Agronomic Division — 2008 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 2008 include implementation of

1) an agronomic test—soilless media analysis—which is particularly useful to the floriculture and nursery industries,

2) a molecular, diagnostic method for identification of plant-parasitic nematodes,

3) an online guide to soil sampling designed for homeowners, and

4) a bar-code labeling application that enables clients to track the arrival of their sample shipments.

In the fall of 2008, the division received a $455,600 grant through the N.C. Tobacco Trust Fund Commission that will enable it to hire a team of professionals to completely redesign its laboratory information management system (LIMS) in 2009. The existing system was designed in 1994 and can no longer efficiently handle the data management and delivery needs required for our current sample load, which has increased 50% since that time. The new LIMS will be programmed to be compatible with emerging technological standards, thereby making it more functional for clients.

In fiscal year 2008, Agronomic Division laboratories set another all-time workload record, surpassing the previous year's record workload by 4%. The labs processed more than 411,700 soil, nematode, plant, waste and solution samples and issued more than 56,400 advisory reports.

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. The soil testing and plant analysis laboratories remain a part of the North American Proficiency Testing program. Under this program, our laboratory results are compared with those of other laboratories across the country on a quarterly basis.

The **Soil Testing Section**, under the direction of David H. Hardy, Ph.D., analyzed 353,848 soil samples and issued 40,353 reports with fertilizer and/or lime recommendations. This workload set an all-time record for the Soil Testing Section, surpassing last year's record of 333,512 by 6%. Turn-around time never exceeded 9 weeks, and for much of the peak, samples were processed in about 4 to 6 weeks or less.

The Soil Testing Section worked with USDA-APHIS and the NCDA&CS Plant Industry Division to comply with a witchweed quarantine effort in five counties. Samples from farms with known infestations are shipped in red boxes and handled with a chain of custody. To prevent spread of witchweed seeds, designated soil samples are spread to a depth of ½ inch and heated to 250 °F for a minimum of two hours in a newly purchased soil sterilization oven.

The **Plant/Waste/Solution (PWS) Section**, under the direction of Brenda R. Cleveland, analyzed 10,609 plant tissue samples; 16,500 waste samples; and 2,791 solution samples. Overall, this workload represents a 9% decrease compared to that of fiscal year 2007. Anaerobic hog lagoon samples accounted for 73% of the total waste samples, followed by poultry house litter at 9%. Most solution samples were either nutrient solutions (44%) or source water used in crop production for uses such as irrigation or hydroponics (34.5%).

The PWS Section introduced a new service for media analysis using the saturated media extract method. This long-needed service will help producers of greenhouse and nursery crops with nutrient management.

The **Nematode Assay Section**, under the direction of Weimin Ye, Ph.D., processed 27,995 samples and issued 3,762 reports in fiscal year 2008, including 1,066 research samples, 379 diagnostic samples, 250 out-of-state samples, 121 samples from the NCSU Plant Disease and Insect Clinic and 176 regulatory samples from the NCDA&CS Plant Industry Division. This sample volume was down about 2% from fiscal year 2007. From April through September, samples were processed in about 10 business days. During the busy season of October through March, turn-around time averaged about 30 days.

Ye implemented a LIMS Access database that makes it possible to summarize section data and check for lab errors. He has also compiled a nematode management database that is used to generate situation-specific, client reports with recommendations for nematicides, rotations and resistant varieties. In addition, he developed a new NemaNote that addresses the management of plant-parasitic nematodes infecting sweetpotato.

With regard to regulatory efforts, the lab assisted USDA-APHIS by screening wood chips destined for export to Turkey. Wood chip samples (680) were assayed for the presence of the pinewood nematode. The lab also worked with USDA-APHIS to comply with witchweed quarantine requirements.

Field Services Section personnel, under the direction of J. Kent Messick, made 9,890 grower visits, primarily to help diagnose nutrient and/or nematode problems. Regional agronomists handled 715 inquiries regarding environmental issues — primarily waste management plan clarifications, regulatory updates and river basin oversight reviews — and participated in local advisory committees. Agronomists also provided technical expertise and/or training for several regional and statewide environmental projects in cooperation with DENR, North Carolina State University (NCSU), N.C. Agricultural & Technical State University and USDA-NRCS.

Regional agronomist David Dycus of Sanford was elected to the Board of Directors of the N.C. Strawberry Association in November 2008.

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. This year, LaShonda Rawlins, a biology major at Central Carolina University, spent six weeks working at the division through an internship with the N.C. Leadership Institute for Female Employees mentoring project. Rawlins worked a week or more in each section of the division. An instructional online PowerPoint for homeowners that explains correct soil sampling procedure was one of her accomplishments.

In-house staff conducted 25 laboratory tours for farmers, master gardeners, agribusiness groups, scientists and students, including an international delegation from Honduras. Information on agronomic services was disseminated through more than 24 educational exhibits displayed at farm shows, field days, training events and professional meetings (see appendix).

Outreach also included 13 news releases in addition to articles in publications such as the *Agricultural Review, North Carolina Flower Growers' Bulletin, North Carolina Turfgrass* magazine and *Nursery Notes.* 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

- Agriculture and Agri-Food Canada conference (Ottawa; Jan 13–20, 2008)
  — presentation: *Advisory services in the NCDA&CS Nematode Assay Section*;
- Soil Science Society of N.C., 51st annual meeting (Raleigh; January 22–23, 2008)
  — poster: *Starter fertilizer on soils testing very high for phosphorus*;
- Joint Conference of the N.C. Small Grain, Soybean & Corn Growers Associations, 19th annual meeting (RTP, NC; Jan 17–18, 2008)
  — poster: *Starter fertilizer on soils testing very high for P* and

— poster: *Starter P and silage corn*;

- American Phytopathological Society, 100th annual meeting (Minneapolis, MN; Jul 26–30, 2008);
- Western N.C. Certified Crop Adviser Training (Winston-Salem, NC; Nov 18, 2008)
  — presentation: *Trends in water quality for tobacco transplant production in float beds*;
- 23rd Annual Southeast Vegetable & Fruit Expo (Myrtle Beach, SC; Dec 2–3, 2008);
- Eastern N.C. Certified Crop Adviser Training (Jacksonville, NC; Dec 2–4, 2008)
  — presentation: *Nematodes: the hidden pest.*

Division staff authored, or co-authored, 18 professional articles (see appendix).

To facilitate increased awareness of clients' needs and problems, regional agronomists and other professional staff spent three days in September touring agricultural businesses in the Rocky Mount area (Edgecombe, Franklin, Halifax and Nash counties) that rely on division services. Stops included the Novozymes composting facility, Foster Family Vineyards & Harvesting (muscadines), Vollmer Farm (organic vegetables; strawberries & blueberries), Jim and Barbara Jones' farm (blackberries & sweetpotatoes) in Bailey, Greenleaf Nursery (ornamentals), the Upper Coastal Plain Research Station (cotton and peanut research), Patrick Edwards' farm (innovative tobacco curing system) in Whitakers and the Benvenue Country Club golf course (nematode management).

Research **(fiscal year summary)**

Division staff routinely conduct cooperative studies with university personnel, farmers and industry specialists. This year, cooperative research involved the processing of 4,205 soil samples; 3,762 plant/waste/solution samples; and 1,066 nematode assays.

The **Soil Testing Section** continued field work on vinifera grape fertilization (begun in spring 2007), conducted jointly with John Havlin, Ph.D., of the NCSU Soil Science Department. The section also collaborated with Eric Hinesley, Ph.D., of the NCSU Horticulture Department, to determine appropriate phosphorus and potassium rates for Leyland cypress. Section chief Hardy also served as an advisor for M.S. student Daniela Montalvo, who is studying the influence of layer manure on nitrogen availability, phosphorus release and lime value on three Coastal Plain soils.

The **Plant/Waste Solution Section** began a study with Keith Edmisten, Ph.D., of the NCSU Crop Science Department, to investigate the usefulness of adding petiole P and K data to plant tissue analysis reports. The section is conducting an on-going evaluation of tissue sample data from bramble crops across the state to fine-tune nutrient recommendations for new cultivars. The study to monitor how cotton petiole nitrate concentrations fluctuate during the day for the generative growth stages continued.

The **Nematode Assay Section** made progress toward equipping the lab with molecular diagnostic capabilities. As a result, section chief Ye was able to supplement assay results and resolve many critical nematode identification problems. With the help of research intern LaShonda Rawlins, he began a project involving the molecular diagnosis of major root-knot nematode species in North Carolina. Project goals include the ability to identify these nematodes by means of polymerase-chain-reaction–restriction-fragment-length-polymorphism (PCR-RFLP), DNA sequencing and real-time PCR.

Ye also assisted Yasmin Cardoza, Ph.D., of the NCSU Entomology Department, by conducting an entomopathogenic nematode assay. As a result, a new species *Oscheius carolinensis*, n. sp., was described based on DNA, ultrastructure and morphology. This description will be published in the journal *Nematology* in the upcoming year.

The **Field Services Section** conducted or participated in about 14 research and demonstration projects in fields throughout the state. These projects were designed primarily to optimize crop fertilization and nematode management efforts.

During 2008, division staff engaged in the following field studies:

- blackberry/raspberry baseline fertilization;
- cotton diurnal study to monitor petiole nutrient concentrations;
- demonstration of the benefits of wheat fertilization according to tissue test results;
- efficacy of fertilizer additives Avail, Nutrisphere & RH-77 (crops: corn, cotton);
- response of cotton to fertilization with ammonium sulfate;
- pre-sidedress nitrogen fertilization of corn;
- late application of nitrogen and additives to wheat;
- management of soybean cyst nematode with rotation and two new varieties; and
- nematode management in field production of peony.