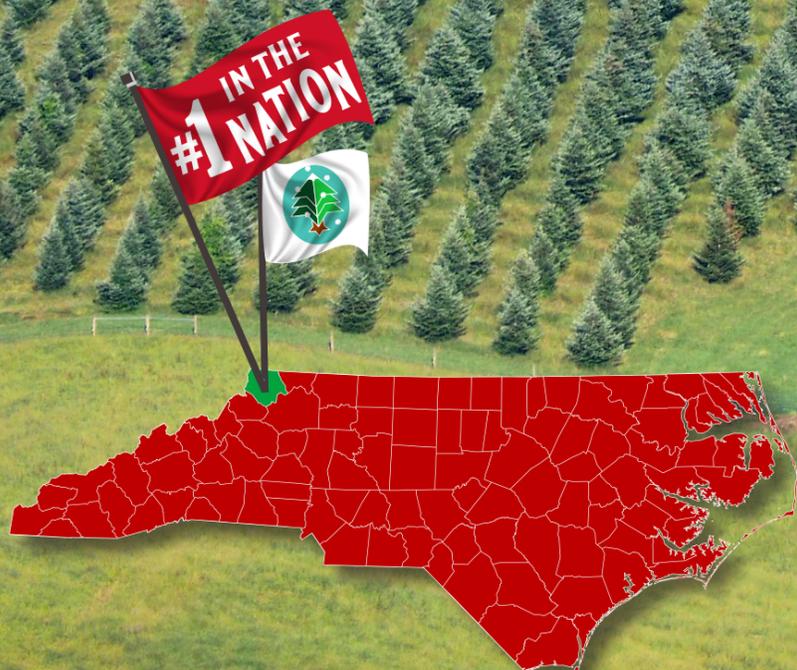
With more than 80 different crops and commodities and over 8 million acres of land used for farming, North Carolina also lead the nation in egg, pork, trout, and turkeys farmers harvested 102,000 acres of peanuts in 2019, 4,000 acres more than the year before.

NC State generated a \$1.6 billion annual impact from research and extension work with just four key crops: blueberry, peanut, sweet potato, and tobacco, while supporting over 13,000 related jobs in 97 of the state's 100 counties



Global Food Demand

- * Increase yields so that global food demand can be met by 2050, recognizing that world farmers will need to produce 50 - 70%
- * Food and fibre production also uses more than half of the world's ice-free land. To overcome these constraints and limit the impact of agriculture on the natural environment the world needs to use fewer resources to produce more food (sustainably intensify production) and better utilise the food that it already produces (reduce waste).(wri.org)
- * The two big drivers of food demand—population and income—are on the rise. The world's population is expected to reach 9.1 billion people in 2050, up from 7.4 billion in 2016. Globally, farmers must increase food production 70 percent compared to 2007 levels to meet the needs of the larger population, according to a report from the Food and Agriculture Organization of the United Nations. (Syngenta-us.com)
- * The sustainable intensification of agricultural production, lifting food production in under-utilised regions, reducing food waste and adopting new technologies, such as precision agriculture, are likely to play a larger role in increasing the global food supply. (futuresdirections.org)
- * Growth in the agriculture sector -- from farm to fork -- has been shown to be at least twice as effective in reducing poverty as growth in other sectors. (usaid.gov)



2019



In Closing...

this is not folklore, folks

Though the pandemic hit very unexpectedly and has led us in a new direction we have worked endlessly to continue to succeed. A lot of people this past year has worded 2020 as a "dumpster fire", "nightmare", "surreal" however the research stations has looked at 2020 as "reflection" an opportunity to reach new goals and learn new methods of handling a situation and making that seed turn into a beautiful flower. As you can see in this 2019 and 2020 annual report we sprout if the soil is good. We will continue to strive for the future so that NC Farmers are able to prosper. There are so many new and exciting things that we look forward to manipulating and making it better than ever. Get ready for this ride with us to watch us continue to grow. We will not stop now.

Remember those shoes
Remember that bar

The show must go on
because our work
will not stop.





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