SERA-IEG-6
Nutrient Analysis of Soils, Plants, Water, and Waste Materials
Southern Extension and Research Activity Information Exchange Group 6
Annual Meeting, June 5-7, 2005, Oklahoma State University, Stillwater, OK
Hampton Inn Conference Rooms

In Attendance:
1. Administrative:

Hugh Savoy, Chairman
Hailin Zhang, Vice-Chair
Rao Mylavarapu, Secretary

Bob Westerman, Administrative Advisor, Research
David Kissel, Administrative Advisor, Extension

2. Local host: Hailin Zhang
3. State Representatives: See Participants Listing
4. Sponsorship:
a. Leco - Dennis Kuhn
b. Spectro - Bob Dussich
c. Lachat - Fred Brinkerhoff
d. Texas Scientific Products - Bruce Moulton
e. Varian - Dennis Goodpasture
f. Oklahoma Cooperative Extension Service

June 5, 2005
-Registration and Social

June 6, 2005, Monday

-Breakfast; Registration continued

8:00 AM **Opening Remarks by Hugh Savoy, Chair** and the meeting was called to order.

***Dr. Robert Westerman*, Assistant Director, Oklahoma Agricultural Experiment Station** introduced **Dr. *Robert E. Whitson*, Vice President of Agricultural Programs and Dean and**

Director for the Division of Agricultural Sciences and Natural Resources, Oklahoma State University . Dr. Whitson officially welcomed the group to the state and underlined the value of fertilizers and nutrients, price of nitrogen fertilizer, and the welfare of the producers. He mentioned that several private laboratories are offering soil testing services in the state.

Administrative Advisors Drs. Westerman and Kissel gave a general nod to the group with regards progress made and everything being on track and did not offer any specific comments.

The following series of presentations then followed for the remainder of the morning session-

Frank Sikora made a presentation entitled, "A Buffer that Mimics the SMP Buffer for Determining Lime Requirement on Soil". The presentation dealt with identifying a buffer solution to replace the current SMP buffer in Kentucky that is not hazardous, similar in pKas, and a procedure that will not require calibration equations. The new buffer will have Imidazole and MES as replacement chemicals when compared to the SMP buffer. The new procedure will be implemented at both Lexington Lab and Princeton Lab starting July 1st, 2005.

David Kissel presented the current (new) procedure for lime recommendations in Georgia. The Georgia lab has started using the procedure from November 1st, 2004 onwards. The procedure measures the lime buffering capacity (acidity) of the soil directly. The soil pH is measured in dilute calcium chloride and the lime requirement is calculated based on the desired pH and lime buffering capacity of the soil.

Greg Mullins made a presentation entitled, "Calibration of the Mehlich Buffer for Determining Limestone Recommendations", which showcased the need for developing and implementing a method for buffer pH determination for agricultural soils of Virginia as none existed before. Based on laboratory and also incubation studies, Mehlich buffer method was identified as most suitable compared to others. VA has four target pHs for different crops and therefore specific regression values were developed for calculating lime requirement at each target pH desired. The new procedure will be implemented from August 1st, 2005.

945AM BREAK

1020AM Morning session resumed after the break with the presentation entitled, "A Modified Adams-Evans Buffer for Limestone Recommendations", by Gobi Huluka. The need to find a replacement for Adams-Evans buffer because of its hazardous chemical ingredient, overcome constraints such as money, space and disposal procedures in the lab triggered the need for this study. Based on lab screening studies, K-phosphate was identified as the suitable replacement for p-nitrophenol because of its similarity in molecular weight, solubility and pKa. Part of the goal was to not have any calibration equations and to not have any changes to current levels of lime recommendations. The procedure may have to be further fine-tuned to minimize the variation and improve predictability.

Jim Wang reported the results of a study comparing methods for "Measuring Soil Silicon". Soils were assayed with seven different extractants for Si (1:10 soil:solution) and the concentration was determined on the ICP and colorimeter (molybdenum blue method). Mehlich-3 and water extraction showed most promise in consistently determining Si concentration.

Bob Miller presented the results from the newly instituted Performance Evaluation Program (PAP), a possible substitute for the North American Proficiency Testing (NAPT) program. The PAP program was implemented as a pilot program in 2004 in the western region, with costs running as high as $8,000-$10,000 per lab per year. This was necessitated as a response to the request from the USDA-NRCS through the NAPT Oversight Committee in which the quality of laboratories offering analyses was the prime focus. Also the NRCS is interested in high quality soil analyses beyond the routine fertilizer response range since there are reports that the clients participating in the federal programs are "shopping" for low nutrient/element values. An alternative to cut down the costs of running this program could be a "double blind" sample analyses assessment, where PAP samples are submitted to the labs disguised as local producer samples. The costs in such a case may be around $1,450, approximately 3 times the current NAPT charges. The NRCS is interested in implementing this program nationwide.

Bill Raun made a presentation entitled, "Manage Nitrogen Fertilization Using the Sensor-based Technology". The presentation focused on regional corn trials in OK, NE and MO based on support from the fertilizer tax dollars for soil fertility research. Yield prediction

models were developed based on NDVI sensors for all soils and all times. Information is being managed through a dedicated website updated regularly.

12:00 LUNCH

1:00 Tourof Accurate Labs - Dr. Fazel
Tourof OSU Soil Testing Laboratory - Hailin Zhang
Tourof Magruder Plots - Bill Raun
Demonstration of Sensor-based Fertilizer Applicator - Bill Raun

5:40 -8:00 PM Dinnerat OSU Botanical Garden

June 7, 2005, Tuesday

8:00 AM Paul Vendrell: Video presentation entitled, "**Well-What Do you Know**" -20 mins. The video presentation was developed by the UGA-Extension Drinking Water Team for educating private well owners and promoting well water testing, non-traditional soil testing feature. The video will be distributed to county offices and the agents can build around the video to tailor to the needs of local well-owners. The videos are available for purchase by other states at $10 a copy. The presentation was followed by a discussion on how the material can be adopted regionally and locally within individual states.

Bill Thom suggested that the topic can be developed into a training module via the E-extension Initiative. Costs of production and customizing for local needs will have to be worked out and Vendrell will help coordinate the effort regionally.

8:45 AM Business Meeting

Hugh Savoy, Chair, called the meeting to order for a brief discussion on business items.

1. Bob Westerman, Research Administrative Advisor, told the group that the reports were due in 30 days back to the Administrators. He will work with David Kissel, Extension Administrative Advisor and Hugh Savoy, Chair to accomplish the same. Westerman indicated that the deadline for renewal of SERA Information Exchange Group -6 is in 2007 and suggested that the group discuss the priorities and identify future needs and tasks at the next meeting.
2. Hugh Savoy, Chair informed that the 2006 meeting of the group will be hosted by Clemson University, South Carolina. Kathy Moore will lead the host group for Clemson and June 4-6th, 2006 have been chosen as tentative dates for the meeting.

State representatives have been asked to inform the Chair of any potential conflicts with the suggested meeting dates.

3. **Publications update -**

Hugh Savoy informed that review for Bulletin 190 was completed and all the comments were received. Once finalized the bulletin will go up on the web site.

No update on publication on Cotton being led by Charles Mitchell was available at this time.

Manure Bulletin has been completed by Nancy Wolf.

Fact sheet on Mehlich-3 vs. Mehlich-1, led by Frank Sikora, was completed and is made available on the web site

A fact sheet on CEC will be developed and made available; the effort to be led by David Kissel and Hugh Savoy. Leticia Sonon volunteered to help.

Possibility of a publication on water soluble P was discussed. However, it was decided that such a publication may not be needed since SERA-17 is developing a white paper on the same topic and it was not necessary to duplicate.

Fact sheet on ICP vs. colorimetric analysis of phosphorus led by Frank Sikora, will likely be made available later in the year.

No update available on the status of the bulletin on "Deficiency Symptoms in the Southern Region" being led by Ray Campbell.

Debbie Joines and Paul Vendrell will work on exploring the possibility of developing a suitable publication on copper deficiency symptoms in cattle.

4. **New Business**

Westerman suggested that since the title of the group includes the term "Water Analyses", written materials on water analyses should be developed. The effort will be led by Paul Vendrell supported by Jim Wang, Gobena and Rao. The issues can be categorized into - human, animal and plant topics.

Hailin Zhang indicated that he was interested in developing template for a regional video on water, soil and tissue testing, which can be customized for local uses. David Kissel will coordinate the effort and those interested should send an email to Kissel.

Hugh Savoy, Chair, adjourned the Business meeting.

9:10AM State Reports

Alabama: Hamilton Bryant reporting - 25,000 samples were analyzed during the past year. Current year, the number might go up due to special analyses. The Soils Lab is being moved from under the umbrella of the College to the Experiment Station. Things look upbeat for the coming year.

Arkansas: **Morteza Mozafferi** reporting- Marianna Lab analyzes only commercial samples. Standard 1:10 M-3 extraction procedure will be implemented at Marianna soon. Routine EC determination on soils will be eliminated and will be done only on request. New soil test reports will have "ppm" as units instead of lbs/acre. The reporting format will be changed to graphical format and the interpretation category will be changed from Low to Optimum. Dept of Environmental Quality certification of the Lab renewed. Total no. of ICPs increased to four. A new soils drier with a capacity of 4000 samples is being installed. Analyses completed on: Routine soil samples - 82,728, cotton petiole samples- 6,139 samples.

Nancy Wolf reporting- The Fayetteville Lab analyzes research samples. Adjustments to the prices will be made in 2005. The Lab analyzed the following - Total manures = 1,420; Forage = 1,389; Diagnostic Plant = 279; Diagnostic soil = 332; Research soil = 2,779; Research plant = 8,845; Predigested or extracted samples = 10,553;

Tennessee: Debbie Joines reporting- Finally getting a new ICP to add to the old AA. Also a new server, SQL server, software, new workstations are being added. A new grinder -Cyclotech Mill is being added. Forage testing services moved back to Nashville; worked out a deal with a private lab in Indiana and the services are subcontracted for NIR and forage mineral analyses. Total number of samples -20,000. The Lab is self-supporting.

Hugh Savoy reporting - the name of the Department is being changed to Biosystems Engineering and Soil Science.

Oklahoma: Hailin Zhang reporting- Analyzed about 43,000 soil, water and forage samples in 2004; Animal waste analysis was added as a routine test since Jan. 1, 2005; An electrical drill operated soil sampler was developed by the lab. It is easier to collect sample from hard and rocky soils than the conventional probe. Many have been distributed to county extension offices or sold to individuals. More information about this sampler can be found at:

http://www.soiltesting.okstate.edu/sampler.htm (http://www.soiltesting.okstate.edu/sampler.htm)

Several research projects related to Mehlich 3 P and soil salinity determination were completed during the last year.

Louisiana: Jim Wang reporting- Total analyses - 15,643 routine soil samples, 6,019 plant samples, 292 irrigation water samples, and 5,366 soil samples for optional tests; 85% received from producers and 15% from LSU researchers. For P extraction M-3 is being introduced in place of strong Bray from Sept 2005. Multiple regression equations developed to handle conversions for recommendations. New IC and TOC instruments at the Agronomy Department"s central lab can be used for special analyses by the Soils lab.

Kentucky: Frank Sikora reporting- A new buffer that mimics the SMP buffer and does not contain hazardous chromium or p-nitrophenol will start being used on July 1. Calculators are available on the Univ. of Kentucky web site for calculating fertilizer, lime, and manure application rates. A calculator is also available to obtain fertilizer and lime recommendations from Mehlich III, water pH, and SMP buffer pH. The Princeton lab has a new automated lab-fit instrument for measuring soil pH and soil-buffer pH. The Princeton Lab analyzed 15,000 samples and the Lexington Lab analyzed 25,000 samples.

Bill Thom reporting - The Agronomy department has changed its name to the Plant and Soil Sciences Department.

North Carolina: David Hardy reporting - **NCDA&CS- Soil Testing Laboratory** The lab analyzed

281,312 samples with approx. turnaround time at 6 to 8 weeks. Milestone in March, 2004, by analyzing a record 59,311 samples for the month. Low soil pH is still a major concern. Manganese deficiency is still prominent in soybeans and small grains, particularly on sandy coastal plains soils that have been overlimed. Changes/updates: equipment and labware to analyze 2,700 samples daily; addition of 4^{th} pH station; process of updating LIMS; acquiring segmented flow auto-analyzer for speciation work (ortho-P, sulfate, nitrate); acquiring new conductivity meter; plans to change drying system, with possibility of rolling carts.

Dr. Richard Reich has left the Agronomic Division to take on new responsibilities as an Asst. Commissioner for NCDA&CS. The Director position is vacant and Dr. Collen Hudak-Wise is the acting director as well as Asst. Director and Section Chief for the Plant/Waste/Solution lab.

NCDA&CS-Plant/Waste/Solution Laboratory

The overall number of samples analyzed by the Plant, Waste and Solution Section increased slightly in FY 2004. In FY2004 a total of 37,313 samples were analyzed compared to 37,242 in FY 2003.

Plant: In FY 2004, 15,201 plant tissue samples were analyzed, which was an 8.3% decrease from FY 2003. The top ten crops that were submitted for analysis were: cotton (16.9%), trellis tomato (10%), sweet potato (5.8%), fraser fir (5.5%), corn (4.7%), bentgrass (4.5%), flue-cured tobacco (4.3%), Irish potato (3.6%), strawberry (3.2%), and wheat (3.2%).

Waste: In FY 2004, 20,023 waste samples were analyzed. Compared to FY 2003, there was a 7.1% increase in the number of waste samples that were handled. By far, the most frequently analyzed sample was anaerobic swine lagoon liquid, with 13,675 (68%) such samples analyzed in FY 2004. Other commonly analyzed waste samples were broiler house litter (6.1%), swine lagoon sludge (3.5%), miscellaneous industrial waste (2.6%), dairy liquid slurry (2.4%), turkey house litter (2.0%), and broiler stockpiled litter (1.4%).

Solution: In FY 2004, there were 2,089 solution samples that were analyzed. This number represents a 6.1% increase in samples compared to FY 2003. Commonly analyzed samples were nutrient solutions (20.8%), livestock water (15.5%), solution source water (14.4%), and irrigation water (13.2%).

Colleen Hudak-Wise, Acting Director and Chief-Plant/Waste/Solution Section reporting - Updates and Changes to the PWS Lab: In the process of

updating our LIMS system for all laboratories; in the process of purchasing a new conductivity meter for pH and soluble salts; plans are in place for completing the renovation of our digestion room, possibly within the next few months. Two new total-exhaust workstations will be purchased; one station will have a built-in Maelstrom Scrubber; supplier will be Salare (formerly Labguard Corp.). A new muffle furnace will also be purchased. Other long-range plans include installation of a central vacuum system for our grinding room and purchase of a new Wiley mill.

Virginia: Greg Mullins reporting- Samples analyses up by about 3%; annually 43,000 to 45,000. Manure analysis is also done, although more as a part of monitoring studies. The state NRCS is requiring the Soil Testing Lab to obtain NELAP certification for all work relating to Nutrient Management Planning. Estimated cost for obtaining NELAP certification may be up to $20,000.

South Carolina: Kathy Moore reporting- Effective July 1st, 2005, Lab will be reorganized out of

Extension and placed under the Regulatory Division. Also starting July 1st, prices for several analyses will be increased, with soils going up to $6 from the current $5.

Development of a soil sample mailer to be distributed through SC garden centers is being considered. A five year plan is in place for making the Soils Lab self-supporting. Total analyses for 2004: soil-36,000; plant - 7,000; feed -1,600; water - 500; animal waste - 2,000.

Georgia: Leticia Sonon reporting- During 2004, a total of 103,942 samples were analyzed: 83,065 soil, 1,959 manure, 5,795 water, 4,158 plant, 1,581 feed and forage, GA EPD contract -2,770 and other 1,913. New method for determining lime requirement was adopted in November, 2004. Work to develop a routine methodology for determination of phosphorus sorption is underway. Certification for 2005 for Manure Testing has been obtained from Minnesota Department of Agriculture. For extracting soluble P forms from poultry manures at pH 6.0, MES has been identified as a suitable buffer. A separate room fitted with biological safety cabinet, fume hood and canopy hood has been designated for handling and preparing manure and animal waste handling. Along with video for private well-water testing, two new circulars on arsenic and mercury have been added to the Household Water Quality circulars list. The Feeds and Environmental Water Lab is certified by the GA Department of Natural Resources to measure bacteria in public water systems.

Florida: Rao Mylavarapu reporting- Approximately 12,000 samples in the extension lab and 85,000 samples in the research lab were analyzed during 2004-05. The research lab is NELAP certified. Have had several problems with both the Spectro ICPs. The Labs doing better, particularly the research lab after the price increase to $2 per analysis. The Soil & Water Science Department hired several new faculty for replacements/new areas.

NCR-13 Manjula Nathan reporting- Highlights from various subcommittee reports at the recent NCR-13 meeting were provided.

Antonio Mallarino made two comments.

1. The NCR 13 group needs to validate the Mehlich buffer lime test for soils across the region.

2. How do we address the use of soil tests (e.g. S and micros) within the NC region that have not been approved by the NCR 13 Committee and are not in Publication 221? What approach should be used? Do to time constraints discussion was limited, but should be addressed.

The Four State Meeting (Illinois, Iowa, Minnesota, Wisconsin) will be held February 24 and 25. John Peters and Antonio Mallarino are organizing this meeting. This will be an NCR 13 sponsored event. There is a need to check to see if the Illinois Soil Testing Association is having a meeting of their own or whether they will participate in the Four State meeting.

QA/QC Subcommittee - Watson (Chair).

The manuscript on QA/QC protocol is complete and has been sent to Tony Provin at Texas A & M for publication. This manual has been a cooperative effort of the NAPT Committee and the various regional Soil Test Working Groups.

Annual Report - Chairperson Achim Dobermann will prepare, in conjunction with the past Chair and the Chair elect, the annual NCR 13 Report to send to NC 1 via the administrative advisor.

Education Subcommittee - Warncke (Chair).

The "Seventeenth Soil - Plant Analysts Workshop" was held on February 24 and 25 in Des Moines, Iowa. Thirteen speakers made 15 presentations. Attendance was 70. Income was $4,058.10. Expenses were $4,800.88. A balance of $800 was carried over from the 16th Workshop. This leaves a balance of $57.22 in the NCR 13 Workshop account with the Soil and Plant Council. Evaluations of the Workshop were quite positive. By holding the Workshop in February we reached more of the actual soil testing lab people than when it was held in November.

Interstate Subcommittee - Warncke (Chair)

Darryl distributed copies of the new MSU Nutrient recommendation bulletin (E 2904) which uses the "Tri-State" (Michigan, Ohio, Indiana) format. Rehm reported that Minnesota and the Dakotas have

updated their "Tri-State" recommendation publication. There is reasonable uniformity of N recommendations for corn across Illinois, Iowa, Minnesota and Wisconsin. In a recent meeting there was agreement on new concept, based on soil productivity, for N recommendations.

Waste Subcommittee - John Peters (Ch), Doug Beegle, Ann Wolf, Maurice Watson, Keith Reid.

The evaluation of various potential laboratory measurements of water soluble P is ongoing at several locations in the region as well as in other work groups. Currently, there are two primary methods for analyzing manure water extractable P (WEP). One developed in PA by Pete Kleinman of the USDA-ARS with assistance from others Andrew Sharpley, Doug Beegle and Ann Wolf) and one developed in Arkansas by Phil Moore. The methods vary in the solids:solution ratio (1:10 for the AK method, 1:200 for the PA method) and in sampling basis (wet weight for AK, dry weight for PA). There are some concerns/issues with both methods. Concern with the AK method is that the solids (dry):solution ratio varies and impacts the ability of this test to predict runoff P over a wide range of manures. Concern with the PA method is that it is difficult to take a large enough sample size for manures with high variability (e.g. poultry manures with large wood chips) and get a representative sample. Much work has been performed on the PA method to evaluate variability and factors impacting the analysis. One of the SERA-17 working groups will be continuing the work this year to further look at solid:solution ratio and its impact on estimates of dissolved reactive P as well as other factors impacting WEP measurement (ICP vs. color, shaker type, etc.). The goal is to complete this work by the SERA-17 meeting next year. The Waste Subcommittee will evaluate these methods to determine if one or more should be added to the methods manual.

Manjula

The URL for the web based publication A3769, "Recommended Methods of Manure Analysis" (http://uwlab.soils.wisc.edu/pubs/A3769.pdf) was changed this past spring due to problems with the previous host site. No revisions have been made to the original version of the manual as of this time.

11:30 AM Discussion Group: Lab Directors and Advisors

Members present: Gobi Huluka, Greg Mullins, Frank Sikora, Jim Wang, Bill Thom, Paul Vendrell, Hugh Savoy, Hailin Zhang, Jim Stevens, Manjula Nathan, Rao Mylavarapu, Kathy Moore

1. Greg Mullins was nominated as the liaison between SERA-6 and SERA-17 groups.

2. Need to more studies on Scoop vs. Weight comparison.

3. Need for sharing analytical methods for P-analyses. Paul Vendrell to lead a group interested to pursue this aspect. Other states interested - Kentucky, Oklahoma, Florida, Virginia, Georgia, Alabama, Louisiana.

4. Need to explore the potential for regionalizing the M-3 based P recommendations- Oklahoma, Texas, Louisiana and Arkansas have started discussions on this subject.

5. Pool the two publications on soil test procedures into one - Sikora, Gobi, Rao, Kathy

Discussion Group: Lab Managers

Members present: Michael Kress, Nancy Wolf, Rodney Henderson attended and discussed the following issues:

1. Mehlich 3 reagent turning pink color over time

2. Problems with CIROS ICP pumps, temperatures, and limitations in contacting SPECTRO offices

3. Problems with student workers in lab- how many hours? how to keep them in the summer? pay rates?

12:00 NOON ADJOURN

Minutes submitted by Rao Mylavarapu