SERA-IEG-6 2013 ANNUAL MEETING
Louisiana State University
Baton Rouge, Louisiana
June 16-18, 2013

In Attendance:

I. Administrative

--David Hardy, Chair
--Larry Oldham, Vice-chair
--Leticia Sonon, Secretary
--David Kissel, Extension Administrative Advisor
--Steve Workman, Research Administrative Advisor
--SERA-IEG 6 Members: Keith Crouse, Charles Mitchell, Gobi Huluka, Cindy Herron, Morteza Mozaffari, Robert Miller, Uttam Saha, Jim Wang, Rodney Henderson, Debbie Joines, Manjula V. Nathan, Kendall Henderson, Kathy Moore, Hugh Savoy, J. Stevens, David Sotomayor, Tony Provin, Nancy Wolfe

II. Conference Hosts: LSU - Jim Wang, Rodney Henderson and Staff

III. Conference Sponsors:

1) Agricultural Laboratory Proficiency Program – Bob Miller
2) Elementar Americas, Inc. – Ken Slight
3) Intuitive Consulting Solutions, LLC – Andrew Sparda
4) LabFit – Dennis Warrenfeltz
5) LECO Corporation - Andy Flores and Greg Moore
6) Perkin Elmer – Anthony Palermo
7) Shimadzu Scientific Instruments - Michael May
8) Spectro Analytical Instruments – Doug Keene
9) Technical Services - Gary Simpson
10) Texas Scientific Products - Bruce Moulton and Doug Keene
11) Thermo Fisher Scientific - Larry Bellan, Bridget Wallace, and King Chambers

AGENDA and MINUTES

June 16, 2013

5:00-6:30 PM **Registration,** Lod Cook Alumni Center at LSU Campus

6:30-8:30 PM **Dinner, Welcome and Introductions**
Sponsor Presentations
State Reports

Jim Wang 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. **Bruce Moulton** of Texas Scientific Products introduced his company that designs, manufactures, and distributes ICP-AES, ICP-MS, XRF, and other products. His company carries an ICP nebulizer for soil analysis marketed as Nebulizer Optimist. **Doug Keene** 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. **Gary Simpson** of Technical Services introduced his company and indicated that it custom-built equipment to suit the needs of its clients.

STATE REPORTS

ALABAMA (**Auburn University - Gobi Huluka):** The total number of routine soil samples is about the same as it was last year (~29,000 samples). Non-routine soil and plant are down due to less grants and researchers using their own instrumentation and providing "low cost analysis". Forage and water analyses are about the same as last year this time. Our payments, report delivery options, lime, organic and inorganic fertilizer calculators have been online and updated frequently. There is no personnel change at our lab. Our vario MACRO CHN analyzer from Elementar is doing fine, but helium prices are rising almost monthly. We will be including CEC and micronutrients in our routine reports in the near future. We have published, "The Basis of Soil Testing in Alabama" and "Nutrient Recommendations Tables for Alabama Crops" online and a hardcopy can also be printed. It is posted at soil testing lab website and Alabama extension systems for visibility. We will be offering forage NIR analysis for our forage

producers and consumers starting very soon. We are working on offering "Soil Quality Test" that will focus on organic matter, CEC, texture and water holding capacity determination.

ARKANSAS (The Agricultural Diagnostic Laboratory, Fayetteville – Nancy Wolf): The laboratory performed fee-based elemental analyses on a total of 30,783 samples including 1,733 forage, 314 plant and 161 soil (for diagnosis of nutrient deficiencies and/or toxicities), 1,348 dry- and 277 liquid-manure, 13,182 research plant, 3,710 research soil, and 9,477 prepared special samples during 2012. Additional samples were analyzed for the strawberry (548) and orchard (14) nutrient monitoring programs with clients from several states. Samples were submitted by growers, the general public, and researchers from various institutions and industries. Our forage analysis program is being updated to allow us to email completed reports to the County Office or Client. We are still testing the new program. The plan is to email all reports instead of mailing them. Databases of dry and liquid manure chemical properties were updated to include information from 2012 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. Again for 2012, the lab agreed not to accept any out of state soils for analysis in order to comply with the USDA stipulations for fire ant control in the state. 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 use an Elementar Rapid N for plant tissue nitrogen and an Elementar Variomax for C/N analysis on soils, manures, and liquids. We use a Skalar SanPlus autoanalyzer for inorganic nitrogen in soil and manure. The Fayetteville lab participated in the North American Proficiency Testing Programs in 2012. 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. For the 6th consecutive year the Marianna Laboratory analyzed record number of soil samples. The total number of soil samples analyzed in 2012 was 211,656. Of this total 193,991 were samples submitted by clientele and the remaining 17,665 samples were standard check soils analyzed for quality assurance. The monetary value of the customer samples tested in 2012 is more than $2.9000,000 while the annual operational budget of the Marianna soil testing laboratory is ~ 1,000,000. The number of grid soil samples analyzed in 2012 was 136,619 which comprise 64.5% of all samples received. The number of grid samples has increased at the rate of 18,366 samples/year since 2006. The number of field average based samples increased from 52,962 in 2011 to 54,574 in 2012. Turnaround time for 50, 25, and 15% of the samples arrived in the laboratory was 7, 12, and 14 calendar days respectively. Turnaround time for only 5% of samples was 20 calendar days.). The annual lab summary and fertilizer sales data is published in the University of Arkansas 2012 W.E. Sabbe Soil Fertility Research Series Bulletin

http://arkansasagnews.uark.edu/7506.htm. The Marianna Laboratory continues to participate in the North American Proficiency Testing Program (NAPT) coordinated by the Soil Science Society of America. In 2012, 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 decreased compared to 2011. One hundred sixty six cotton petiole samples were tested for NO_3-N, P, K, S and 1578 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).

Laboratory Analytical Methods, Instruments/Equipment, and Research. Cindy Herron prepared the documentation for renewing certification with the Arkansas Department of Environmental Quality (ADEQ). Organic matter analysis by Weight Loss on Ignition was performed on 781 soil samples in 2012. A new ICP-AES ARCOS model FHS 12 was purchased and brought on line in May 2012. This new instrument replaced an old one which was having frequent problems. A new CETAC auto sampler was purchased and installed on one ARCOS ICP. The ARCOS ICP + CETAC auto sampler increased the throughput by 50% compared to the ARCOS+ standard auto sampler. However, this modified instrument requires almost constant monitoring by a dedicated laboratory technician because the sample uptake is very fast.

Facility Related Issues. A new soil drying oven capable of drying 13,000 soil samples/24 hours was installed and will be functional in May 2013. The new oven will remove one of the initial bottlenecks in the soil testing process. The current Marianna laboratory was remodeled in 1984 to handle 40,000 samples per year, but the demand for our services has increased exponentially during the last decade. It is not uncommon for the laboratory to receive 40,000 samples in one month. The laboratory tested approximately 45,000 samples in November of 2012. The staff of the Marianna laboratory is currently working with SCM architectural firm of Little Rock to develop plans for upgrading the existing facility and build additional structure to increase available laboratory space.

FLORIDA (University of Florida - Rao Mylavarapu). Total Number of Samples FY12-13 through June 11, 2013 **(**Analytical Services Laboratories, IFAS**):**

	FY11-12	FY12-13	% change
Extension Soil Testing Laboratory	16973	13561	-20.1%
Analytical Research Laboratory	23089	25826	+11.9%
Environmental Water Quality Laboratory	6940	2484	-64.2%
Livestock Waste Testing Laboratory	316	413	+30.7%

Number of samples for the EWQL has dropped further this year as there is less funding available for projects through FDEP and the Water Management Districts. Some researchers have

mentioned short holding times for some parameters and the extra cost of analysis as reasons that they submit samples to the ARL rather than the EWQL. There was no new instrumentation purchased by the lab this year. The IT Specialist for LIMS has been replaced with a part-time student for logging in samples and sending extension reports. Other duties were absorbed by other personnel. 5. The new web based LIMS is in the testing phase. Two part-time computer students are helping with the testing in addition to helping with problems with the current LIMS. The EWQL is preparing for a biannual NELAC audit this summer or fall. All of the forms used by the ANSERV labs are currently being reviewed. The extension forms are being translated into Spanish. We are trying to be sure that only the current versions of our forms are available through the IFAS publication web site and from County Extension offices.

GEORGIA (University of Georgia - Leticia Sonon). The total number of samples received at the Agricultural and Environmental Services Laboratories (AESL) of the University of Georgia slightly decreased relative to last year's submission.

NIR Spectroscopy. Work continues on testing of software to calculate the nitrogen mineralization from Winter cover crops and poultry litter. Farmer samples of cover crops were submitted in spring 2012 for evaluation of their N release. Poultry litter samples were analyzed and a robust calibration was generated for total N. NIR spectroscopy is used to provide some inputs for the model. Additional data is being collected to further test the model for cover crops, but total N by NIR technique is already made available to the public. Analysis of total nitrogen in poultry litter is now done by NIR spectroscopy. This more efficient method is faster and eliminates loss of nitrogen in the drying process. During this same period, a large number of samples analyzed by the new method were compared with the previous method to ensure that the new results would continue to be of the same high quality. Research is almost completed to include ammonium, and expected release of plant available nitrogen from poultry litter to rapid analysis by NIR. Within the next year, the laboratory should have the routine analysis of both in place, improving its ability to estimate the amount of nitrogen from poultry litter that will be available to crops over one crop growing season.

Onion Quality Laboratory. In addition to the routine feed, water quality, forage and pesticide residue analysis programs at the laboratory, a new initiative was undertaken to provide nutrition and vegetable quality analysis for the **Vidalia Onion Growers**. It is anticipated that this effort will be expanded to the wine and olive growing and the oil seed production industries. The Laboratory currently provides Brix, onion pungency, lachrymatory factor, sugar profile and methyl sulfide analysis on the onions and is setting up to run fatty acid profiles and lipid analysis for the olive and oil seed producers. The laboratory in cooperation with the Georgia Department of Agriculture has purchased 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.

KENTUCKY (University of Kentucky - Frank Sikora). The number of soil samples remained consistent in 2012 with a total of around 50,000 samples for both the Lexington and Princeton labs. The lab is going to increase the routine soil test fee from $5 to $6 on July 1. The last time we increased prices was about 4 years ago as we increased them from $4 to $5. The new LabFit software and control box have been purchased for both LabFit in the Lexington and Princeton labs. Installation is anticipated for the summer. Bill Thom has retired for the Director position. We have a new Executive Director that has taken the position on August 1. His name is Darrell Johnson and he came from the animal feed industry. Last fall, the Division of Regulatory Services underwent restructuring with elimination of some positions and increased responsibility in other positions. Feed and Milk regulation are directed by one individual. Fertilizer and Seed regulation are directed by one individual. Laboratory oversight and management is directed by one individual. Frank has become the individual with the last responsibility accepting the position of Laboratory Director which started last Nov.

LOUISIANA (Louisiana State University - Rodney Henderson). The LSU AgCenter Soil Testing and Plant Analysis Laboratory analyzed 14,485 routine soil samples and 3,393 plant samples in 2012, which reflected a very slight decrease of soil samples and about a 50% drop in plant tissue analysis. The lab did have a significant increase in water samples going from 382 in 2011 to 876 in 2012. The prepaid mailing boxes seem to be working out well so far. We had to increase the mailing fee due to the post office raising their rates. There was no new equipment purchased for the lab this last year. We were able to be self-sufficient for salaries and supplies. We have contracted for a new LIMS for the laboratory that should be operational by August. Sample input and data capture are almost complete. Reporting is yet to be done. New LIMS will allow clients to log in and pay for their samples on line as well as view all their samples that have been submitted. They will also have ability to change crop to be grown in their history.

MISSISSIPPI (Mississippi State University – Larry Oldham). The MSU-ES Soil Testing Laboratory analyzed 20,096 soil and 1,798 tissue samples in 2012-2013. This was 7.7 % lower than last fiscal year. Current year late winter and spring rains were more frequent than the previous year probably was the reason for the decreased sample numbers. Dr. Bobby Golden, located at the Delta Research and Extension Center, is working on calibration and correlation issues, as well as other soil fertility issues, chiefly in row crops. He presented some of his work in the Nutrient Section of the meeting.

NORTH CAROLINA (North Carolina Department of Agriculture - David Hardy). Soil Testing - Fiscal year 2012, the lab analyzed 389,903 soil samples. For the fiscal year ending in 2013, we estimate around 3650,000 will be analyzed. A new LIMS was implemented for the 2013 fiscal year. For the 2013 season, turnaround time approached 10 weeks due to staffing issues. For the first time, the soil testing lab hired a temporary chemist from an agency and also received support from other divisions to decrease turnaround time due this situation. No new

equipment was purchased during the 2013 year. A new Spectro Arcos has been ordered for delivery in August, 2013. For the second year, the lab provided an expedited service for $100 per 36 samples with about 28,000 analyzed. Currently given pending legislation, the lab is expecting a fee on soil testing at $4.00 per sample for samples arriving during the December 1, 2013 – March 31, 2014; the fee is in place to encourage early sampling so more samples can be possibly analyzed in the September – November timeframe. The expedited service will also be offered but likely the fee will be $200 per 36 samples. This summer, the lab is working on salt pH measurement study using 0.01 M $CaCl_2$.

OKLAHOMA (**Oklahoma State University - Kendal Henderson).** The soil testing lab did a total of 76,381 samples last year including soil, water, forage and animal waste. Of those 19,016 were research samples. We acquired a LabFit AS3000 pH robot with the newest software version. There were no major personnel changes.

PUERTO RICO (**University of Puerto Rico – David Sotomayor**)

David is a professor of soil fertility at the University of Puerto Rico and do research in water quality and nutrient management. He is stationed in the Mayagüez campus of the UPR system. He has a research laboratory that runs a few tests on some soil and water samples. But, most of his research samples are sent to external (private) laboratories for analysis. He collaborates with Dr. Gustavo Martínez in water quality work in rivers, streams and lakes of Puerto Rico. For a number of years they have been working on developing nutrient criteria in these aquatic systems, with the goal that these will serve to establish fundamentally sound nutrient standards. Dr. Martinez is in charge of the water quality laboratory, which specializes in nutrient (N, P) analysis.

David's interest in participating with the SERA-IEG-6 group lies in that he is interested in interacting with fellow researchers, and gathering information towards improving his knowledge base in soil test calibration research. He is interested in knowing how they can adapt the technology developed in the US to soil conditions and crops in the tropics. He is also interested in learning more about new soil testing analytical techniques and methodology, and strengths and limitations of these. He is regularly involved in making fertilizer recommendations.

The PR Department of Agriculture operates a pesticide, soil, water, plant, and fertilizer testing laboratory for the general public. They run about 600 soil samples a year and about 400 plant samples a year. The laboratory is also responsible for registering pesticides and fertilizers for agricultural use. The laboratory oversees pesticide residues in food and feed. The laboratory

oversees all regulatory aspects associated with fertilizer, feed and pesticides. Puerto Rico has a fertilizer Law and the laboratory is partly responsible for executing said law. The laboratory is understaffed and under budgeted. It would be David's interest that they incorporate some of the aspects that are discussed in the SERA-6 meetings.

SOUTH CAROLINA (Clemson University – Kathy Moore). 2012 Totals for the laboratory: Soil – 54,653; Plant – 2,339; Feed – 1,039; Water – 451; Waste – 1,773; Compost – 67; Other – 5,308. Installed 2 out of 3 new acid scrubber fume hoods made by Salare. Once all hoods are in place the roof will be recovered by a new thermoplastic membrane. Purchased service contract on the ARCOS ICP for a second year. (The first year's contract paid off.). Had a tune up done on the 21 year old TJA 61E ICP – still running.

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 2012 thru December 2012, our sample totals were as follows: Soil – 23,850; Forage – 1,543; Plant Problem/Disease/Insect ID – 694.No new instrumentation. 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 Soil, Water and Forage Testing Laboratory processed approximately 45,000 samples in 2012. The laboratory added an ICP, carbon analyzer and is continuing its programming efforts on a new LIMS. The laboratory also is working with Extension specialists on various precision agriculture management tools including the evaluation of apparent soil EC measurements as a mechanism for determining field variability and optimum soil sampling locations.

June 17, Monday

Administrative Session: 8:00 – 8:20 am

Welcome address by Dr. B. Roger Leonard, Assoc. Vice Chancellor and Associate Director of LSU AgCenter. Dr. Leonard welcomed the group to LSU and encouraged everyone to explore the campus and enjoy their stay. He graciously offered assistance to everyone to make their visit at LSU pleasant and comfortable.

Administrative Reports. Jim introduced **Dr. Steve Workman**, SERA-IEG 6 Research Administration Advisor and **Dr. David Kissel**, the group's Extension Advisor. Steve informed the group that the new project was approved at the last Experiment Station directors meeting in September. This means the SERA6 project will extend for another 5 years. He said that the group was doing a great job in addressing pressing issues and encouraged everyone to document achievements and continue working on the publications. He announced the appointment of Dr. Joe Zublena, Director of Cooperative Extension- NC State University as the incoming next Extension AA following the retirement of Dave Kissel. Steve expressed his appreciation to have worked with the group in the last 3 years. He thanked Jim and Rodney for their efforts in organizing the meeting. In his remarks to the group, Dave Kissel informed the members that he has retired from the University of Georgia, but was returning to work on a part time basis. Dave mentioned the importance of soil fertility, its evaluation, the use of fertilizers, and its importance to all members of the society. He said that food used to be expensive early in the 20th century and that in the U.S., a typical person spent 30% of his /her income for food, but with improvement in soil fertility and the use of fertilizers, food expense has decreased to less than 10% of one's

income today. Less costly and good quality food has had a very positive benefit to all society, allowing a great improvement in the standard of living. He emphasized the important role that the SERA-6 committee has had and will continue to have for proper fertilizer use based on soil testing and plant analysis. He stressed the importance of continuing to improve technology in laboratories, to broaden the services they provide, and the special importance of top quality laboratory work and providing accurate recommendations to clients. He wished the group continued success in the future. After his message, the Chair of SERA-IEG 6, David Hardy, presented Dave Kissel a plaque of appreciation for his contribution to the group.

TECHNICAL SESSION 8:20 am - 12:00 pm

Dr. B. Roger Leonard started the session by talking about the recent highlights of Louisiana Agriculture. He talked about the history of the state including the United States' purchase of Louisiana from France in 1803. He emphasized the importance of agriculture to the state - the agricultural products contributed $7.2 billion to the state's economy in 2012. He highlighted the top 10 commodities of the state: Forestry, poultry, sugarcane, soybeans, feed grains, beef cattle and calves, marine fisheries, rice, horses, and aquaculture.

Brenda Tubana, a soil fertility faculty member of LSU, delivered a paper on soil fertility research in LA for efficient management of NPK fertilizer in row crop production. Louisiana agriculture is diverse, consisting of a wide array of crops growing on different soil types. Soils along the alluvial plain and loess origin are commonly cultivated to row-crops such as cotton, soybean corn and sugarcane. With the adoption of new soil test analytical procedures, high yielding varieties and production technologies, the fertilizer recommendation guidelines for these crops have to be validated regularly. From the concerted effort of soil scientists and agronomists from LSU AgCenter, every year multiple field calibration trials for nitrogen, phosphorus and potassium are established at different locations in Louisiana. The data generated from these studies are used to validate the soil test interpretation and fertilization guidelines that were established decades ago. Utilizing soybean and corn field trials from 2004 to date, the critical soil test P level using Mehlich-3 procedure was established at 35 ppm. In addition to validation work, effort is also invested in increasing precision of P recommendations through the integration of P buffer coefficient. Soil P buffer coefficient which is the amount of soil P increase per unit P added can be estimated using short term laboratory incubation method. Apart from conducting N response studies every year, the application of optical sensing technology in

N management has been studied since 2008 for sugarcane, rice, cotton and corn. Results from multiple N response studies have shown how crop N requirement vary in time and space. With the use of optical sensing, crop N health status can be evaluated instantly wherein treatment, if recommended, can be done on a management zone basis using Excel-based N calculator or treat the field on-the-go using the more sophisticated variable N rate applicator. Several small-scale research plots and large-scale field demonstration plots for cotton and corn have been established to compare the performance of sensor-based N recommendation with the farmer's standard N management approach. The outcome of these studies were very encouraging as both N use efficiency and net return to N fertilizer were enhanced for more than 60% of the studied area. Improvement in the sensor-based N recommendation may come from integrating the economics (cost of fertilizer inputs and price of commodity) in the algorithm and combining with in-season soil N testing (e.g. preplant and presidedress nitrate).

Rao Mylavarapu talked about Diagnostics for Environmental Assessment of Phosphorus. Coastal Plain soils form the largest physiographic region in the southern United States and the entire state of Florida falls under this physiographic classification. These soils have sandy surface textures and are acidic in reaction requiring extremely good lime, nutrient and water management for successful agricultural production. Spodosols, Entisols, Alfisols, and Ultisols comprise the major soil orders in Florida. Surface textures of these acid-mineral soils in Florida are typically >95 sandy with an average soil organic matter of 1% and a CEC of <10 meq/100 g. Therefore, understanding the inherent fertility of soils is primary to successful nutrient management, crop production and environmental protection in Florida.

Fragile ecosystems such as the Springs of the Suwannee basin, Lake Okeechobee, and Everglades in Florida are impacted by nutrients, particularly nitrogen (N) and phosphorus (P). Several Best Management Practices (BMPs) are in place for all the major agricultural commodities grown in the state. Typically soil testing is the most easily accessible predictive/diagnostic tool for managing P in soils for crop production and is the first and foremost BMP for scientific P management. Soil tests may not, however, provide adequate insight into the environmental fate of applied P under certain specific instances. Most surface soils of these soil orders have iron and aluminum coatings giving rise to various degrees of sorption capacities; however, A horizons of Spodosols may be stripped down to clear quartz devoid of any coatings and reactivity due to long term seasonal water table fluctuations. Soil retention of applied P will therefore be directly dependent on the finite sorption capacity based on the degree of Fe and Al coatings of surface soils. So, a soil sample from the A and E horizons may test deficient in P, which may be due to inherent lack of Fe and Al coatings and therefore the adsorption capacity. In such circumstances, potential loss of applied P to the environment will be significantly higher.

Researchers in the Soil & Water Science Department, University of Florida have been investigating methods that will improve the accuracy of environmental impact prediction of applied P to agricultural lands for the past decade. Our intention is to develop a technical tool

that can be complemented with the routine soil test without additional burden of sampling and testing separately. The soil testing program in Florida currently uses Mehlich-1 (M-1) extractant for analyzing soil nutrients. Although oxalate extractable P is most linearly related to water soluble P (WSP), oxalate extraction for routine method for soils labs is not practical due to the need for dark reaction setups in the labs. However, our research has shown the strong linearly significant relationship between WSP and Mehlich-3 (M-3) and to a lesser degree with Mehlich-1.

We have developed the Florida Phosphorus Index (PI), specific to the soils of Florida, to assess the risk of P loss applied from organic sources. Similar to most other states, soil test index was included in the original PI. However, subsequently, we introduced 'Capacity Index' or 'P Saturation Ratio' (PSR) in place of soil test, where the soil test P value is only a part of the Capacity Index calculation.

PSR = (M-1 Extractable-P/31) / [(M-1 Extractable-Fe/56) + (M-1 Extractable-Al/27)]

Various relationships between WSP and PSR, oxalate and M-1 or M-3 PSRs, manure impacted vs. un-impacted soils, and for surface and subsurface soils have been developed. Subsequently, an equation to estimate the P release potential of the soil was developed after determining precisely the point of inflection between the strong adsorption and release phases. The following two equations show the SPSC calculations for the surface and the subsurface (Bh) horizons, where 0.1 and 0.08 represent the inflection or change points for A and E and B horizons, respectively.

A and E horizons:

SPSC = (**0.1** – Soil PSR_{M1}) * Mehlich 1-[(Fe/56) + (Al/27)] * 31 * 1.3 (mg/kg)

Bh horizons:

SPSC = (**0.08** – Soil PSR_{M1}) * Mehlich 1-[(Fe/56) + (Al/27)] * 31 * 1.8 (mg/kg)

Correction factors of 1.3 and 1.8 were included to normalize the relative extractability strengths of M-1 compared to M-3 and oxalate.

Currently, a graduate student is conducting research on P isotherms, linear and non-linear, Langmuir and Freundlich relationships, to estimate the maximum P-retention capacity of a soil by measuring the amount of P a soil can hold when equilibrated with relatively high solution concentrations of P. Higher bonding strength (k) indicates stronger bonding energy of P with Fe and Al oxides (i.e., low solution P). Determination of Langmuir isotherms and subsequent calculation of the P bonding strength (k), and the equilibrium P concentration (EPC_0) of a soil is tedious and time-consuming process. A strong relationship between PSR/SPSC and k will remove the constraint and ensure robust estimation of soil's capacity. EPC_0 and P bonding strength (k) and Freundlich K_f can be estimated from P, Fe and Al in an oxalate or soil test solution like Mehlich 1 (Nair et al., 2004) easily obtained from a soil testing lab.

Langmuir k or Freundlich K_f increases with increase in positive SPSC (i.e., below the threshold soil PSR); such a relationship cannot be obtained from a k_L/PSR or K_f/PSR relationship which just indicates that k is high. The k_L/PSR K_f/PSR relationship is applicable to surface horizons of all Florida soils where the Fe and Al content are lower and Bh horizon of Spodosols where A and E horizon have no P adsorption capacity. Soils with different bonding energies (k) and K_f could potentially be used to rank the risk of P loss from land-use systems. A simple procedure for determining k would be valuable when such values are needed as input in models for predicting P release from soils on a site-specific basis.

Jim Wang talked about biochars derived from sugarcane and rice residues: properties and functions. Fundamental properties of biochar produced from sugarcane and rice residues and their environmental functions were evaluated. In general, sugarcane and rice residue biochars exhibited different elemental compositions with sugarcane leave and rice straw biochars having higher total and Mehlich 3 extractable K and Ca contents than sugarcane bagasse and rice husk biochars. Charring at high temperature decreased N and S contents but increased P, K, Ca, and Mg. Increasing pyrolysis temperature also caused the loss of surface structures of biochar. Soils treated with either sugarcane harvest trash or bagasse char enhanced water holding capacity as well as adsorption capacity of atrazine, a common herbicide used in sugarcane production. Biochar amendment also enhanced sugarcane growth with in a potting experiment.

Break: 10-10:20 am.

Gobi Huluka – A Buffer for Acid Requirement of Soils. It is not unusual to encounter soils that have high pH for certain plants to grow optimally. The causes of high pH are overliming, free Ca/Mg carbonate parent materials and high concentrations of OH^-, HCO_3^- and CO_3^{-2}. Even though there are many proven materials that will reduce soil pH, there is a lack of rapid method to determine the amount of acidifying materials that can be applied to soil to reach a target pH. The objective of this study was to develop a rapid laboratory method that will determine the amount of acid needed to lower a soil pH to a target pH value. A 10 mL soil samples were equilibrated with 10 mL of H_2O and 10 mL of the buffer added to the soil solution (1:1:1). A simple relation was developed that is parallel to the widely used lime requirement procedure and determines the amount of acidifying material (sulfur) needed to adjust a soil pH to a targeted value. The procedure worked very well for soils that do not have free carbonate parent materials and poorly buffered soils.

Hugh Savoy - Tennessee's Review of Fertilizer Enhancement Products. Field trials are currently conducted in Tennessee to evaluate the efficacy of various fertilizer enhancement products including AGROTAIN, Nutrisphere, and Avail.

Nutifafa Adotey and Leon Young– Evaluation of Biomass Power Plant Wood Ash as a Liming Material for Agricultural Soils in East Texas.
Application of wood ash from biomass power plants has the potential to reduce soil acidity, improve nutrient availability and increase yields of agricultural crops. A greenhouse pot study was conducted to compare effects of wood ash and commercial agricultural limestone on soil properties and growth of common bermudagrass. The experiment was a randomized complete block design with three lime sources applied at six rates on two acid soils grouped into four blocks. Lime sources were mixed with one thousand grams of each acid soil at six rates corresponding to 0, 0.5, 1, 1.5, 2, and 4 times the lime requirement of each soil expressed on an effective calcium carbonate equivalent (ECCE) for each of the three lime sources. Core soil samples were collected from each pot after three weeks of incubation and final clipping. Samples were analyzed for salt pH, buffer pH, electrical conductivity, Mehlich III extractable P, K, Ca, Mg, and KCl extractable Al and Mn. Grass sprigs were planted in pots after incubation. Grass was clipped on day 42 and 82 from planting. Lime application significantly increased soil pH of both soils at the end of incubation. Elevation in soil pH was not significantly different for lime sources except at highest rates where wood ash amended soils were higher. Soil pH declined in Darco amended soils after final clipping due to acidity from N fertilization. There no meaningful pH difference between lime sources. Grass yield increased by as much as 100 percent in amended Darco soils at half the recommended lime rate, however differences were not observed beyond this rate. Grass did not respond to liming effect or lime sources in Nacogdoches soil. Results indicate that wood ash is as effective in changing soil pH as commercially available limestone sources.

Chris Sanderson and Leon Young. An Evaluation of K in Biomass Power Plant Derived Wood Ash for Agricultural Use. A greenhouse pot study was performed to compare potassium (K) found in biomass power plant derived wood ash to commercially available potassium fertilizer (KCl). Wood ash was collected from the Aspen Power Plant located in Lufkin, Angelina County, Texas. In this study both wood ash and KCl were applied to 1000 g of a Darco soil collected in Nacogdoches County, Texas. The soil selected was determined through previous studies to be both low in plant available K and responsive to K fertilization. The experimental design of the study was a randomized block with 4 blocks treated with ten rates of K (0, 20, 40,

60, 80, 100, 200, 300, 400, and 600 mg K kg^{-1}) with two sources, wood ash and KCl . The soil was sampled from each pot after four week incubation period and after the harvest of the test species, corn (*Zea mays*). Soil samples were analyzed for soil pH, salt pH, electrical conductivity, and Mehlich III extractable P, K, Ca, Mg and S. Corn was planted after the incubation period and was harvested at four weeks. Dry matter yield and chemical analysis of the soil and plants showed that wood ash gave K responses similar fertilizer K at lower rates, however at higher rates soil and plant analysis showed wood ash K was not as available as the K from KCl.

Uttam Saha - Prediction Gross Calorific Value, and Carbon, Nitrogen & Sulfur Contents of Loblolly and Slash Pine Biomass Using Near Infrared Spectroscopy¨ Given a worldwide increased energy demand with a consequent increased use of biofuels, it is necessary to develop new technologies and techniques to improve efficiency of biomass production, biomass screening and biomass-to-energy conversion systems. Gross calorific value (GCV) and total carbon (C) content of biomass are the two of the critical properties of interest in biomass screening process for biofuel production potential. Total nitrogen (N) and sulfur (S) contents in plant at various stages of growth are useful and effective tools for designing and implementing appropriate nitrogen and sulfur fertilizer management strategies to maximize biomass production along with higher nitrogen and sulfur fertilizer use efficiency. Therefore, non-destructive spectroscopic sensing techniques have the potential to be an accurate method to rapidly determine the GCV and CNS contents of biomass to be used in biofuel industry. This presentation discussed Near-infrared Reflectance Spectroscopic calibration equations developed at University of Georgia to determine GCV and CNS contents of woody biomass of 8-17 years old loblolly pine (*Pinus taeda*) and slash pine (*Pinus elliotti*) trees from Piedmont and Coastal Plains of Georgia. Prediction of an independent validation set of 92 samples for GCV and 45 samples for CNS contents showed significant correlation between the NIRS predicted values and the reference values based on the low standard error of prediction, high coefficient of determination in prediction, and ratio of standard deviation for prediction greater than 2, thereby characterizing the equations as having good quantitative information. The results suggested that NIRS could be used to rapidly determine GCV and CNS contents of woody biomass of loblolly and slash pine biomass to support bioenergy research and industry.

LUNCH 12-1 PM.

FIELD TOUR 1-5:30 pm

Visit to the Turtle and Alligator Farm. The group travelled to Hammond, LA to visit the Kliebert's Turtle and Alligator Farm. It was a guided adventure with a walk through the Swamp People Trail. The guide showed the production facilities of turtles, their mating and eating habits. The adventure continued on to the alligator ponds. The tour guide described the feeding habits

and reproductive cycle of alligators. Along this tour, the group saw the feeding crew as he walked right up to the gators and hand feed them.

The alligator farm visit was highlighted by some SERA-IEG 6 members actually touching the animal while its mouth was securely taped. Rare turtles were also shown.

Everyone had fun!

Laboratory Visit. **LSU Soil Testing Lab and Louisiana State Regulatory Laboratory Tour.** The group was divided into two to keep a manageable number of people entering a laboratory. One group led by Rodney Henderson started with the LSU lab, while the second group went to State Lab. Tour hosts were very generous of their time in showing the various analytical activities and instrumentation of the lab. The group expressed their appreciation for the opportunity to visit these labs.

LSU Soil Testing Laboratory

Louisiana State Regulatory Laboratory

Dinner and Sponsor Presentations 6:30-8:30 p.m.

Five sponsors gave their respective presentations: **Bob Miller** of Agricultural Laboratory Proficiency Program, **Ken Slight** of Elementar America, **Andy Flores** of Leco Corp., **Tony Palermo** of Perkin-Elmer, and **Tom Murphy** of Thermo Fisher.

Tuesday, June 18

Concurrent Technical Sessions (http://www.clemson.edu/agsrvlb/sera6/presentations1.htm**)**

A. Laboratory Session

8-8:30 – Detection Limits, Kathy Moore

8:30-9:00 – Lab QA/QC – Leticia Sonon

9-9:30 – Troubleshooting Bias in the Laboratory – Bob Miller

B. Nutrient Management Session

8:00 - 8:30 – Soil Fertility Management for High Population Corn – Carl Crozier

8:30 – 9:00 – Current Calibration Work in Mississippi – Bobby Golden

9:00 – 9:30 – Alabama Update on Soil Test Calibration – Charles Mitchell

Break: 9:30-10:00

During the break, **Andrew Sparda** of Intuitive Consulting gave a presentation about his program in using respiration test.

Business Session - David Hardy, Presiding.

NCERA – 13 Update - Manjula Nathan.

The NCERA 13 Committee was held the day before the 21st North Central Soil and Plant Analysis Workshop, which was held on February 26-27, 2013 at Iowa City, IA. Educational workshop conducted covered topics of crop sensors for assessing N fertilizer needs, soil sampling recommendations as influenced by fertilizer placement, biochar quality and testing, soil testing on moist soils and slurry method, NCERA-13 website and developments, history of plant analysis, interpretation of tissue test results for P and K for corn and soybeans, summary report on plant analysis surveys for corn, soybeans, wheat and alfalfa in MN and WI, and relationship

among Bray, Mehlich, soluble and bioavailable P in soils, and developing a national database for improving nutrient removal estimates in US. The group discussed future involvement of private labs as part of the NCERA-13 committee discussions on relevant topics. Discussion was focused on the topic of advantages and disadvantages of private labs involvement. Overall consensus was favorable for commercial lab involvement with NCERA-13 because of their laboratory experience. A decision was made to invite one representative from each North Central laboratory for the NCERA-13 morning session of the Workshop each year. The next workshop year is 2015.

Some major highlights of the topics discussed: Potassium testing moist soil: What can/should we do? Iowa State has good field calibration. Discussion of a sample exchange. A few states were interested in an exchange to determine within and between lab variability especially with slurry method. Antonio Mallarino will take the lead on this.

Manjula also expressed interest in having a representative from the SERA6 attend the NCERA-13 meeting as she does ours.

Publications

North Central Region Research Publication on Recommended Chemical Soil Test Procedures for the North Central Region - NCR 221 (revised) as of Jan. 2013. Will be online only version. As chapters are revised, the online version will be revised. The revision date for each chapter will be put on Contents page as well as on Chapter itself. Acknowledgements, Introduction and Contents page were recently updated. The manual can be found at: http://ncera-13.missouri.edu/pdf/sb1001_updatedJan2013.pdf 221. Manjula Nathan and Ron Gelderman serve as the editors.

Chapters 1 – Soil Preparation and Chapter 4 – pH both were revised in 2012.

Chapters 14 – Greenhouse and Chapter 15 – Quality Assurance revised in 2009.

Chapter 6 – Phosphorus. Discussion on Mehlich III by ICP and colorimetric methods to be included.

Other chapters of OM, Chloride, Nitrate, should soon be revised.

Discussion of Micronutrient chapter. Correlations with DTPA, Iowa good for Zn and Cu, not so good for Mn. In Minnesota, Dan Kaiser is working on micronutrients research on corn and soybeans.

Sulfur chapter – draft submitted by Dave Franzen. Discussion that the draft had more calibration and correlation material than other chapters. Although this is excellent and needed material, it does not fit format of other methods chapters. Consensus of committee is that the draft be split

into two; 1) A white paper concerning the calibration/correlation of sulfate-S tests to be listed on the website, and 2) the sulfate-S methods chapter

NAPT Update – Frank Sikora.

Tony Provin was voted as chair of the NAPT committee this past fall. The number of labs in the program is approximately 130. A price increase occurred this year at around 5%. Staff has increased to improve efficiency and timeliness. A new web-based program is working well for data entry. Generated reports are the same as they have been in the past.

SERA-IEG 6 Publications

Frank Sikora provided an update on the Methods Manual. He has reviewed all chapters and will send out to lead authors for their final review and approval. The deadline would be August 1.

Hugh Savoy will update has recently updated the procedure bulletin 409 per information from this meeting. **Leticia Sonon** expressed interest in taking on this responsibility as Hugh has decided to pass them on to someone else.

Charles Mitchell raised concerns of it taking too long for publications to get finished and published. There was much discussion about why this occurs and the need for their review. The difference between listings of fact sheets and publications was also mentioned. It was decided that **Kathy Moore** would separate out the Fact Sheets from the Publications as a separate link to make them easier to find.

David Hardy raised the concern of some publications or fact sheets developed or talked about at past meetings that were never published- **Mineral Nutrition of Forages, Calibration, and CEC**. The forage publication that **Debbie Joines** and the late **Paul Vendrell** had worked on was discussed as it was never published. The publication was completed but needed review. **Uttam Saha** agreed to review. The goal was to have this publication read as soon as possible.

A publication on calibration was being planned cooperatively with a subcommittee chaired by **Dave Kissel**. The subcommittee was to consist of the following states: AL, GA, TN, TX, MS, NC, FL, and OK. The publication never materialized. Due to Dave's retirement, he can no longer commit to this. There was discussion of a need for this.

A fact sheet on CEC was being developed by **Leticia Sonon**. She will move forward to complete this publication soon.

Poultry Project Update- Carl Crozier

Progress has been very slow on this, I admit that I no longer have grant funds to support any poultry litter work, so it has been difficult to keep up with the process. Nevertheless, we still have a process underway that should allow individual chapters to be circulated internally for review. Each chapter could be individually added to a SERA-6 web publication as it becomes

available. To date, I note the following progress: Chapter 1. Composition (N. Slaton) – outline submitted; Chapter 2. Storage effects (C. Mitchell) – prior publication manuscript submitted; Chapter 3. Mineralization (R. Mylavarapu) – rough draft prepared; Chapter 4. Volatilization losses – no action; Chapter 5. Specific cropping system examples (field crops & forages) – no action; Chapter 6. Vegetable cropping system examples (G. Hochmuth) – outline submitted; Chapter 7. Litter application alternatives (C. Crozier) – outline submitted; Chapter 8. Residual soil & environmental effects (C. Crozier) – outline submitted.

SPAC Update- Bob Miller. He discussed the success of the past ISSPA meeting in New Zealand. Plans are being made for the next meeting- 2015 ISSPA in Kona, Hawaii! Bob also reported on the latest SPAC tour through labs in the southeastern US; the NCDA, Clemson and UGA soil testing labs were visited and also the group stopped at CEM in NC.

2014 SERA Meeting: The 2014 meeting is planned to be held in Kentucky with Frank Sikora the host. The date is June 22 through 24, 2014.

The meeting was adjourned after Jim and Rodney were thanked for hosting a great meeting!

Minutes prepared by:

Leticia Sonon and David Hardy
June 20, 2013