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Horticulture and Crop Sciences

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Interpreting a Soil Test for Lawns

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Soil is defined as a complex medium of organic and inorganic materials providing water and nutrients for plant growth and development. In most Ohio lawns the soils are composed principally of an inorganic fraction consisting of sand, silt and clay particles. The percentages, by weight, of each of these three components are used to determine the Texture of the soil. In addition to the inorganic materials, soils also contain organic matter. This organic matter is the remains of previous plant growth in the soil and generally ranges from 2-4% in most Ohio lawns.

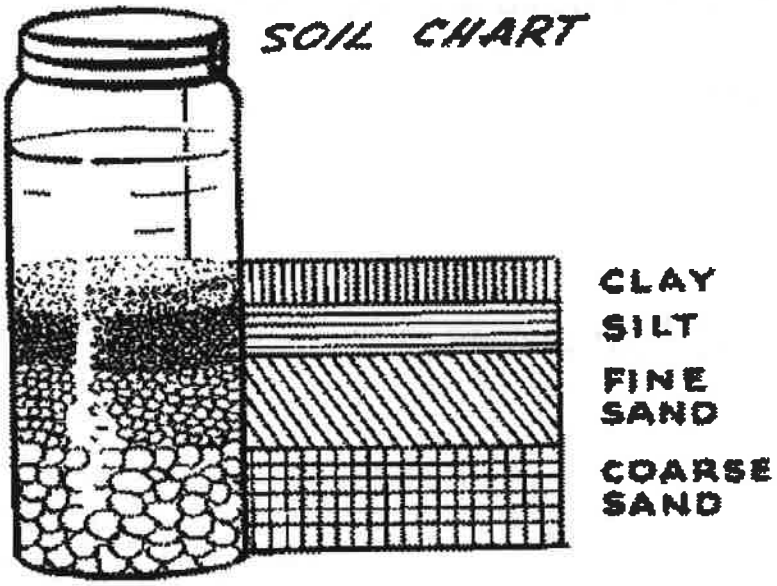
One of the most important functions of soil is to provide nutrients to the root systems of plants to support their growth and development. Soil nutrients needed by turfgrass and other plants are retained on the surfaces of soil particles and organic matter called exchange sites. The total number of nutrient exchange sites is referred to as the Cation Exchange Capacity (CEC) of the soil. The higher the CEC value, the richer the soil is in the contents of nutrients.

Occasionally, the soil in lawns may be low in one or more nutrients needed by the turfgrass plants. The deficiency of needed nutrients are normally expressed in the appearance of the lawn. Such symptoms include a light green coloration of the blades, weak or thin turfgrass density despite generous applications of fertilizer or a rapid decline in quality during periods of heat or moisture stress. The only way to determine if important nutrients are low or lacking is to conduct a soil test.

Once a soil test has been conducted and the results are available, the ability to interpret the results is an important consideration in correcting the deficiency or imbalance. Unless otherwise specified on the soil test report, the homeowner should use a complete or balanced fertilizer (i.e. a fertilizer containing nitrogen, phosphorus and potassium in an approximate 3-1-2 to 5-1-2 ratio) and adhere to the fertilizer schedule provided in the soil test report. The soil should be tested once every three to five years as part of preventive lawn maintenance. If lawn problems develop or if the impact of corrective treatments are

being assessed, more frequent testing is recommended.

This publication will help you interpret the recommendations provided by The Ohio State University's soil testing laboratory. The facility is termed the Research Extension Analytical Lab (R.E.A.L.) and is an important facility for testing lawn soils.



The acceptable levels for each of the tests performed in the Standard Test are listed in Table 1. This table should serve as a general guideline to help determine if your soil is within the acceptable range for each of the parameters tested.

TABLE 1. Acceptable Levels From Standard R.E.A.L. Soil Test

Test Parameter	Acceptable Range
Ph	6.3 to 7.0
Lime Test Index	68 to 70
Phosphorus (P) lb/acre	50 to 75
Potassium (K) lb/acre	200 to 250
Calcium (Ca) lb/acre	800 to 16,000
Magnesium (Mg) lb/acre	150 to 2,000
Cation Exchange Capacity - Course Textures (sands)	1 to 5
Cation Exchange Capacity - Medium Textures (silts)	5 to 20
Cation Exchange Capacity - Fine Textures (clays)	20 to 30 plus
Base Saturations[1]:	
Base Saturation, % Ca	40 to 80
Base Saturation, % Mg	10 to 40

Base Saturation, % K	1 to 5
1 assuming pH value is within recommended range.	

Cation Exchange Capacity (CEC): CEC measures the capacity of the soil to hold exchangeable cations (nutrients). The cations include hydrogen, calcium, magnesium and potassium. The CEC depends largely on the amount and type of clay present and the organic matter content. The higher the CEC value, the more cations the soil is able to hold against leaching. It is not practical to attempt to increase the CEC of a soil by adding clay or organic matter on a large scale basis. Liming an acid soil will slightly increase the effective CEC.

Base Saturation: % Calcium, % Magnesium and % Potassium: Base Saturation is the extent to which the adsorption complex of a soil is saturated with exchangeable cations other than hydrogen or aluminum. It is expressed as a percentage of the total CEC.

Calcium to Magnesium Ratio: This ratio is calculated on the basis of percentage saturation of the soil CEC by each element. This ratio should be considered when lime is added to the soil. If the ratio is 1:1 or less (less Ca than Mg), a low magnesium limestone should be used. Turfgrasses grow over a wide range of ratios with the ideal ratio being about 6 to 10:1.

Magnesium to Potassium Ratio: This ratio should be greater than 2:1. In other words, the percent base saturation of Mg should be at least two times the percent base saturation of K. High K frequently results in reduced uptake of Mg by plants. Therefore, to help prevent plant nutrient imbalance, additional Mg may be required to maintain a Mg to K ratio of at least 2:1.

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