How To Interpret A Soil Test Report

(Report Explanation and Definitions)

Report Terms

Ppm (lbs/acre)
Results maybe listed in ppm (parts per million) or pounds per acre. To convert from ppm to pounds multiply by 2 and to convert from pounds per acre to ppm divide by 2.

Millimhos/cm (mmhos/cm)
Electrical conductivity measurements are often used to measure the amount of soluble salts in the soil. The conductivity increases with increasing soluble salts, and the soil is considered saline when the conductivity reading reaches 2 to 3 millimhos/cm.

Ratings
Most soil test readings on the report are given a rating of very low, low, medium, optimum, or very high. The rating bars are color coded to the rating scale across the top. The purpose of these ratings is to provide a general guideline for determining the optimum nutrient levels. However, the actual value that is best depends on many factors such as crop, yield potential, and soil type.

Soil Analysis Terms and Applications

Soil pH
The soil pH measures active soil acidity or alkalinity. A pH of 7.0 is neutral. Values lower than 7.0 are acid; values higher are alkaline. Usually the most desirable pH range for mineral soils is 6.0 to 7.0 and for organic soils 5.0 to 5.5. The soil pH is the value that should be maintained in the pH range most desirable for the crop to be grown.

Buffer pH
This is an index value used for determining the amount of lime to apply on acid soils to bring the pH to the desired pH for the crop to be grown. The lower the buffer pH reading the higher the lime requirement.

Phosphorus
The phosphorus test measures that phosphorus that should be available to the plant. The optimum level will vary with crop, yield and soil conditions, but for most field crops a

medium to optimum rating is adequate. For soils with pH above 7.3 the sodium bicarbonate test will determine the available P.

Potassium
This test measures available potassium. The optimum level will vary with crop, yield, soil type, soil physical condition, and other soil related factors. Generally higher levels of potassium are needed on soils high in clay and organic matter versus soils, which are sandy and low in organic matter. Optimum levels for light-colored, coarse-textured soils may range from 90 to 125 ppm (180 to 250 lbs/ac). On dark-colored heavy-textured soils levels ranging from 125 to 200 ppm (250 to 400 lbs/ac) may be required.

Calcium
Primarily soil type, drainage, liming and cropping practices affect the levels of calcium found in the soil. Calcium is closely related to soil pH. Calcium deficiencies are rare when soil pH is adequate. The level for calcium will vary with soil type, but optimum ranges are normally in the 65% to 75% cation saturation range.

Magnesium
The same factors, which affect calcium levels in the soil, also influence magnesium levels except magnesium deficiencies are more common. Adequate magnesium levels range from 30 to 70 ppm (60 to 140 lbs/ac). The cation saturation for magnesium should be 10 to 15%.

Sulphur
The soil test measures sulfate-sulfur. This is a readily available form preferred by most plants. Soil test levels should be maintained in the optimum range. It's important that other soil factors, including organic matter content, soil texture and drainage be taken into consideration when interpreting sulfur soil test and predicting crop response.

Boron
The readily soluble boron is extracted from the soil. Boron will most likely be deficient in sandy soils, low in organic matter with adequate rainfall. Soil pH, organic matter level and texture should be considered in interpreting the boron test, as well as the crop to be grown.

Copper
Copper is most likely to be deficient on low organic matter sandy soils, or organic soils. . The crop to be grown, soil texture, and organic matter should be considered when interpreting copper tests. A rating of medium to optimum should be maintained.

Iron
Soil pH is a very important factor in interpreting iron tests. In addition, crops vary a great deal in sensitivity to iron deficiency. Normally a medium level would be adequate for most soils. If iron is needed it would be best applied foliar.

Manganese
Soil pH is especially important in interpreting manganese test levels. In addition, soil organic matter, crop and yield levels must be considered. Manganese will work best if applied foliar or banded in the soil.

Zinc
Other factors, which should be considered in interpreting the zinc test, include available phosphorus, pH, and crop and yield level. For crops that have a good response to zinc, the soil test level should be optimum.

Sodium
Sodium is not an essential plant nutrient but is usually considered in light of its effect on the physical condition of the soil. Soils high in exchangeable sodium may cause adverse physical and chemical conditions to develop in the soil. These conditions may prevent the growth of plants. Reclamation of these soils involves the replacement of the exchangeable sodium by calcium and the removal by leaching.

Soluble Salts
Excessive concentration of various salts may develop in soils. This may be a natural occurrence or it may result from irrigation, excessive fertilization or contamination from various chemicals or industrial wastes. One effect of high soil salt concentration is to produce water stress in a crop to where plants may wilt or even die. The effect of salinity is negligible if the reading is less than 1.0 mmhos/cm. Readings greater than 1.0 mmhos/cm may affect salt sensitive plants and readings greater than 2.0 mmhos/cm may require the planting of salt tolerant plants.

Organic Matter and ENR (Estimated Nitrogen Release)
Percent organic matter is a measurement of the amount of plant and animal residue in the soil. The color of the soil is usually closely related to its organic matter content, with darker soils being higher in organic matter.

The organic matter serves as a reserve for many essential nutrients, especially nitrogen. During the growing season, a part of this reserve nitrogen is made available to the plant through bacterial activity. The ENR is an estimate of the amount of nitrogen (lbs/acre) that will be released over the season. In addition to organic matter level, this figure may be influenced by seasonal variation in weather conditions as well as soil physical conditions.

$N0_3$-N (Nitrate Nitrogen)
Nitrate nitrogen is a measure of the nitrogen available to the plant in nitrate form. In high rainfall areas, sandy soil types and areas with warm winters, this measurement may be of limited value except at planting or side dress time. In the areas with lower rainfall, the nitrate test may be very beneficial.

Cation Exchange Capacity (CEC)
Cation exchange capacity measures the soil's ability to hold nutrients such as calcium, magnesium, and potassium, as well as other positively charged ions such as sodium and hydrogen. The CEC of a soil is dependent upon the amounts and types of clay minerals

and organic matter present. The common expression for CEC is in terms of milliequivalents per 100 grams (meq/100g) of soil. The CEC of soil can range from less than 5 to 35 meq/100g for agricultural type soils. Soils with high CEC will generally have higher levels of clay and organic matter. For example, one would expect soil with a silty clay loam texture to have a considerably higher CEC than a sandy loam soil. Although high CEC soils can hold more nutrients, it doesn't necessarily mean that they are more productive. Much depends on good soil management.

Cation Saturation
Cation saturation refers to the proportion of the CEC occupied by a given cation (an ion with a positive charge such as calcium, magnesium or potassium). The percentage saturation for each of the cations will usually be within the following ranges:

Calcium	40 to 80 percent
Magnesium	10 to 40 percent
Potassium	1 to 5 percent

Report Delivery
Reports are available by e-mail, U.S. Postal Service, or through our secure web-site portal.

Report Number
All samples are filed by report number. When contacting A & L concerning a certain report, be sure to refer to this number.

Sample Number
The customer's identification number on the information sheet for each sample is listed on the report.

Laboratory Number
The identification number, which was assigned by the laboratory to each individual soil sample, is shown. There may be more than one laboratory number or sample per report.

Soil Fertility Guidelines
The crop to be grown will be listed and the recommendation units (lbs/acre or lbs/1000 sq ft) will be listed on the same line. The fertility guidelines are based on a season long application and suggested splits are normally listed in the comments.

The lime application is reported in pounds of limestone per acre, effective calcium carbonate or the value commonly used in your state. Contact the laboratory if you have any questions on how the lime value is reported. A comment on the report lists the target pH, which the limestone application should bring the soil pH. If you want a lower pH, reduce the lime application; for a higher soil pH, increase the lime application.

The recommendations for N-P-K- etc are in lbs of the actual nutrient. For example, 100 lbs of N would require 294 lbs of ammonium nitrate per acre.