

SERA-IEG-6 2014 ANNUAL MEETING

The Good Barn
University of Kentucky
Lexington, Kentucky
June 22-24, 2014

I. AGENDA

Sunday, June 22

5:00-6:00PM	Registration at Good Barn The Good Barn is walking distance from University Inn
6:00-9:00PM	Evening meeting (dinner, social, and meet) at the Good Barn
6:00-6:10PM	*WELCOME AND INTRODUCTIONS
6:10-6:45PM	Dinner
6:45-7:30PM	*SPONSOR PRESENTATIONS LabFit – Dennis Warrenfeltz Texas Scientific Products – Sergei Leikin & Doug Keene Spectro – Bob Dussich
7:30-9:00PM	SERA6 ADMINISTRATOR REPORTS Steve Workman, Assistant Dean for Research & Associate Director, College of Agriculture, Food and Environment Joe Zublena , Associate Dean, CALS and Director, North Carolina Cooperative Extension Service, North Carolina State University *STATE REPORTS (~ 5 to 10 min each)
	ADJOURN

Monday, June 23

8:00-8:15AM	UK Administrator Welcomes Jimmy Henning, Associate Dean for Extension, College of Agriculture, Food and Environment Darrell Johnson, Director, Division of Regulatory Services
8:15-8:45AM	<i>A Long Term N x Tillage Trial: The 45-Year Outcomes</i> John Grove Plant and Soil Sciences, UK
8:45-9:15AM	<i>Nutrient Management for Kentucky Farmers</i> Amanda Gumbert Plant and Soil Sciences, UK
9:15-9:45AM	<i>Soil Testing: Correlation, Calibration, and Interpretation</i> Hugh Savoy University of Tennessee
9:45-10:15AM	BREAK
10:15-10:45AM	<i>Automated Soil Sampling Technology</i> Allan Baucom North Carolina Grower
10:45-11:15AM	<i>Corn Potassium Dynamics</i> Bob Miller Colorado State University
11:15-11:45AM	<i>Modifying the Kentucky P Index using Published P Loss Data</i> Carl Bolster Animal Waste Management Unit, USDA/ARS

11:45-1:00 PM	LUNCH – SPONSOR PRESENTATIONS Thermo Fisher Scientific – Thomas Murphy & Gwyneth Trojan Elementar – Mark Larson
1:00-3:00 PM	Tour Labs at Division of Regulatory Services (Soils and Feed/Fert)
3:00-5:00 PM	Tour Town Branch distillery and brewery
5:00-6:30 PM	Break back to University Inn
6:30-9:00 PM	DINNER AT HILARY BOONE CENTER

Tuesday, June 24

8:00-8:30 AM	<i>Soil Quality/Soil Health Testing for Alabama</i> Charles Mitchell and Gobena Huluka Auburn University
8:30-9:00 AM	<i>Evaluation of Methods for Rapid Analysis of Soil Organic Carbon</i> Ling Ou and Gobena Huluka Auburn University
9:00-9:15 AM	BREAK – SPONSOR PRESENTATION ALP/CTS – Bob Miller
9:15-12:00 PM	Regional project proposals to evaluate soil test methods white paper discussion on NRCS and soil test adoption NAPT update, Tony Provin ALP update, Bob Miller NCERA13 update, Manjula Nathan Publications update Next year's meeting Voting for secretary Passing the gavel to Larry Oldham

Highlights of the 2014 SERA-IEG 6 Meeting

- 22 participants from 14 states, a representative from NCR 13 group, several staff from UK Testing Laboratory, and sponsors.
- Steve Workman is moving on with other duties more in Instruction at UK, and his advisory term will be handled by Nathan McKinney of Arkansas Agricultural Experiment Station.
- Tony Provin and Charles Mitchell will draft a white paper on Soil Quality and the Haney Soil Test Health adopted by NRCS.
- Tony Provin elected as the incoming secretary of SERA-IEG 6; Larry Oldham will be the incoming chair, and Leticia Sonon as the incoming vice-chair.
- The 2015 SERA-IEG 6 Annual Meeting host is the University of Florida c/o Rao Maylavaram and scheduled on June 7-9, 2015.
- All papers presented during the meeting are available in this link:
<http://www.clemson.edu/agrvlb/sera6/Meeting2014.pdf>.

II. ATTENDANCE

- **Administrative**

David Hardy, Chair

Larry Oldham, Vice-chair

Leticia Sonon, Secretary

Steve Workman, Research

Administrative Advisor

- **SERA-IEG 6 Members:**

AL	Gobi Huluka, Charles Mitchell
AR	Cindy Herron, Morteza Mozaffari, Nancy Wolfe
CO	Bob Miller
FL	Bill de Angelo
GA	Jason Mowrer, Uttam Saha, Leticia Sonon, Yang Yuangen
KY	Frank Sikora
LA	Rodney Henderson
MS	Keith Crouse, Larry Oldham
NC	David Hardy
OK	Kendall Henderson
SC	Kathy Moore
TN	Debbie Joines, Hugh Savoy
TX	Tony Provin
VA	Steve Heckendorn
NCR 13	Manjula Nathan

II. CONFERENCE HOSTS: University of Kentucky – Frank Sikora and Staff

III. CONFERENCE SPONSORS:

- 1) Agricultural Laboratory Proficiency Program – Bob Miller
- 2) Elementar Americas, Inc. – Mark Larson
- 3) LabFit – Dennis Warrenfeltz
- 4) Spectro Analytical Instruments – Bob Dussich
- 5) Texas Scientific Products - Sergei Leikin and Doug Keene
- 6) Thermo Fisher Scientific - Thomas Murphy & Gwyneth Trojan

June 22, 2014

Registration, The Good Barn, University of Kentucky, Lexington, KY

Dinner, Welcome and Introductions

Sponsor Presentations

State Reports

Frank Sikora welcomed the group and thanked those in attendance including the sponsors. After introduction of each participant, everyone was invited to have dinner provided by the sponsors.

SPONSOR PRESENTATIONS

The sponsors briefly introduced themselves, and four made brief presentations of their products. **Dennis Warrenfeltz**, representing LabFit, gave a brief presentation on the new controller and software that are more efficient and user-friendly than the system currently used by the laboratories. **Sergei Leikin and Doug Keene** of Texas Scientific Products introduced their company that designs, manufactures, and distributes ICP-AES, ICP-MS, XRF, and other products. Their company carries an ICP nebulizer for soil analysis marketed as Nebulizer Optimist. **Bob Dussich** of Spectro Analytical Instruments discussed the three ICP models of his company: Arcos, Spectroblue, and Genesis. All three instruments were shown to be useful in soil testing labs.

STATE REPORTS

ALABAMA (Auburn University - Gobi Huluka): The total number of routine soil samples is about the same as it was last year (~25,000 samples) and non-routine soil samples are still down due to limited grant activities and availability of individual lab services. The same is true for plant analysis. Forage analysis is about the same as last year with upswing potentials. Water analysis remains steady over many years unless specific projects are involved. We continue to use Vario Macro CNS analyzer for C, N and S. We are researching and doing a lot of soil analysis on Soil Quality Index with a help of a graduate and it is progressing well. The final result of the study will be shared with the SERA-6 group. Also, Solvita test is offered on a limited capacity for clients who request the service. We had a successful AU Soil Testing lab Advisory Committee meeting in June last year, and planning to have the forage committee very soon. We will be replacing a technician who had relocated after ten years of service to the lab and the people of Alabama.

ARKANSAS (The Agricultural Diagnostic Laboratory, Fayetteville – Nancy Wolf):

A. The Agricultural Diagnostic Laboratory located in Fayetteville, AR performed fee-based elemental analyses on a total of 31,328 samples including 1,118 forage, 246 plant and 183 soil (for diagnosis of nutrient deficiencies and/or toxicities), 1,154 dry- and 205 liquid-manure, 11,382 research plant, 3,862 research soil, and 12,536 prepared special samples during 2013. Additional samples were analyzed for the strawberry (631) and orchard nutrient monitoring programs with clients from several states. Samples were submitted by growers, the general public, and researchers from various institutions and industries.

B. We are now able to email almost all analysis reports out to the County Extension Offices for them to review and forward to the producer. We do not email directly to the producer unless they request it on the information form. This has been a big time-saver for us because we are no longer printing, collating, and mailing the several copies out. We have some issues with emailed reports getting lost in the incoming mail but it is easily remedied by emailing another copy when the office contacts us.

C. Databases of dry and liquid manure chemical properties were updated to include information from 2013 samples. Information on poultry litter WEP continues to be shared with the Arkansas Natural Resources Commission (ANRC) as a reference of mean values for nutrient management planning. We are still analyzing Euchi Spavinaw Watershed Manure samples for both 1:10 soluble P and 1:100 soluble P until the new P-index is finalized.

D. Again for 2013, the lab agreed to only accept soils for analysis from AR, MO, and IL in order to comply with the USDA stipulations for fire ant control in the state.

e. We are using a Spectro Arcos radial ICP for all of our samples except for chloride run on a 2000 model Cirros axial ICP. We have a service maintenance agreement for only the ARCOS ICP. We use an elemental Rapid N III for plant tissue nitrogen and an elemental Variomax for C/N analysis on soils, manures, and liquids. We use a Skalar SanPlus autoanalyzer for inorganic nitrogen in soil and manure.

F. The Fayetteville lab participated in the North American Proficiency Testing Programs in 2013. The Diagnostic Laboratory also maintained certification by the National Forage Testing Association Certification Program and the Manure Analysis Program.

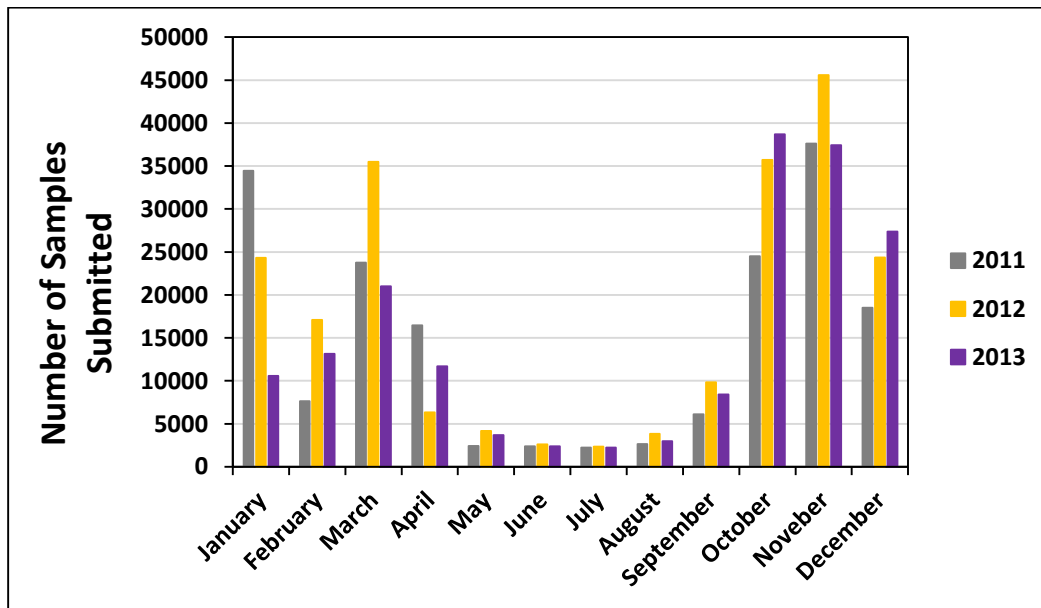
ARKANSAS (University of Arkansas Soil Testing and Research Laboratory, Marianna - Morteza Mozaffari, Cindy Herron and Nathan Slaton).

Soil Analysis

The Marianna Laboratory analyzed near record number of soil samples in 2013 despite a wet fall and spring. The total number of soil samples analyzed in 2013 was 179,592. These statistics indicate a continuous strong demand for our program. Of this total 164,626 samples were submitted by clientele and the remaining 14,966 samples were standard check soils analyzed for quality assurance. The monetary value of the customer samples tested in 2012 is more than \$2.47 million (based on \$15/client sample) while the annual operational budget of the Marianna soil testing laboratory was approximately \$1.1 million. This cost benefit comparison clearly demonstrates the substantial saving to Arkansas citizens by the Soil Testing Program.

The number of grid soil samples analyzed in 2013 was 115,597, which comprised 64.4% of all samples received compared to 64.5% in 2012. This suggests a continued interest in grid sampling and the importance of the need to address the special needs of this group of customers. The number of customer field average samples was 49,029, which shows a slight decrease from 54,574 samples in 2012. The turnaround time (sample residence time at the lab) for soil analysis was ≤ 8 days for 50% of the arrival dates, ≤ 15 days for 90% of the arrival dates, and ≤ 21 days for 100% of the received arrival dates. The time samples spent at the county office or in transit to the lab are not included in these statistics. The breakdown of client samples submitted by month for the past three years is shown in the figure below.

The Marianna Laboratory continues to participate in the North American Proficiency Testing Program (NAPT) coordinated by the Soil Science Society of America. In 2013, results from quarterly soil samples continue to show the soil test results from the Marianna laboratory for Mehlich-3 extractable nutrients and soil pH are accurate and comparable to other laboratories using similar testing procedures.



Plant Analysis

The number of plant samples analyzed by the laboratory has remained relatively stable compared to 2012. One hundred thirty seven cotton petiole samples were tested for NO₃-N, P, K, S and 1,541 plant tissue samples were digested and tested for total elemental analysis. The Marianna laboratory will continue to provide analytical services for the Cotton Petiole Monitoring Program (CNMP).

Personnel

A new Laboratory technician and a new Administrative Specialist were hired to fill the vacancies created by departure of the two staff members.

Publication

The Wayne E. Sabbe Arkansas Fertility Studies 2013 was published as a web (pdf format) only publication. The report is available at <http://arkansasagnews.uark.edu/8020.htm>

Facility Related Issues

- A. The new laboratory facility construction and remodeling officially started on August 27, 2013. The project will involve a preconstruction period and two construction phases to allow the laboratory to remain operational during the entire construction project. Soil receiving and analysis will be ongoing during the construction project. During the preconstruction period a new soil grinding room equipped with cyclonic dust collectors was built. A temporary soil receiving structure was established in the parking lot.
- B. Phase #1 will involve razing the rear portion of the facility's soil receiving area and in its place building a modern laboratory that will house the soil processing area and instruments. Phase I was initially scheduled to be completed by late April 2014, but the unusually cold and wet winter and spring of 2014 has delayed progress. It is now estimated that Phase # 1 may be completed by Oct. 2014.
- C. Phase #2 will involve renovation of the existing laboratory and front offices and will begin as soon as the equipment and instruments are relocated into the newly constructed laboratory.

Laboratory Analytical Methods and Instruments/Equipment

- A. Cindy Herron prepared the documentation for renewing certification with the Arkansas Department of Environmental Quality (ADEQ).
- B. Organic matter analysis by Weight Loss on Ignition was performed on 616 soil samples in 2013.
- C. A new large custom made mixing tank for preparation of large quantities of Mehlich-3 soil extraction solution was purchased. Once it is installed in the new laboratory, the new tank will improve our efficiency by allowing us to prepare up to 200 gallons of Mehlich-3 solution in one batch.
- D. Once Phase #1 of the construction is near completion and additional space is available, we intend to improve and upgrade the work flow in the main laboratory and soil receiving area pending availability of funds.

Service to the Public

Educational programs were developed and delivered as the opportunity arose to increase public awareness of the University of Arkansas Soil Testing Program. Two tours of the soil testing laboratory were given during the year. The activities and accomplishments of the soil testing laboratory were covered as a part of presentations made at commodity production meetings.

Miscellaneous Item

The soil sample pick up program was continued in 2013. The Marianna staff picked up more than 32,000 soil samples from 11 counties. At the current shipping rate of \$1.05 per sample, our

shipping cost for 32,000 samples would have been \$33,600. Our labor and mileage cost for the pickup program was estimated to be \$6,000. This program has enabled the Marianna staff to get the samples into the laboratory faster and save \$27,600 in shipping costs.

FLORIDA (University of Florida - Rao Mylavarapu).

Total Number of Samples FY13-14 through June 19, 2014 (Analytical Services Laboratories, IFAS):

	FY13-14	FY12-13
Extension Soil Testing Laboratory	13981	13561
Analytical Research Laboratory	25288	25826
Environmental Water Quality Laboratory	407	2484
Livestock Waste Testing Laboratory	286	413

Number of samples for the ESTL and ARL remain about the same. Samples for the EWQL dropped off further as less funding is available through DEP and the Water Management Districts.

No new instrumentation.

We are still waiting for our biannual NELAC audit – FDOH is behind in performing audits. Our new LIMS is in the final testing stage. It is a web based system that will be available from any computer. We are buying some new computers for the lab in preparation for the new LIMS.

Last summer, the lab switched from using Mehlich-1 to Mehlich-3 for soil tests. We ran duplicate extractions on 2500 soil samples from July through November.

GEORGIA (University of Georgia - Leticia Sonon)

Soil and Plant Testing Program. The number of soil samples received at the Agricultural and Environmental Services Laboratories (AESL) of the University of Georgia slightly decreased relative to last year’s submission. Few reasons for the decrease in sample numbers include the closure of a USDA research station near Athens, GA and overall decline in research grants. Plant tissue samples saw a significant rise in number, and these were mostly from UGA researchers.

Sample Type	May 2012 - April 2013	May 2013 - April 2014	Difference
Soils	72081	69488	- 2593
Manures	2060	1828	- 232
Waters	7389	8587	+ 1198
Plants	2657	4182	+ 1525
Feed and Forages	5150	3590	- 1560
Microbiology	2144	2368	+ 224
Georgia EPD contract	1243	745	- 498
Other	1126	2183	+ 1057
TOTAL	93850	92971	- 879

Poultry Litter Testing Program – Near infrared (NIR) technique for analysis of total nitrogen in poultry litter has been used by AESL for two years. The program has a high rate of success as measured by agreement with the reference combustion method. Moving into the next phase of this program, clients will receive a report (with fast turnaround) that includes total nitrogen, mineral nitrogen (NO₃+NH₄), organic nitrogen, uric acid, and mineralizable nitrogen. This package will inform the end user of the nitrogen that is immediately available, and The nitrogen that will become available to plants over a normal growing season of 3 months. We have suspended the practice of drying poultry litter samples as part of the sample preparation process. Drying changes the nitrogen chemical composition of poultry litter samples so drastically that we can no longer rely on the resulting material to adequately represent the original submission. A study is currently considered to investigate and predict the loss of plant available nitrogen in poultry litter with time and conditions of stacking/storage. The study will simulate stacking conditions and monitor changes in water content, temperature, nitrogen chemical profile, and pathogenic bacteria survival rates with time of storage. By-product gypsum as an amendment will be included with the hypothesis that gypsum will preserve the plant-available nitrogen while hastening the destruction of pathogens. If the hypothesis is true, added economic value can be assigned to poultry litter managed this way for vegetable producers.

Feed and Forage Testing Program. Carried out analytical work, prepared summaries for successful completion of Southeastern Hay Contest, Georgia Farm Bureau Hay Contest, and Piedmont Hay contest. Created a “Hay Directory Assistance Program” to help the hay sellers and buyers in forage quality based hay marketing in the southeast. 2013-14 is the first year of this program. Installed the latest 2013-updates of all NIRS forage calibration equations for forage testing.

Water Testing Program. We revised and developed the following extension circulars to support our water testing program:

CAES Publication Number	Title	URL
Circular 858-3 <i>Published in July/2013</i>	Home Water Quality and Treatment	http://aesl.ces.uga.edu/publications/watercirc/HomeWater.pdf?2
Circular 858-2 <i>Published in July/2014</i>	Testing for Water Quality	http://aesl.ces.uga.edu/publications/watercirc/TestingWaterQuality.pdf?2
Circular 858-8 <i>Published in April/2014</i>	Your Household Water Quality: Hydrogen Sulfide and Sulfate	http://aesl.ces.uga.edu/publications/watercirc/HydrogenSulfide.pdf?2
Circular 858-15 <i>Published in April/2014</i>	Your Household Water Quality: Removal of Hydrogen Sulfide and Sulfate	http://aesl.ces.uga.edu/publications/watercirc/SulfideRemoval.pdf

Crop Quality Testing Program. The Laboratory currently provides Brix, onion pungency, lachrymatory factor, sugar profile and methyl sulfide analysis on the Vidalia onions. A collaboration was formed between the lab and the Georgia Olive Growers Association, and a USDA Specialty Crop Block Grant was developed and funded. The lab began offering analysis of olive oil samples in the spring, and is currently pursuing accreditation of its personnel through the American Oil Chemistry Society for olive oil analysis.

Pesticide Testing Program. PHW continued providing support by; 1) continuation on fish analysis through GA EPD contracts, 2) providing analysis support to research faculty at UGA and other institutions, 3) supporting home owner and farmers in the State through routine analysis for pesticides.

New Instrumentation. Thermo ICAP 7400 Radial, Agilent 1260 Infinity HPLC with Variable Wavelength, Fluorescent Light, and Refractive Index Detectors, Agilent 7890A GC with Flame Ionization and Flame Photometric Detectors, Agilent 7890A GC with two Electron Capture Detectors, Spectra Max 190 Microplate Reader from Molecular Devices, and Brix handheld Refractometer, Elementar Rapid N Cube, and Foss XDS Rapid Content Analyzer (NIRS analysis system).

KENTUCKY (University of Kentucky - Frank Sikora).

In 2013, the Lexington and Princeton labs tested 32,000 and 18,500 soil samples, respectively. This was down from a record breaking year of 2012 that had a total of 60,000 samples tested. The number of manure samples tested in Lexington was 660 with 250 of those from producers and the rest from researchers.

The Lexington lab started using an automated extractor for ammonium acetate extractable CEC.

Both the Lexington and Princeton labs purchased a new control box and software for the LabFit. There have been some issues with the new items. The issue in Lexington has been minor and a workaround was found. The issue in Princeton was more serious causing delay in its use but it is now currently been resolved.

Kentucky experienced a very late winter this year. The busy season in the Lexington lab extended all the way until the middle of May. The normal end of the busy season is the middle to end of April.

LOUISIANA (Louisiana State University - Rodney Henderson).

The LSU AgCenter Soil Testing and Plant Analysis Laboratory analyzed 14,964 routine soil samples and 7,004 optional soil tests. This was a slight increase (3%) above 2013 routine numbers. The lab analyzed 6,171 plant samples in 2013 which was about back to normal compared to the 3,393 low in 2012. Irrigation water samples were down in numbers at 507 samples.

The lab has had a Foss NIRS DS2500 installed and will start doing forage samples in August. Associate Professor Kun-Jun Han has been transferred to our department from our Southeast Research Station and will be setting up this system.

Our fiscal year ends June 30 and we were able to get into the black about 2 weeks ago. This is a little later than it has been the last couple of years.

MISSISSIPPI (Mississippi State University – Keith Crouse).

The MSU-ES Soil Testing Laboratory analyzed 20,708 soil sample and 1,575 tissue samples.

NORTH CAROLINA (North Carolina Department of Agriculture - David Hardy).

The Soil Testing Section 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.

The lab also placed a new Arcos ICP online by September, 2013 and for the first time had 5 ICPs operating during the busy season. 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 robot was made by Automation Techniques out of Greensboro, NC; this is the same company that made the OM robot years ago.

Fees became a part of soil testing in FY 2014. A busy season fee was implemented by legislation passed. The \$4.00 per sample fee occurred during the time period of December 2013 – March, 2104. Revenue for the fee is earmarked for the lab to buy equipment the first two years. The fee

was designed to encourage early sampling; the lab has more capacity in the early fall months given low sample volume. Samples were submitted earlier than normal and heavy sample drop-off was high two to three weeks before the fee went into effect. The lab experienced drastic reductions in sample delivery after the fee. Turnaround time was 8 to 9 weeks after the large volume of samples were delivered but turnaround time decreased rapidly due to large lab analysis volume. The lab analyzed up to 2,900 to 4,300 samples a day depending on staffing. By mid-February, there was no backlog of samples. A wet cold winter seemed to influence low volume after the backlog of samples was cleared. In addition to this fee, the lab also ran its expedited service by selling shippers (525) for \$200 each that guaranteed a 2-week turnaround time. As related to the fee, the division implemented online sample information submission and credit-card payment for peak-season soil samples.

OKLAHOMA (Oklahoma State University - Kendal Henderson).

The total number of samples analyzed was 64,610 in 2013. We tested 29,580 soil, 4,592 water, 7,064 forage, 1,058 animal waste, 15 growth media, and 17,782 various research samples during the year.

We have not added any new equipment. We have done some remodeling to some rooms in our lab.

We are thinking about trading in our Spectro Arcos ICP for a Spectro Blue ICP.

We raised the price of TN TC from \$6 to \$8.

SOUTH CAROLINA (Clemson University – Kathy Moore).

Equipment. Retired TJA 61E after 22 years and purchased a new Spectro ARCOS which should arrive around the beginning of July. Purchased two pH analyzer computer upgrades from Labfit which will be installed sometime after this meeting.

Methods. Added heavy metals to the water testing program.

Sample Numbers. Lab totals have been fairly consistent across the board over the last several years. *Soil* – 55,792; *Plant* – 2,089; *Feed* – 1,102; *Water* – 544; *Waste* – 1,669; *Compost* – 68; *Other* – 5,032.

TENNESSEE (University of Tennessee - Debbie Joines).

The Soil, Plant and Pest Center (SPPC) analyzes soil, forage, plant tissue samples with additional services of plant disease and insect diagnosis for producers, homeowners and researchers in all 95 counties of the state. These are fee based programs.

January 2013 thru December 2013, our sample totals were as follows: **Soil** – 22,150; **Forage/Plant Tissue** – 1,759; **Plant Problem/Disease/Insect ID** – 633

Timberline Ammonia and Nitrate Analyzer (install 6/25/2014). Changed argon delivery to bulk-March 2014.

We have 1 full time lab technician, 1 full time diagnostician, 2 full time administrative support personnel and support for 3 student/part time employees. Modest price increases expected next fiscal year.

TEXAS (Texas A&M University – Tony Provin).

The Texas A&M AgriLife Extension Service Soil, Water and Forage Testing Laboratory processed a total of 40,531. The laboratory also developed six online calculators allowing website visitors the ability to obtain new fertilizer recommendations if yield or cropping changes are made after sample submission, nitrogen and nutrient cost, limestone cost and sprayer boom calibrations. Additionally, the laboratory purchased a new Spectro-Blue Axial ICP to replace its 2007 Spectro Arcos ICP. The laboratory also fully converted chloride analyses to its Metrohm IC.

TECHNICAL SESSIONS. All papers presented during the meeting are available in this link: <http://www.clemson.edu/agsrvlb/sera6/Meeting2014.pdf>.

Minutes prepared by:

Leticia Sonon
June 2014