**Minutes of NCERA-13 meeting, Iowa City, IA, February 25-26, 2019**

**Attending**

Antonio Mallarino, Iowa State Univ. Chair, Iowa rep

David Franzen, North Dakota State Univ. (Attended over phone 0n 25 and joined on 26th -ND rep

Carrie Laboski, Univ. of Wisconsin, Wisconsin rep

Jon Dahl, Michigan State Univ., Michigan rep

Jason Clark, South Dakota State University rep

Andrew Margenot- Illinois rep, attended only on the 2nd day the Soil Testing and Plant Analysis Workshop and presented

Dan Kaiser, Univ. of Minnesota, Minnesota rep- attended via skype meeting

Andrew Stammer, University of Wisconsin., visitor

Steve Culman, The Ohio State Univ., Ohio rep

Sakthi Subburayalu, Central State Univ., visitor

**Meeting called to order 1PM, Carrie Laboski (since chair David Franzen was unable to attend due to icy road conditions and flight cancellation)**

**Official rep status**-

 We had Jason Clark new official rep from SDSU attend the meeting,

 New Rep from University of Illinois– Andrew Margenot

 Now we have reps for all states except for Indiana – yet to be confirmed

**NCERA-13 committee discussions-**

**NCERA-13 committee** Chair 2019 Dave Franzen

Secretary 2019 Manjula Nathan

Chair 2020 Manjula Nathan

Secretary 2020 Steve Culman

A joint meeting will be held by the North Central, Southern and North Eastern Regional Extension and Research Activity Groups in soil testing and plant analysis committees every 4 years. In 2020 the joint meeting will be hosted by Southern Regional Group. Needs to start discussions with regional chairs on planning for the joint meetings.

Steve discussed about Ohio State is in the process of revising the State recommendations based on strip trail results and moving from Bray P to Mehlich 3 P. Tristate recommendation based on 1500 sample analysis comparison Bray P x 1.35 is equal to Mehlich 3 P by ICP.

Antonio would like to discuss the concept of CEC and K recommendations and shared his presentation on this topic with the group

**NAPT oversight committee** **report**- Manjula Nathan, member of NAPT oversight committee.

The committee is considering adding selected soil heath tests as possible criteria to be evaluated. There was discussion that correlation of tests not best way to work with different soil tests as

Diagnostic and predictive tools. The number of labs (150) associated with NAPT has been maintained. There is competition with the other group, ALP, Fort Collins, CO.

The NCERA-13 committee supports the efforts of NAPT to consider certification for Soil Health analysis based on chemical properties, and supports NAPT sponsored training of technicians for soil physical properties.

**White papers- regional publications**

**Sulfur paper**- was completed by Dave Franzen as a North Central Region Publication from the NCERA-13 group and was circulated to members.

**Phosphorus management and calibration**- Mallarino and Joern (who has left Purdue and is now in private industry). A rough draft is available.

 **Soil test correlation and calibration**. Mallarino and Ruiz-Diaz.

**General discussion topics**

**Status of the public/University soil Testing Labs**

Public lab status is generally decreasing. At least some states had budget issues.

Steve Culman said that the Ohio State lab does not take samples from the public. Their lab is difficult to maintain because of the low sample numbers received. Plant samples are not sent to the OSU lab because tissue processing and testing is time consuming. Private labs provide results for plant tissue faster than public labs. Antonio mentioned that private labs might provide feedback on the importance of private labs. Public labs can assist private labs when they need help. Public labs can provide the private labs with soil test calibration study data. Manjula mentioned in the North Central Region the public labs are facing problem because the state or the University does not fund public labs. This is not the case with SERA where money comes from the lime and fertilizer funding in some states (AR, OK and KY) and State or University funding for the other state labs in Southern region. Steve Culman was going to take the lead on putting a white paper together like what SERA group did and circulate to the administrators at the Universities in the North Central Region.

**Future of North Central Extension-Industry Soil Fertility Conference**

The topic of IPNI closing down by June 2019 was brought up. The future of North Central Extension Industry conference on Soil Fertility was discussed. Now that IPNI is closing down who will be taking the lead on organizing it

**OSHA respirable silica levels when grinding soil - Carrie Laboski**

New OSHA standards: OSHA has recently reduced the levels of respirable silica that are acceptable in the workplace. University of Wisconsin Dept. of Environmental Health & Safety sampled air during the soil grinding at the UW Lab. Respirable silica levels were found to be too high. A respirator and heath monitoring program has been established and the lab will look to engineering controls to reduced silica levels below action levels.

The problem of dust in grinding room and related health hazards and the measures that can be taken to reduce it has been discussed.

**State Reports**.

**Iowa**

**Update for the ISU Soil and Plant Analysis Laboratory**

The Iowa State University Soil and Plant Analysis Laboratory was closed on June 2018, after about 70 years of service to Iowa farmers, crop consultants, extension agronomists and researchers. This resulted from a combination of a long-term declining trend for samples submitted to the laboratory by farmers, financial considerations, management problems due to added major teaching responsibilities to the lab director, no support by administrators above the department chair, and weak support by research faculty not involved with applied research and extension. This is major loss for our applied research and extension efforts, especially for the large volume of samples involved for soil and plant tests calibration on-farm or experiment stations research. The Agronomy Department Chair asked a committee to study technical and financial advantages/disadvantages concerning the department and university missions of several options for an undetermined future. The committee submitted a detailed report in August 2018 for options that included no reopening, internal use of equipment (no analysis service) by department faculty and graduate students, open as service laboratory only internally within the university, and reopening as before as a public service laboratory. No decision has been made yet, and likely will not be made for a year or two. Therefore, faculty members with high volume of soil and plant tissue samples who used the laboratory (mainly from the departments of Agronomy, Agricultural and Biosystems Engineering, and Horticulture) had to switch sample analyses to private labs. This is resulting in not only major logistical problems but also technical problems for evaluation of long-term experiments because of the usual lab bias that complicates interpretation of long-term soil-test trends.

**Soil/Plant Testing Applied Research/Extension Update**

The most significant soil and plant testing related applied research/extension activities during 2018 continued to be developed mainly by Drs. Mallarino and Sawyer. These two research/extension specialists gave about 80 presentations to stakeholders at field days or conferences and 12 newsletter or blog articles for issues related mainly to N, P, K, lime, micronutrients, manure nutrients management, and both fertilizer and manure P management to reduce water quality impairment. Approximately one-half of these presentations and articles focused on soil or plant tissue testing interpretations for crop management or water quality conservation. These two faculty members developed and published two stand-alone extension publications. The publication “Phosphorus and Potassium Tissue Testing in Corn and Soybean” includes the first ever guidelines for tissue test for these nutrients in Iowa. The publication “Use of the End-Of-Season Corn Stalk Nitrate Test in Iowa Corn Production” included a major update (the first since 1996) for this tissue test including new interpretations and relevant research results. Several new fertility research projects by these investigators or others put heavy emphasis on soil/plant testing. These include field correlation of dry/moist soil tests for K, soil tests for sulfur, relationship between routine and soil-health P soil tests with P loss with runoff or tile drainage, corn plant tissue testing for N, and assessment of K tissue testing in corn and soybean when granulated or liquid K fertilizers are broadcast or injected. Several useful long-term experiments were discontinued due to insufficient funding and support by the university and major state, federal, and private organizations. These included six 15-year old trials that evaluated N management for continuous corn and corn-soybean rotations and two 10-year old trials that evaluated N by K interactions in continuous corn. Several other long-term experiments are in danger of closure for the same reasons.

**Michigan**

It was a very slow fall and winter for the lab as the state received a lot of rain the past several months. Sample numbers, however are comparable to last year.

We launched our new computer program for homeowner samples in September. The program allows us to see when or if the client opens up the report. This makes it much easier to follow up results and be sure the client sees the results in a timely manner. This was a big problem with the previous program. It also allows us to text message the client when their report is ready. 83% of text messaged customers opened their reports the day they received them versus 66% of the clients who did not get text messages. After 6 days 97% of text messaged customers had opened their reports versus 90% of the clients who did not get text messages. The program also allows me to go in and make recommendation changes.

On the soil health side of things, Kurt Steinke is primarily focusing on DNA work and microbial diversity and community structure rather than Solvita driven measureables as he just hasn’t seen many tangible results from that. Kurt expects to have a couple publications coming out on his soil DNA work in the next year. He has seen some interesting results with this and N/fertilizer management and feels it may be more useful than respiration testing.

Sample analysis numbers for fiscal year 2018 for main soil tests.

 Test Grower Research

|  |  |  |
| --- | --- | --- |
| Regular (pH, P, K, Ca, Mg) |  2494 |  2543 |
| Self-Mailer (Urban regular) |  3381 |  |
| K, Ca & Mg Extracts |  364 |  555 |
| P Leachates |  416 |  352 |
| Zn & Mn |  1229 |  341 |
| Cu & Fe |  363 |  614 |
| Na & Cl |  256 |  324  |
| Organic matter |  4361  |  1117 |
| Nitrate-N |  714 |  5707 |
| Ammonium-N |  78 |  5286 |
| Particle size analysis |  495 |  373 |
| Sand sieve analysis |  477 |  39 |

Major projects for the next year:

Continued work on the interactive fertilizer recommendation program that is tied to our main program for providing producers, Extension agents and Industry professionals the ability to enter lab information from private soil test labs and get MSU fertilizer recommendations.

**Minnesota**

There has been five new faculty members hired in Minnesota which deal with nutrient management in crop production. Yixin Mao was hired under a research and teaching appointment and will focus on precision agriculture. Mellissa Wilson was hired under a research extension appointment and will focus on manure management. Lindsay Pease was hired with a research and extension focus and she is located at the Northwest Research and Outreach Center at Crookton. We also have hired two non-tenure track positions which are primarily extension positions with some research roles. Anna Cates was hired as a soil health specialist and Vasu Sharma has been hired as our irrigation specialist.

The University of Minnesota soil testing lab has finished a three million dollar renovation. In 2018 the U of M lab ran 10,116 soil samples with 4514 samples coming from outside the university and 5602 coming from internal samples. Of the external samples, roughly 2/3 of the samples came from home owners while 1/3 were from farmer samples. The lab is being carried heavily by internal samples through the research and analytical lab. The primary source of samples internally have been soil and plant tissue samples followed by special analysis then water analysis.

We are currently in the process of updating corn and soybean fertilizer guidelines in the state. Corn nitrogen rates are being modified and we are planning a significant modification to the potassium guidelines adjusting the K soil test classes and possibly application rates suggested for the current medium classification for soybean and possibly corn. We also are in the process of summarizing long term research data related to build and maintenance versus sufficiency approaches. Two new studies which may impact the fertilizer guidelines are a product funded to study the impact of P timing in corn and soybean rotations and one to further study clay chemistry and how it may relate to K fertilizer guidelines. In the P timing study we will be further comparing the Mehlich 3 color and ICP tests for use in Minnesota. One area of interest are identifying soils which have been shown to extract high levels of P with the Mehlich 3 color compared to the Olsen test. I have no current plants on modifying the P guidelines. However, I have been tracking P and K removal rates and reporting those values on updates to the fertilizer guidelines moving forward.

**Missouri**

MU soil and plant testing labs processed 27,709 soil samples for fertility analysis (14,978 field crops, 5113 lawns and gardens –horticulture, 284 commercial horticulture – fruits ,vegetables, turf, 6841 research ),3340 plant samples, 261 manure samples, 86 compost, 22 Greenhouse media, 155environmental testing, 247 water samples, and 6028 soil samples for special soil tests. Total samples analyzed by the MU soil and plant testing lab is 21709+5765= 27,474 samples.

MU soil and plant testing labs at Columbia campus and Delta Center, Portageville together processed a total of 35,244 samples. Both MU soil and plant testing labs participate in the North American Proficiency Testing Program for soils and successfully met the criteria to be a state approved lab by the Missouri Soil Testing Association Approval Program. In addition, the Columbia lab goes through the Manure Proficiency Testing and Certification Program and is a certified lab for manure testing in USA. I serve is the Coordinator for the Missouri Soil Testing Association State Approved labs program and evaluates the performance of 24 participating commercial labs to ensure the quality of the data provided by these labs for the Citizens of Missouri.

The lab signed a contract with Extension Technology and Computer Services to develop the web-based soil testing database program to replace the current PC based system. MU soil testing labs continues to function as totally self-supporting labs based solely on fee generation. This is becoming a challenge with the new full costing change of 4.965% being changed on the total expenses of the lab by the University effective July 1, 2019. According to the total expenses for the last fiscal year, we will be paying the University about 22,000 for full costing charges. We continue to train visiting scientists, and students in soil testing methods, lab instrumentation, interpretations and recommendations. Conduct educational programs for adults and school children to bring awareness of the importance of soils and testing soil for proper nutrient management.

John Lory and Peter Scharf continues to conduct statewide strip trials by getting funding from the commodity groups and Extension to study P response in corn and soybean. Research on the use of cover crops for row crops is continuing in Missouri.

A Soil Health Assessment Center in the College of Agriculture Food and Natural Resources continues to function under DNR, NRCS and Soil Conservation funding and by fee generation. There is statewide emphasis on improving soil health by NRCS and other state and federal agencies and the lab receives samples under the cost share programs by NRCS.

**North Dakota**

State Report for the North Dakota State University Soil Testing Lab

December 1st /2017 – November 11th/2018

|  |  |
| --- | --- |
| Type of Sample | Number of samples |
| Farmer soil | 3079 |
| Research soil | 14147 |
| Total | 17226 (includes lawn and garden, manure and greenhouse) |
| Water  | 579 |
| Plant  | 241 |

July 1st / 2018 – February 15th/ 2019

|  |  |
| --- | --- |
| Type of Sample | Number of samples |
| Farmer soil | 1049 |
| Research soil | 6725 |
| Total | 7774 |
| Manure | 71 |
| Water  | 206 |
| Plant  | 347 |

**Budget**

1. The lab implemented new test prices starting in July 2017 with a general increase of 25% in price, except when the prices went above regional private lab prices. There has not been a decrease in sample number because of this. A late spring in 2018 did result in a reduced carry over revenue.
2. Equipment repairs and maintenance were performed using the skills of technicians from different departments on campus and company tech support over the phone.
3. Opted out of yearly service plans for equipment.
4. Recurring rental expenses were eliminated e.g. Rugs, lab coats, mops.
5. Part-time student work hours were modified. The students were hired based on need as per the work load trends of previous years.
6. The budget will be closely monitored monthly over the years to identify potential ways to minimize expenses and we will be obtaining assistance from the NDSU Ag Budget office.
7. Efforts will also be taken to make the lab more visible and beneficial to customers through Facebook, customer surveys, with assistance from the NDSU Ag Communication office.

**New equipment**

The lab received funds from the School of Natural Resource Sciences revolving equipment fund (2018) for the purchase of the Filamatic AB Series Medium Duty Filling Machine, used in the analysis of nitrate samples in the lab.

**New Tests**

1. The laboratory staff is working with the Geosciences Department at NDSU to provide semi-quantitative analysis of clay mineralogy generated from the recently installed TOPAS software used with the XRD machine at Research-2 complex at NDSU. The clay minerology data will be used to support new clay mineral-based potassium fertilizer recommendations in North Dakota as a result of recent studies completed by Dr. David Franzen (2018) and his graduate students.
2. The laboratory staff is working on a method for testing non-exchangeable ammonium content in soil in collaboration with John Breker, Agvise. The method used will be the sodium tetraphenylboron method.

**Other information**

1. The Soil Testing Lab, NSDU, is certified for soil and manure testing by the Minnesota Department of Agriculture (MDA). For soil certification, results from the NAPT is sent directly to the MDA, whereas for manure certification the results are sent directly from the lab to the MDA. The lab also has the USDA-APHIS permit for receiving, processing, testing and disposing foreign soil samples.
2. The lab runs close to 600 samples on the Elementar analyzer per year.
3. The lab hosts tours for students and the public

Tours per year

|  |  |  |
| --- | --- | --- |
|  | Number of students | Topics |
| PLSC 225 Principles of Crop Production | 100-125 | General Introduction to soil testing- Receiving soil, information sheets, soil prep, logging in, scooping, lab equipment |
| [PLSC 375 Turf grass Management](https://www.ag.ndsu.edu/plantsciences/undergraduate/courses/plsc375) | 5-10 | In depth information from receiving soil to sending out reports including instrumentation |
| SPA 465/665 Soil and Plant Analysis  | 10-20 | Principles and use of the atomic absorption spectrophotometer |
| Non-student tourAg Consultant (Liberty Ag) | 1 | In depth information from receiving soil to sending out reports including instrumentation |

1. In 2018 the lab was able to employ an undergraduate student from MSUM, an undergraduate student and a graduate student from the Natural Resource Management department, NDSU. The employment provided assistantship/tuition waiver to the graduate student. Apart from the student employees the lab has 2 full time employees and 2 part time seasonal employees. The lab is self-funded except for benefits of one full time employee.
2. The lab has not received any new requests for soil health tests in the past year.
3. The lab has seen an increase in SAR test requests and CEC tests using the sodium saturation method from farmers. The lab routinely does summation method for CEC but does sodium saturation method too upon request.

**Ohio**

Ohio has completed 5 years of on-farm strip trials (2014-2018) mainly manipulating P and K, but also some N and S trials. The strip trials for P, K and S were not rate trials, simple fertilized vs. control (randomized and minimum 3 reps). We conducted 102 P trials, 84 K trials, approximately 50 S trials, and 56 N full rate trials. In March 2018 we had a major overhaul of our corn N rates via the MRTN database. We are currently analyzing and writing up results to update the Tri-State Fertilizer Recommendations (Indiana, Michigan and Ohio), originally published in 1995. Most P and K trials were at or above maintenance range and yield responses were rare and inconsistent. New recommendations should be released in 2019. Major changes likely will include:

* Moving to Mehlich-3 as the default extractant for P and K
* Removing the draw-down range from the recommendations
* Revising grain nutrient removal rates to reflect an overall decline in nutrient concentrations per bushel in P and especially K

**South Dakota**

* The South Dakota State University Soil Testing Lab has not been open for commercial soil samples since 2011. However, the Soil Testing Lab continues to analyze samples from research projects within the university. This past year the soil testing lab has run approximately 2000 samples. In addition to the traditional soil fertility samples, the lab is also starting to conduct some soil health tests such as anaerobic potentially mineralizable nitrogen and permanganate oxidizable carbon.
* As a new source for soil testing and soil fertility work the state of South Dakota has established a fee assessed to fertilizer purchases in South Dakota. The organization is called the South Dakota Nutrient Research and Education Council (NREC). This council consists of people from the fertilizer industry, grower organizations, CCA board, farmers, environmental organizations, and state department. The focus of this funding is to improve on-farm testing of science-based nutrient management practices specific to South to Dakota to enable our producers to effectively manage their resources. The council is focused on updating nutrient

**Wisconsin**

The University of Wisconsin Soil and Forage Analysis Lab offers soil fertility, forage quality, manure, plant, and lime quality analysis. The lab tests approximately half research samples and half public samples.

Types of analyses

**Soil**

The volume of public soil samples analyzed at the UW Soil and Forage Analysis lab trended slightly higher in 2018 than 2017, with 16,853 samples tested in 2018 compared to 16,222 in 2017.

FY 2017 and 2018 public soil sample volumes.

SFAL analyzed 19,812 research samples in calendar year 2018. The lab has switched from analyzing S turbidimetrically to calorimetrically.

**Plant Tissue Analysis**

Plant tissue volumes decreased slightly in 2018 with 3,010 samples analyzed. These numbers are still approximately double the throughput of the Soil and Plant analysis lab. The lab receives significant numbers of cranberry samples from local producers.

**Forage**

Forage sample volumes have been gradually decreasing over the past few years. This is in part because of changes in the tests used by animal nutritionists that we have not adapted to NIR. Work is ongoing to expand the methods the lab can perform. This year we added ICP analysis of Cobalt and Ytterbium to help dairy researchers. Tests to be added in the coming year include Selenium, a NIR calibration for sorghum forage and others.

**Lime**

Ag lime samples remain a small part of the labs sample volume. We conducted a small comparison of drying and sieving methods for gypsum samples containing calcium hydroxide. Current sieving methods seem appropriate for these samples, although samples may contain occasional large (golf ball to fist sized) chunks of material.

**Manure**

Manure volumes are trending down, perhaps in part due to the consolidation of the dairy industry and tight farm economy.

**Closing remarks**

In 2019 meeting Chair- Franzen, Manjula, secretary. Meeting was adjourned at 11:00 am to get ready for the Soil and Plant analysis workshop. There were 87 participants registered for the workshop and there may be some more expected to register today. The final agenda for the work shop is provided below:

**NCERA-13 Soil and Plant Analyst's Workshop**

**Clarion Highlander Hotel and Conference Center, Iowa City, Iowa**

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**Tuesday, February 26, 2019**

11:00 AM Sponsor display setup begins

12:00 PM Registration and check-in

1:00 PM Welcome, announcement and introductions

*Antonio Mallarino, professor, Agronomy and Extension soil fertility specialist, Iowa State University*

1:10 PM Does a healthy soil really requires less fertilizer? Evidence from corn-soybean cropping systems.

*Jordon Wade, graduate student, Environment and Natural Resources, The Ohio State University; Steve Culman, assistant*

*Professor and state specialist, Soil Fertility, The Ohio State University*

1:40 PM Soil enzyme activities: measurement and interpretation in soil health frameworks

*Andrew Margenot, assistant professor, Crop Sciences, University of Illinois*

2:10 PM Initial evaluation of routine and soil health nutrient tests in Wisconsin

*Carrie Laboski, professor, Soil Science and Extension soil fertility specialist, University of Wisconsin*

2:40 PM NAPT update and results of labs survey regarding soil health measurements

*Grant Cardon, professor and Extension soils specialist, Utah State University and Coordinator, NAPT program*

3:00 PM Break, refreshments and visit sponsor displays

3:15 PM Evaluation of soil testing laboratory performance in the Illinois Soil Testing Association

*Robert Miller, ALP Program Technical Director, Collaborative Testing Services, Inc.*

3:45 PM Lime requirement methods in the north central region

*Manjula Nathan, Extension associate professor, Plant Sciences, University of Missouri*

4:10 PM using infrared spectroscopy to measure routine soil properties

*Leonardo Deiss, postdoctoral researcher, Soil Fertility, The Ohio State University; Steve Culman, assistant professor and state*

*Specialist, soil fertility, The Ohio State University*

4:40 PM Sponsor displays, hors d'oeuvres and cash bar

6:00 PM Adjourn for the day

**Wednesday, February 27, 2019**

6:30 AM Breakfast buffet (provided)

8:00 AM Soil salinity, sodium adsorption ratio, and gypsum amendments

*Tom DeSutter, professor and program leader, Soil Science, North Dakota State University; Dave Franzen, professor, Soil*

*Science and Extension soil specialist, North Dakota State University*

8:30 AM Do we need to consider soil Ca: Mg ratios?

*Steve Culman, assistant professor and state specialist, soil fertility, The Ohio State University*

9:00 AM Percent K saturation, CEC, and soil-test K relationships with crop yield response to K fertilization

*Antonio Mallarino, professor, Agronomy and Extension soil fertility specialist, Iowa State University; Ryan Oltmans, graduate*

*Research assistant, Agronomy, Iowa State University*

9:30 AM Clay chemistry and soil-test K: Review and impact on recent North Dakota K recommendations

*John Breker, soil scientist, AGVISE Laboratories; David Franzen, professor, Soil Science and Extension soil specialist, North*

*Dakota State University*

10:00 AM Break, refreshments and visit sponsor displays

10:15 AM Mehlich-3 extracted P, Cu, Mn, and Zn: Relationships with other routine soil-test methods and with crop yield response

*Antonio Mallarino, professor, Agronomy and Extension soil fertility specialist, Iowa State University*

10:15 AM Sponsors may begin removing displays

Break

10:45 AM OSHA silica standard review for soil testing

*David Phillips, industrial hygienist, Iowa OSHA*

11:15 AM ALP update and inter-lab comparison of soil test phosphorus methods in North America

*Robert Miller, ALP Program Technical Director, Collaborative Testing Services, Inc.*

11:45 AM concluding remarks

*Dave Franzen, professor, Soil Science and Extension soil specialist, North Dakota State University*

12:00 PM Workshop adjourns