

**Project Number: NECC-1812**

**Project Title: Northeast Coordinating Committee on Soil Testing**

**Period Covered: 10/2019-10/2020**

**Report Date: November 30, 2020**

**Annual Meeting Date: October 6-8, 2020 (via Zoom)**

**Participants listed by day with daily notes.**

**Summary:** A major focus of the meeting was discussion of the impacts of COVID-19 at individual institutions, namely the impact on soil testing laboratory functionality and research project impacts. The group discussed joint regional projects, potentially performing sulfur response trials. We heard updates on national ongoing projects, including updating manure testing manuals and soil test recommendation survey.

**Outputs:** Develop regional protocol for sulfur response trials to evaluate soil and tissue testing methods for sulfur in field crops. Interest in expanding trials beyond field crops, into onions and garlic, where sulfur is an important nutrient. This may prove difficult, as most members of the group do not have formal research appointments but are administratively directing their respective testing laboratory.

Attending 10/6/2020

Bruce Hoskins, University of Maine

Oliva Saunders, University of New Hampshire

John Spargo, Penn State University

Stephanie Murphy, Rutgers University

Amy Shober, University of Delaware

Dawn Pettinelli, University of Connecticut

Brian Kalmbach, University of Maryland

Charlie White, Penn State University

Zachary Sanders, Penn State University

Eugenia Pena-Yewtukhiw, West Virginia University

Gurpal Toor, University of Maryland

Patrick McIntosh, University of Connecticut

Karen Gartley, University of Delaware

Nicole Fiorellino, University of Maryland

Clem Clay, University of Massachusetts

Richard Rhodes, University of Rhode Island (Administrative Representative)

## Housekeeping

All agreed to meeting being recorded for minute taking. Presentation of minutes from 2019, motion to accept minutes as presented. Motion passed. Meeting planning follows the alphabetical order of the states in the group, Maryland (Nicole) agreed to take minutes for this meeting. Agenda for 2020 meeting is set but can be fluid and adjusted based on speaker preference.

## Advice from Administrative Rep Dr. Richard Rhodes

Discussion with Richard regarding creating a regional network for engaging in collaborative work, providing stakeholders with verifiable science based recommendations. At some point we need to provide a mid-term report as this project ends in 2023. Richard recommended nominating our group for an award after that time, the nomination should focus on how would you characterize the impacts of this group? How has our work led to changes? We are a coordinating committee, but we could become a research group to be eligible for hatch funding (multi-state) that is awarded to each AES annually through an internal competitive process. To put together a regional project, researchers in each state could use AES funds as venture capital to gather preliminary data for future funds. Additional considerations: how might multi-state group work together to create multi-institutional proposals funded partially from each internal AES funds

## NAPT update – Bryan not on the call yet

## Response to COVID – war stories

Eugenia presented a Powerpoint summary with information from each lab who responded to her regarding their status throughout COVID, when they entered this status, date started new regular operations, have they been asked to stop functioning. Rutgers, UConn, Maine, WVU responses on the slide. All considered essential services, some asked to stop functioning others not. In Mid-Atlantic/NE, only Rutgers and UMass were made to close down. The other labs were able to remain open in some fashion because they were considered essential. Some discussion about different procedures at various testing labs. Each labs, as with all research labs, had to submit plans for how to operate safely, Rutgers was inspected to ensure they were following procedures, but most others not inspected. Some had support from upper administration or provided guidance on how to work with upper administration to ensure continued functionality of labs (preparing safety plans) other university administrators unaware of the importance of the work of testing labs. Use of UV lights or allowing samples to sit for 24 hrs before handling to reduce potential spread of disease. When campuses closed, it affected receiving of samples and mailing of reports to clientele, each university had a different experience with mail services and status of extension offices. There was a discussion that all labs in the region should be considered “essential service” because they are providing a service to agriculture and should be able to remain open, this should be consistent across the region. Could the group send a joint letter to upper administration to justify the importance of the work? Discussion regarding furloughs of faculty and staff and the implication of this with faculty unions and benefits. Some also offered early retirement package to assist with budget impacts. Some labs moved to extended hours or work weeks, to minimize the number of people in the labs at one time.

Amy Shober volunteered to set up a shared Drive folder so all labs can share their contingency and functioning plans so that others may adopt practices that are working for other labs.

In some states, public assumed the labs were open while in other states, it was assumed the labs were closed. Varying response of increase or decrease in number of samples by state, based on popular

assumption of lab being closed or open. Future of funding and support for labs is important for some labs, they need the support of the public. Some changes that have been implemented for COVID may last permanently past the immediate future. It is important for continued funding and continued support from the clientele that labs stay open and available. Most labs had to create their own strategy for functioning during the pandemic, there is interest in sharing protocols among the labs. Most groups felt safe working during this time, they have low staff numbers and it was not difficult to space apart. Personnel impacts included furloughs and lack of student help, this impacted some labs and not others. Some faculty took over small tasks to cover reduced personnel but the lack of personnel was felt in some labs where there were increased number of samples received.

#### Mid-Atlantic Lime Recommendations

Amy asked to give a talk for the Tri-Societies meeting on lime recommendations so she is sharing what she put together for the talk, not all the slides just an overview. She reported differences in physiology across the region. She collected soil pH distribution across the region, which tend to follow a bell curve, although observing lower pH in DE. In VA, soil pH by region was presented with no major differences from the regional data. Methods of university and private labs presented for comparison, with concern that there are labs in the region using methods that may not provide appropriate recommendations to our clientele. Regional target pH is consistent across region for the major crops. Universities are calculating base lime rate differently across the region. She presented different options in the states for determining lime recommendations using specific methods and what adjustments are available by state – there is a variety of adjustments available by state. Generally, land grant labs are using appropriate methods but it is difficult to generate a lime recommendation because information is spread across multiple documents. Do we consider developing a comprehensive document across the region? It could still include state-specific recommendations but it would be all together in one document that could have consistent terminology across the region. There was general discussion about this idea and it may be useful, Amy was volunteered to serve as editor of the document. Although it is not a research output from the group, it could be a beneficial output of the group. John suggested using the NAPT soils across each lab and determine the lime recommendation in each state from the same check soil – this could be a good publication to compare the lime recommendations. Continued discussion after the presentation regarded pH distribution in the regions of the state and stratified pH in no-till or pasture fields. Amy thanked the other labs who provided her information for development of the presentation.

General agreement to move forward with mining the NAPT data to use observed values for pH for a soil (use consensus value) to utilize for a regional publication on lime recommendations. We should revisit engaging the commercial labs with this group to include them in the discussion of use of appropriate methods. Other coordinating committees in the country are engaging their commercial labs in their groups.

Adjourned at 1:15pm

Attending 10/7/2020

Bruce Hoskins, U Maine

John Spargo, Penn State University

Amy Shober, University of Delaware

Olivia Saunders, University of New Hampshire

Karen Gartley, University of Delaware

Clem Clay, University of Massachusetts

Stephanie Murphy, Rutgers University

Leslie Parise, University of Vermont

Patrick McIntosh, University of Connecticut

Brian Kalmbach, University of Maryland

Eugenia Pena-Yewtukhiw, West Virginia University

Dawn Pettinelli, University of Connecticut

Charlie White, Penn State University

Gurpal Toor, University of Maryland

N availability from poultry litter – Charlie White

Preliminary work on nitrogen availability factors from poultry litter; trying to reconcile with other states in the northeast. Two ways in PA to allow available N from manure, total N and N fractions method. Charlie presented these two methods. Total N method was designed to reduce time for calculation, as farmers were performing this calculation on a large number of fields. Concerns around decreased N credit with minimal incorporation and there is a large number of no-till operations and farmers may be incorrectly crediting their N. The two methods should be generating similar N credits, but using experimental manure, the two methods are not providing similar recommendations. Methods assume a lot of volatilization from poultry litter and assuming a lot of the manure is ammonium – these may not be correct assumptions based on the experimental manure analysis. PA factors are not consistent other state's factors (MD, MA). Charlie performed an experiment this growing season to examine yield response to litter application utilizing precipitation as "incorporation" to mimic no-till situation. His results did not compare well to their Total N method, with guide values being lower than what he observed in his study. Although there are differences in N credits from the experiment, to PA's calculation method and MD's calculation method, they are similar enough to each other. He does not feel the need to make radical changes at this point, the calculation methods are conservative enough and will not lead to under-fertilization (and potentially hurt yields). Discussion ensued regarding regional labs and their willingness to report ammonium N, Maryland assured that most commercial labs in the region are reporting this value so it shouldn't be a problem for the growers in PA to get this value, if they are considering using the N fractions method only.

### Land Grant Universities role in the regulatory process

Recommendations were initially just recommendations but are now being used ever-increasingly as regulatory guidance, so how do we navigate this shift. Since there are a lot of LGUs in our region, which is a small region, we may have more say than we think we do. Regulation is not a part of mission of LGUs, as we examine in detail the three components of the mission. Our funding, if received from NIFA, does stream down to NIFA from federal regulatory agencies, in fact. Discussion began about the roles of LGUs within nutrient management regulations in individual states. Most LGU researchers have been caught up between regulations and recommendations, with questions directed at how recommendations were developed. We are all involved in teaching and extension, and it is an important component of testing labs at LGUs to explain reasoning for regulations. Ensure that extension publications include peer reviewed publications to back up the recommendations. Maryland is a good example for other states of how to incorporate extension and regulations. Sometimes despite having good scientific justification, there can be other factors at play with policy development, including economic and financial factors, that impact decision-making in the regulatory process.

### Yield database construction for the Northeast

In NY, they are developing yield tables for different soil series in the state. Is there interest or need to expand this on a regional basis? Current yields for each soil series in some states are dated and it may not be the best idea to just adjust historic yields with some coefficient to adjust average yields. NY is collecting this data directly from yield monitor data, with the goal to determine updated yield potential for each soil series. This may be something that is uniquely important to NY at the moment, despite discussion of its utility to generating recommendations in other states. Not generally excitement about this becoming a regional project, it would be great information to have but it is a large undertaking and would be very costly; we are generally unsure what outlet would be able to provide the funding for this type of work.

### Ideas for a joint regional project

Options generally include sulfur response, with some labs seeing low sulfur values. PSU did some work on this a few years back to look at distribution of their state samples – earleaf samples they collected did fall below the critical levels. They saw responses at some sites (embedded S response into variety trials) where it was expected and came to an approximate Mehlich-3 sulfur critical level where they feel comfortable recommending fertilization below that point. Discussion about embedding fertility work into variety trials, although these fields tend to have high fertility where a response may not be observed. There seems to be limited information on sulfur generally, in terms of testing for sulfur in soils and understanding adsorption in soil solution. There is interest in looking at other crops besides field corn too, especially onions and garlic where S may be important. Suggestion of a soil health related project led by WVU to investigate response from some of the biological tests – extract nutrients as status quo, organic matter and organic carbon, aggregation test developed by Eugenia, then one of the standard available biologic tests to determine which indicators are sensitive to what is happening in the field.

Adjourned at 2:15pm

Attending 10/8/2020

Olivia Saunders, University of New Hampshire

Joe Heckman, Rutgers University

Bruce Hoskins, U Maine

Dawn Pettinelli, University of Connecticut

John Spargo, Pennsylvania State University

Clem Clay, University of Massachusetts

Eugenia Pena-Yewtukhiw, West Virginia University

Brian Kalmbach, University of Maryland

Amy Shober, University of Delaware

Gurpal Toor, University of Maryland

Charlie White, Pennsylvania State University

Karen Gartley, University of Delaware

Patrick McIntosh, University of Connecticut

Stephanie Murphy, Rutgers University

State Reports (attached as addendum)

Connecticut - attached

Delaware – no report

Maine - received

Maryland – Nicole presented highlights of her research, including an adaptive N project with DE and PA evaluating commercially available N models alongside university recommendations, continued research with industrial hemp, looking at N and P fertilization strategies, protein study in wheat, new work with soybeans upcoming. Gurpal highlighted some of his research, including development of a tool to quantify and track soil organic C, a USDA-SAS project looking at nitrogen transport to ditches and edge of field losses, another project looking at phosphorus transport from field to plug into new P index for MD in the future, work with miscanthus in riparian areas, and water extractable P pools in legacy high-P soils.

Massachusetts – no report

New Hampshire - attached

New Jersey - attached

Pennsylvania - attached

West Virginia - attached

#### Update on LGU soil test recommendation survey – John Spargo

John presented an update on the FRST model project taking place nationally, a survey of soil fertility recommendations from LGUs. Less faculty FTEs dedicated to doing soil test calibration and correlation field research and decreasing number of states with testing labs (30 states still have lab performing testing and providing recommendations). Additional questions included how are fertility recommendations developed (build & maintain or sufficiency approach) and what kind/size scoop is used in lab for extraction. An update will be presented at the next joint meeting.

#### Update on revised manure methods manual – John Spargo

Melissa Wilson is new faculty member at U of Minnesota is taking on an update of manure analysis method document, first authored in early 2000's, Bruce was involved with development of original document. Private labs are engaged during this update process and there is a diversity of views present at virtual meetings. This update will have some new methods added for elements not previously included and will include any valid existing method. Draft complete and together by early 2021 to send out for review by labs (to add comments and suggestions) before it is in press. Plan is to update the document every few years to keep it current.

#### Getting academics/training involved with routine testing – Joe Heckman

Joe teaches soil fertility without a lab and his students should have experience in the testing lab, taking a soil sample, interpreting a soil test report. He took his students on a field trip to the soil testing lab and recorded this visit – which he uses with future classes for teaching. Could we put together a video of different methods within the testing lab for teaching purposes? It may help labs that in jeopardy in terms of funding could demonstrate they are engaged with undergraduate teaching in addition to research and service to producers. Rutgers lab analyzes samples for undergraduate classes and Eugenia teaches courses as well. Other labs shared their experience with engaging students in terms of teaching (not just student workers), most labs seem to be at least providing tours to soils classes.

Adjourned at 2:19pm

**NECC-1812 Annual State Report For Connecticut**

Reported October 2020 for period: Calendar 2019

<b>Contact</b>	Thomas Morris Retired in 2019	Dawn Pettinelli Patrick McIntosh
<b>Mailing address</b>		UConn Soil Nutrient Analysis Lab 6 Sherman Place U5102 Storrs, CT 06269
<b>Phone number</b>		860.486.4274
<b>FAX number</b>		860.486.4562
<b>e-mail address</b>	<a href="mailto:thomas.morris@uconn.edu">thomas.morris@uconn.edu</a>	<a href="mailto:dawn.pettinelli@uconn.edu">dawn.pettinelli@uconn.edu</a> <a href="mailto:patrick.mcintosh@uconn.edu">patrick.mcintosh@uconn.edu</a>
<b>Website address</b>		<a href="http://www.soiltest.uconn.edu">www.soiltest.uconn.edu</a>

**Lab personnel FTE's:** 2 + ½ Special Payroll (12 months) + Student Labor

**Extractant(s):** Modified Morgan for mineral soils, water for SME for greenhouse soils,

**Instrumentation:** Spectro Genesis ICP, Unity Westco Smart Chem 170 Discrete Analyze for ortho-phosphate and nitrogen-nitrogen, nitrate electrode for tissue NO<sub>3</sub>-N (Cornstalks), Elementar VarioMax

**Cost for routine test:** \$12

**Routine test includes:** pH, Ca, Mg, K, P, Mn, Cu, Zn, Fe, Al, B, estimated total lead, estimated CEC, % BS & modified Mehlich buffer pH.

**Sample Summary:**

Category	Soil	SME	Plant
<b>Total Samples</b>	12,497	58	902
<b>Total MM</b>	9877		
<b>Commercial</b>	1664		
<b>Homeowner MM</b>	8150		
<b>Dept Research/Teaching MM</b>	66		
<b>Nitrate/PSNT</b>	327		
<b>Misc – OM, Tex, SS, pH</b>	2083		
<b>Cornstalk NO<sub>3</sub></b>			15
<b>Total N – Elementar</b>	210		419
<b>ICP Plant Tissue</b>			468

**Summary of Research:**

Two post-doctoral scientists working on: 1) development of an environmental critical level for soil test phosphorus, and the amount of manure and fertilizer phosphorus required to increase soil test phosphorus one unit, and 2) evaluation of soil health measurements and tests as part of a national program with NRCS.

**Other/News:**

New Technician – Patrick McIntosh

Master Composter program offered in October 2019

Need to redo an incubation study to confirm modified Mehlich buffer limestone recommendations.

Planning to set up ammonium on the Westco.

Price increase scheduled for Jan 1, 2021

Dean supports a soils faculty position to replace T. Morris but concentration not determined – maybe soil fertility/agronomist; maybe soil microbiology & soil health. Tentatively summer 2021.



# NECC-1312 Annual State Report for Maine

reported October, 2020

(sample numbers for calendar 2019)

**Contact:** Bruce Hoskins  
**Address:** 5722 Deering Hall  
Orono ME 04469

**Voice:** 207-581-2945

**Fax:** 207-581-3597

**Email:** hoskins@maine.edu

**Web site:** umaine.edu/soiltestinglab

**Lab personnel FTE's:** 3.5 technical, 2 professional, 1 IT/Administrative

**Extractant(s):** modified Morgan (ME, VT); Morgan (NY); NH<sub>4</sub>Cl (forest soils), others on request

**Instrumentation:** TJA iCAP-6300 ICP, Spectro Genesis ICP (2019), OI Analytic & Lachat Ion Analyzers, Labfit pH system, Leco Tru-Mac combustion analyzer, AIM600 Kjeldahl block digester  
Dionex ICS-1000 Ion chromatograph, CEM MDS-2100 microwave system, PE FIMS-100 Hg analyzer

**Cost for routine test:** \$18 (\$15 volume or winter discount), \$25 with NH<sub>4</sub>/NO<sub>3</sub> (Comprehensive test)

**Routine test includes:** pH,LR (mod Mehlich), OM, P, K, Mg, Ca, S, B, Cu, Fe, Mn, Zn; Na, (Cd,Cr,Ni,Pb)

## Sample Number Summary (for calendar 2019)

	ME+VT+NY Soil	Plant	ME+VT Manure	Compost	Metals	Other	Prepped for instrument
Commercial	11450	405	610	250	200	63	3035 ICP
Homeowner	4125					(lime/fert)	215 FIA
Research	765	832					1735 TN/TC
NO <sub>3</sub> /PSNT	2300						
Other	680 HT/GH						

670 Solvita

265 Soil Health

370 Fsoil

## Summary of Research (2019/2020)

*Field research allowed to resume w/safety plans on July 1, 2020*

Organic bread wheat production - collaborative w/ VT (continuing grant).

High tunnel fertility and production survey w/ VT, NH, RI, MA

Weed control in vegetable and small grain production

Multi-state comparison of manure type on soil health indices in vegetable production (ME, MD, CA, MN)

Composting of mortalities.

## News/Other (2019/2020)

10% drop in ME sample numbers in 2019, first full year after 20% price increase. Net increase financially.

10 - 15 % rebound in sample numbers in 2020. Increased requests for add-on analysis (NO<sub>3</sub>, Part. Size)

Increase in out of state samples during 2020 lockdown.

Lab continues with fixed Exp. Sta. input for Grad project samples (short proposal required).

Continued evaluation/comparison Soil Health/SoilQuality indicators and enhancements - SLAN, POXC

Subcontracting from several private labs for combustion, lime eq., fertilizer methods.

**NECC-1812 Annual State Report For:**

Reported \_\_NH\_\_ for period: \_\_Jan 1 2019 –Dec 31, 2019\_\_

<b>Contact</b>	Olivia Saunders
<b>Mailing address</b>	PO Box 1480
<b>Phone number</b>	603-447-3834
<b>FAX number</b>	
<b>e-mail address</b>	<a href="mailto:Olivia.saunders@unh.edu">Olivia.saunders@unh.edu</a>
<b>Website address</b>	Extension.unh.edu

**Lab personnel FTE's:** 0.5

**Extractant(s):**

**Instrumentation:**

**Cost for routine test:** \$20.00

**Routine test includes:** Includes extractable calcium, magnesium, potassium, phosphorus, soil pH, organic matter content, and a lead screening analysis. Both conventional and organic fertilizer recommendations are given

**Sample Summary:**

Category	Soil	SME	Plant	Manure	Compost	Other
<b>Total Samples</b>	2466				18	
<b>Commercial</b>	877					
<b>Homeowner</b>	1589					
<b>Dept Research</b>						
<b>Nitrate/PSNT</b>						
<b>Teaching</b>						
<b>Misc – OM, Tex, SS, pH</b>						
<b>Cornstalk NO<sub>3</sub></b>						
<b>Total N –</b>						
<b>ICP Plant Tissue</b>						

**Summary of Research:**

UNH continues to collaborate with Penn State to run samples.

**Other/News:**

We have Pollinator planting recommendations as well as non-commercial hay/corn forage.

The lab was closed March 17 thru August 11, 2020. Growers were instructed to send their soil to neighboring states lab (ME or PA). We had 81 cancelled tests. At tissue testing time, we were in the process of re-opening and instructed fruit growers to hold onto their dried samples until we reopened.

Our administration has instructed us that the Cold Fusion Database where our recommendations are held will be retired, so in the upcoming year we will be exploring what options are out there. We have had a

reduction in IT support within the Extension unit, so we will be working at the university level to accomplish this task.

We no longer create new accounts for billing purposes unless they are internal to the University or government. Repayment of accounts was taking too long for this to work for our program.

I am hopeful we will be able to post a new agronomy/soil state specialist. The position has not been posted yet and may be delayed by COVID hiring freeze. We continue to advocate for this position. This individual will work one on one with growers on field trials, and will be based out of the Durham campus.

We will be moving the soils “lab” across campus, to the old Thompson School building. This will make client drop offs much easier. We are also purchasing a mail box/drop box to help with weekend visitors when the building is locked. We hope to also get a parking spot for client drop offs that for both our soils, pathology and entomology ID labs.

We have a new Dean at the College of Agriculture, as well as a new director of the Agriculture Experiment Station. Extension is excited about these new hires and continued collaboration with AES, COLSA and Extension.

## NECC-1812 Annual State Report Form

State: New Jersey  
 Year: FY2020 (July 2019-June 2020)  
 Contact: Stephanie L. Murphy  
 Mailing address: Rutgers Soil Testing Lab  
 ASB-II, Cook Campus  
 57 US Highway 1  
 New Brunswick, NJ 08901  
 voice: (848) 932-9295  
 fax: (732) 932-9292  
 email: [soiltest@njaes.rutgers.edu](mailto:soiltest@njaes.rutgers.edu)  
 web site: [njaes.rutgers.edu/soil-testing-lab](http://njaes.rutgers.edu/soil-testing-lab)

Lab personnel FTE's: 3.66

Extractant(s): Mehlich 3  
 Instrumentation: Thermo iCap 6000  
 Elementar vario Max cube (TN/TC)  
 Mettler Toledo SevenExcellence (pH)  
 Bran+Luebbe Autoanalyzer 3

Cost for routine test: \$20  
 Routine test includes: pH, Adams-Evans buffer pH, P, K, Ca, Mg, Cu, Mn,  
 Zn, B, Fe, recommendations (max 2)

### Sample Number Summary (change categories as needed)

	Soil	Plant	Manure	Compost	Lead	PottingMedia	Water
Agriculture	469			1	13	2	2
Landscapers	1792			4	12	7	
Homeowner	1845			1	72	13	4
Research	598	289			1	11	24
Eng/Topsoil	1382			55	20	3	4
Other	719			14	21	35	4
NO3/PSNT	444			~70			38
<b>TOTAL*</b>	6806	289	0	74	139	71	38

*\*total may not be sum of category values*

### Summary of Research

S. Murphy	portable optical sensor scanning of soil, machine learning correlation to analyzed soil properties (USDA-SBRI)
	Land use/C sequestration and C balance project (Duke Farms Foundation)
J. Heckman	PSNT for certified organic sweet potato
	Horse manure/soil fertility
	Writing review article, soil Mn effect on disease susceptibility

### News/Other

Rutgers, including STL, closed April 10-May 3 due to COVID19 pandemic. STL allowed to re-open with essential research classification.
3-day furlough (over 3 weeks) during July for Director (non-aligned staff category). Potential furlough for lab technician (delayed to 2021).
Instruction: Soils and Society (Plant Biology 102) course taught by S. Murphy fall semester every year (brings in IDR funds to STL, finally)



## Summary of Research

Evaluation of mine drainage residuals (MDR) to reduce water soluble P and P runoff from surface applied manure - Collaboration among Penn State, ARS, and Iron Oxide Recovery/Hedin Environmental. Completed series of batch experiments to evaluate effectiveness of several MDR to reduce soluble P and determine optimum rate and equilibration time. Completed work to determine efficacy of MDR to reduce manure WSP and evaluate impact on runoff P losses from surface application of treated manure. Batch study research has been accepted for publication in JEQ. Paper summarizing run-off work in in-review.

Analysis of contaminants in cocoa (cadmium), and soil remediation - Collaborations b/t Penn State and Universidad Nacional de Ingeniería. pilot project seeks to develop working capacity between partners in order to achieve our long-term goal of minimizing cocoa Cd concentration and making Peruvian cocoa commercially satisfactory for the world market. Via collaborative field sampling campaigns and institutional exchange programs with students and faculty, we begin to build a long-term research program. One MS completed. Paper summarizing research is in-review.

Mo uptake by forages grown on steel slag amended soils: Implications for animal health – Research evaluating Mo uptake by forages (alfalfa and orchardgrass) grown in soil amended with a widely available limestone alternative and the associated risk of molybdenosis in livestock. A greenhouse trial completed in 2017. Field trial planted fall 2018 to validate our results. Second year of field work is nearly complete. Will summarize findings and submit for publication. A feeding trial will be started this fall with forages harvested from treated field plots. Work is being funded by the Pennsylvania Dept. of Ag. Animal Health and Diagnostic Commission.

A Survey to Evaluate the Current Status of Land Grant University/State Department of Agriculture Soil Fertility Recommendations and Analytical Methods – Collaboration among multiple partners in NE, SE, and NC regions led by Nathan Slaton, Deanna Osmond, and John Spargo. Goal is to gain a better understanding of the current status of soil testing across the U.S. to direct collaborative efforts among states and regions to identify where opportunities exist to harmonize guidelines. Objectives are to collect information regarding state soil test recommendations, fertilization philosophy, analytical methods, and the provenance of the correlation/calibration data used to support recommendations. Last known, published survey of Land Grant University soil-test recommendations was by Voss (1998). Survey distributed in February 2020 and closed in June. Responses from 49 states/territories. Validation of data is on-going. Preliminary findings to be presented at the 2020 ASA meeting. Summarized results will be submitted for publication in early 2021.

Modernizing Fertilizer Recommendations: Fertilizer Recommendation Support Tool (FRST) – Effort led by Deanna Osmond, Pete Klienman, Josh McGrath, Nathan Slaton, and John Spargo; team is currently comprised of over 80 individuals from across the USA and the participants are growing; all have volunteered to be part of this project. Project aims to develop a soil-test and crop-response-to-fertilization searchable web-based tool that provides more consistent, transparent, and science-based decision support for nutrient recommendations across the USA for major crops, including but not limited to corn, cotton, grain sorghum, peanuts, soybean, and wheat. Initial work focused on building a stable database of soil-test correlation and calibration results from published field trials, theses and dissertations, and state records. Results from both single-year, and multi-year trials are included.

Sulfur management in corn-soy rotations. Evaluating dynamics of S availability from ammonium sulfate, gypsum, elemental S and poultry litter applied to corn and the extent to which S applied to corn in one year is stored in the subsoil and carried over to soybeans the following year.

Crediting Cover Crops and Soil Organic Matter in Nitrogen Fertilizer Recommendations - Developing and validating algorithms for cover crop and soil organic matter N credits. Testing variations of the algorithm in different cover crop management systems and also using variable rate prescriptions based on sensor derived variations in cover crop N content and soil texture.

Mid-infrared FTIR spectroscopy to evaluate soil organic matter chemistry and other parameters- Mid-infrared spectroscopy is being used to assess the prevalence and relative composition of different soil organic matter functional groups and their association with microbial community composition as identified by phospholipid fatty acid analysis. We will also assess the instrument's capability to predict other soil

**NECC-1312 Annual State Report For**  
Reported October 2020 for period: Calendar 2019

<b>Contact</b>	Eugenia Pena-Yewtukhiw
<b>Mailing address</b>	Division of Plant & Soil Sciences Davis College of Agriculture, Natural Resources and Design West Virginia University, Agriculture Science Building, Rm 1405 1194 Evansdale Dr Morgantown, WV 26506
<b>Phone number</b>	304.293.5375 & 304.293.2287
<b>FAX number</b>	
<b>e-mail address</b>	<a href="mailto:wvu.davis.soiltesting@gmail.com">wvu.davis.soiltesting@gmail.com</a>
<b>Website address</b>	<a href="https://soiltesting.wvu.edu/">https://soiltesting.wvu.edu/</a>

**Lab personnel FTE's:** 1 (12 months) + Student Labor

**Extractant(s):** Mehlich I until August 2018 (starting September 2018, Mehlich III).

**Instrumentation:** ICP-OES - Optima 2100 DV (PerkinElmer Inc.)

**Cost for routine test:** \$0 for WV residents, \$10 for out of state clients.

**Routine test includes:** pH (water 1:1), Ca, Mg, K, P, Mehlich buffer pH.

**Sample Summary:**

Category	Soil	SME	Plant
<b>Total Samples</b>	8,997		
<b>Commercial MM</b>	6,462*		
<b>Homeowner MM</b>	2,391		
<b>Dept Research MM</b>	144		
<b>Nitrate/PSNT</b>	N/A		
<b>Teaching</b>	Not identified		
<b>Misc – OM, Tex, SS, pH</b>	239 OM		
<b>Cornstalk NO<sub>3</sub></b>	N/A		
<b>Total N – Elementar</b>	N/A		
<b>ICP Plant Tissue</b>	N/A		

\* Identified as farmers

**Summary of Research:**

No funded research projects related to the West Virginia University Soil Testing Lab was performed in 2019. Soil sampling in special structures such as high tunnels was researched at the WVU Certified Organic Farm.

**Other/News:**

Organic matter content estimated by Loss on Ignition (LOI) is an additional analysis performed by our lab at a cost. Electrical conductivity (EC) analysis has been added in March as a new lab product for 2019 at \$3/sample. We studied adding micro-nutrients as a new out-of-pocket analysis (Al, Fe, Na, Mn, Ni, Cu). Starting September 2018, the WVU Soil Testing Laboratory transitioned from Mehlich I to Mehlich 3 extractant, the software was updated. Jim Hintz (WVU Extension) software developer ("Cold Fusion" based) worked on bugs in the program.

WVU Extension Service continued improving the new fertilizer recommendations (no field calibration). The recommendations are responsibility of Dr. Ed Rayburn. He adapted existing recommendations from WV, Virginia and Pennsylvania. We have seventy-five (75) recommendations. We are working on adding Hemp and Brambles recommendations.