

Agronomic Division — 2012 Annual Report

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Service

The Agronomic Division serves North Carolina residents by providing soil testing, plant tissue analysis, waste analysis, solution analysis, nematode assay and expert advice regarding plant nutrient management. This year, the division made several changes that have improved the quality and scope of these services. Some notable milestones for 2012 include

- 1) implementation of new laboratory information management system (LIMS) and associated fine-tuning,
- 2) roll-out of a reprogrammed and upgraded public access laboratory-information-management system (PALS),
- 3) setting of a new all-time record for number of soil samples analyzed in a single fiscal year (nearly 390,000),
- 4) data collection from grain sorghum field trials to determine optimal nitrogen rates,
- 5) initiation of a two-year study to assess Fraser fir phosphorus and calcium needs through tissue analysis and soil testing, and
- 6) completion of the initial phase of implementation of a molecular approach to identifying plant-parasitic nematodes, with the help of funding by the N.C. Tobacco Trust Fund Commission.

In the fall of 2008, the division received a \$455,600 grant through the N.C. Tobacco Trust Fund Commission for the redesign of its LIMS. Phase I of this project was completed in October 2010. A new team of programmers worked on Phase II of the project from 2011 and into the summer of 2012. The new LIMS went “live” July 2012 and continues to be refined and adjusted to meet laboratory needs. To accompany the LIMS redesign, computer analyst Jingqing Ren revised and updated PALS, the client’s Web interface to LIMS, to render it more functional and user friendly.

In accordance with its designation as a Public Sector STAR site, the Agronomic Division conducted monthly building inspections; issued a quarterly safety newsletter; presented benchtop training on more than a dozen safety topics; and sent representatives to attend NCDOL’s annual Carolina STAR safety conference. All in-house employees met regularly and served on one of eight safety teams: Safety Inspection & Compliance, Sign & Chemical Storage, Safety Program & Policy, Safety Information & Communication, Job Safety Analysis, Housekeeping & Landscaping, Wellness, and Mentoring.

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The soil testing and waste analysis laboratories continued to operate under the N.C. Department of Environment and Natural Resources (DENR) Division of Water Quality's laboratory certification program and are qualified to provide critical testing for animal waste permits and nutrient management compliance. In addition, the waste analysis laboratory achieved Manure Analysis Proficiency (MAP) certification from the Minnesota Department of Agriculture. The soil testing and plant analysis laboratories continue to meet the requirements of the North American Proficiency Testing program.

Three Agronomic Division employees received department recognition as Employee of the Month in 2012: regional agronomist Dianne Farrer (June); nematologist Weimin Ye, Ph.D., (November); and processing assistant Darlene Carpenter (December). Weimin Ye was additionally recognized as the NCDA&CS Employee of the Year.

Workload Summaries

The **Soil Testing Section**, under the direction of David H. Hardy, Ph.D., analyzed 389,903 soil samples and issued 45,845 reports with fertilizer and/or lime recommendations in FY2012. This workload is a new record, surpassing last year's record by nearly 17,000 samples.

The **Plant/Waste/Solution/Media (PWSM) Section**, under the direction of Brenda R. Cleveland, analyzed 10,728 plant tissue samples; 15,819 waste samples; 2,642 solution samples; and 981 soilless media samples in FY2012. It issued a total of 11,881 reports.

The **Nematode Assay Section**, under the direction of Weimin Ye, Ph.D., processed 36,028 samples and issued 4,606 reports in FY2012, including 1,608 research samples, 560 diagnostic samples, 715 out-of-state samples, 85 samples from the NCSU Plant Disease and Insect Clinic and 266 regulatory samples from the NCDA&CS Plant Industry Division. In addition, 1145 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.

In addition, the lab initiated a trial program for molecular identification of root-knot nematode species by providing 200 vouchers for clients interested in trying the service. Overall, sample volume was up about 15.5% from FY2011. Turn-around time averaged about five business days from April through September and about 40 days during the busy season of October through March.

Field Services Section personnel, under the direction of J. Kent Messick, made 9,440 grower visits, primarily to help diagnose nutrient and/or nematode problems. Regional agronomists handled 530 inquiries regarding environmental issues — primarily waste management plan clarifications, regulatory updates and river basin oversight reviews — and participated in local advisory committees.

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Agronomists spearheaded an effort to promote grower acceptance and confidence in grain sorghum production as a way to optimize production in areas of sandy soils, combat plant-parasitic nematode and weed pressures, and improve rotational options. They conducted field tests to determine appropriate nitrogen fertilizer rates and management practices for this crop. They cooperated with local commercial feed companies, North Carolina State University (NCSU) and Cooperative Extension in hosting field days and informational tours to educate growers on how to best use this crop to their advantage.

Five (regions 1, 2, 3, 9, 11) of the 13 regional agronomist positions became vacant this year due to retirement and resignation.

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. In-house staff conducted 17 laboratory tours for farmers, master gardeners, agribusiness groups, scientists and students. Information on agronomic services was disseminated through more than 17 educational exhibits displayed at farm shows, field days, training events and professional meetings.

Outreach also included 19 news releases, at least five of which were radio interviews by J. Kent Messick aired on the Southern Farm Network. Many presentations on agronomic services were made to master gardeners, growers, commodity associations, conservation groups, and county and state organizations. Division personnel participated in local, state, regional, national and international meetings, including

- NCASWCD meeting (Greensboro; January 9, 2012)
— presentation: *Agribusiness outlook*, B. Knox
- Southern States meeting (Pembroke; January 12, 2012)
— presentation: *Soil sampling primer*, R. Morris
- N.C. Soybeans, Small Grains, Corn and Cotton Producers meeting (Joint Conf.) (Durham; January 12, 2012)
— presentation: *Agronomic Division overview*, C. Hudak-Wise
- Edgecombe County Master Gardeners (Rocky Mount; January 19, 2012)
— presentation: *Basics of soil sampling & report interpretation*, K. Yarborough
- N.C. Christmas Tree Association winter meeting (Boone, NC; March 1-2, 2012)
— presentation: *Fraser fir tissue analysis and soil testing: phosphorus and calcium assessment*, B. Cleveland

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- Society of Nematologists 51st annual meeting (Savannah, GA; Aug 12–15, 2012)
— presentation: *Molecular characterization of Meloidogyne incognita from a peach orchard in North Carolina*, W. Ye
- Southern States CCA training (Madison, WI: August 15, 2012)
— presentation: *Soil fertility status for major North Carolina crops*; D. Hardy
- SERA meeting (Madison, WI: August 26–29, 2012)
— presentation: *Nitrogen in poultry litter and livestock manure by preparation method*; B. Cleveland
- SERA meeting (Madison, WI: August 28, 2012)
— presentation: *Refining nutrient availability for animal wastes*; D. Hardy
- CCA training (Raleigh: November 8, 2012)
— presentation: *What I wish dealers knew about soil testing*; D. Hardy
- Dept. Plant Pathology, Univ. Arkansas (Fayetteville, AR: December 4, 2012)
— presentation: *NCDA&CS Nematode Assay Section*; W. Ye

Division staff authored, or co-authored, 16 professional articles.

Research

Division staff routinely engage in cooperative studies with university personnel, farmers and industry specialists. In FY2012, cooperative research included the processing of 1,946 soil samples; 4,112 plant/waste/solution/media samples; and 1,608 nematode samples.

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

- 1) Verification of poultry manure nitrogen availability and fertilizer nitrogen equivalence coefficients for crop production in North Carolina soils (NCSU Soil Science Ph.D. project) — Canon Engoke, Carl Crozier and Jot Smyth;
- 2) Restriction of root growth by soil acidity from sandy Coastal Plain soil (NCSU Soil Science M.S. project) — Aaron Pettit, John Havlin and Josh Heitman; and
- 3) Land-applied swine lagoon sludge increases soil concentrations and crop uptake of Zn and Cu — Dan Israel and Jot Smyth, NCSU Soil Science (paper accepted for publication in *Crop Management*).

The **Plant/Waste Solution/Media Section** was awarded \$9,989 in NCDA&CS specialty crop block grant funds to conduct an assessment of the phosphorus and calcium fertility needs of Fraser fir. This project began in January 2012 and will continue through December 2013. Its goals are to determine 1) if detection of low P and Ca levels in plant tissue limits Fraser fir production; 2) what factors impact P and Ca status (poor soil pH

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and fertility, improper sample collection, environmental stress, immature versus mature tissue at sample time); and 3) to fine-tune the current sufficiency ranges for Fraser fir. The specific goal is to assess tree quality and growth rate as affected by tissue P and Ca levels during the season.

In addition, the PWSM Section continued last year's participation in these cooperative studies:

- 1) Evaluation of fertilizer rates in greenhouse production of Beauregard, Covington and Evangeline sweet potatoes — J. Schultheis, Ph.D., NCSU Horticultural Science;
- 2) Mineralization, plant availability and water quality consequences of nitrogen and phosphorus in land-applied municipal biosolids — Jeffery White, Ph.D., NCSU Soil Science and David Hardy, Ph.D., NCDA&CS Agronomic Division;
- 3) Corn diagnosis support for cooperative extension agents — Carl Crozier, Ph.D., NCSU Soil Science; Steve Koenning, Ph.D., NCSU Plant Pathology; and Ron Heiniger Ph.D., NCSU Crop Science;
- 4) Cotton diagnosis support for cooperative extension agents — Carl Crozier, Ph.D., NCSU Soil Science; Steve Koenning, Ph.D., NCSU Plant Pathology; and Keith Edmisten, Ph.D., NCSU Crop Science;
- 5) Peanut diagnosis support for cooperative extension agents — Carl Crozier, Ph.D., NCSU Soil Science; and Barbara Shew, Ph.D., NCSU Plant Pathology; and
- 6) Small grain diagnosis support for cooperative extension agents — Carl Crozier, Ph.D., NCSU Soil Science and Steve Koenning, Ph.D., NCSU Plant Pathology.

The **Nematode Assay Section** received \$48,500 from the N.C. Tobacco Trust Fund Commission in the fall of 2011 to purchase real-time PCR equipment needed to implement molecular diagnosis of root-knot nematode species. Purchases during 2012 included an ABI real-time PCR thermocycler, an ABI Veriti PCR thermocycler, an iMac, a Frigidaire commercial stainless steel freezer, and a Zeiss Imager A2 microscope with an AxioCam MRc 5 digital camera.

Research projects included

- 1) Identification of a new species of sting nematode in cooperation with regional agronomist Kent Yarborough and the University of Arkansas and
- 2) Development of many species-specific primers and probes for use in molecular diagnosis of root-knot nematode species through a grant from the N.C. Tobacco Trust Fund Commission.

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

During 2012, division staff engaged in the following field studies:

- 1) Tobacco greenhouse source water, alkalinity and fertilizer project (six locations) — David Dycus, Kent Yarborough, Rick Morris, Robin Watson, Dwayne Tate and Don Nicholson;

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- 2) Grain sorghum nitrogen rate study (five locations) — Don Nicholson, David Dycus, Dianne Farrer and Tim Hall;
- 3) Fraser fir study (three locations) — Dwayne Tate;
- 4) Cotton tissue analysis baseline study (five locations) — Dianne Farrer, Rick Morris, Wayne Nixon, Don Nicholson and Jenny Johnson;
- 5) Peanut fumigation trial (one location) — Wayne Nixon and Kent Yarborough.