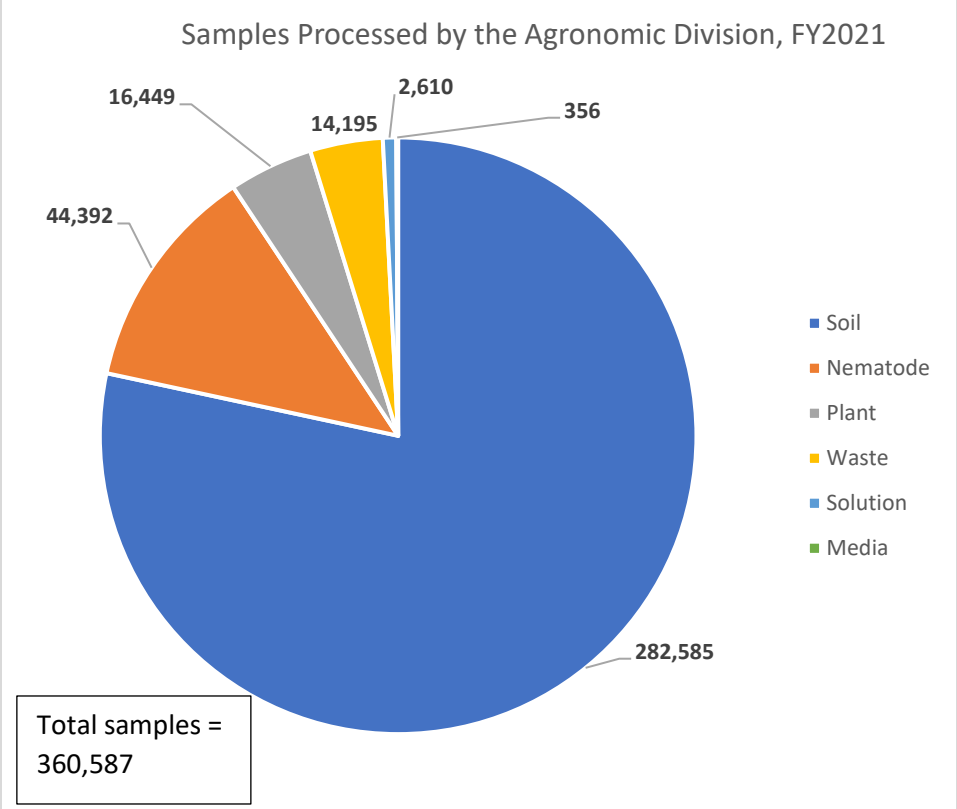
Agronomic Division —2021 Annual Report

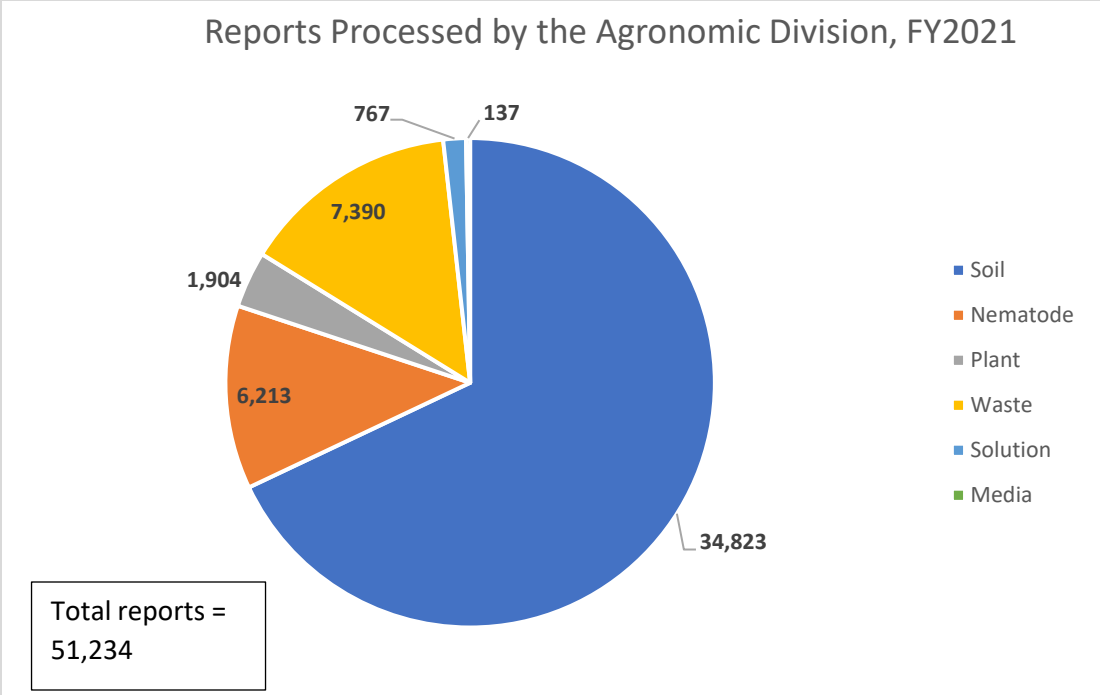
Colleen Hudak-Wise, Ph.D., director, (919) 664-1600

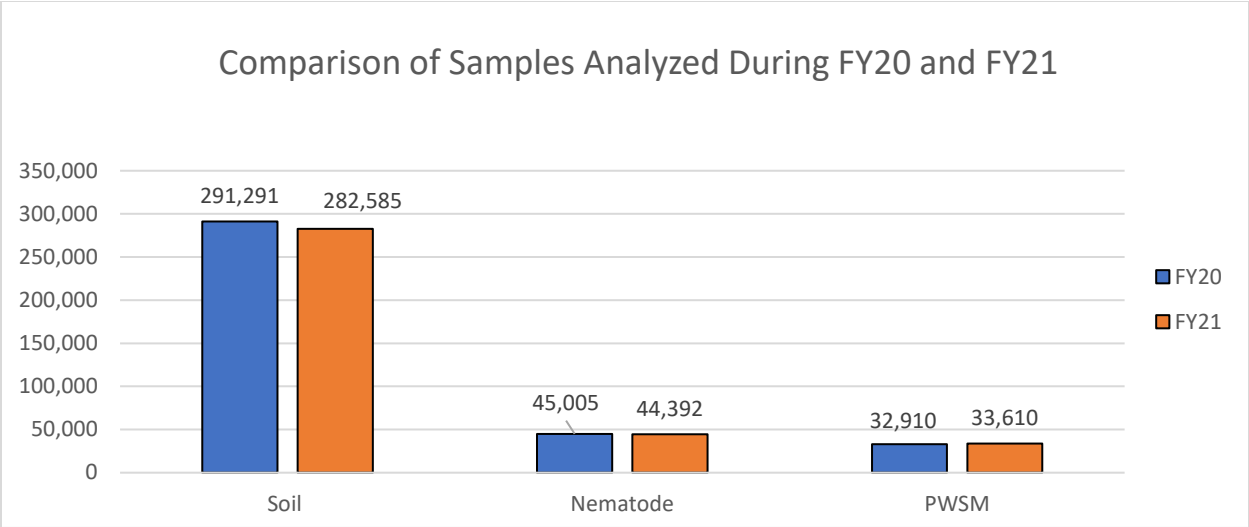
Introduction

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 Agronomic Division's laboratories processed 360,926 total samples during FY2021 (July 1, 2020 – June 30, 2021), which is approximately a 2% decrease over the previous year. Over 51,000 reports with test results and recommendations were prepared for clients during FY2021.

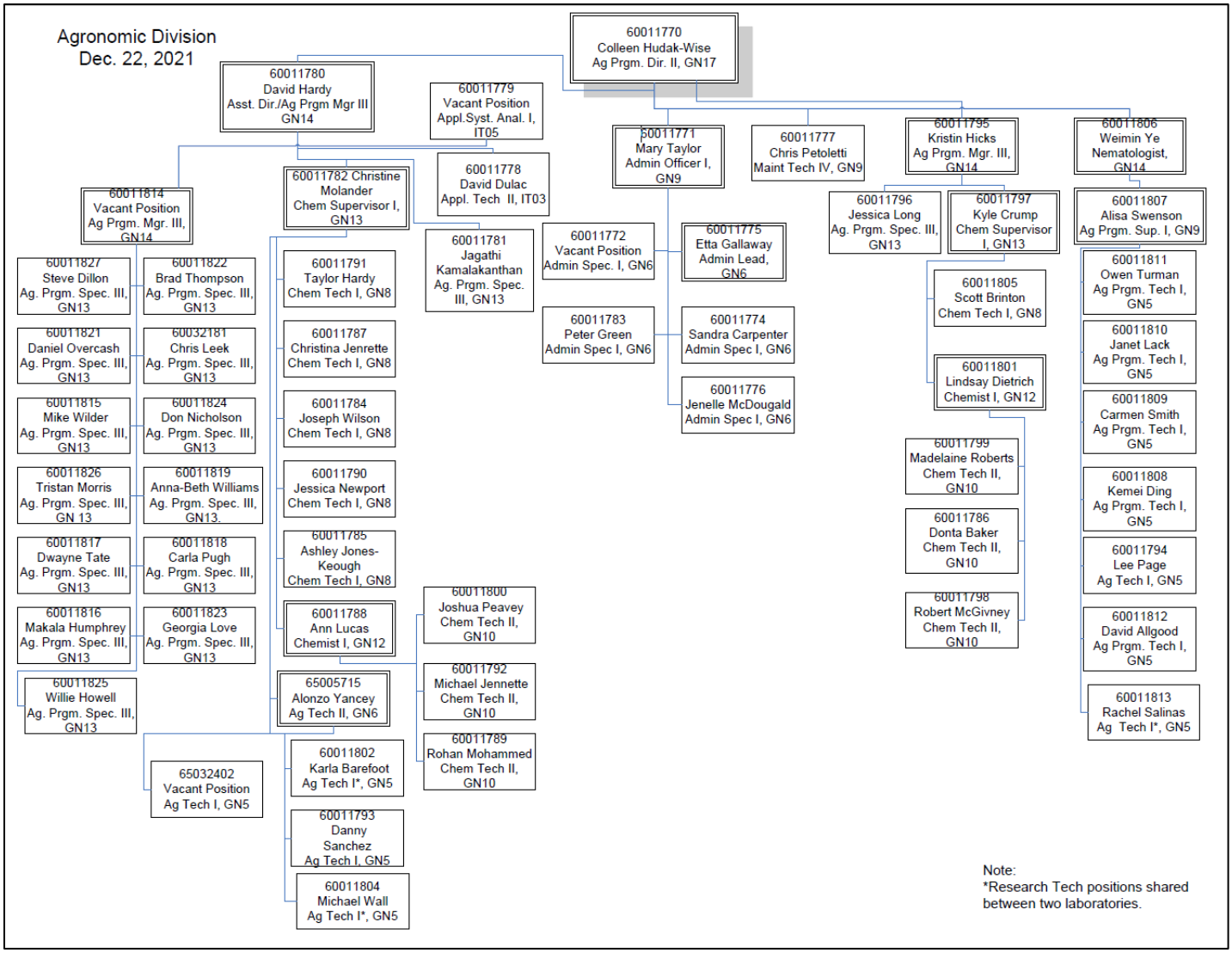


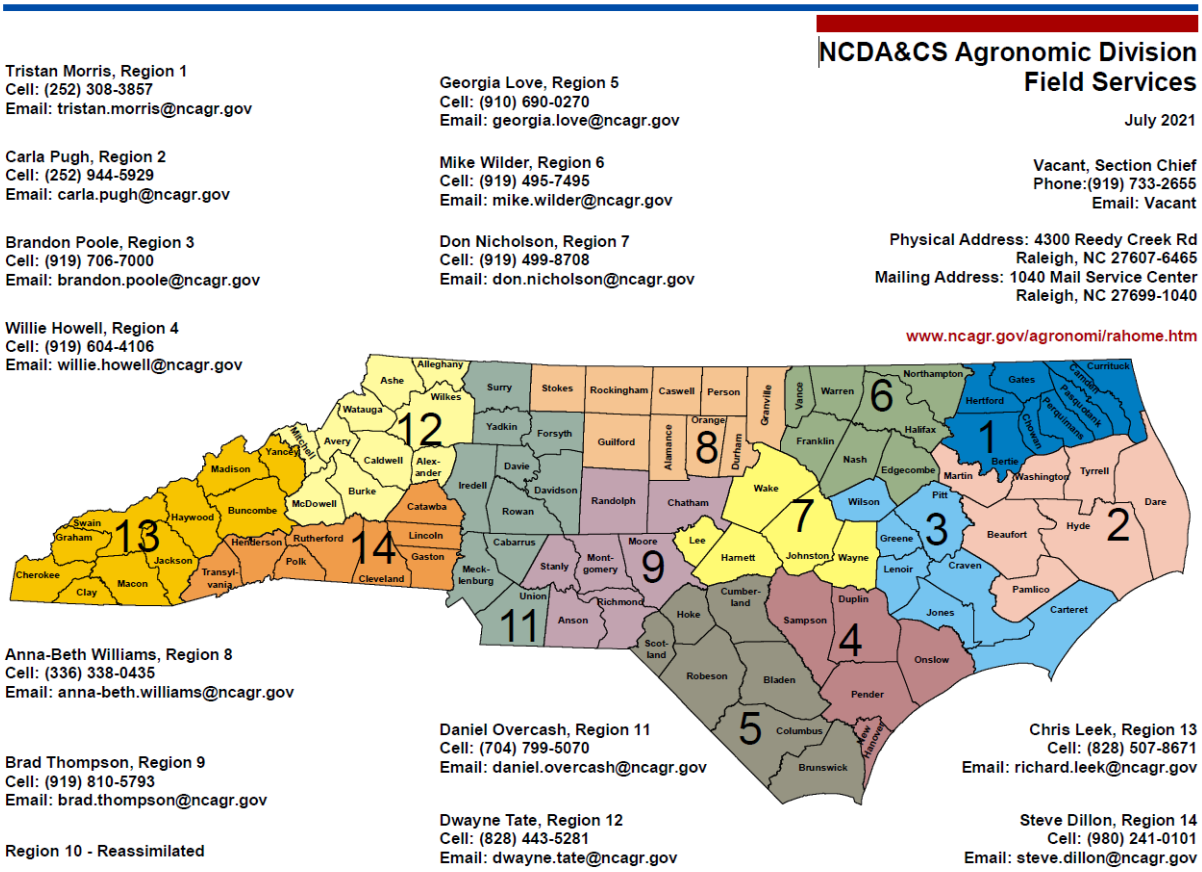




Personnel

The Division had 58 full-time permanent positions during calendar year 2021: 16 office positions, including administrative support, information technology, maintenance, and leadership positions; 29 laboratory staff distributed across 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 Services Division's organizational chart and the Field Services territorial map for 2021 follow.


Agronomic Division
Dec. 22, 2021
60011770 Colleen Hudak-Wise Ag Prgm. Dir. II, GN17
60011780 David Hardy Asst. Dir./Ag Prgm Mgr III GN14
60011779 Vacant Position Appl.Syst. Anal. I, IT05
60011771 Mary Taylor Admin Officer I, GN9
60011777 Chris Petoletti Maint Tech IV, GN9
60011795 Kristin Hicks Ag Prgm. Mgr. III, GN14
60011806 Weimin Ye Nematologist, GN14
60011814 Vacant Position Ag Prgm. Mgr. III, GN14
60011782 Christine Molander Chem Supervisor I, GN13
60011778 David Dulac Appl. Tech II, IT03
60011796 Jessica Long Ag. Prgm. Spec. III, GN13
60011797 Kyle Crump Chem Supervisor I, GN13
60011807 Alisa Swenson Ag Prgm. Sup. I, GN9
60011827 Steve Dillon Ag. Prgm. Spec. III, GN13
60011822 Brad Thompson Ag. Prgm. Spec. III, GN13
60011791 Taylor Hardy Chem Tech I, GN8
60011781 Jagathi Kamalakanthan Ag. Prgm. Spec. III, GN13
60011772 Vacant Position Admin Spec. I, GN6
60011775 Etta Gallaway Admin Lead, GN6
60011805 Scott Brinton Chem Tech I, GN8
60011811 Owen Turman Ag Prgm. Tech I, GN5
60011821 Daniel Overcash Ag. Prgm. Spec. III, GN13
60032181 Chris Leek Ag. Prgm. Spec. III, GN13
60011787 Christina Jenrette Chem Tech I, GN8
60011783 Peter Green Admin Spec I, GN6
60011774 Sandra Carpenter Admin Spec I, GN6
60011801 Lindsay Dietrich Chemist I, GN12
60011810 Janet Lack Ag Prgm. Tech I, GN5
60011815 Mike Wilder Ag. Prgm. Spec. III, GN13
60011824 Don Nicholson Ag. Prgm. Spec. III, GN13
60011784 Joseph Wilson Chem Tech I, GN8
60011776 Jenelle McDougald Admin Spec I, GN6
60011809 Carmen Smith Ag Prgm. Tech I, GN5
60011826 Tristan Morris Ag. Prgm. Spec. III, GN 13
60011819 Anna-Beth Williams Ag. Prgm. Spec. III, GN13.
60011790 Jessica Newport Chem Tech I, GN8
60011799 Madelaine Roberts Chem Tech II, GN10
60011808 Kemei Ding Ag Prgm. Tech I, GN5
60011817 Dwayne Tate Ag. Prgm. Spec. III, GN13
60011818 Carla Pugh Ag. Prgm. Spec. III, GN13
60011785 Ashley Jones-Keough Chem Tech I, GN8
60011786 Donta Baker Chem Tech II, GN10
60011794 Lee Page Ag Tech I, GN5
60011816 Makala Humphrey Ag. Prgm. Spec. III, GN13
60011823 Georgia Love Ag. Prgm. Spec. III, GN13
60011788 Ann Lucas Chemist I, GN12
60011800 Joshua Peavey Chem Tech II, GN10
60011798 Robert McGivney Chem Tech II, GN10
60011812 David Allgood Ag Prgm. Tech I, GN5
60011825 Willie Howell Ag. Prgm. Spec. III, GN13
65005715 Alonzo Yancey Ag Tech II, GN6
60011792 Michael Jennette Chem Tech II, GN10
60011813 Rachel Salinas Ag Tech I*, GN5
60011802 Karla Barefoot Ag Tech I*, GN5
60011789 Rohan Mohammed Chem Tech II, GN10
65032402 Vacant Position Ag Tech I, GN5
60011793 Danny Sanchez Ag Tech I, GN5
60011804 Michael Wall Ag Tech I*, GN5
Note:
*Research Tech positions shared between two laboratories.



Staff turnover during 2021 included several key positions. The following is a description of the personnel changes that took place during 2021.

Personnel Changes for Calendar Year 2021 (Permanent Staff)

- Ag Tech I – 65032402, new receipt supported position
  May 2021 – Candice Adams hired
  September 2021 – Candice Adams resigned
  December 2021 – position remained vacant

- Agricultural Program Specialist III (Regional Agronomist) - 60011816
  August 2021 – Brandon Poole resigned
  November 2021 – Makala Humphrey hired

- Agricultural Technician I – 60011813
  April 2021 – Nathan Tryon resigned
  September 2021 – Rachel Salinas hired

- Ag Program Manager III (Field Services Section Chief) – 60011814
  June 2021 – Michelle McGinnis resigned
  December 2021 – position remained vacant
- Application Systems Analyst I - 60011779
  March 2021 – Grant Sugaski hired
  July 2021 – Grant Sugaski resigned
  December 2021 – position remained vacant
- Administrative Associate II (Receptionist) – 60011772
  January 2021 – Sara DeFusco vacated position
  December 2021 – position remained vacant
- Chemistry Technician I – 60011790
  December 2021– Jessica Newport resigned
- Ag Program Technician I - 60011809
  March 2021 – Carmen Smith hired

Funding

The Agronomic Services Division's expenditures for FY2021 were more than $5.6 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).

FY2021 Sources of Funding

State Appropriations, $3,816,663 (67%)

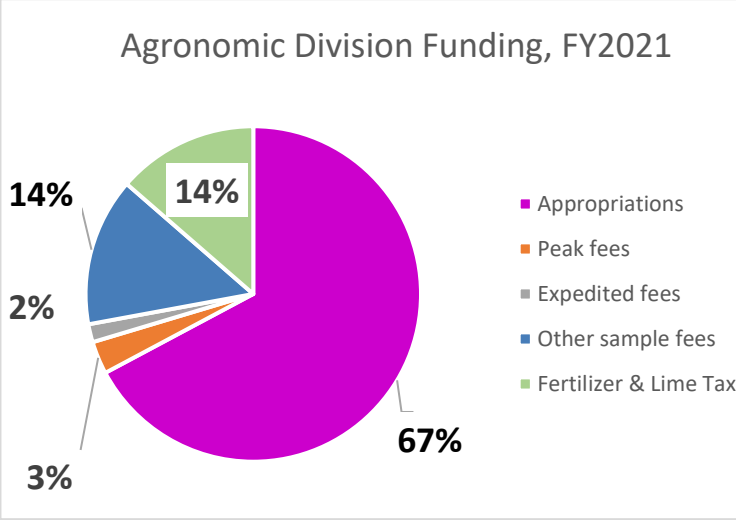
Peak-season Soil Fees, $179,320 (3%)

Expedited Soil Fees, $98,800 (2%)

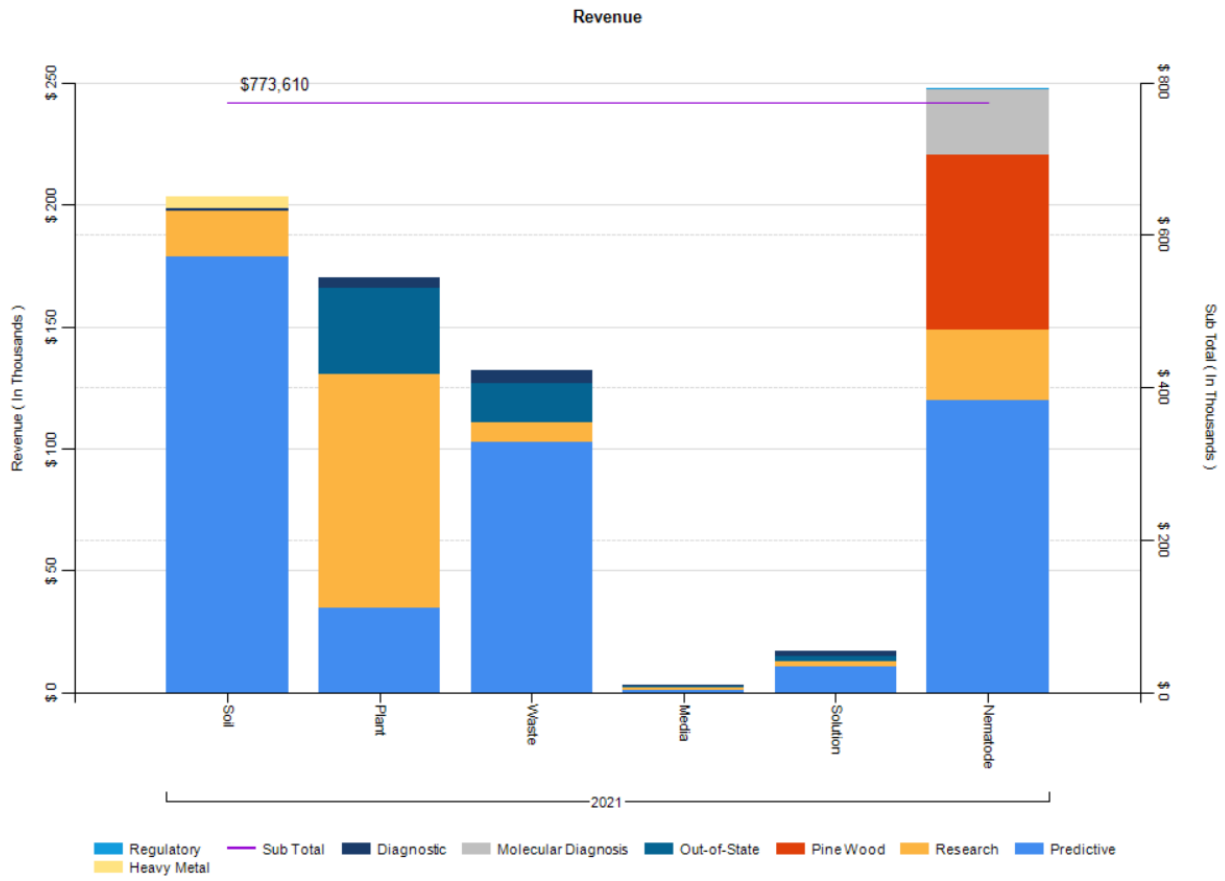
Other Sample Fees, $811,554 (14%)

Fertilizer & Lime Taxes, $772,780 (14%)

Total Budget: $5,679,117



The chart below shows the FY2021 revenue generated by routine samples.



Laboratory Services

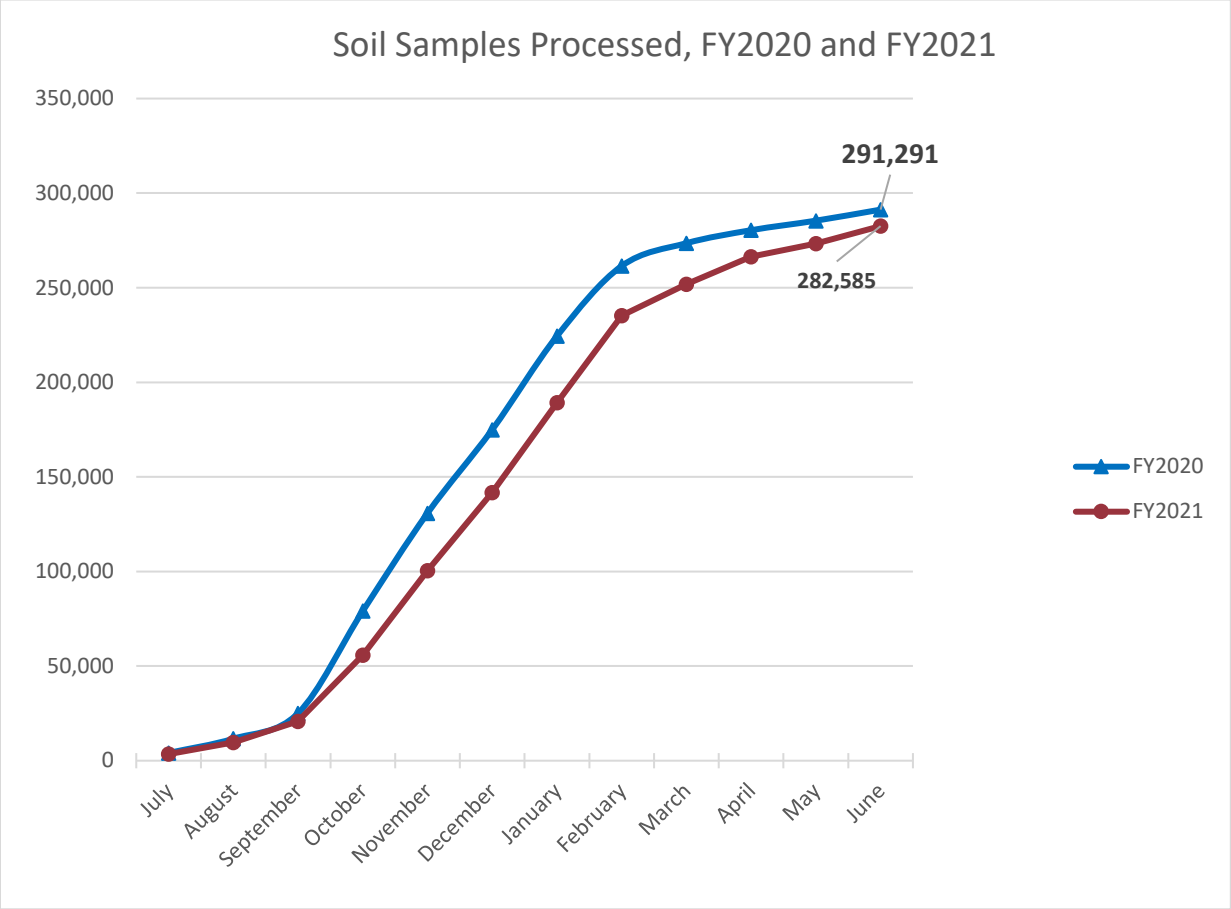
Quality Analysis/Quality Control

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 Division of Environmental Quality's Division of Water Resources' Laboratory Certification Branch. The Agronomic Division passed its proficiency testing in 2021 and remains certified by DEQ through 2022.

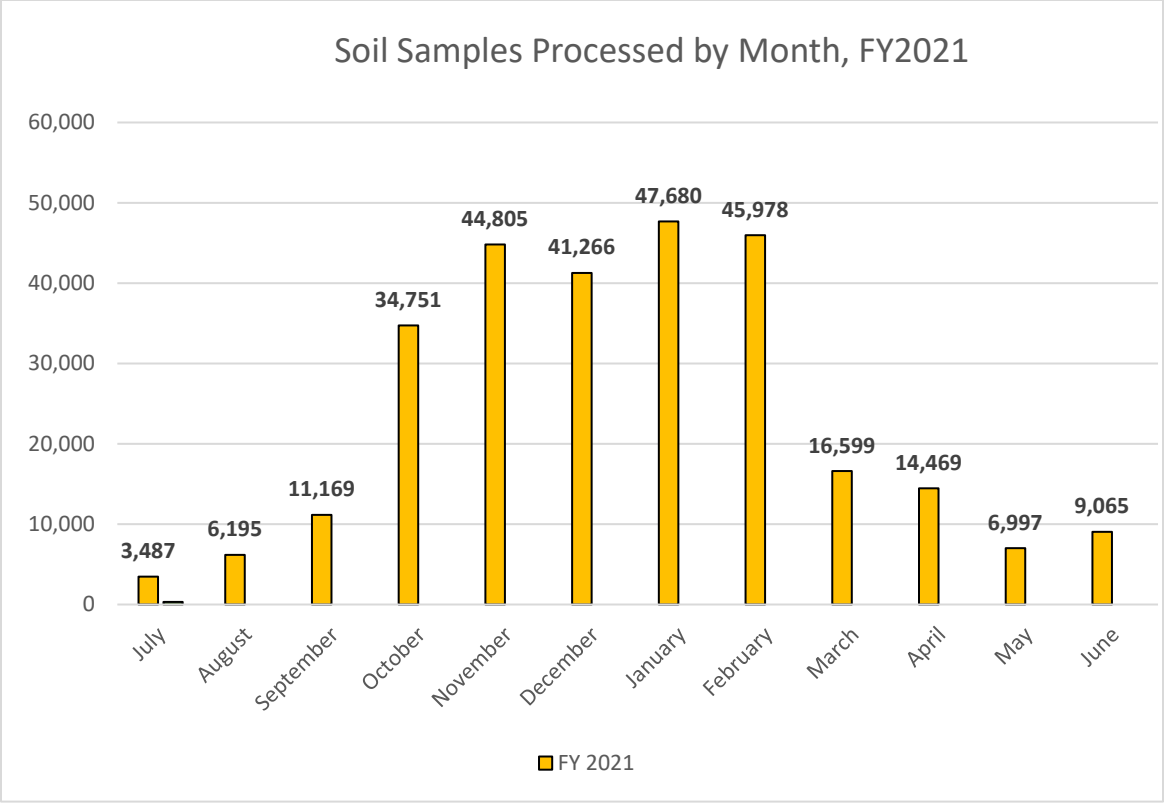
The Agronomic Division also voluntarily participated in the following inter-laboratory proficiency testing and certification programs during 2021:

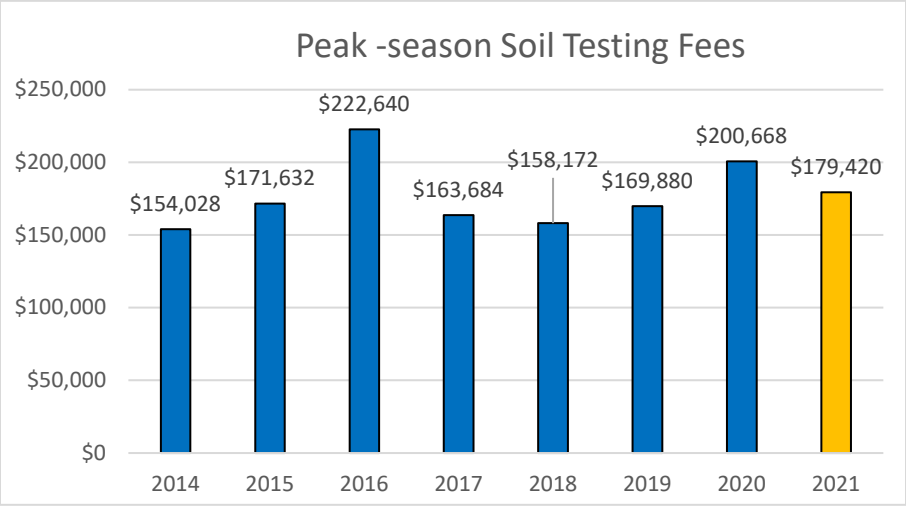
1. North American Proficiency Testing Program (NAPT) – soil analyses
2. Manure Analysis Program (MAP) – manure analyses
3. Agricultural Laboratory Proficiency program (ALP) – soil and plant tissue analyses

The **Soil Testing Section,** under the direction of David H. Hardy, Ph.D., analyzed 282,461 soil samples in FY2021: 274,384 predictive; 1,407 diagnostic; 3,796 research; 2,575 internal; 197 heavy metals; and 260 witchweed. The Soil Testing Lab issued a total of 34,823 reports for fertilizer/lime recommendations. Total sample volume for FY2021 was down about 3% compared to the previous fiscal year.



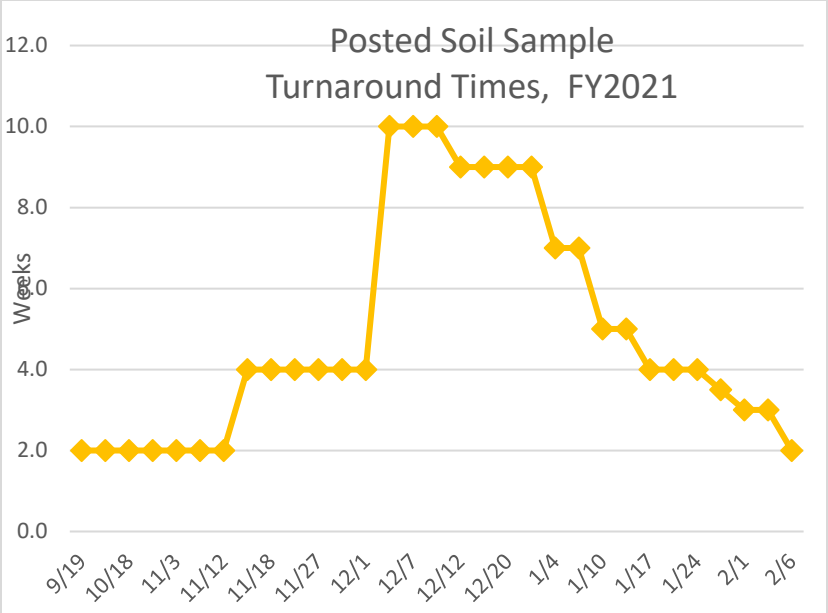
A total of $179,420 was collected in peak-season soil testing fees ($4.00/sample) for samples submitted December 1, 2020, through March 31, 2021. Peak-season samples (44,855) represented 16% of the total sample volume analyzed by the Soil Testing Lab.





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. January 2021 was the busiest month of FY2021, with 47,680 soil samples analyzed.

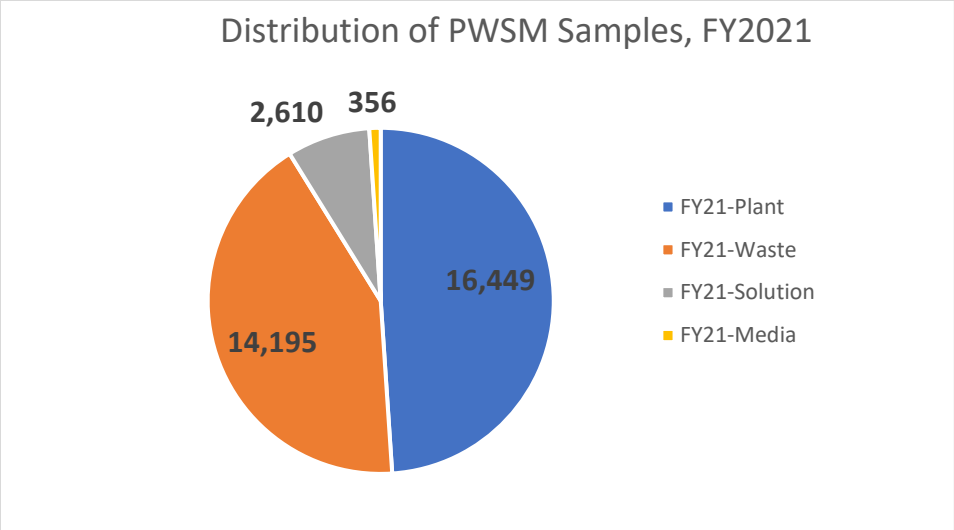
In general, the sample turnaround times were very acceptable for growers during FY2021. Soil sample turnaround for predictive samples plateaued at ten weeks on December 2, 2020, but then dropped back down to two weeks by February 6, 2021.

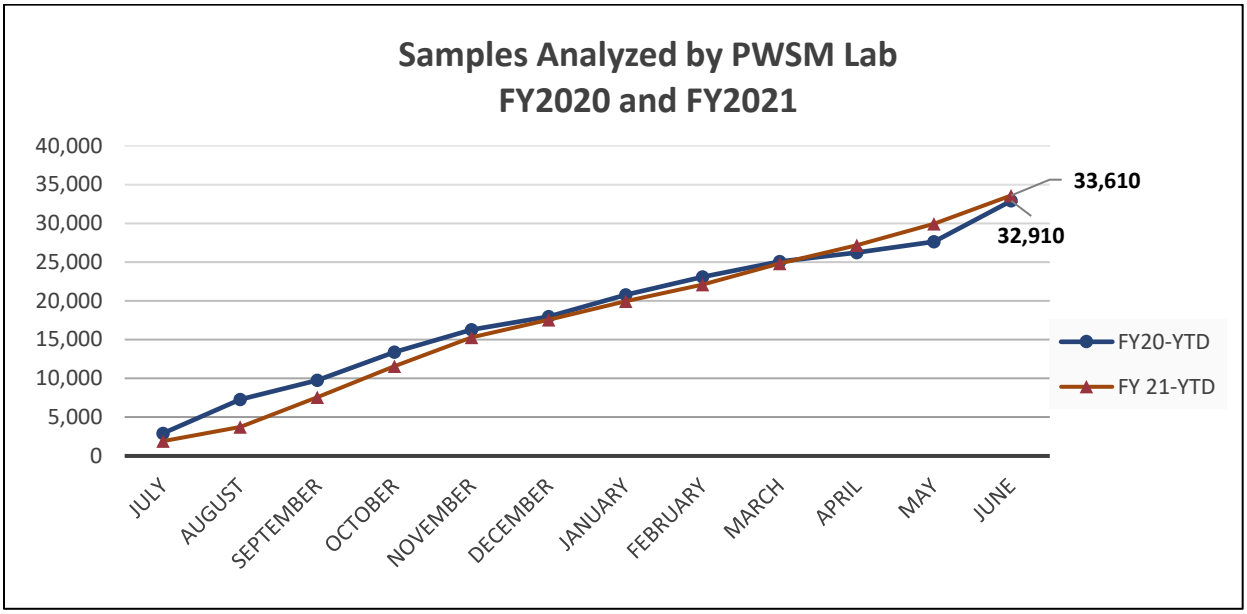


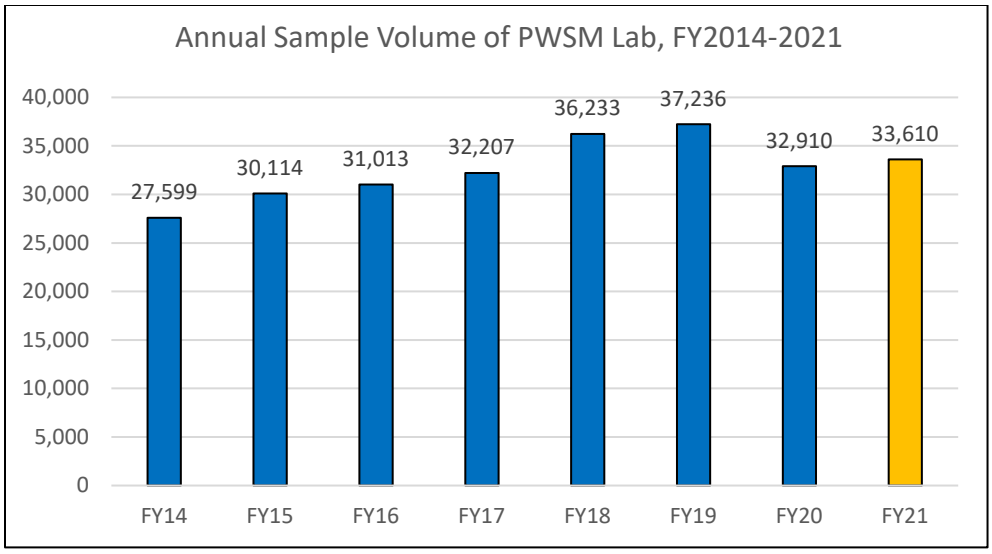
For high-volume customers wanting a guaranteed turnaround time of 7 to 10 business days, a limited number of "expedited shippers" were sold at $200 each. Each expedited shipper holds 36 soil samples. During FY2020, 355 expedited shippers were sold to clients, with a net revenue of $71,000.

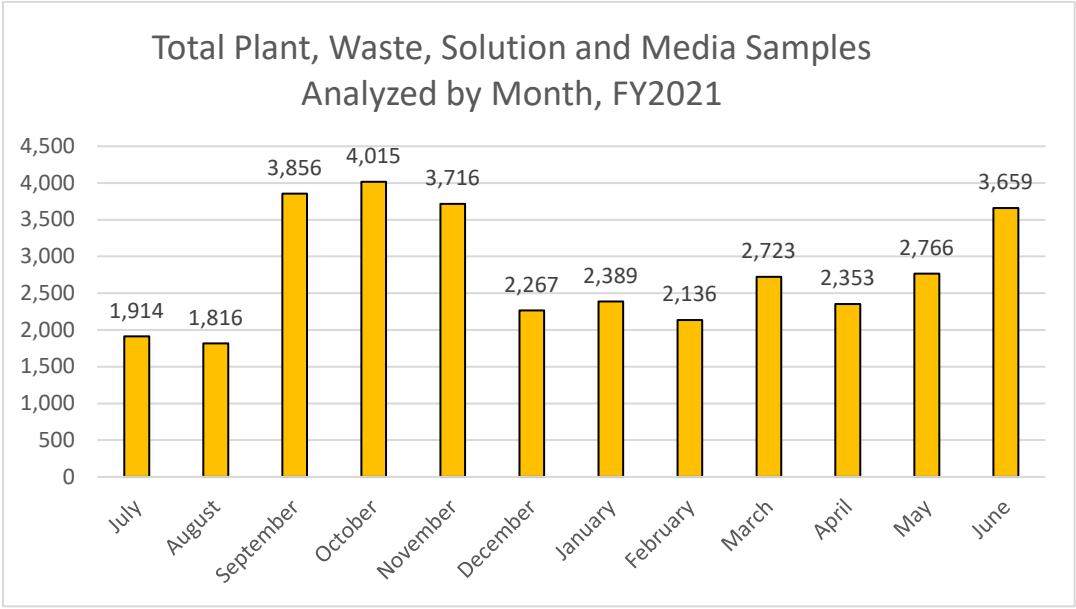
The **Plant/Waste/Solution/Media (PWSM) Section,** under the direction of Kristin Hicks, Ph.D., issued a total of 10,198 reports during FY2021. These reports gave recommendations for 16,449 (49%) plant tissue samples; 14,195 (43%) waste samples; 2,610 (8%) solution samples; and 356 (1%) soilless media samples in FY2021. Overall, annual sample volume was up about 2% compared to the previous fiscal year. With few exceptions, the following turnaround times were able to be maintained throughout the year: plant, 2 days; media and solution, 3 to 4 days; and waste, 7 to 10 days.

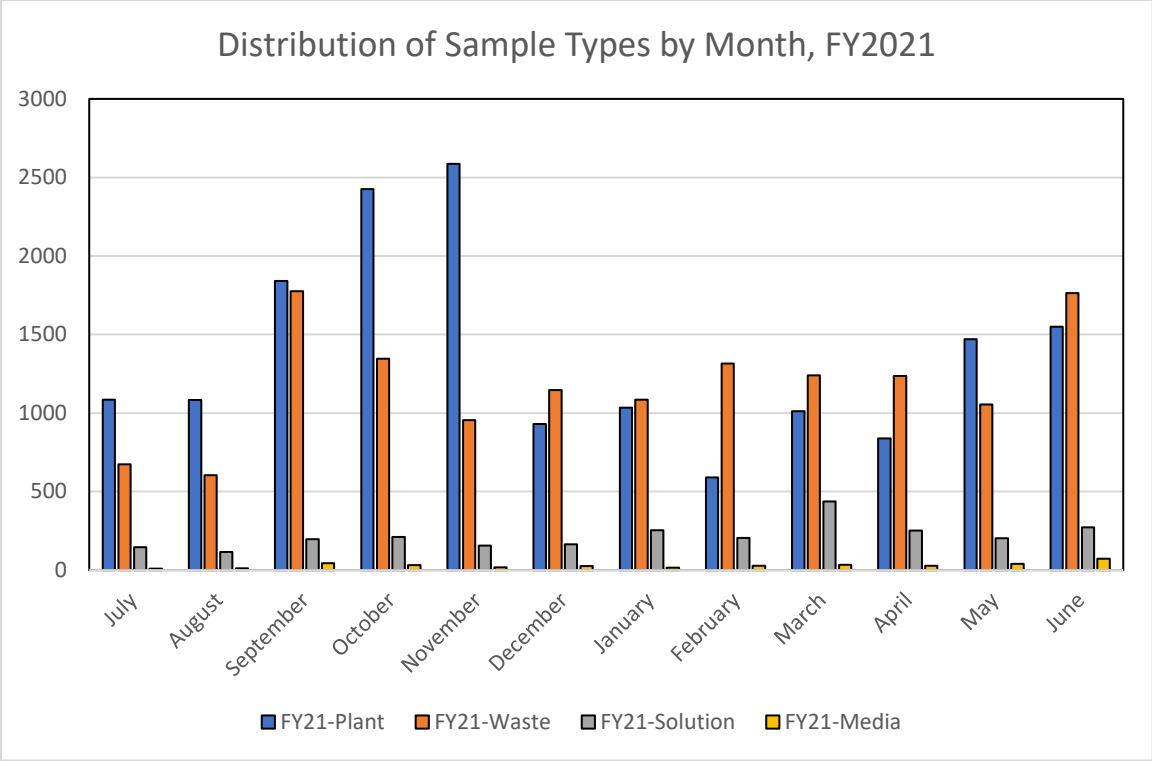
The busiest month for the PWSM Section for FY2021 was October 2020, with 4,015 samples analyzed, followed by September 2020, with 3,856 samples. In total, 33,610 samples were processed during FY2021.


Distribution of PWSM Samples, FY2021
2,610
356
16,449
14,195
FY21-Plant
FY21-Waste
FY21-Solution
FY21-Media

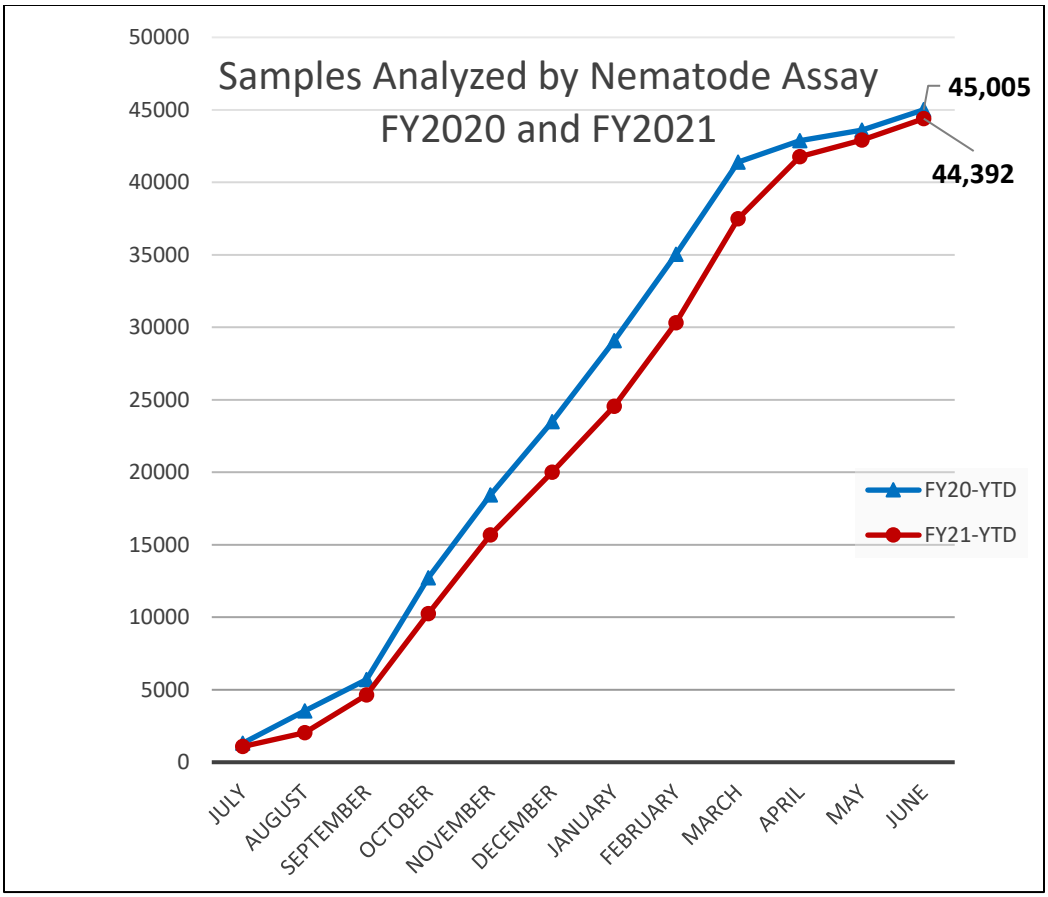

Samples Analyzed by PWSM Lab
FY2020 and FY2021
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
33,610
32,910
FY20-YTD
FY 21-YTD

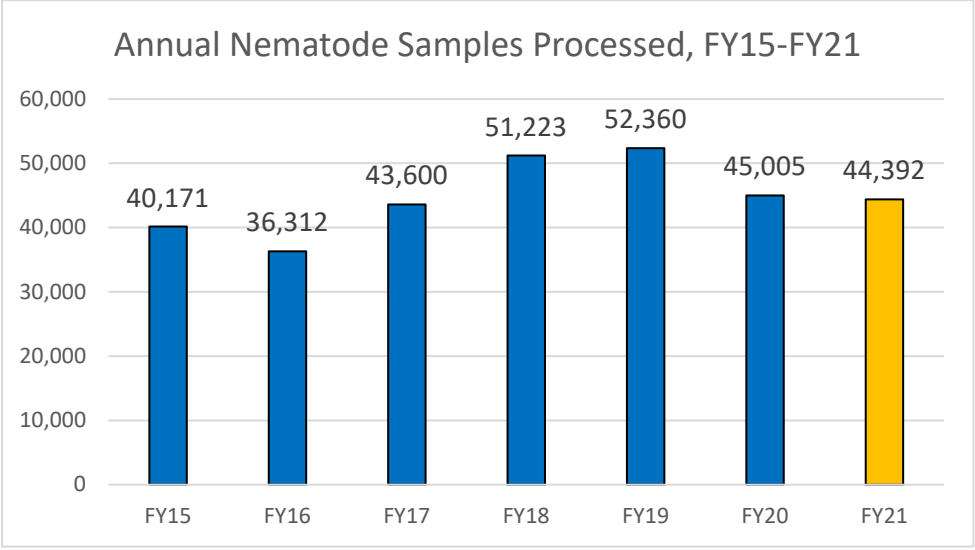

Annual Sample Volume of PWSM Lab, FY2014-2021
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
27,599
30,114
31,013
32,207
36,233
37,236
32,910
33,610
FY14
FY15
FY16
FY17
FY18
FY19
FY20
FY21

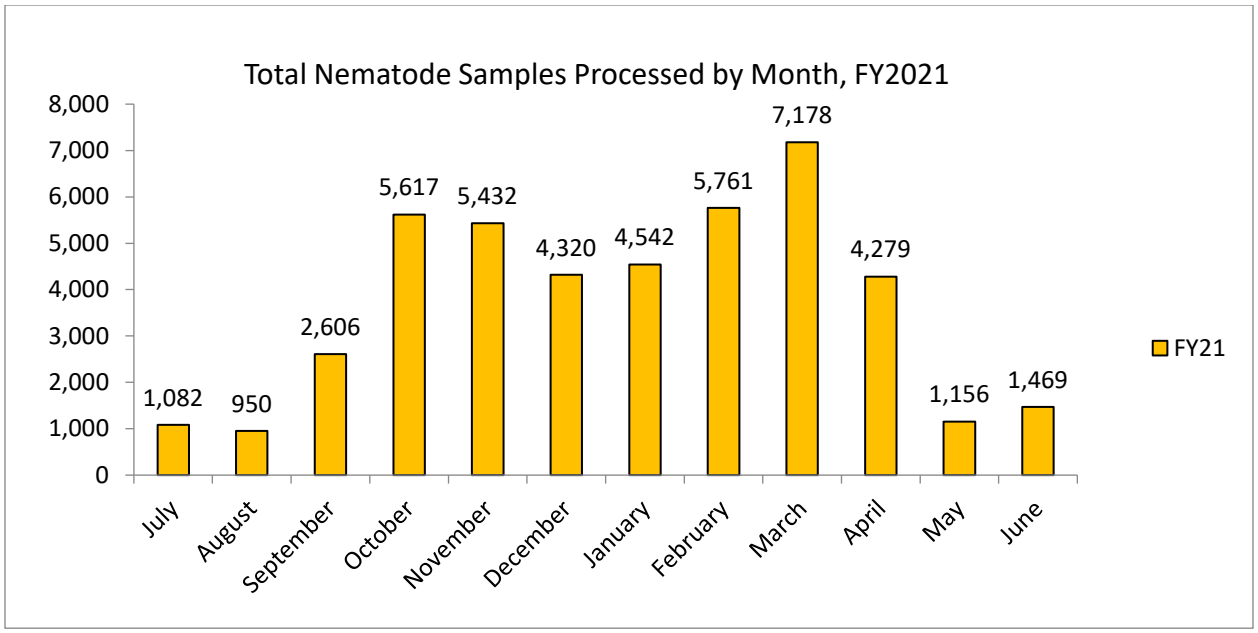

Total Plant, Waste, Solution and Media Samples Analyzed by Month, FY2021
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1,914
1,816
3,856
4,015
3,716
2,267
2,389
2,136
2,723
2,353
2,766
3,659
July
August
September
October
November
December
January
February
March
April
May
June



The Nematode Assay Section, under the direction of Weimin Ye, Ph.D., processed 44,392 samples and issued 6,213 reports in FY2021. Sample volume was down about 1% compared to the previous fiscal year. Nonetheless, the Nematode Assay Lab had the fourth highest sample annual sample volume since the lab's beginning (1975). March 2021 was the busiest month in FY2021for the lab, with 7,178 samples processed.

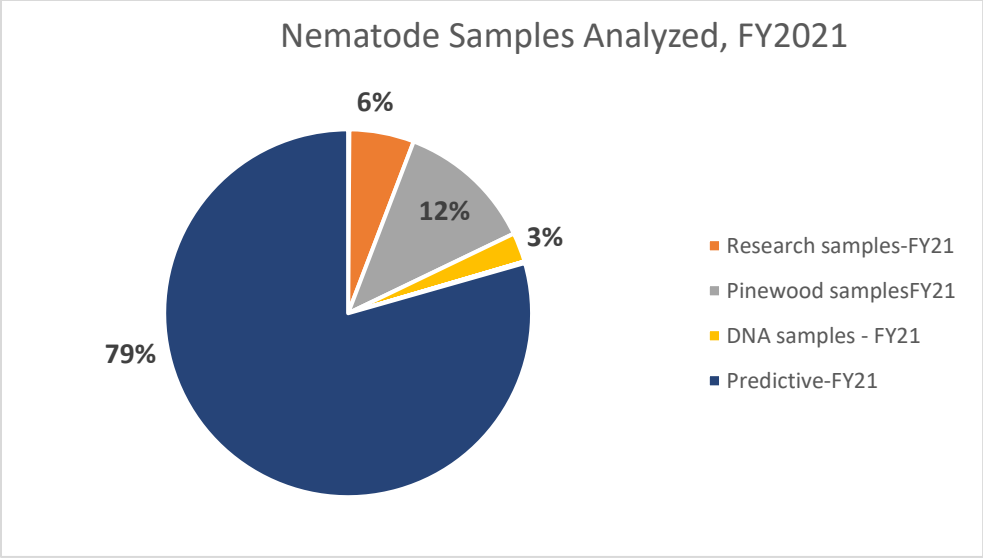

Samples Analyzed by Nematode Assay
FY2020 and FY2021
45,005
44,392
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
FY20-YTD
FY21-YTD


Annual Nematode Samples Processed, FY15-FY21
60,000
50,000
40,000
30,000
20,000
10,000
0
40,171
36,312
43,600
51,223
52,360
45,005
44,392
FY15
FY16
FY17
FY18
FY19
FY20
FY21

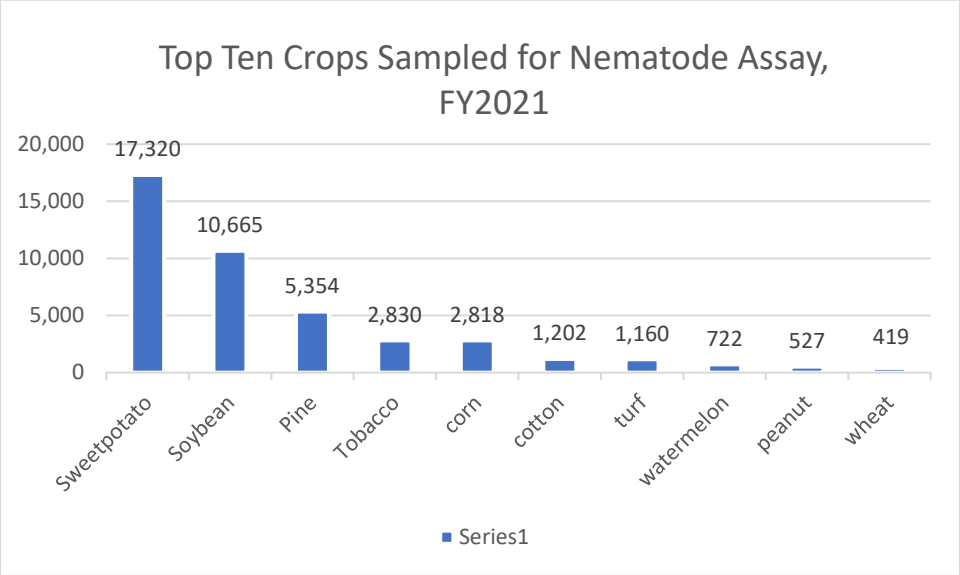


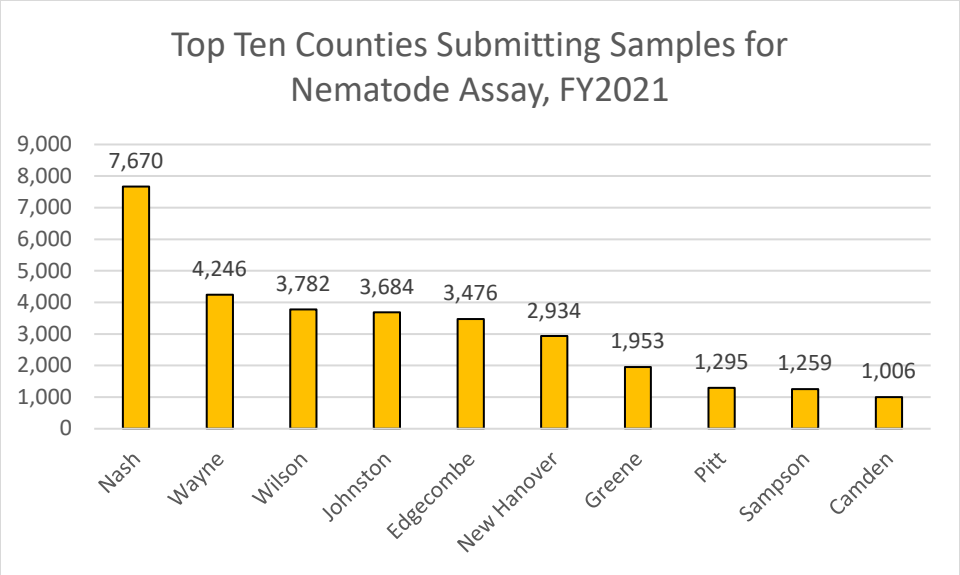
Most samples (35,251) were predictive in nature; other types included 2,528 research samples, 49 diagnostic samples, 61 internal samples, 1,146 molecular diagnostic samples, and 2 regulatory samples from the NCDA&CS Plant Industry Division.

In addition, 5,355 pine wood samples 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 102 samples, but this was only 1.91% of the total pine wood samples assayed. A tariff imposed by China on pinewood imported from the United States has continued to have a negative impact on pinewood samples submitted to the Nematode Assay Lab. Pinewood samples made up 12.1% of all nematode samples processed in FY2021, compared to 16.0% in FY2019 and 27.4% in FY2018. Although most pinewood samples came from North Carolina ports, the Nematode Lab also processed samples from Georgia, Florida, New York, Alabama, Connecticut, and South Carolina, with each out-of-state sample being assessed an additional $10 surcharge.



In FY2021, the crop with the largest number of submitted samples was sweet potato, with 17,320 samples (39% of total sample volume), followed by soybean (10,665 samples and 24% of total). The top five counties submitting nematode samples for assay were Nash, Wayne, Wilson, Johnston, and Edgecombe Counties, with samples totaling, 7,670; 4,246; 3,782; 3,684, and 3,476, respectively.





The Nematode Assay Lab processed 26 samples for the NC State University's Plant Disease and Insect Center as part of a long-standing cooperative agreement.

Field Services

Field Services Section personnel, under the direction of Michelle McGinnis, Ph.D., made about 10,500 grower consults in FY2021, primarily to help diagnose nutrient and/or nematode problems. Regional agronomists handled more than 500 inquiries regarding environmental issues in FY2021, primarily waste management plan clarifications, regulatory updates, and river basin oversight reviews, and participated in at least 10 county Soil & Water local advisory committees.

Field Services personnel served on 17 agricultural commodity and agricultural organization boards, committees, and advisory groups.

- 1217 Interagency Guidance Committee – Willie Howell
- Buncombe County FARMS Board – Chris Leek
- Corn Growers Association of North Carolina Board – Don Nicholson
- 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 – Brandon Poole
- NC Certified Crop Advisors Exam Committee – Michelle McGinnis
- NC Raspberry and Blackberry Growers Association Board – Steve Dillon
- 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
- Wayne County Farm Bureau Board – Willie Howell
- Wilkes County/Roaring River Water Quality Initiative Advisory Comm. – Dwayne Tate

Outreach Activities and Publications (Fiscal Year 2021)

Agronomic Division staff reached thousands of growers and agricultural professionals through a wide range of outreach activities in 2021.

AdvanSix
The N.C. Department of Agriculture and Consumer Services (NCDA&CS) Agronomic Division is very grateful to AdvanSix for their sponsorship of a voucher program for analysis of plant samples for North Carolina growers. Growers can use plant analysis as a tool to improve their fertility management program, thereby maximizing yields and plant quality while safeguarding the environment from unnecessary fertilizer applications. Each year AdvanSix provides funding for the distribution of a limited number of vouchers to cover the cost of plant tissue analysis to introduce growers to this service.

Regional agronomists play a key role in spreading the word about tissue testing and offering these free vouchers to interested growers. During fiscal year 2021, the AdvanSix and NCDA&CS Voucher Program funded the nutritional analysis of 117 plant samples, benefitting 38 growers. Of the 117 samples, 78 vouchers were used to pay for 6 field crops and 39 vouchers for 15 horticultural crops. By geographic region, 30 plant samples were collected from the Piedmont, 82 from the Coastal Plain and 5 from the Mountains. Plant samples from 24 of North Carolina's 100 counties were supported by the voucher program. Robeson, Onslow, Johnston, Lenoir, Montgomery, Rowan, and Sampson counties used the greatest number of vouchers.

Laboratory Tours
Laboratory tours for farmers, master gardeners, agribusiness groups, scientists, and students were suspended during fiscal year 2021 due to COVID-19.

News Releases
The Agronomic Division developed five news releases during FY2021.

	News Releases for Fiscal Year 2021	Date
1.	*Peak season soil testing begins Dec. 1*; by Dr. David Hardy;	Nov. 11, 2020
2.	*User-friendly upgrades made to online sample submission forms for soil and nematode testing*; by Jagathi Kamalakanthan	Nov. 17, 2020
3.	*Now is the time for tobacco transplant producers to test float bed water;* by Dr. Kristin Hicks	Feb. 18, 2021
4.	*Understanding agricultural limestone in North Carolina; basic information to protect consumers*; Dr. David Hardy	March 17, 2021
5.	*Optimize strawberry fertility with plant tissue testing;* by Dr. Kristin Hicks	April 14, 2021

External Publications
Eight external professional publications were published by staff during FY2021 (July 1, 2020-June 30, 2021).

1. Gu, M., Bui, H.X., Desaeger, J.A. & **Ye, W**. 2021. The first report of Meloidogyne enterolobii on Thai basil in Florida, United States. Plant Disease (First look).

2. **Ye, W**. & David Hunt. 2021. Section 7. Preparation of figures, measuring and image processing. In Methods for work with plant and soil nematodes (Editors: Roland N. Perry, David J. Hunt & Sergei Subbotin). CAB International. 290 pp.

3. **Ye, W**., Koenning, S.R., Zeng, Y., Kan, Z. & Liao, J. 2020. Molecular characterization of an emerging root-knot nematode Meloidogyne enterolobii in North Carolina, USA. Plant Disease 105 (4): 819-831.

4. Mc Groary, P., **Ye, W**. & Nangle, E. 2020. First report of the sting nematode Belonolaimus longicaudatus infecting bermudagrass in Barbados. Journal of Nematology 52 (e2020-21): 1-2. DOI: 10.21307/jofnem-2020-021.

5. Jalalinasab, P., Esmaeili, M., **Ye, W.** & Heydari, R. 2020. Description of Deladenus gilanica n. sp. (Hexatylina: Neotylenchidae) isolated from wood of black pine in Northern Iran. Journal of Nematology 52 (e2020-65): 1 - 10. DOI: 10.21307/jofnem-2020-065.

6. Kalinowski J, Edmisten K, Davis J, **McGinnis M**, **Hicks K**, Cockson P, Veazie P, Whipker BE. (2020). Augmenting Nutrient Acquisition Ranges of Greenhouse Grown CBD (Cannabidiol) Hemp (Cannabis sativa) Cultivars. Horticulturae. 2020; 6(4):98.

7. David H. Suchoff, Maggie M. Short, Matthew C. Vann, Drake A. Stevens, **Michelle S. McGinnis** & Kenneth K. Crump (2021) Evaluation of organic acidifiers as a corrective measure for high bicarbonate concentrations in organic tobacco (Nicotiana tabacum L.) float bed systems, Journal of Plant Nutrition, 44:4, 523-535.

8. Thiessen, L., T. Schappe, S. Cochran, **K. Hicks**, A. Post. Surveying for Potential Diseases and Abiotic Disorders of Industrial Hemp (Cannabis sativa) Production Plant Health Progress. August 27, 2020: 21(4)

Research (Fiscal Year 2021)

Division staff routinely engage in cooperative studies with university personnel, farmers and industry specialists. Research conducted in FY2021includes the following:

1) A Lime Laboratory Incubation and Lime Rate Field Study, in cooperation with Crop and Soil Sciences at N.C. State University (NCSU) – Joseph Wilson and Dr. David Hardy

(NCDA&CS) and Drs. Carl Crozier, John Havlin and David Jordan (NCSU). Project funding: Agronomic Division. Study conducted for Master of Science in Soil Science.

2) Nitrogen Rate Management for Malting Quality Barley in North Carolina in cooperation with the Crop and Soil Sciences Department at N.C. State University (NCSU), Year 3 – Dr. Kristin Hicks (NCDA&CS); Regional Agronomist Brandon Poole (NCDA&CS); Dr. Luciano Gatiboni (NCSU); Dr. Deanna Osmond (NCSU) and Graduate Student Josh Whelan (NCSU). Project funding: N.C. Tobacco Trust Fund Commission

3) Fertility of double-cropped, primocane-fruiting blackberries in collaboration with the Crop and Soil Sciences Department at N.C. State University (NCSU), Year 2 – Dr. Kristin Hicks (NCDA&CS); Regional Agronomist Steve Dillon (NCDA&CS); and Dr. Gina Fernandez (NCSU).

4) Molecular Characterization and Diagnosis of Root-knot Nematodes (*Meloidogyne* spp.) from North Carolina – Dr. Weimin Ye (NCDA&CS).

5) Pine wood nematode fumigation study on wood chips in Savannah Georgia – Dr. Weimin Ye (NCDA&CS).

6) Nitrogen and Potassium Rates for Floral CBD Hemp Production in cooperation with the Crop and Soil Sciences Department at N.C. State University (NCSU) – Dr. Michelle McGinnis (NCDA&CS); Dr. Loren Fisher (NCSU); Dr. Keith Edmisten (NCSU); Dr. Matthew Vann (NCSU); Dr. David Suchoff (NCSU) and Maggie Short (NCSU). Project funding: New and Emerging Crops Grant.

7) Effect of drying temperature on cannabinoid concentrations, mycotoxin levels, and yeast & mold levels of hemp grown for CBD extraction in cooperation with the Crop and Soil Sciences Department at N.C. State University (NCSU) – Dr. Michelle McGinnis (NCDA&CS); Brandon Poole (NCDA&CS), and Dr. Keith Edmisten (NCSU). Project funding: New and Emerging Crops Grant.

Safety Program (Calendar Year 2021)

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

The Agronomic Services Division prepared a detailed annual report on its 2021 safety program and submitted it to the N.C. Department of Labor (NCDOL) on February 15, 2022. (Reports are prepared according to the calendar year per NCDOL guidelines.) The Agronomic Division had

two recordable workman comp cases during 2021. In addition, there were nine first aid injuries and three near misses during 2021.