**Report on NCERA-13 Soil Testing and Plant Analysis Committee**

Virtual Meeting, January 8, 2021

Dave Franzen, chair

**Attendees and state representatives**

Francis Casey, Administrative advisor, North Dakota State University

David Franzen, NDSU, chair

Manjula Nathan, University of Missouri, recording secretary

Steven Culman, The Ohio State University

Jon Dahl, Michigan State University

Daniel Kaiser, University of Minnesota

Jason Clark, South Dakota State University

Carrie Laboski & Andrew Stammer, University of Wisconsin

Sylvie Brouder, Purdue University

Andrew Margenot, University of Illinois

Antonio Mallarino, Iowa State University

Bijesh Maharajan, University of Nebraska

Dorivar Ruiz-Diaz, Kansas State University

**Short state reports-**

North Dakota-

The North Dakota State University Soil and Water Testing Laboratory continues to analyze soil, water and some plant samples for farmers, ag-consultants, homeowners and researchers. Sample numbers from all sources increased about 10% over previous years. The laboratory director Dr. S. Mathews resigned in September to take a job in industry locally. The long-term technicians of the laboratory continued the management of the laboratory, keeping the operations in good order. Currently, the former laboratory director, Larry Swenson, was called out of retirement to manage affairs. The College of Agriculture, Food Science and Natural Resources is highly supportive of the laboratory and despite threat of budget cuts to the College generally, the status of the laboratory as self-supporting will ensure its future operation. Extension operations have been virtual from March until the present; however, some county and regional conferences have begun to feature at least some face-to-face speakers, using a hybrid model of virtual and live presentations and attendees. Spring research was not hindered and new projects were begun. The research itself was hindered by lack of undergraduate student help, introduction of new graduate students into the program, particularly those from out-of-state, and limitation of people per vehicle to one. The caravans of vehicles none the less traveled to research sites and data was collected and sites were cared for to their successful conclusion. Revised nutrient recommendations were agreed upon by soybean fertility researchers in the NDSU Ag Experiment Station system and the new recommendations were introduced early 2021 to growers and ag-consultants. The revisions were shared with members of the NCERA-13 committee.

Minnesota-

The University of Minnesota lab continues to operate but has been at a limited capacity during COVID. Due to reduced staff they have limited analysis for some internal research samples, but they have been continuing to operate and take homeowner and farmer samples throughout the pandemic. I do not have current data on the number and types of samples being run n the U of M soil testing lab.  Most out state labs were also in operation over the past year.

Updates were made to fertilizer guidelines in Minnesota for corn and soybean. Changes to the potassium fertilizer guidelines were made back in 2019 to both crops but the bulletins were revised in 2020.  A removal-based set of phosphorus guidelines were added to the corn and soybean publications in 2020. The sufficiency-based guidelines were also kept for the publications. Changes are expected for the soybean phosphorus guidelines in 2021 updated fertilizer recommendations for the medium soil test phosphorus class. We are also in year 2 of a study focused on mapping clay species across the state of Minnesota which will be used to further refine potassium guidelines.

No changes have been made to any suggested soil tests for the state of Minnesota. There have been more questions related to the use of the Mehlich-3 test however our data still shows problems with the test in soils with free calcium carbonate.

Missouri-

The state laboratory at Missouri was negatively affected by Covid and sample numbers received were down from previous years.

Iowa State-

The state laboratory at Ames was dissolved, and the research samples which supported crop nutrient requirements were farmed out to other laboratories.

Illinois-

The state laboratory association until recently known as the Illinois Soil Testing Association (ISTA) is now branded as the Agricultural Laboratory Testing Association (ALTA). The Illinois system never had a state laboratory, but for decades the state laboratories were supported by certification by Dr. T.R. Peck at the University of Illinois. In 1981, the ISTA was established to form a more cohesive entity, and certification continued to be supported by Dr. Peck’s laboratory until his passing. Since about 2007, the ISTA has formed a partnership with ALP (Agricultural Lab Proficiency) to perform member laboratory certification.

Indiana/Purdue-

Research supporting soil testing was reduced this past year due to Covid restriction, but there is optimism that research would be conducted in a more normal manner this coming crop season.

Wisconsin-

A phosphorus and potassium soil test calibration/correlation study for corn and soybean is being conducted at four ag research stations. Soil tests being evaluated for phosphorus include: Bray-1, Mehlich-3, and H3A; and for potassium include: Bray-1, ammonium acetate, Mehlich-3, and H3A.

A cloud-based nutrient recommendations calculator is nearing completion. All Wisconsin Department of Ag, Trade, & Consumer Protection certified soil test labs to use the calculator to provide nutrient recommendations consistent with UWEX Publication A2809 “Nutrient application guidelines for field, vegetable, and fruit crops in Wisconsin”.

The University of Wisconsin Soil and Forage Analysis Lab was closed for several months during the spring during the early stages of the COVID pandemic. Despite this closure farm samples were only down approximately 1000 samples from the previous year. The lab is in the process of transitioning to the Wisconsin State Lab of Hygiene. This will involve a move to Madison, reevaluation of services offered and conversion of IT infrastructure.

In addition to routine and research analysis lab work includes a five-year summary of soil test results for the state, ongoing work evaluating relationships between water extractable P and routine soil test factors, and collaboration on various forage soil fertility studies.

South Dakota-

The number of research activities was restricted in 2020; however, more normal activities are anticipated for this coming year.

Michigan-

Regular soil testing sample numbers were ahead of the previous year by 1,000 through March and then the Covid-19 restrictions hit. Regular soil tests were down 2,100 samples from April through June. County Extension offices were closed during this time making it more difficult for farmers and homeowners to get our soil testing kits.

We finished 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.

Sample analysis numbers for fiscal year 2020 for the main soil tests:

**Test Grower Research**

|  |  |  |
| --- | --- | --- |
| Regular (pH, P, K, Ca, Mg) | 2706 | 1759 |
| Self-Mailer (Urban regular) | 3425 |  |
| K, Ca & Mg Extracts | 0 | 100 |
| P Leachates | 0 | 231 |
| Zn & Mn | 865 | 259 |
| Cu & Fe | 165 | 286 |
| Na & Cl | 190 | 139 |
| Organic matter | 3889 | 979 |
| Nitrate-N | 321 | 5807 |
| Ammonium-N | 78 | 4764 |
| Particle size analysis | 439 | 759 |
| Sand sieve analysis | 403 | 56 |

Ohio-

Research was restricted due to Covid in 2020, but more normal activities are expected in 20201.

Nebraska-

Research was restricted due to Covid in 2020, however, some studies were accomplished. More normal research activities are anticipated in 2021.

Kansas-

Services: The Kansas State Soil Testing Lab offers analyses for soil, plant, irrigation water, and lime samples. Soil analysis is normally split about even between farmers and researchers, however, this past year most samples were related to research. During the 2020 calendar year we analyzed 26,814 soil samples, 18,286 plant tissue samples, 3577 water samples, and 115 ag lime samples. Plant nitrate analysis is the most requested plant tissue test for farmers. Most plant analysis work is performed for private and university researchers. Lime analyses are run for farmers, quarries, and Kansas Department of Agriculture. Our lab remained open during the Covid-19 pandemic, but it had a profound impact on the daily operations of the lab and the number of samples we received, especially from farmers and homeowners. We did not receive many samples during the spring season but received a lot of samples in the fall. For example, approximately 82% of the plant tissue samples we received in 2020 were received after July.

Personnel: We haven’t had any changes in personnel in the past year. We continue with three full-time analysts, each dedicated to either farmer’s soil (Lynn), researcher’s soil (Jake), or plant analysis (Kathy). We also have a full-time office administrator (Pattie). Several undergraduates also gain experience by working in the lab. A part-time research assistant and graduate student (Bryan) answers farmers’ and researchers’ questions, validates fertilizer recommendations, works on internal lab research projects, and oversees daily lab operations. We were unable to employee student-workers for much of 2020 due to the pandemic and KSU guidelines, but were fortunate to have only one employee quarantine and no direct COVID-19 illness in our lab.

Ongoing research projects: We are continuing work to compare different methods of soil analysis for plant available P and K (e.g. Mehlich-3 vs H3A) for corn, wheat, and soybean. In 2020, we also conducted an in-house experiment comparing Mehlich-3 extractable cations and micronutrients with their conventional counterparts (e.g. Ammonium Acetate and DTPA). We are also comparing acid digestion to dry-ash methods for several plant analyses and hope to offer dry-ash tests to both farmers and researchers soon.

Other department updates:The Agronomy Department at KSU has a new department head as of January 2021 (Dr. Raj Khosla). Ernie Minton was selected as the Dean of the College of Agriculture.

Software upgrades:We have implemented some changes to our LIMS system to allow easier import/export of grid sample soil data to popular precision agriculture software and crop management applications (e.g. AgStudio-MapShots). We also assisted the KDA in developing their new data management system to reduce the amount of time they devote to data entry for lime analysis results. We have also setup a github account for our lab members (mostly Bryan!) to play around with (<https://github.com/KSUSTL>). Our main goal is to provide support to our KSU soil classes by hosting repositories containing “real-world” lab data they can use freely (and remotely!) if needed.

Extension Support: Most of our public samples are submitted through extension offices around the state. One service we offer to agents is free diagnostic tests and testing for trials. We also support the department’s online newsletter by tweeting about soil testing and nutrient management articles (@KStateSoilTest).

**Discussion on planned virtual joint meeting with the south soil testing group (SERA-6) and the northeast soil testing group (NECC-1312)-**

The meeting will be in June and will be a virtual event. The NCERA-13 membership will urge that the number of discussions be limited in time and in number to allow sufficient discussion. Also, we will urge that the event be limited to 3 hours a day over 2-3 successive days to reduce the virtual burnout from day-long computer virtual events that we know occur. Shannon Alford at Clemson is lead on the project and Dave Franzen, Manjula Nathan and Antonio Mallarino will aid in its organization.

**Discussion of Mehlich 3 extractant for crop nutrients-**

Guidelines for use of the Mehlich 3 extractant for P and K already appear in our publication <https://extensiondata.missouri.edu/pub/pdf/specialb/sb1001.pdf> . It is up to each state to determine its utility in predicting need of crop nutrients with any extract or procedure.

**Use of subsoil P and K as a modifier to P and K recommendations.**  Although in early soil test calibration work, the subsoil K and sometimes subsoil P was considered. However, with nearly 2 centuries of crop production in most North Central states, the value of consideration of subsoil levels has been found to be negligible.

Meeting adjourned