

## **Agronomic Division — 2013 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, soilless media 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 2013 include

- 1) roll-out of online sample information submission and credit-card payment functions for peak-season soil samples,
- 2) purchase, set-up & activation of new pH robot in the soil lab,
- 3) implementation of \$4 peak-season fee for soil samples and a fee increase (\$5 → \$8) for waste analysis
- 4) implementation of revised waste codes and coefficients as recommended by the N.C. Interagency Nutrient Management Committee,
- 5) the PWSM lab's switch to closed vessel microwave digestion,
- 6) use of molecular diagnostic methods to screen samples of wood (destined for export) for the presence of pinewood nematode, and
- 7) physical improvements to our facility, including a new roof, electric gate, repaving of entryway and an additional surveillance camera.

As a Public Sector STAR site, the Agronomic Division conducted monthly building inspections; issued a quarterly safety newsletter; presented benchtop trainings on relevant 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 nine safety teams: Safety Inspection & Compliance, Sign & Chemical Storage, Safety Program & Policy, Safety Information & Communication, Job Safety Analysis, Housekeeping & Landscaping, Wellness, Mentoring & STAR Report, and Ergonomics. These preparations enabled the division to successfully pass a safety audit conducted by the Office of State Human Resources on November 21, 2013.

The Ergonomics Center of North Carolina was invited to visit the Agronomic Division Eaddy Building in September for the purpose of conducting a site evaluation. The ensuing report issued a number of recommendations for safer and more efficient job performance in both office and laboratory settings. Implementation of these changes has been scheduled.

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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 Resources laboratory certification program and are qualified to provide critical testing for animal waste permits and nutrient management compliance. The soil testing and plant analysis laboratories continue to meet the requirements of the North American Proficiency Testing program.

### Workload Summaries

The **Soil Testing Section**, under the direction of David H. Hardy, Ph.D., analyzed 367,964 soil samples in FY2013: 332,820 predictive; 29,094 expedited; 3,038 diagnostic; 2,092 research; 294 from witchweed-infested areas; 504 heavy metals; and 122 internal. Reports issued with fertilizer/lime recommendations totaled 44,062.

By December, the lab had purchased, programmed and initiated use of a new pH robot, which set the stage for more efficient processing during the 2013–14 busy season.

The **Plant/Waste/Solution/Media (PWSM) Section**, under the direction of Brenda R. Cleveland, analyzed 10,761 plant tissue samples; 16,069 waste samples; 1,589 solution samples; and 747 soilless media samples in FY2013. Of these, 4,497 were research samples. PWSM issued a total of 11,877 reports.

In June 2013, PWSM purchased two, new microwave ovens to use for closed-vessel digestion of plant and waste samples. This equipment upgrade should reduce potential sample contamination and provide more complete digestion. It will also reduce employee exposure to gas fumes.

The **Nematode Assay Section**, under the direction of Weimin Ye, Ph.D., processed 35,012 samples and issued 4,744 reports in FY2013, including 666 research samples, 215 diagnostic samples, 16 out-of-state samples (excluding pinewood), 57 samples from the NCSU Plant Disease and Insect Clinic and 220 regulatory samples from the NCDA&CS Plant Industry Division. In addition, 3,937 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.

Overall sample volume was up 2.6% from FY2012. Turn-around time averaged about five business days from April through September and about 40 days during the busy season of October through March. Lab efficiency was enhanced through the purchase of two Leica inverted microscopes and a Zeiss dissecting scope.

**Field Services Section** staff (regional agronomists), under the direction of J. Kent Messick until July 2013, made 7,161 grower visits, primarily to help diagnose nutrient and/or nematode problems. They handled 317 inquiries regarding environmental issues — primarily waste management plan clarifications, regulatory updates and river basin oversight reviews — and participated in local advisory committees. In September, Michelle McGinnis, Ph.D., assumed the duties of section chief following Messick's retirement.

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

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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 new regional agronomists were hired this year: Rexford Cotton (Region 1); Adam Lassiter (Region 2); Chris Jernigan (Region 3); Georgia Love (Region 9); and Amy Poirier (Region 11). At year end, three positions (Regions 1, 6 & 13) were still vacant due to resignation/promotion.

### **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 28 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.

All Field Services staff attended Incident Command System (ICS) training in November to prepare them for emergency response situations. They received FEMA certification for both ICS-100 (Introduction to Incident Command System) and ICS-200 (Single Resources and Initial Action Incident).

Outreach also included 19 news releases, interviews and/or tweets. 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. Groups to whom presentations were made include

- NC Soil & Water Conservation Districts Personnel (Raleigh; Jan 7, 2013)  
— presentation: *Grain sorghum and the HRW program*, D. Nicholson
- Bedford Homeowners Association (Raleigh; Jan 10, 2013)  
— presentation: *Soil sampling for lawns*, D. Nicholson
- Edgecombe County Master Gardeners (Tarboro; Jan 17, 2013)  
— presentation: *Soil testing for success*, T. K. Yarborough
- Wayne County Farmers Association (Goldsboro; Jan 23, 2013)  
— presentation: *Nutrient management in grain sorghum*, D. Nicholson
- Johnston County Farmers & Industry Reps (Smithfield; Jan 30, 2013)  
— presentation: *Nutrient management in grain sorghum*, D. Nicholson

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- Alamance County Farmers Association (Burlington; Feb 6, 2013)  
— presentation: *Nutrient management training*, R. Watson
- Henderson County Apple School (Flat Rock; Feb 6, 2013)  
— presentation: *Agronomic sample completion update*, S. Dillon
- NCSU Extension Agents (Raleigh; Feb 7, 2013)  
— presentation: *Strawberry tissue sampling*, B. Cleveland
- Wilson County Farmers & Industry Reps (Wilson; Feb 11, 2013)  
— presentation: *Nutrient management in grain sorghum*, D. Nicholson
- Union County Farmers & Industry Reps (Monroe; Feb 13, 2013)  
— presentation: *Nutrient management in grain sorghum*, D. Nicholson
- NC Commercial Blackberry & Raspberry Growers (Shelby; Feb 19, 2013)  
— presentation: *Agronomic sample completion update*, S. Dillon
- Avery County Christmas Tree Growers (Newland; Feb 21, 2013)  
— presentation: *Current issues: specialty crop grants, open burning permitting, lab update*, D. Tate
- SC Grain Growers, Coop Extension & Industry Reps (Florence, SC; Feb 21, 2013)  
— presentation: *Nutrient management in grain sorghum*, D. Nicholson
- NRCS District Conservationists (Carthage; Feb 26, 2013)  
— presentation: *Nutrient & crop management in grain sorghum*, D. Nicholson
- Onslow County Farmers & Industry Reps (Jacksonville; Feb 27, 2013)  
— presentation: *Nutrient management in grain sorghum*, D. Nicholson
- Moore County Farmers & Industry Reps (Carthage; Mar 5, 2013)  
— presentation: *Nutrient management in grain sorghum*, D. Nicholson
- Washington County Farmers, CES & Industry Reps (Plymouth; Mar 11, 2013)  
— presentation: *Nutrient management in grain sorghum*, D. Nicholson
- Lee County Farmers, CES & Industry Reps (Sanford; Mar 16, 2013)  
— presentation: *Working with your NCDA&CS regional agronomist*, G. Love
- Alexander/Caldwell Co Master Gardeners (Taylorsville; Mar 20, 2013)  
— presentation: *How to take a soil sample for the home gardener*, D. Tate
- N.C. Soil & Water Committee, Area 2 (Granville County; Mar 25, 2013)  
— presentation: *Understanding & applying soil test information*, R. Watson
- NCSU Faculty, NCDA&CS Staff & Poultry Industry Reps (Raleigh; Apr 17, 2013)  
— presentation: *Poultry utilization of grain sorghum in feed rations*, D. Nicholson
- Wilkes County Soil & Water Staff (Wilkesboro; Jun 7, 2013)  
— presentation: *How your regional agronomist serves Wilkes County farmers*, D. Tate
- SERA-IEG-6 2013 (LSU; Jun 16–18, 2013)  
— presentation: *Lab QA/QC*, D. Hardy

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- Association of Southern Feed, Fertilizer and Pest Control Officials (Wilmington; Jun 21, 2013)  
— presentation: *Agronomic Division overview*, C. Hudak-Wise
- Greene County Master Gardeners (Snow Hill; Jul 7, 2013)  
— presentation: *Soil sampling*, C. Jernigan
- American Society of Nematologists (Knoxville, TN; Jul 13–18, 2013)  
— presentation: *Real-time PCR for species identification of pine wood nematode *Bursaphelenchus xylophilus* (Nematode: Parasitaphelenchidae)*, W. Ye
- Lincolnton Kiwanis Club (Lincolnton; Jul 22, 2013)  
— presentation: *Agriculture in Lincoln County*, S. Dillon
- Caldwell County Cattleman’s Association (Lenoir; Aug 6, 2013)  
— presentation: *Peak-season soil testing, lab update*, D. Tate
- Craven Co Growers & Fertilizer Industry Professionals (Cove City; Aug 6, 2013)  
— presentation: *Soil testing fee*, C. Jernigan
- Blackland Farm Managers’ Association (Terra Ceia; Aug 8, 2013)  
— presentation: *Agronomic updates—peak-use soil test fee*, A. Lassiter
- Craven Co Growers & Fertilizer Industry Professionals (Vanceboro; Aug 8, 2013)  
— presentation: *Soil testing fee*, C. Jernigan
- Stanly County Summer Grazing Field Day (Norwood, NC; Aug 8, 2013)  
— presentation: *Tissue sampling in forages*, A. Poirier
- Catawba County Cattleman’s Association (Newton; Aug 13, 2013)  
— presentation: *Peak-season soil testing, lab update*, D. Tate
- Greene County Growers (Snow Hill; Aug 20, 2013)  
— presentation: *Soil testing fee*, C. Jernigan
- Wilkes County Corn Growers Association (Roaring River; Aug 20, 2013)  
— presentation: *Peak-season soil testing, lab update*, D. Tate
- Avery County Farmland Preservation Group (Newland; Aug 24, 2013)  
— presentation: *NCDA’s farmland preservation & VAD programs*, D. Tate
- NASDA (Asheville/Brevard; Sept 10, 2013)  
— presentation: *WNC regional agriculture*, D. Tate
- Caldwell County Nurseryman’s Association (Lenoir; Sept 24, 2013)  
— presentation: *Peak-season soil & solution sampling*, D. Tate & M. McGinnis
- N.C. Christmas Tree Growers’ Association (Boone, NC; Sept 26–27, 2013)  
— presentation: *Fraser fir calcium and phosphorus assessment*, B. Cleveland
- N.C. Christmas Tree Growers’ Association (Boone, NC; Sept 27, 2013)  
— presentation: *Specialty crop grants, tissue sampling and lab update*, D. Tate
- Montgomery County Cattleman’s Association (Troy, NC; Oct 8, 2013)  
— presentation: *Soil lab update*, G. Love

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- Pine Wilt Disease Conference (Braunschweig, Germany; Oct 15–18, 2013)  
— presentation: *Pinewood nematode assay and development of real-time PCR for species identification*, W. Ye
- N.C. Greenhouse Vegetable Growers (Durham, NC; Oct 22–23, 2013)  
— presentation: *Substrate and solution testing: tools for greenhouse vegetable production*, M. McGinnis
- N.C. Greenhouse Vegetable Growers (Durham, NC; Oct 22–23, 2013)  
— presentation: *Plant tissue testing: fine-tune your greenhouse fertilizer program and optimize plant nutrition*, B. Cleveland
- Davidson County Cattleman’s Association (Lexington, NC; Nov 4, 2013)  
— presentation: *Nutrient deficiency issues in forages*, A. Poirier
- Columbus County Cattleman’s Association (Whiteville, NC; Nov 12, 2013)  
— presentation: *Pasture management*; R. Morris
- Southeast Pork Conference (Onslow County, NC; November 21, 2013)  
— presentation: *Agronomic Division updates*; C. Hudak-Wise, Ph.D.
- Richmond County Farmers (Rockingham, NC; Nov 25, 2013)  
— presentation: *Soil lab update*, G. Love
- CES and ag consultants (online training) (Raleigh, NC; November 25, 2013)  
— presentation: *Agronomic Division (peak-season) overview*; C. Hudak-Wise, Ph.D.
- N.C. Small Grain Growers Board (December 5, 2013)  
— presentation: *Agronomic Division updates*; C. Hudak-Wise, Ph.D.
- N.C. Ag Consultants Association (Raleigh, NC; December 6, 2013)  
— presentation: *Agronomic Division updates*; C. Hudak-Wise, Ph.D.

Division staff authored, or co-authored, 23 professional articles.

## Research

Division staff routinely engage in cooperative studies with university personnel, farmers and industry specialists. In FY2013, cooperative research included the processing of 3,166 soil samples; 4,497 plant/waste/solution/media samples; and 666 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

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- 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** continued its assessment of the phosphorus and calcium fertility needs of Fraser fir funded by an NCDA&CS specialty crop block grant. This project began in January 2012 and will likely continue through September 2014. Data will be compiled 1) to determine if detection of low P and Ca levels in plant tissue limits Fraser fir production; 2) to identify factors that impact P and Ca status (e.g., poor soil pH and fertility, improper sample collection, environmental stress, immature versus mature tissue at sample time); and 3) to fine-tune current sufficiency ranges for Fraser fir. The specific goal is to assess the effect of tissue P and Ca levels on tree quality and growth rate.

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

- 1) Bioenergy crop production on N.C. swine effluent spray fields — R. Gehl, Ph.D., NCSU Soil Science;
- 2) Soil fertility management for rapeseed production — Adam Lassiter, NCDA&CS Agronomic Division, and Carl Crozier, Ph.D., NCSU Soil Science;
- 3) Establishing tissue analysis standards for floriculture species — Brian Whipker, Ph.D., NCSU Horticultural Science.

The **Nematode Assay Section** participated in the following research projects:

- 1) Testing of a new nematicide for sting nematode — Bayer Crop Science;
- 2) Use of rotation and cultivar choice to reduce potential for nematode problems in peanut — NCSU;
- 3) Influence of crop rotation and Vydate on peanut nematode populations — NCSU;
- 4) Identification of *Meloidogyne enterolobii* on cotton and soybean in N.C. (first report) — NCSU; and
- 5) Molecular characterization and development of real-time PCR assay for pinewood nematode *Bursaphelenchus xylophilus* — University of Florida.

The **Field Services Section** conducted or participated in the following research and demonstration projects in fields throughout the state, primarily to optimize crop-fertilization and nematode-management efforts:

- 1) Zn removal from Murphy-Brown nursery lagoons — Tim Hall & Darren Akhurst;
- 2) Grain sorghum nitrogen rate study (year 2) — Chris Jernigan, Don Nicholson, Georgia Love & Kent Yarborough;
- 3) Grain sorghum sulfur rate study (year 1) — Don Nicholson
- 4) Grain sorghum management study (year 1) — Don Nicholson
- 5) Soil fertility management for grain sorghum — Adam Lassiter & Carl Crozier;
- 6) Nitrogen study with flax—Rick Morris & Columbus County Extension;
- 7) Effect of at-planting micronutrient application on corn yield — Rick Morris, Georgia Love & Ron Heiniger;
- 8) Fraser fir P and Ca tissue sampling assessment (year 2) — Brenda Cleveland & Dwayne Tate;

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- 9) Canola biofuel study — Steve Dillon & Dwayne Tate;
- 10) Assessment of soil types in relation to Christmas tree production — Dwayne Tate;
- 11) Wheat response to sulfur on heavy clay soils with excessive rain — Robin Watson;
- 12) Corn pop-up study (year 1) — Georgia Love.