Northern New York Agricultural Development Program News

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NNY Ag Research on ICP: First Study of Its Kind for New York

Northern New York Agricultural Development Program-funded research is evaluating two methods of measuring phosphorus (P) – a key soil nutrient for crop production. The goal of the NNY Soil Test P project is to determine if a different method may offer an advantage over the traditional way of measuring P in soil test extracts. More efficient use of phosphorus in fertilizer and manure represents a significant cost savings for farmers and enhances agricultural environmental stewardship.

The Northern New York Agricultural Development Program (NNYADP) steering committee of farmers representing the diverse agricultural sectors in Clinton, Essex, Franklin, Jefferson, Lewis and St. Lawrence counties identified the use of ICP - inductively coupled plasma spectroscopy - for measuring P in NNY soils for evaluation by W.H. Miner Agricultural Research Institute, Chazy, NY.

Soil Test P project leader Eric Young, an agronomist and soil scientist at Miner Institute, says, "Phosphorus is a critical nutrient that can limit crop productivity and its management is an important environmental consideration on dairy farms. A better accounting of plant-available phosphorus has important economic and environmental implications for Northern New York farms."

Young has begun the preliminary comparison of the use of ICP with the current practice of measuring P in soil extracts with a spectrophotometer. Today, ICP has become a standard piece of instrumentation in most soil testing laboratories. It accurately measures multiple nutrients simultaneously and measures the total amount of an element in soil extracts.

"This Northern New York Agricultural Development Program-funded research is the first study of its kind in New York and should help determine if fertilizer guidelines based on ICP might be advantageous," Young says.

P recommendations for manure and fertilizer applications on NY-grown field crops are presently based on the colorimetric procedure that measures only the inorganic form of P.

"In practical terms, measuring phosphorus using ICP may provide a more complete picture of phosphorus fertility. We know that the organic forms of phosphorus are an important source of plant-available nutrient, but we do not have the research yet to translate this into agronomic guidelines for farmers," Young says.

The objectives of this NNYADP-funded research were to determine the extent of soil test P variation between the ICP and colorimetric methods for a large number of regional soils, and to identify soil test factors influencing results differences between the two methods.

In the fall of 2011, Champlain Valley Agronomics of Peru, NY, collected 244 soil samples from different agricultural fields in Clinton, Essex and Franklin counties to obtain a research sample representing the range of soil properties across the Northern New York growing region.

"Samples spanned a wide range in pH, organic matter, extractable nutrients and soil test P as well as a wide range in soil types, drainage capacity, and texture," Young explains.

All samples were sent to the University of Maine Soil Testing Laboratory for analysis using the Morgan extractant soil test that is standard for NY. Phosphorus levels were determined using both the colorimetric and ICP methods.

Test results revealed that soil test P levels were consistently higher using the ICP method, and indicate that soil calibrations based on ICP for Northern New York soils would differ substantially from P levels measured by only the colorimetric procedure, particularly for soils in the agronomic responsive range, e.g., soils testing in the very low to medium levels categories.

"Soil test P measured by ICP ranged from 1 to 3.4-fold greater than P measured by the colorimetric method. This research suggests that Northern New York agricultural soils may contain substantial organic phosphorus which may contribute to plant-available P," Young says.

“A better understanding of phosphorus dynamics is needed to develop testing procedures for improved prediction of phosphorus availability, and to answer the question of whether the additional phosphorus indicated by the ICP testing is actually plant-available. Current phosphorus use guidelines would also benefit from further refinement based on accounting for differences in soil type, organic matter, and pH, all known to strongly influence phosphorus nutrient availability,” he adds.

This NNYADP project draws on earlier NNYADP-funded research conducted by a Cornell University research team led by Dr. Quirine M. Ketterings. That research suggests that the measurement of sulfur in calcium chloride extracts using ICP showed the best likelihood as a soil test for sulfur and was the most consistent detection method across soil types.

The results of the NNYADP Soil Test P project were presented at the 2012 American Society of Agronomy/Soil Science Society of America/Crop Science Society of America Conference.

The complete project report is on the NNYADP website at www.nnyagdev.org under Field Crops/Phosphorus. More information is also available from Miner Institute and the Cornell Cooperative Extension offices of Northern New York. -30-