TECHNICAL NOTES

UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE
OCTOBER 2007 ALEXANDRIA, LOUISIANA

AGRONOMY TECHNICAL NOTE NO. 98

CONVERTING SOIL TEST MEHLICH 3 PHOSPHORUS TO BRAY 2 PHOSPHORUS FOR COMPUTING PHOSPHORUS INDEX VALUES

BACKGROUND

The LSU Agricultural Center's Soil Testing and Plant Analysis Laboratory (STPAL) changed their soil testing method to Mehlich 3 on September 1, 2005. Prior to that date, the LSU STPAL used the Strong Bray (Bray 2) procedure for phosphorus and the ammonium acetate procedure for calcium, magnesium, potassium, and sodium. Change was requested by producers and consultants so that soil test analyses from private labs and LSU would be based on the same procedures and there would be less confusion among producers enrolled in NRCS financial assistance programs.

Years of research are required to calibrate and correlate soil test extractants into reliable databases from which nutrient recommendations are made. With no Mehlich 3 database from which to make nutrient recommendations, regression equations have been developed to convert Mehlich 3 P (phosphorus) results to Bray 2 P (phosphorus) and ammonium acetate (potassium) results, so that existing databases could be used, until such time that a Mehlich 3 database could be developed to make nutrient recommendations. Calcium, magnesium, and sodium results obtained with Mehlich 3 were similar enough to ammonium acetate results that existing databases for these nutrients could be used without regression equations.

The change in soil testing procedures does have a direct impact on how NRCS calculates Phosphorus Index (PI) values. Louisiana's PI was developed based on soil test P values derived from the Bray 2 procedure. Now that soil testing procedure has changed it is necessary to convert Mehlich 3 P values to Bray 2 P values.

PHOSPHORUS INDEX

The soil test P fertility index value (Part B, Site Characteristics) used in Louisiana's Phosphorus Index (PI) is based on the Bray 2 (Strong Bray) procedure. Bray 2 is a very rigorous P test which extracts more P than does the Mehlich 3 procedure. However, there is no "rule of thumb" for converting Mehlich 3 P to Bray 2 P, largely due to the clay and calcium (Ca) content of the sample. Dr. Jim Wang, of the LSU STPAL, developed regression equations based on soil test Ca levels that are less than 1500 ppm Ca and greater than 1500 ppm Ca. Use the following regression equations to convert Mehlich 3 P to Bray 2 P to use our PI:

REGRESSION EQUATIONS

Phosphorus

Use the following regression equations to convert Mehlich 3 P to Bray 2 P. When Mehlich 3 calcium is < 1500 ppm, use the following regression equation:

$$\text{Bray 2 P} = -33.97 + 1.56(\text{M3-P}) + 0.033(\text{M3-Ca})$$

When Mehlich 3 calcium is > than 1500 ppm, use the following regression equation:

$$\text{Bray 2 P} = 1.56(\text{M3-P}) + 15.53$$

Potassium

Use the following regression equation to convert Mehlich 3 potassium to ammonium acetate potassium:

$$\text{Ammonium Acetate K} = 0.88(\text{M3-K})$$

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REFERENCES:

1. Stevens, J C. and Jim Wang. January, 2006. Personal Communication. LSU Agricultural Center, Soil Testing and Plant Analysis Laboratory, Department of Agronomy and Environmental Management, Louisiana State University.