

MINUTES

MID-ATLANTIC SOIL TEST WORK GROUP
February 20-21, 1985
Southern States Building
Richmond, Virginia

8:30 AM INTRODUCTIONS

The meeting was called to order by Charles Mitchell who welcomed everyone and particularly new participants. Joe Will, host from Southern States, welcomed everyone and gave instructions regarding dining and/or other accommodations. A list of the participants is included at the end of the minutes.

8:45 AM SOIL AND PLANT SAMPLE EXCHANGE

Joe Buriel, University of Maryland
Went over sample exchange data. Data reviewed and corrections made. Discussed target pH for various states, ie, critical pH and maximum. General pH range for sandy CP soils is 5.5 - 6.2 pH. Cox asked about using BS and Al as criteria for lime as opposed to pH as such. Some concern about Adams-Evans buffer due to safety hazard with para-phenol in the buffer. Group expressed no danger to laboratory personnel. Virginia work showed preference of Adams-Evans over Mehlich buffer.

Nitrogen - some used yield goals, others a flat rate for dry land farming. General range among labs is 150-180 lbs N/acre.

Potash - Most states use a continuum for fertilizer recommendations with exception of Alabama. Agrico relates K rates to CEC.

Some discussion on toxic levels of Zn and Cu but no data available. Cox brought up the question of pH/zinc availability.

Some discussion on boron. Flannery stated response when soil test was 0.1 - 0.2 ppm hot water extractable boron. Data presented by Steve Donahue showed no response on corn from D. C. Martens data. Major concern is a lack of soil test correlation and crop response. Jim Woodruff reported on 3 years data in S. C. showed B related to K content on irrigated corn. The ^{sub}nutrient subcommittee (the Southern Regions) plans to investigate boron soil test for future use. General consensus of group was to use Plant Analysis but cautioned against one sample being representative. Flannery suggested plant and soil sample if boron is in question.

10:20 AM USE AND CALIBRATION OF MEHLICH III EXTRACTANT

Agrico, N. C. and Oklahoma using Mehlich III

Alabama - no work with M3, plans to collect data for 1986.

Virginia - no published data on M3. Dave Martens comparing M3 for B, Cu and Zn. No work for basic P, K. comparisons.

Don Storer, Agrico - Correlated M111 with Bray P1 1.N NH_4OAc . Multiplied M3 by factor to get NH_4OAc and Bray P1. Data based on 290 soil samples 190 samples with plant and soil from Mid-western states. Good correlation between Bray P1 and M3, $n = 370$ samples. Correlation better when Mid-western soils removed. Good correlation between M3 and N NH_4OAc . Some variability may be result of comparing plasma with colormetric.

South Carolina - no comparisons made.

Delaware - compared M3 Cu, Mn and Zn with wide pH range with M1. Results look good for Mn and Zn, Cu not as consistent.

A & I - M3 correlation with all labs show poor but correlations with eastern soils look good. Considering change in future.

Brookside - Illinois lab show good results. Change to M3 may be down the road.

Tucker - discussed M3 copper application versus soil test to see if applied copper can be detected. Soil test data looks good on two years samples.

Flannery - Data looks good between M1 and M3. Plan to change - in the future.

Cox - Discussed M3 manganese work for corn and soybeans. Good correlation between M1 and M3. M3 - Mn includes pH in calculating MnAI. Discussed zinc soil test calibration with corn and soybeans as affected by pH and CEC. Soils categories set up in mineral, mineral organic and organic. Trying to develop a continuum across pH as opposed to soil classes. Showed equations relating pH, CEC to crop requirement. Needs further evaluation before adopting as a routine practice. Some concern with Agrico on varietal differences in zinc critical levels, observed a lot of variability. Virginia expressed the same experience.

1:00 PM DIRECTIONS FOR PLANT ANALYSIS SERVICE

South Carolina: May need to be concerned about ratio between B and K. Low CEC soils have low K content 30 lbs. with adequate K in leaf. High K applications depressed yields in absence of B. If B is present in adequate amounts no yield depression observed. Distributed research data to illustrate this phenomenon. Hand out. "Potassium Soil Test Ratings, Potassium Fertilization, and Potassium - Boron Balance Related to crop Yields." Appears we may need to apply B on irrigated soils where high K rate is applied. Research shows similar results with other crops. Higher K rate had no effect on B content in leaf. Potash applied at 350 lbs K_2O . Flannery stated that high yields can be obtained on low CEC if water and fertilizers are applied at the right rate and time.

Delaware - Inquired about feasibility of using whole plant as a means of correcting fertility problems. Auxley indicated tissue analysis as a good monitor for nitrogen. Considerable discussion on developing guidelines for early sampling diagnostic capability. Agrico stated growers are satisfied with DRIS system for diagnosing problem in time to make corrective treatments.

Brookside - Analyze plant samples, turn around time about 4 days. Lab hooked to telex computer.

Campbell - Turn around time 3 days, interested in DRIS, eluded to problems of getting some nutrients (Ca++) into the plant. Pointed out the need for pooling data base (sufficiency ranges). Sufficiency ranges lacking for many vegetable crops, cold crops. Appointed to collect sufficiency data and/or references from the group and present this at the next meeting. Expressed a need for more information on irrigation water interpretation from the standpoint of soluble salts and sodium.

Ray Tucker - Discussed manganese sources (% water solubility) as related to fertilizer sources reported from thesis work under G. S. Miner.

Maryland - Went through plant samples exchange. Results were very similar.

Virginia - Steve Donohue - discussed results N fertilization on wheat published in Comm Soil Sci. and Plant Anal. Summarized literature survey and discovered little data available for this crop. Leaf sampling conflicted with powdery mildew. Rec 60-80 lbs N in late winter, plant sample at Feaks 4 & 10 growth stage and fertilize accordingly.

VPI continuing work on intensively managed wheat. Showed contamination data on nutrient levels; Mn and Al went up considerably if plant is contaminated. Discussed nutrient changes between paper and plastic bags. Recommend not using plastic bags.

Cox - Critical level on corn is 11 ppm. Critical levels on soybean changes as growth state changes.

3:20 PM FERTILIZING PHOSPHORUS SOILS

Mitchell - Showed data to support no need for additional P and K where soil test levels are high. Recommends starter fertilizers for corn regardless of soil test.

Bandel - Discussed P and K rate study on soils with high P and K soil tests. Residual benefit subsided after 3 years. Soils testing low in soil test phosphorus showed no yield response. Considerable discussion on interpretation of classification of what is high, medium etc.

Cox - Discussed revamping soil test recommendations for a given soil test based on long term fertility trials over various soil types. Compare soil test - vs - rate up to point where maximum yields are achieved. Presented some models drafted by G. S. Miner to achieve these predictions. End

result would predict rate of fertilizer to achieve maximum yield at a given soil test value. Discussed maximum economic return - showed slides on this approach using data generated over time. Phosphorus soil test and corresponding rate of application would be a function of clay content. Necessitates a means of measuring clay content on each soil sample.

Cotnoir - stated there is a soil test level where you can recommend zero application. Likes the straight line relationship between soil test and fertilizer recommendation. The difference between straight line and curve is nil. Glad to see recommendations go to zero. Some labs still have small maintenance recommendations at high soil test levels mostly as a starter fertilizer.

Don Storer - Chairman - Agrico Chemical

Send a letter to Chairman for Charles Mitchell

Next meeting 19th & 20th February, 1986.

Discussed sample exchange for 1986. Group expressed interest in continuing the sample exchange for future meetings.

Literature Review

SEWAGE SLUDGE

Hawkins, Virginia - Stated that Tom Simpson, sludge specialist at VPI done extensive work in sludge application. Publications available through VPI Extension Service. Most sludge analysis conducted by A & L and soil test for sludge permitting application use. Much controversy in certain areas of Va on the use of sewage sludge. Approximately 50% sludge generated in Va is land applied, the remainder goes to land fill or burned. Distributed publication. Research program under way on sludge application sites.

Tech. Bull. 143 - Ag Use of Sewage Sludge a Li:review

South Carolina - Discussed publication on sludge conference for those interested in sludge application practices. Expressed some concern by homeowners of Pb contamination from old home sites of peeling point.

Delaware - Sludge sold for non-food chain use only. Tremendous volume of material and a disposal problem. Sludge processors' main objective is to produce a marketable product. Question raised about soil testing involvement and responsibility - implying that someone other than soil testing should bear this responsibility. However, state agencies should be involved and have responsibilities in the interpretation of the disposal in conjunction with analytical service laboratories.

Ultimately the soil test will and should become involved through a monitoring program. General consensus of group was to involve regulatory agencies, analytical labs and educational effort to deal with these problems. Also acknowledgement that critical levels have not been established conflicting with contrasting views of various scientific advisors.

Brookside involved in sludge analysis and have technically trained specialists for making land application recommendations. Demand for environmental analyses will increase agricultural soil tests. For those labs who offer advice the general guidelines are based on %N, and heavy metals, accumulative quantity based on CEC. Regional publication available at Penn State University in the future. Major concern should be focused on long term effects.

Major concern of North Carolina is the long term effect on sludge application particularly with buildup of heavy metals. Maryland expressed a similar concern. For said reasons sludge application rates should be on the conservative side until adequate data exists to show otherwise.

New Jersey - sludges analyzed by private labs. Permit from DEP must be obtained before applications can be made. Guidelines supplied by Rutgers soil Scientist for DEP regulation.

North Carolina - research is looking at pH on heavy metal uptake over time.

Donohue expressed an interest in getting sludge research representatives from various regions to form their own regional mtgs with soil test workgroup representatives involved.

Delaware - Poultry manure, 500,000 tons/year which would supply 50,000 acres assuming 5 tons/acre based on N%. \$10-20 x 10⁶ fertilizer value. Problems with groundwater contamination and Chesapeake Bay. Good fertilizer source if managed properly.

State Reports:

Virginia: Va going to ICP, one simultaneous, one sequential. Distributed research on copper conducted by Dave Martens. No response on corn. No copper recommended for any crops. Manganese response on corn. Work is continuing.

Southern States would like for group to present data on maximum yield tests with fertilizer rates. Generate more data for plant analysis during the growing season starting with seedling plants.

South Carolina - Would like more information on maximum economic yields and have input from those who are involved in these trails.

Agrico - Suggest forming a central data base from high yielding or maximum yielding test plots.

North Carolina - suggested that a volume measure system be used along with the change from MI - MIII. Reason expressed is that large soil test data base could be established across regions for numerous crops.

Maryland - Going to computer for recommendations. Beginning to run manure samples.

MEETING ADJOURNED

Participants of 1985 meeting

- 1. M. Ray Tucker (NC)
- 2. Joe F. Buriel (Md)
3. John Axley (Md)
4. Ray Flannery (NJ)
5. V. Allan Bandel (Md)
6. Ray Campbell (NC)
7. Fred Cox (NC)
8. Charles Mitchell (Ala)
- (Jim or) -9. Steve Donahue (Va)
- 10. Don Storer (Agrico)
11. Jim Woodruff (SC)
- 12. Bob Lippert (SC)
- 13. Steve Heckendorn (Del)
- 14. Paul Chu (A & L)
15. Tom Sims (Del)
- 16. Mark Flock (Brookside)
- 17. Joe Will (SS)
18. Charles Robinson (Del, CPS)
19. Maywood Snyder (A & L)
20. Leo Cotnoir (Del)

Minutes taken by M. Ray Tucker (NC). Any error in the minutes may be attributed to the secretary and will be corrected if requested. Respectfully submitted by M. Ray Tucker, acting secretary for 1985 meetings.

M. Ray Tucker

(919) 829-2655