



SCHOOL OF ENVIRONMENT AND NATURAL RESOURCES

# GRADUATE EXIT SEMINAR

LOUCELINE FLEURIDOR

## Soil Health and Fertility, Variability and Connections to Crop Productivity

Soil health is the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans and combines soil physical, chemical and biological properties. Soil health is usually assessed by indicators which are responsive to and reflect changes in soil management. While chemical and biological health indicators may change rapidly, soil physical indicators are not immediately measurable. This justifies the systematic approach of measuring several interrelated indicators of soil health. My research addresses the trending shift in Ohio farmland management to on the one-hand an enhanced-fertilization program that preemptively mitigates yield losses due to perceived soil S deficiency and on the other hand more targeted applications of phosphorus (P) and potassium (K) to reduce P losses contributing to water quality issues and soil potassium build up. For S, one of the main sources used is gypsum, a calcium sulfate amendment that not only provides S but also improves soil physical conditions and overall soil health. Although cited as a soil conditioner, the effect of gypsum on yield and soil health is unclear, with most existing studies short-term (1 to 2 field seasons). Of the same, the time needed to measure responses as well as the connection between yield and soil health is not immediately clear. My dissertation aimed to: 1) evaluate crop response to S addition under differing management practices across 96 trials to determine if S addition is needed on Ohio cropland, 2) determine the effects of continuous long-term use of gypsum as both a plant nutrient and a soil conditioner on crop productivity and soil health and 3) determine the associative effects of cation exchange capacity, pH, initial Mehlich-3 soil test phosphorus and potassium on soil available P and K. Our results showed limited crop response to the addition of S across a wide variety of Ohio soils, likewise measured soil physical and biological health indicators did not show consistent evidence of improvement. Long-term annual application of gypsum after 8 years did not show evidence of soil health improvement. Our results suggest that site specific characteristics may influence crop and soil response. Therefore, the use of soil health indicators can be a great tool to sustainably manage agricultural soils.

Advisor: Dr. Scott Demyan

**Tuesday July 25, 2023**  
**10:00 A.M.**

**Location:** Kottman Hall 245

**Join the seminar via Zoom:**

<https://osu.zoom.us/j/95894834871?pwd=Vi9rNUpFZkltRE5JZE5ObSs3bnVBdz09>

Meeting ID: 958 9483 4871      Passcode: 250543

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