

Nutrient Recommendations for Coastal Plain Soils Based on Subsoil Sample Analysis

The Clemson University Agricultural Service Laboratory now offers a program for modified nutrient recommendations based on subsoil sample analysis for sandy Coastal Plain soils. This subsoil test provides information for adjusting fertilizer recommendations based on the topsoil. Research shows that potassium, magnesium, and sulfur in the subsoil of sandy Coastal Plain soil are available for plant utilization and should be adjusted accordingly when developing fertilizer recommendations.

Potassium, sulfur, and—to some extent—magnesium are leached from the surface of sandy Coastal Plain soils. These nutrients are retained when they encounter a clayey layer and, along with water, can be utilized by plants provided two conditions are met.

First, the plow layer that usually develops at about 6 to 8 inches below the surface must be disrupted by subsoiling. This will allow plant roots to penetrate to the clayey layer. Second, the upper part of the clayey layer must be disrupted as well or roots will not be able to penetrate into the zone where potassium, sulfur, and magnesium have accumulated.

The maximum probable depth typical subsoiling equipment will reach is 20 inches. Thus the depth to the clayey layer is important. For subsoiling to be effective, the clayey layer should be within 20 inches of the surface. It is not practical to plow through the clayey layer if it is deeper than 20 inches, and collecting and analyzing a subsoil sample from a depth deeper than 20 inches may not reflect the true plant availability of the nutrients. Plants have to rely on available nutrients in the surface soil if the clayey subsoil is deeper than 20 inches.

Research in the Coastal Plain region of several Southeastern states indicates that soils with sandy

surfaces have difficulty accumulating potassium and magnesium regardless of the amounts applied because of their low cation-holding capacity. Soil-test summary results during 1997 showed that in South Carolina about 72 percent of the commercial surface soil samples from the Coastal Plain region tested in the Very Low to Medium range for potassium and 26 percent of the commercial samples tested in the Very Low to Medium range for magnesium. Potassium and magnesium applied to soils with sandy surfaces will leach down to the subsoil and accumulate on the clay fraction in this soil horizon. In such cases, using the subsoil sample analysis in nutrient management will prove a cost-saving measure.

For corn grown on soils in South Carolina, a typical potash recommendation is 80 pounds per acre, and this rate goes up to 100 pounds per acre when corn is irrigated. Potash costs approximately \$0.10 per pound, which amounts to \$8.00 to \$10.00 per acre in this case. If the subsoil sample analysis tests High in potassium, the soil-test report will call for reducing the potash rate by one-half, resulting in a savings of \$4.00 to \$5.00 per acre. And for magnesium, if the subsoil-test results indicate adequate levels offsetting the need for magnesium fertilizer, the cost savings can approach \$10.00 per acre. Subsoil sampling serves as an important step in saving money for growers.

A practical subsoil nutrient evaluation requires collection of two samples. A topsoil sample and a subsoil sample is recommended, and the subsoil sample will provide the information for adjusting the topsoil sample fertilizer recommendation. When a subsoil sample with a Soil Code 5 is submitted to the lab, relevant comments listed in the table on the following page will be returned based on analysis and soil-test levels. Actual amount of fertilizer should be

calculated based on these comments. Contact your local county Extension agent for further assistance.

The general guidelines for sampling soil include separating fields into uniform areas no larger than 10 acres and collecting two to five cores per acre within the uniform area. To collect samples, insert the soil auger into the ground to the plow depth (6 inches). Place this topsoil sample in its own container. Then reinsert the soil auger into the original hole until the top of the clay is reached. Discard the sandy part and pull a 3- to 4-inch core from the clayey layer. When filling out the soil sample submission form for the subsoil sample, 'Soil Code 5' should be clearly indicated.

Subsoil sample analysis is a key nutrient management tool in sandy Coastal Plain soils. Subsoil nutrient evaluation permits the fertilization adjustments of potassium, magnesium, and sulfur applications, which is a cost-saving measure, particularly for marginal and small farmers.

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Adjustments to Nutrient Recommendations Based on Subsoil Sample Analysis

| <i>Subsoil Nutrient Level</i> | <i>Recommended Adjustment</i> |
|-------------------------------|---|
| Potassium (K) | |
| Low | Based on soil-test results, no adjustment is recommended in fertilizer rates based on the topsoil sample. |
| Medium | Subsoil contains medium level of K. The recommended rate of K ₂ O should be reduced by one-fourth. In-row subsoiling needs to be a part of routine cultural practice for row crops. |
| High | Subsoil contains high level of K. The recommend rate of K ₂ O should be reduced by one-half. In-row subsoiling needs to be a part of routine cultural practice for row crops. |
| Very High | Subsoil contains a very high level of K. The recommended rate of K ₂ O should be reduced by three-fourths. In-row subsoiling needs to be a part of routine cultural practice for row crops. |
| Magnesium (Mg) | |
| Medium to Very High | Subsoil contains adequate magnesium; disregard any recommendation for magnesium based on topsoil sample. However, in-row subsoiling may need to be a part of the cultural practice for row crops. |
| Sulfur (S) | |
| Sufficient | Test for sulfur indicates there is sufficient sulfur in the subsoil for good plant growth. Disregard any other recommendation for sulfur on this area. However, in-row subsoiling may need to be a part of the cultural practice for row crops. |