

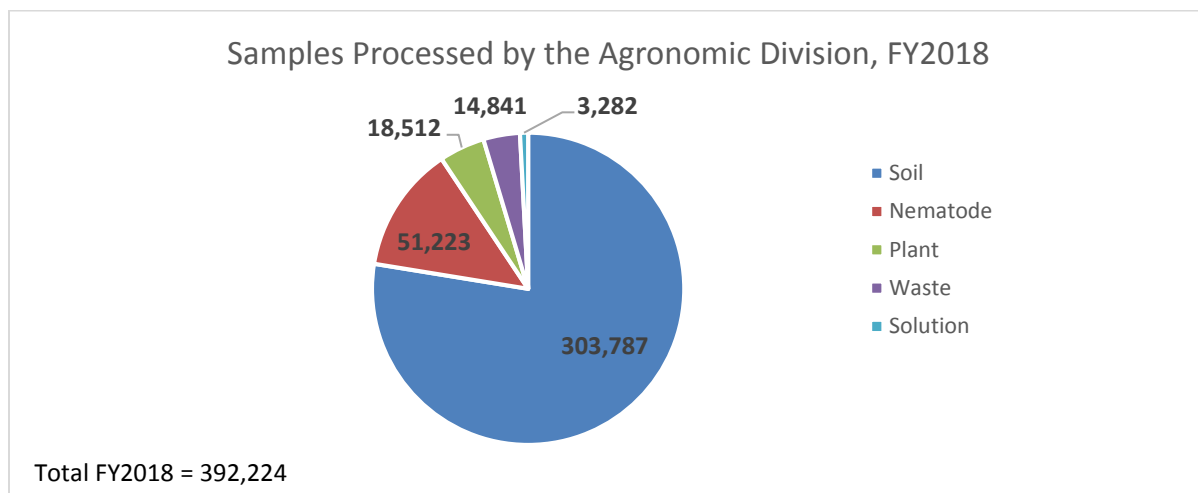
Agronomic Division — 2018 Annual Report

Colleen Hudak-Wise, Ph.D., director, (919) 733-2655

Introduction

The Agronomic Services Division's mandate is to provide all North Carolina residents with diagnostic and advisory services that increase agricultural productivity, promote responsible land management and safeguard environmental quality. The Agronomic Services Division is the largest publicly operated agronomic laboratory in the country, offering the following laboratory services: soil testing, plant tissue analysis, waste analysis, solution analysis, soilless media analysis and nematode assay. The Division has 57 full-time permanent positions: 16 office positions, including administrative support, information technology, maintenance and leadership positions; 28 laboratory staff distributed among three laboratories (Soil Testing, Nematode Assay and Plant/Waste/Solution/Media) and 13 regional agronomists who make up the Field Services Section. Regional agronomists are assigned to territories consisting of 5 to 11 counties; they conduct grower consultations to help diagnose nutrient and/or nematode problems and to offer expert advice regarding plant nutrient management for waste management plans.

The Agronomic Division's laboratories processed 392,214 total samples during FY2018, which is approximately a 2% increase over the previous year. Other accomplishments include performing at least 10,800 consultations with producers, including approximately 504 environmental consultations. Four major field research projects to validate the Division's recommendations were conducted by staff. In addition, the Agronomic Division educated N.C. citizens regarding its mission by hosting 25 laboratory tours and preparing 5 news releases.



Other notable events for 2018 include

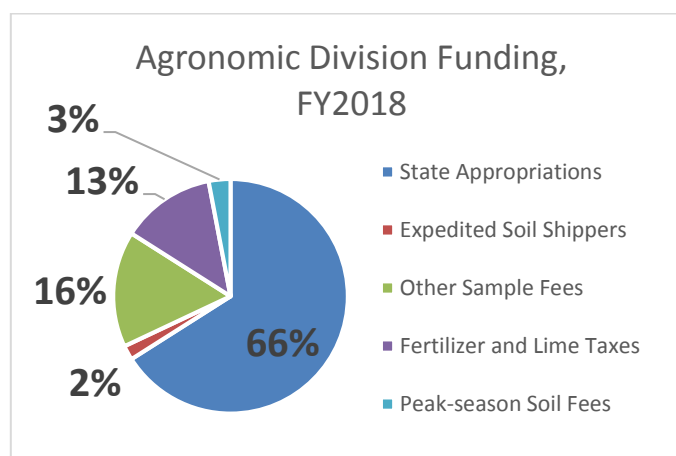
- 1) Completion of a repair and renovation project for the Eaddy Building, including replacement of the fire alarm system and the addition of electronic controls for the HVAC system. New lights were also installed in offices and the conference room and occupancy sensors were added.
- 2) Participation in the NC Star Public Sector Safety Program for the ninth year, including passing an onsite program audit in July 2018 to achieve recertification for an additional five years.
- 3) Purchase of a third pH robot and a large screen monitor for viewing control charts in the Soil Testing Laboratory
- 4) Purchase of a Fritsch grinder with vacuum for large, fibrous plant samples
- 5) Continued ergonomic improvements with the purchase of ergonomic laboratory tables (three) for the Nematode Assay Lab and three new Ergotron work stations for the Soil Testing Lab and receptionist

Funding

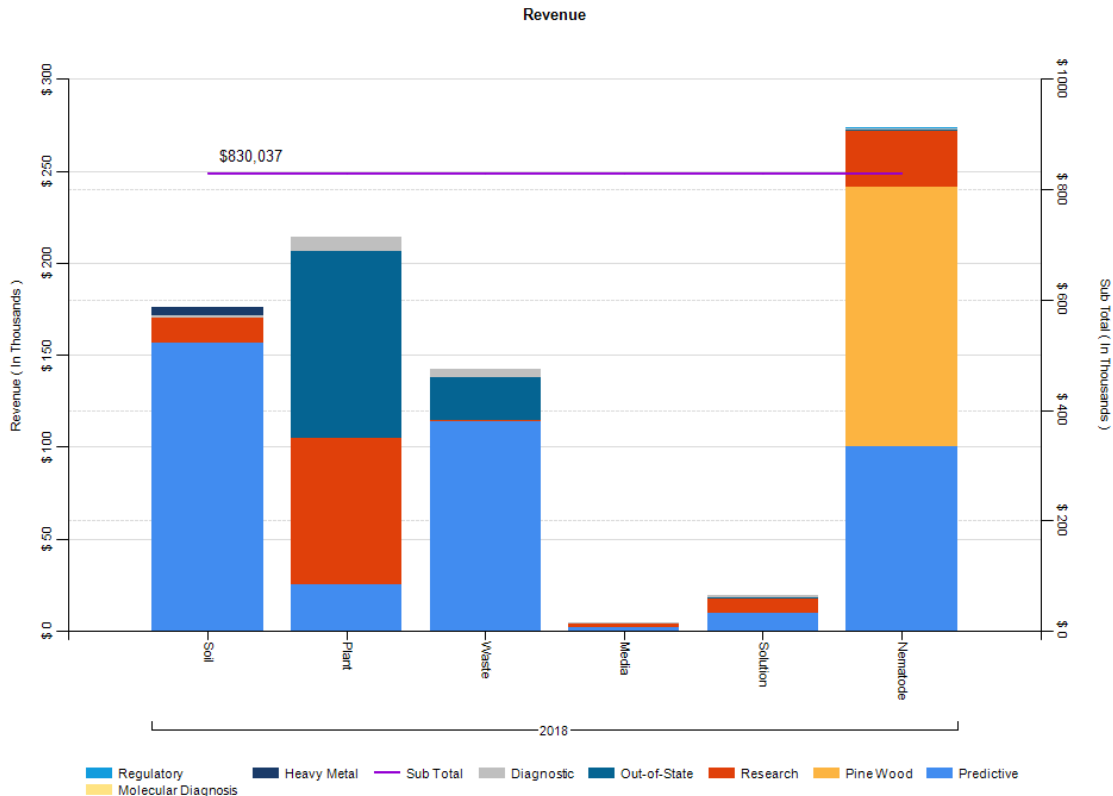
The Agronomic Services Division's expenditures for FY2018 were more than \$5.1 million. Sources of funding included State Appropriations, expedited soil shippers, peak-season soil fees, fertilizer and lime taxes and "other" sample fees (nematode, plant, waste, solution and media samples).

FY2018 Sources of Funding

State Appropriations, \$3,405,272 (66%)
 Peak-season Soil Fees, \$158,172 (3%)
 Expedited Soil Fees, 100,000 (2%)
 Other Sample Fees, \$816,845 (16%)
 Fertilizer & Lime Taxes, \$679,207 (13%)
 Total Budget: \$5,123,636



The tonnage assessment for fertilizers and lime sold in North Carolina is set at \$.50/ton; the Agronomic Services Division gets a percentage of these receipts. The chart below shows the FY2018 revenue generated by routine samples.



Laboratory Services

Quality Analysis/Quality Control

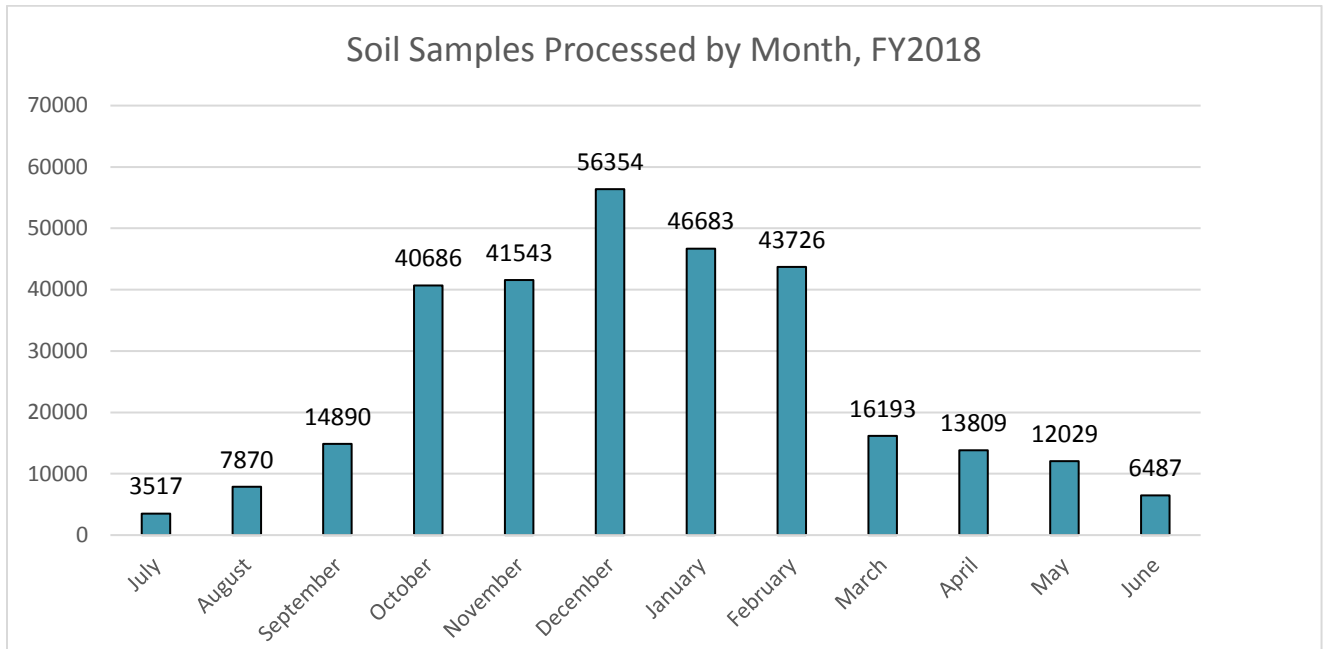
The Soil Testing and Plant/Waste/Solution/Media Advisory Laboratories participate in several external quality control programs. Annual analysis of unknown samples provided by an accredited proficiency testing provider is part of the laboratory recertification process by the DEQ Division of Water Resources' Laboratory Certification Branch. The Agronomic Division passed its proficiency testing in 2018 and is certified through 2019.

The Agronomic Division also voluntarily participated in the following inter-laboratory, proficiency testing and certification programs during 2018:

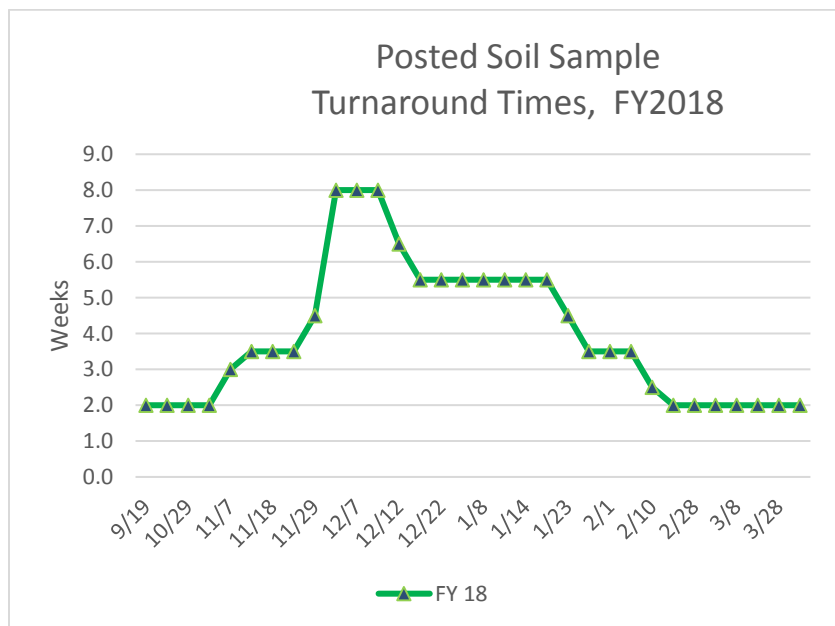
1. North American Proficiency Testing Program (NAPT) – soil analyses
2. North American Proficiency Testing Program (NAPT) – plant tissue analyses
3. Manure Analysis Program (MAP) – manure analyses
4. Agricultural Laboratory Proficiency program (ALP) – soil analyses

The **Soil Testing Section**, under the direction of David H. Hardy, Ph.D., analyzed 303,787 soil samples in FY2018: 296,259 predictive; 2,084 diagnostic; 2,673 research; 2,599 internal and 172 heavy metals. The Soil Testing Lab issued 38,001 reports for fertilizer/lime recommendations.

A total of \$158,172 was collected in peak-season soil testing fees (\$4.00/sample) for samples submitted December 1, 2017 through March 31, 2018. As seen below, the peak-season fee achieved its intended purpose, to distribute the workload for the Soil Testing Lab more evenly across the year. December 2017 was the busiest month of FY2018, with 56,354 soil samples being analyzed.



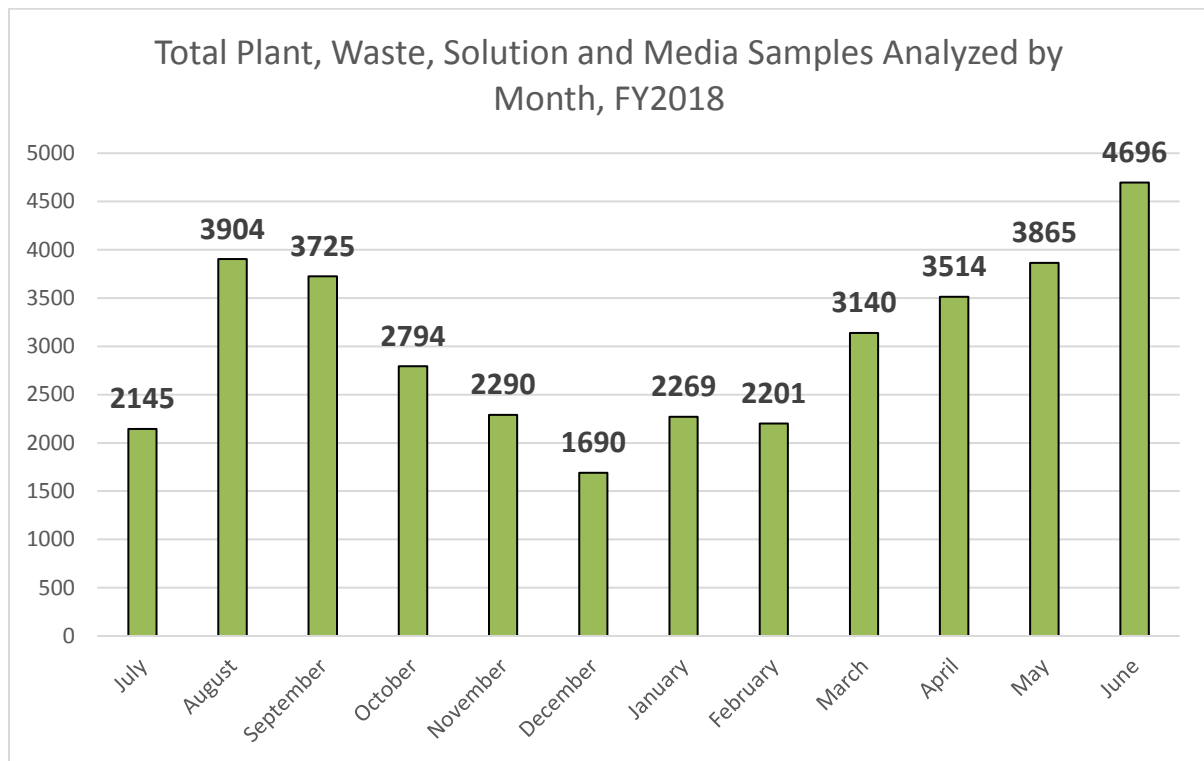
In general, the sample turnaround times were very acceptable for growers during FY2018. Soil sample turnaround for predictive samples plateaued at eight weeks on December 2, 2017 but then dropped back down to two weeks by February 19, 2018.

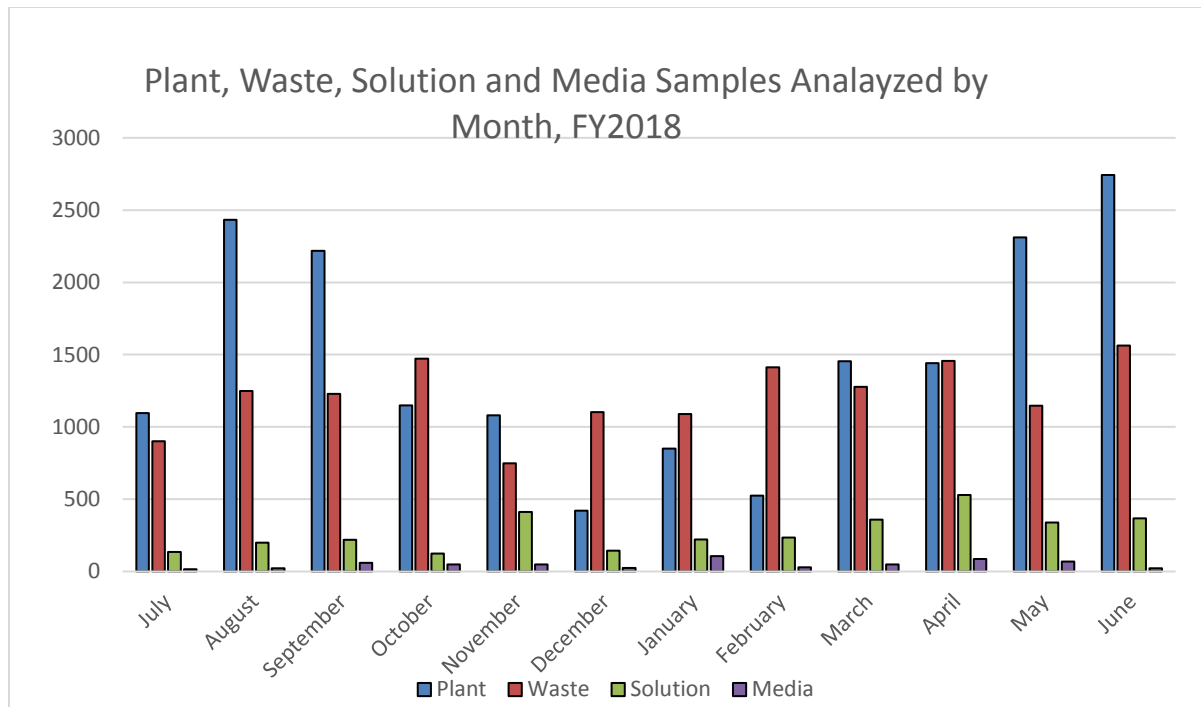


For high-volume customers wanting a guaranteed turnaround time of 7 to 10 business days, a limited number (500) of “expedited shippers” were sold at \$200 each. Each expedited shipper holds 36 soil samples.

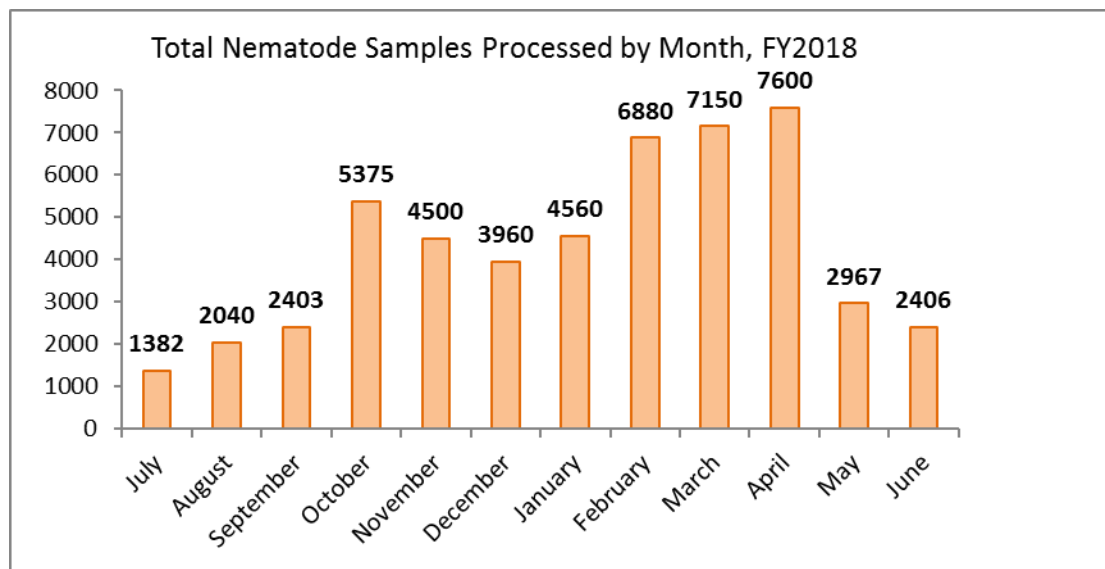
The **Plant/Waste/Solution/Media (PWSM) Section**, under the direction of Kristin Hicks, Ph.D., issued a total of 11,312 reports during FY2018. These reports gave recommendations for 18,512 plant tissue samples; 14,841 waste samples; 3,282 solution samples; and 579 soilless media samples in FY2018. Due to the time-sensitive nature of PWSM samples, the following turnaround times were adhered to: plant, 2 days; media and solution, 3 to 4 days; and waste, 7 to 10 days.

Although the PWSM Laboratory had a large number of samples submitted year-round, the busiest month for the PWSM Section was June, with 4,696 samples analyzed. In total, 36,233 samples were processed during FY2018, making this the largest sample volume handled by the PWSM Lab since FY2002.





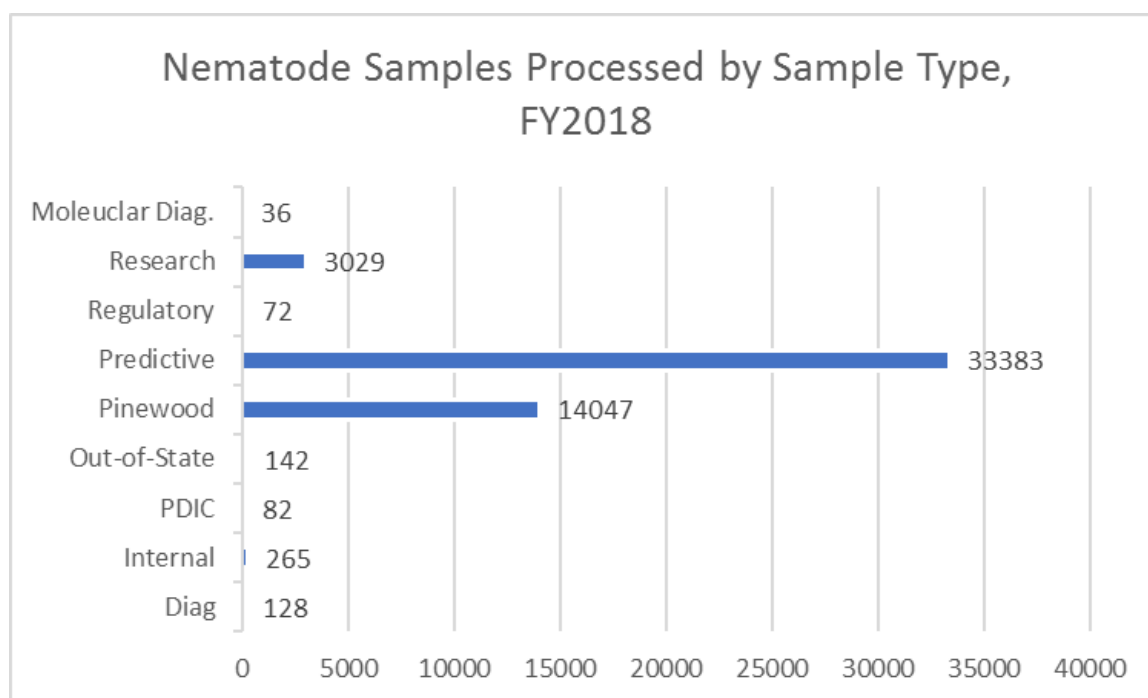
The **Nematode Assay Section**, under the direction of Weimin Ye, Ph.D., processed 51,223 samples and issued 6,498 reports in FY2018, making this a record-breaking year with at least 7,500 more samples processed than the next highest year (FY2017). April was the busiest month for the lab, with 7,600 samples processed.



Most samples (33,383) were predictive in nature; other types included 3,029 research samples, 128 diagnostic samples, 142 out-of-state samples (excluding pinewood), 265

internal samples, 82 samples for the NCSU Plant, Disease and Insect Clinic, 36 molecular diagnostic samples and 72 regulatory samples from the NCDA&CS Plant Industry Division.

In addition, 14,050 pine wood samples, (1,378 reports) were specifically tested for the presence of pinewood nematode so shipments of lumber and wood products could be cleared for export from the United States. Pine wood nematode was detected in 359 samples, but this was only 2.56% of the total pine wood samples assayed. Pinewood samples made up 27.43% of all nematode samples processed in FY2018.



Excluding pine, the crop with the largest number of submitted samples was sweet potato, with 12,231 samples (24% of total sample volume), followed by soybean (10,677 samples and 21% of total). Crop consultants submitted at least 67% of the total sample volume in FY2018.

Field Services Section personnel, under the direction of Michelle McGinnis, Ph.D., made about 10,800 grower consults in FY2018, primarily to help diagnose nutrient and/or nematode problems. Regional agronomists handled more than 500 inquiries regarding environmental issues in FY2018— primarily waste management plan clarifications, regulatory updates and river basin oversight reviews — participated in at least 15 county Soil & Water local advisory committees and served on 19 boards, committees, or advisory groups.

- 1217 Interagency Guidance Committee – Chris Jernigan
- Buncombe County FARMS Board – Chris Leek
- Chatham Community Food Council – Josh Mays

- Greene County Farm Bureau Board – Chris Jernigan
- Green Fields Sandhills Board – Josh Mays
- Corn Growers Association of North Carolina Board – Don Nicholson
- Lee County Extension Field Crops Advisory Committee – Josh Mays
- Lee County Farm Bureau Board – Don Nicholson
- Madison County Ag Agencies Board – Chris Leek
- Mountain Research Station Field Day Planning Committee – Chris Leek
- NC Ag Foundation Board – Georgia Love
- NC Certified Crop Advisors Board – Michelle McGinnis
- NC Certified Crop Advisors Exam Committee – Michelle McGinnis
- NC Raspberry and Blackberry Growers Association Board – Steve Dillon
- NC Strawberry Growers Association Board – Josh Mays
- NC Tomato Growers Association Board – Chris Leek
- Robeson County Crop Promotion Association Board – Georgia Love
- Robeson County Extension Field Crops Advisory Committee – Georgia Love (Chair)
- Rowan County Extension Advisory Council – Daniel Overcash
- Upper Mountain Research Station Research Greenhouse Facility Advisory Group – Dwayne Tate
- Wilkes County/Roaring River Water Quality Initiative Advisory Committee

Safety Program

The Agronomic Services Division maintains a very active, employee-led safety program and is recognized as a Public-Sector Star site by the North Carolina Department of Labor (NCDOL). All employees serve on one of eight safety teams: Safety Inspection & Compliance; Safety Program & Policy; Safety Information & Communication; Job Safety Analysis; Housekeeping and Wellness; Ergonomics; Environmental Management and Field Services.

A safety program assessment was conducted by Mike Bink, NCDA&CS Safety Consultant, at the Eaddy Building on January 16-22, 2018. A written response to the findings, recommendations and general comments was submitted to Kathy Buckley, NCDA&CS Occupational Safety and Environmental Manager on March 12, 2018.

The Agronomic Division had its second Star recertification program audit on July 11-12, 2018. Morgan Brown, Carolina Star IH Consultant, and LaMont Smith, Recognition Program Manager, conducted the onsite inspection. Star Team Chairs gave an opening PowerPoint presentation to the auditors, highlighting their teams' accomplishments. On August 16, 2018, an Action Plan was submitted to DOL to address hazard findings and recommended areas of improvement noted in the inspection report. All abatement items on the Action Plan were completed by October 16, 2018.

The Agronomic Services Division prepared a detailed annual report on its 2018 safety program and submitted it to NCDOL on February 15, 2019.

*Agronomic Division
2018 Annual Report*

Education & Outreach (calendar year summary)

Agronomic Division staff, especially the **Field Services Section**, reach thousands of growers, homeowners and agricultural professionals through a wide range of educational activities. Honeywell provides funding for the distribution of a limited number of vouchers to cover the cost of plant tissue analysis as a means to introduce growers to this service. Regional agronomists play a key role in spreading the word about tissue testing and offering the free vouchers to interested growers.

In-house staff conducted at least 25 laboratory tours for farmers, master gardeners, agribusiness groups, scientists and students, with at least 503 participants (Appendix A.). Information on agronomic services was disseminated through more than 23 educational exhibits displayed at farm shows, field days, training events and professional meetings (Appendix B).

Outreach also included five news releases and 10 interviews and/or tweets (Appendix C). Many presentations on agronomic services were made to master gardeners, growers, commodity associations, conservation groups, and county and state organizations as well as to regional, national and international meetings (Appendix D). At least 9 external professional publications were published by staff in 2018 (Appendix E).

Research (calendar year summary)

Division staff routinely engage in cooperative studies with university personnel, farmers and industry specialists. In FY2018, cooperative research included the processing of 2,673 soil samples; 7,483 plant/waste/solution/media samples; and 3,029 nematode samples.

The **Soil Testing Section** cooperated in the following research projects during 2018:

- 1) Validation of Soil Test Potassium Recommendations and Plant Tissue Analysis to Optimize Soybean Yield in North Carolina Cropping Systems, in cooperation with Crop and Soil Sciences at N.C. State University (NCSU), Year 3 – Dr. David Hardy (NCDA&CS) and Dr. Carl Crozier (NCSU). Project funding: N.C. Soybean Producers Association.
- 2) Validation of Soil Test Potassium Recommendations and Plant Tissue Analysis to Optimize Corn Yield in North Carolina Cropping Systems, in cooperation with Crop and Soil Sciences at N.C. State University (NCSU), Year 2 – Dr. David Hardy (NCDA&CS) and Dr. Carl Crozier (NCSU). Project funding: Corn Growers Association of NC.

The **Plant/Waste Solution/Media Section** cooperated in the following research projects during 2018:

- 1) Nitrogen Rate Management for Malting Quality Barley in North Carolina in cooperation with N.C. State Crop & Soil Sciences Department, Years 1 & 2— Dr. Kristin Hicks (NCDA&CS); Dr. Amy Johnson (NCSU); Dr. Deanna Osmond (NCSU) and Josh Whelan (NCSU). Project funding: N.C. Tobacco Trust Fund Commission
- 2) Establishing an Aluminum Tissue Sampling Criteria for Ensuring Blue Color in Hydrangeas in cooperation with N.C. State Horticulture Department – Hunter Landis (NCDA&CS); Dr. Kristin Hicks (NCDA&CS); Dr. Brian Whipker (NCSU)
- 3) Seasonal Variation in Blackberry Nutrient Concentration of Primocane and Floricane Leaves in Prime-Ark® 45 and Traveler in Double and Single Cropping Systems in cooperation with N.C. State Horticulture Department, Year 1 of 2—Dr. Kristin Hicks (NCDA&CS); Dr. Gina Fernandez (NCSU); Karen Blaedow (NCSU) and Steve Dillon (NCDA&CS)
- 5) Nutrient Disorder Diagnosis in Greenhouse Cannabidiol-Hemp in cooperation with N.C. State Horticulture Department—Dr. Kristin Hicks (NCDA&CS); Dr. Brian Whipker (NCSU) and Paul Cockson (NCSU)
- 4) Validation of Soil Test Potassium Recommendations and Plant Tissue Analysis to Optimize Soybean Yield in North Carolina Cropping Systems, Year 3 – Dr. Kristin Hicks in collaboration with Dr. David Hardy (NCDA&CS) and Dr. Carl Crozier (NCSU)
- 6) Validation of Soil Test Potassium Recommendations and Plant Tissue Analysis to Optimize Corn Yield in North Carolina Cropping Systems, Year 2 – Dr. Kristin Hicks in collaboration with Dr. David Hardy (NCDA&CS) and Dr. Carl Crozier (NCSU)
- 7) Expanding Leaf Tissue Nutrient Survey Ranges for Greenhouse Cannabidiol-Hemp in cooperation with N.C. State Horticulture Department—Dr. Kristin Hicks (NCDA&CS); Dr. Brian Whipker (NCSU) and Hunter Landis (NCDA&CS and NCSU)

Dr. Weimin Ye and the **Nematode Assay Section** participated in the following research projects (2018):

- 1) Sweet potato root knot nematode survey in North Carolina, USA. – Dr. Weimin Ye.
- 2) Characterization of the new emerging *Meloidogyne enterolobii* in North Carolina, USA. – Dr. Weimin Ye.
- 3) Molecular characterisation and diagnosis of root-knot nematodes (*Meloidogyne* spp.) from North Carolina, USA. – Dr. Weimin Ye.

The **Field Services Section** conducted or participated in at least five research and demonstration projects in 2018. These projects were designed primarily to optimize crop fertilization and nematode-management efforts.

- 1) Validation of Soil Test Potassium Recommendations and Plant Tissue Analysis to Optimize Soybean Yield in North Carolina Cropping Systems, Year 3.
- 2) Validation of Soil Test Potassium Recommendations and Plant Tissue Analysis to Optimize Corn Yield in North Carolina Cropping Systems, Year 2.
- 3) Nitrogen Rate Management for Malting Quality Barley in North Carolina in cooperation with N.C. State Small Grains Cooperative Extension, Years 1 and 2.
- 4) Seasonal Variation in Blackberry Nutrient Concentration of Primocane and Floricane Leaves in Prime-Ark® 45 and Traveler in Double and Single Cropping Systems in cooperation with N.C. State Horticulture Department, Year 1 of 2.
- 5) Race determination of soybean cyst nematodes present in North Carolina.

Personnel Changes for Calendar Year 2018 (permanent staff)

Chemistry Technician II – 60011800

December 2017 – Smita Desai retired

January 2018 -- Joshua Peavey promoted to 60011800/ resigned 60011790

Chemistry Technician I – 60011790

January 2018 - Joshua Peavey resigned 60011790/promoted to 60011800

April 2018 – Jessica Pack promoted to 60011790/ resigned 60011787

Administrative Officer I -- 60011771

February 2018 – Darlene Carpenter retired

February 2018 – Lori Pfister hired (promoted within NCDA&CS)

Ag Program Technician I (Nematology Technician) – 60011809

November 2017 – Kendal Capps resigned

March 2018 –Christopher Parker hired (Temporary hired via Temp Solutions)

Agronomist (Regional Agronomist) – 60011826

March 2018 – Jacob Searcy passed away

December 2018 - Position remains vacant

Administrative Associate II (Receptionist) – 60011772

December 2017 – Jennifer H Johnson resigned

March 2018 – Diane Fly hired

October 2018 – Diane Fly resigned (promoted with NCDA&CS)

December 2018 – position remains vacant

Agricultural Technician II (Shipping & Receiving Coordinator) – 65005715

October 2017 – Matthew Mason resigned

March 2018 - Alonzo Yancey promoted to 65005715/ resigned 60011793

Agricultural Technician I (60011793)

March 2018 - Alonzo Yancey resigned 60011793/promoted to 65005715

May 2018 – Samuel Jarman hired (Transferred Temp to Perm position)

Agricultural Technician I – (60011804)

November 2017 – Taylor H Hardy resigned 60011804/promoted to 60011785

April 2018 – Micheal Wall hired

Chemistry Tech I (60011805)

October 2017—Madelaine Roberts resigned 60011805/promoted to 60011799

April 2018 – hired Scott Brinton

Agricultural Technician I – 60011813

November 2017 – Ma Kpa passed away

April 2018 - Troy Spindler hired (Temporary hired via Temp Solutions)

December 2018 – Troy Spindler resigned, position remains vacant

Chemistry Technician I—60011787

April 2018 - Jessica Pack resigned 60011787/ promoted to 60011790

August 2018 – Aldo Castillo Hernandez hired (Temporary hired via Temp Solutions)

Applications Technician II— 60011778

July 2018 – Jeffrey Stines resigned

December 2018 – Position remains vacant

Agricultural Program Specialist III (Regional Agronomist) -- 60011825

October 2018 -- W. Tyler Whaley resigned

December 2018 -- Position remains vacant

Administrative Specialist I (Data Entry Lead) – 60011783

December 2018 – Michelle Coleman dismissed, position remains vacant

APPENDICES

Appendix A. Laboratory Tours for Calendar Year 2018

	Tour Group	Tour Date
1.	Bangladesh scientists (2)	March 19, 2018
2.	Union County Master Gardeners (22)	March 21, 2018
3.	Orange County Master Gardeners (30)	March 22, 2018
4.	Ag Services Division Directors (10)	April 2, 2018
5.	Davidson & Guilford County Master Gardeners (60)	April 4, 2018
6.	NCSU Soil Science 201 Class (20)	April 10, 2018
7.	Wayne Community College Soils Class (40)	April 11, 2018
8.	NCSU Soil Science 201 Class (20)	April 11, 2018
9.	NCSU Soil Science 201 Class, AM (20)	April 12, 2018
10.	NCSU Soil Science 201 Class, PM (20)	April 12, 2018
11.	Soil & Water Conservation Div. New Employees (10)	May 8, 2018
12.	New Hanover County Master Gardeners (28)	May 15, 2018
13.	Alamance County 4-H (4)	June 19, 2018
14.	Duplin County Agribusiness STEM Camp (20)	June 27, 2018
15.	Robeson Master Gardeners (20)	August 23, 2018
16.	Catawba Community College Horticulture Class (12)	October 18, 2018
17.	Beaufort County Master Gardeners (8)	October 24, 2018
18.	Lenoir Community College Soil Science Class (17)	October 25, 2018
19.	Brunswick County Master Gardeners (20)	October 26, 2018
20.	NCSU Plant Pathology Class (12)	November 7, 2018
21.	NCSU Soil Science 201 Class (25)	November 13, 2018
22.	NCSU Soil Science 201 Class (25)	November 14, 2018
23.	NCSU Soil Science 201 Class, AM (25)	November 15, 2018
24.	NCSU Soil Science 201 Class, PM (25)	November 15, 2018
25.	Peru and Ecuador Pasture Mgmt. Class USDA-FAS (8)	November 27, 2018

Appendix B. Educational Exhibits for Calendar Year 2018

2018 Educational Exhibits	Date
NC Apple Growers Meeting (Asheville)	Jan 9-10, 2018
SE Regional Fruit and Vegetable Conference (Savannah)	Jan 11-14, 2018
NC Commodities Conference (Durham)	Jan 10-12, 2018
Soybean Festival in Elizabeth City	Jan 16, 2018
NC Blueberry Council Open House and Trade Show (Fayetteville)	Jan 17-18, 2018
Green & Growin' Show (Greensboro)	Jan 18-19, 2018
NC Peach Society Annual Meeting (Carthage)	Jan 23, 2017, 2018
Southern Farm Show (Raleigh)	Jan 31-Feb 2, 2018

Winter Apple School (Hendersonville)	Feb 7, 2018
NC Commercial Blackberry & Raspberry Growers (Shelby)	Feb 13, 2018
Small Farms & Opportunities Conference (Louisburg)	Feb 17, 2018
Winter Vegetable/Tomato Conference (Asheville)	Feb 21-22, 2018
Orange County Ag Summit on 2/26/18	Feb 26, 2018
NC Christmas Tree Association Winter Meeting (Blowing Rock)	Mar 1-2, 2018
Organic Commodities & Livestock Conference (Mt. Olive)	Mar 6, 2018
Chatham County Spring Ag Fest	Mar 24, 2018
NE Ag Expo Field Day (Pasquotank)	July 26, 2018
Blacklands Farm Managers Tour (Pinetown)	Aug 1, 2018
Caldwell County Nurseryman's Association	Sept 8, 2018
NC Christmas Tree Association Summer Meeting (Bakersville)	Aug 17-18, 2018
NC Greenhouse Vegetable Growers Association (Raleigh)	Oct 16-17, 2018
SE Strawberry Expo (Winston-Salem)	Nov 7-9, 2018
SE Vegetable & Fruit Expo (Myrtle Beach)	Dec 13-15, 2018

Appendix C. News Releases and Interviews for Calendar Year 2018

1. Whaley named NCDA&CS regional agronomist to serve Southeastern Coastal Plain, Michelle McGinnis Feb. 5, 2018
2. New NCDA&CS regional agronomist to serve nine Piedmont counties, Michelle McGinnis Feb. 5, 2018
3. Advice on managing fertility in centipede grass, Jagathi Kamalakanthan April 27, 2018
4. NCDA&CS Agronomic Services can help ID growth concerns, David Hardy July 12, 2018
5. NCDA&CS offers soil management guidance after Hurricane Florence, David Hardy October 1, 2018
6. Optimize strawberry fertility with plant tissue testing, Kristin Hicks February 15, 2018
7. Now is the time for tobacco transplant producers to test float bed water, Kristin Hicks January 30, 2018
8. Cannabis Tips: 10 building blocks to plant nutrition, Cannabis Business Times, Hunter Landis December 17, 2018
9. Potential hurricane effects on ag, Interview with Scott Mason WRAL, Don Nicholson September 10, 2018
10. Hurricane effects on ag, Interview with Kevin Kennedy WFMY, Don Nicholson October 9, 2018

Appendix D. Presentations for Calendar Year 2018

Nematode Assay Section

- Nematology training for NCDA&CS Plant Industry Plant Pest Specialists. (Raleigh; October 16, 2018)
 - *Presentation: Meloidogyne enterolobii, an emerging root-knot nematode in North Carolina, W. Ye*
- 57th Annual Meeting of the Society of Nematologists (Albuquerque, New Mexico; July 22-25, 2018)
 - *Presentation: Molecular Characterisation of Root-Knot Nematodes (Meloidogyne spp.) from North Carolina, W. Ye*

Plant/Waste/Solution/Media Section

- Waste analysis training for NCDEQ Department of Environmental Assistance and Customer Service (DEACS). (Raleigh; February 5, 2018)
 - *Presentation: Nutrient Value of Industrial Waste in NC, K. Hicks*
- Mid-Atlantic Soil Testing and Plant Analysis Work Group (MASTPAWG). (Richmond; VA; February 7, 2018)
 - *Presentation: Industrial Hemp: Lessons from N.C., K. Hicks*
- Eastern N.C. Nursery Conference. (Wilson; February 12, 2018)
 - *Presentation: Plant, Solution & Media Testing for Nursery Production, NC, K. Hicks*
- University of Mt. Olive Agricultural Production Systems student capstone course training. (Kinston, NC; March 7, 2018)
 - *Presentation: NCDA&CS Agronomic Lab Services, K. Hicks*
- Soil Science Society of North Carolina. (Raleigh; March 12, 2018)
 - *Presentation: Industrial Hemp: Lessons from N.C., K. Hicks*
- Small Grains Field Day: Piedmont Research Stations. (Salisbury; April 17, 2018)
 - *Presentation: Nitrogen Management in Malting Barley, K. Hicks*
- Small Grains Field Day: Oxford Research Station. (Oxford; April 23, 2018)
 - *Presentation: Nitrogen Management in Malting Barley, K. Hicks*
- Hemp sample control procedures for law enforcement. (Salisbury; June 28, 2018)
 - *Presentation: Industrial Hemp: Transport and Handling Protocols for N.C., K. Hicks*
- Extension Agent Short Course. (Raleigh; July 10, 2018)
 - *Presentation: Industrial Hemp: Plant Tissue Sampling and Transport, K. Hicks*
- Hemp Field Day: Piedmont Research Station. (Salisbury; August 6, 2018)
 - *Presentation: Industrial Hemp: Plant Tissue Sampling and Transport, K. Hicks*
- Hemp sample control procedures for law enforcement. (Kinston; August 30, 2018)
 - *Presentation: Industrial Hemp: Transport and Handling Protocols for N.C., K. Hicks*
- Hemp Field Day: Piedmont Research Station. (Salisbury; August 6, 2018)
 - *Presentation: Industrial Hemp: Plant Tissue Sampling and Transport, K. Hicks*
- Hemp sample control procedures for law enforcement. (Kinston; August 30, 2018)
 - *Presentation: Industrial Hemp: Transport and Handling Protocols for N.C., K. Hicks*

- Landscape Color and Professional Field Day. (Raleigh; June 27, 2018)
 - Presentation: *NCDA&CS Services for Plant Nutrition Monitoring*, H. Landis
- American Society for Horticultural Science Annual Meeting. (Washington D.C.; August 1, 2018)
 - Presentation: *Determining Effect of Aluminum Sulfate on Red Hydrangea Sepals*, H. Landis

Soil Testing Section

- Soil Science Society of North Carolina Annual Meeting (Raleigh, NC; January 16, 2018)
 - Presentation: *Soil Testing in North Carolina: Building on a Great Heritage in Continuing Excellent Service for Agriculture's Future*, D. Hardy
- Crop Science 214 (Raleigh, NC; January 24, 2018)
 - Presentation: *NCDA&CS Agronomic Services*, D. Hardy
- MASTPAWG Annual Meeting (Richmond, VA; February 8, 2018)
 - Presentation: *NC Corn and Soybean K Soil Test Validation Studies*, D. Hardy
- SSC / CS 462 Class (Raleigh, NC; April 2, 2018)
 - Presentation: *A Step into the Working World Using Agronomic Services- NCDA&CS*, D. Hardy
- Blackland Farm Managers' Tour (3B Farms, Pinetown, NC; August 1, 2018)
 - Presentation: *Verification of NCDA&CS Fertility Recommendations for Corn and Soybean*, D. Hardy
- 2018 Mid-Atlantic Crop Management School (Ocean City, MD; November 13, 2018)
 - Presentation: *Evaluation of K Fertilizer Recommendations for Optimum Corn and Soybean Yield*, D. Hardy
- Santee CCA Workshop (Santee Cooper, SC; November 14, 2018)
 - Presentation: *Troubleshooting Agronomic Field Problems*, D. Hardy
- Santee CCA Workshop (Santee Cooper, SC; November 14, 2018)
 - Presentation: *Soil, Nutrients and Water – Principles in Crop Management*, D. Hardy
- NC Assoc. of Crop Consultants Assoc. (Raleigh, NC; December 6, 2018)
 - Presentation: *An Overview of Soil Test Philosophies*, D. Hardy
- Eastern NC CCA Training (Smithfield, NC; December 11, 2018)
 - Presentation: *Approaches to Soil Testing - Discussion of Soil Test Philosophies*, D. Hardy

Field Services Section

- 48th Tobacco Workers' Conference (Myrtle Beach; Jan 15, 2018)
 - Presentation: *Influence of Quadris Fungicide and Foliar Fertilizer Blends on the Holdability of Flue-Cured Tobacco*, C. Jernigan
- 2018 Grape School (Hendersonville; Feb 28, 2018)
 - Presentation: *Soil, tissue and nematode sampling.*, S. Dillon
- Weed Science Society Annual Meeting (Raleigh; March 5, 2018)
 - Panel Members: *C. Jernigan* and *T. Whaley*

- Weed Science Society Annual Meeting (Raleigh; March 5, 2018)
 - Panel Members: *C. Jernigan* and *T. Whaley*
- Madison County Farm Agencies Breakfast Meeting (Edwardsville; April 19, 2018)
 - Presentation: *Agronomic Field Services*, C. Leek
- Land Application Training School (Raleigh; Apr 10, 2018)
 - Presentation: *Agronomic Services for Land Application*, M. McGinnis
- Land Application Training School (Raleigh; Apr 11, 2018)
 - Field Demonstration: *Agronomic Considerations*, D. Nicholson
- Strawberry Variety Field Day at Cottle Farms (Faison; May 1, 2018)
 - Presentation: *Albion Production & Fall Harvest*, J. Mays
- Surface Irrigation System Operators Training School Field Day (Raleigh; Mar 19, 2018)
 - Field demonstration: *NCSA Agronomic Lab Services*, D. Nicholson
- Ashe County Cattleman's Association Meeting (Jefferson, June 11, 2018)
 - Presentation: *Soil Sampling & Liming*, D. Tate
- Davidson County New Farmer Workshop (Lexington; June 23, 2018)
 - Presentation: *Soil Sampling for Success*, D. Overcash
- Smithfield Grain Grower Meeting (Kinston; July 10, 2018)
 - Presentation: *SCN Race Determination*, C. Jernigan
- Smithfield Grain Grower Meeting (Kinston; July 10, 2018)
 - Presentation: *Evaluation of Soil Potassium Recommendations for Soybeans*, C. Jernigan
- Small Fruit Agent Training (Hendersonville; July 10, 2018)
 - Presentation: Overview of plant tissue study at M&M Berry and Faith Farm, S. Dillon
- Peach Field Day (Jackson Springs; July 11, 2018)
 - Presentation: *A look into peach fertility in the Sandhills*, J. Mays
- NCSU Peach Production Workshop (Jackson Springs; July 13, 2018)
 - Presentation: *A look into peach fertility in the Sandhills*, J. Mays
- Mountain Research Station Field Day (Waynesville; July 19, 2018)
 - Field Demonstration: *Calibrating a Grain Drill*, C. Leek
- SE Small Fruit Consortium Meeting (Raleigh; July 19, 2018)
 - Presentation: *Dual Season Strawberry Production & Low Tunnels*, J. Mays
- Columbus County Hay Field Day (Whiteville July 27, 2018)
 - Presentation: *Nutrient and Weed Management in Hay Fields*, G. Love
- American Society of Horticultural Science (Washington DC; Aug 1, 2018)
 - Presentation: *Dual Season Strawberry Production & Low Tunnels*, J. Mays
- Animal Extension Agent Training (Raleigh; Aug 7, 2018)
 - Presentation: *Pastureland Fertility Decisions*, B. Poole

- Scotland, Robeson, Hoke Counties Master Gardener Training (Laurinburg; Aug 16, 2018)
 - Presentation: *Soils and Soil Fertility for Homeowners*, G. Love
- Regional Strawberry Preplant Meeting (Smithfield; Aug 21, 2018)
 - Presentation: *Agronomic Considerations in Strawberry Production*, D. Nicholson
- Regional Strawberry Preplant Meeting (Smithfield; Aug 21, 2018)
 - Presentation: *Dual Season Strawberry Production & Low Tunnels*, J. Mays
- Robeson County Soybean Field Day (Rowland; Sept 6, 2018)
 - Presentation: *Corn and Soybean Potassium Study Update*, G. Love
- NC Greenhouse Vegetable Growers Annual Meeting (Raleigh; Oct 16, 2018)
 - Presentation: *Dual Season Strawberry Production & Low Tunnels*, J. Mays
- Rockingham County Cattleman's Association (Wentworth; Nov 8, 2018)
 - Presentation: *Fertility Management in Forage Crops*, B. Poole
- Harvey's Sales Training (Kinston; Dec 13, 2018)
 - Presentation: *Tobacco Fertilization*, C. Jernigan
- Harvey's Sales Training (Kinston; Dec 13, 2018)
 - Presentation: *Tobacco Sucker Control*, C. Jernigan
- Mullen View Farms Grower Meeting (Bunn; Dec 5, 2018)
 - Presentation: *Overview of Agronomic Problems with Hemp Observed in the 2018 Season*, M. McGinnis
- Dairy Producer's Meeting (Waynesville; Dec 18, 2018)
 - Presentation: *How to Interpret Soil and Waste Samples*, C. Leek

Appendix E. Professional Publications (external) for Calendar Year 2018

1. Ye, W. 2018. Chapter 10. Nematodes of agricultural importance in North and South Carolina. In *Plant Parasitic Nematodes in Sustainable Agriculture of North America. Vol. 2 – Northeastern, Midwestern and Southern USA*. (Editors: Sergei A. Subbotin and John J. Chitambar). 247-276. Springer. ISBN 978-3-319-99588-5
2. Munawar, M., Ye, W., Yu, Q. & Gu, J. 2018. Description of *Xiphinema parachambersi* n. sp. (Nematoda: Longidoridae) from imported ornamental plants in Japan with a key to *Xiphinema* species in group 1. *Journal of Nematology* 50 (2): DOI: 10.21307/jofnem-2018-027
3. Ye, W., Foye, S., MacGuidwin, A.E. & Steffan, S. 2018. Incidence of *Oscheius onirici* (Nematoda: Rhabditidae), a potentially entomopathogenic nematode from the marshlands of Wisconsin, USA. *Journal of Nematology* 50 (1): 9-26. DOI: 10.21307/jofnem-2018-004
4. Xu, Y., Leduc, D., Ye, W. & Zhao, Z. 2018. Morphological and molecular description of *Tripylella jianjuni* sp. nov. (Nematoda: Tripylidae) from New Zealand. *Nematology*. 20 (8): 795-810. DOI: 10.1163/15685411-00003176
5. Xu, Y., Ye, W., Wang, J. & Zhao, Z. 2018. Morphological and molecular characterisation of *Longidorus pinus* sp. n. (Nematoda: Longidoridae) from China and a key to known species of *Longidorus* in China. *Nematology* 20 (7): 617-639. [10.1163/15685411-00003165](https://doi.org/10.1163/15685411-00003165)
6. Huang, D., Yan, G.P., Gudmestad, N., Whitworth, J.L., Frost, K., Brown, C., Ye, W., Agudelo, P. & Crow, W.T. 2018. Molecular characterization and identification of stubby-root nematode species from multiple states in the United States. *Plant Disease* 102. <https://doi.org/10.1094/PDIS-10-17-1668-RE>.

7. Yaghoubi, A., Pourjam, E., Ye, W., Castillo, P. & Pedram, M. 2018. Description and molecular phylogeny of *Ditylenchus gilanicus* n. sp. (Nematoda: Anguinidae) from northern forests of Iran. *European Journal of Plant Pathology* 152 (3): 735-746. <https://doi.org/10.1007/s10658-018-1516-6>
8. Yu, Q., Munawar, M., Gu, G. & Ye, W. 2018. *Delatylyus andersoni* n. gen., n. sp. (Nematoda: Neotylenchidae) isolated from white pine (*Pinus monticola*) lumber from USA and intercepted in Ningbo, China. *Journal of Nematology* 50 (1): 69-76. DOI: 10.21307/jofnem-2018-013
9. Zeng, Y., Zeng, W., Zhang, Y., Ye, W., Cheng, D., Kanzaki, N. & Giblin-Davis, R.M. 2018. Morphological and molecular characteristics of *Parasitodiplogaster religiosae* n. sp. (Nematoda: Diplogastrina) associated with *Ficus religiosa* in China. *PLoS ONE* 13 (7): e0199417. <https://doi.org/10.1371/journal.pone.0199417>
10. Hardy, D.H., C.R. Crozier, and B.S. Farmaha. 2018. Yield and plant tissue response to potassium in North Carolina Cropping systems. Poster presented at 2018 ASA and CSSA Annual Meeting, Baltimore, MD. 07-09 Nov. Poster 1089.