



How to Read the Spectrum Analytic Soil Test Report

[interpretation](#), [reading](#), [report](#), [soil test](#), [understanding](#)

Standard Agricultural Report

This report lists up to 20 results on a single page with no graph. The analytical results are reported in parts per million (or pounds per acre (lbs/acre upon request) for the major nutrients while sulfur (S) and the micronutrients are expressed in parts per million (ppm). This report includes a status assignment for each of the nutrient (**Low, Medium, Good, High, Very High**). This status assignment is unique for various soil conditions and the crop to be grown. The recommendations are listed on a separate page with up to three crops and are made in pounds per acre.

Special Agricultural Report

This report lists one sample result per page, but it includes a large bar graph representing the qualitative status of the nutrients (**Low, Medium, Good, High, Very High**). This status assignment is unique for various soil conditions and the crop to be grown. The analytical results for the major and secondary nutrients are reported in ppm or pounds per acre (lbs/ac), while sulfur, boron, iron, copper, manganese and zinc are only reported in parts per million. This report also includes the optimal or desired range for each test result. The recommendations for up to three crops are made in pounds per acre.

Turf and Ornamental Report

This report lists one sample result per page, but it includes a large bar graph representing the qualitative status of the nutrients (**Low, Medium, Good, High, Very High**). This status assignment is unique for various soil conditions and the turf or ornamental to be grown. The analytical results for the all nutrients are reported in ppm. This report also includes the optimal or desired range for each test result. The recommendations for this report are in pounds per 1000 square feet.

Each of these reports is divided into a few major groupings of information. The first or top sections of each report include information that identifies the sample(s). This information includes

- The name and address of the grower or homeowner
- The name and address of the person/company that sent the sample
- The sample identification assigned by the sender and the lab number of the sample assigned by Spectrum Analytic.
- The dates that the sample was received and analyzed by Spectrum Analytic.

The large central section of each report contains the analytical results. As mentioned previously, this area can be different for each report.

The last section of each report includes recommendations for fertilizer and other materials as requested by the customer. Please note that **to receive recommendations you must request them on the soil test information sheet which is located in the boxes at the bottom of the sheet**. Many customers prefer to make their own recommendations or obtain them in other ways. **If recommendations made by Spectrum Analytic are desired, the Sample Information Forms sent with the sample must include the appropriate information on the intended crop or plant to be grown and yield goals.**

CEC

CEC stands for Cation (pronounced "cat-ion") Exchange Capacity. Cations are elements with a positive charge such as K^+ , Ca^{++} , Mg^{++} , Cu^{++} , Fe^{++} , Mn^{++} , Zn^{++} , Al^{+++} , Na^+ , NH_4^+ , H^+ , and others. CEC is an indication of the soil's ability to attract, hold, and supply cations to plants. Large CEC values indicate that a soil has a greater capacity and strength to hold cations. Therefore, it will be more resistant to a change in the soil test, or pH level. When the soil test level is good, it offers a large nutrient reserve. A high CEC soil also requires a higher soil cation level to provide adequate crop nutrition. Low CEC soils hold less nutrients, and will likely be subject to leaching of mobile nutrients such as nitrate nitrogen (NO_3^- -N), sulfur (S), boron (B) and molybdenum (Mo). These soils may benefit from split applications of several nutrients. The particular CEC of a soil is neither good nor bad, but knowing it is a valuable management tool. See the article "[Cation Exchange Capacity](#)" for more information on CEC.

pH

pH is an indication of the relative acidity or alkalinity of the soil. It is based on a logarithmic scale from 0 to 14, with 7 being neutral. Being a logarithmic scale each change of 1.0 unit is a 10x unit change. For example a soil pH of 6.0 is 10 times more acid than a pH of 7.0. A soil pH of 5.0 is 100 times (10×10) as acid as a pH of 7.0. Most plants perform best and a wider range of nutrients are adequately available with a soil pH between 6.0 and 7.0. However, some plants require more acid soils. Few, if any do better with soil pH higher than 7.0. See the article "[Soil and Buffer pH](#)" for more information.

Buffer pH

This is a test that is conducted to determine the amount of lime to apply in order to reach the desired soil pH. It does not represent the intended or target pH for that crop or plant. This test is required due to the effect of the soil CEC. See the article "[Soil and Buffer pH](#)" for more information.

Nutrients

All are reported with a status assignment (**Low**, **Medium**, **Good**, **High**, and **Very High**). The standard agricultural report has the first letter of each status printed with the result, while the other reports use the bar graphs to indicate the status.

Phosphorus (P)

Reported in pounds per acre or parts per million ($ppm \times 2 = lb./A$), depending on the report. These status ranges may be unique for specific crops or plants. Spectrum Analytic uses the Mehlich 3 as our routine extraction. Others extractions are available as an option for an additional charge.

Potassium (K), Magnesium (Mg), Calcium (Ca)

These are the three major cation elements and are reported in the same format. The amount contained in the sample is reported in either pounds per acre or parts per million (ppm), depending on the report format. These status ranges may be unique for specific crops or plants. Additional information is reported as the percent saturation of each element. Percent saturation is best described as the percent of the CEC that is occupied by the element. The desirability of a particular percent saturation for each of these nutrients is sometimes affected by other soil conditions and the plant species to be grown. For more information on [calcium](#) and [magnesium](#), click on the individual element. Normally as long as the soil pH is within the optimum range, most plants will receive a sufficient amount of calcium. However in the case of acid loving plants such as blueberries, some conifers, etc you may find a calcium recommendation listed in the comments section of the report.

Sulfur (S), Boron (B), Zinc (Zn), Manganese (Mn), Copper (Cu), and Iron (Fe)

Each element is reported in parts per million (ppm). The reported Cu and Mn recommendations are derived by a proprietary formula that calculates the effects other soil factors on the availability of Cu and Mn. For more information on [sulfur](#), [boron](#), [zinc](#), [manganese](#), [copper](#) and [iron](#) click on the individual element.

Sodium (Na)

Sodium is reported both as parts per million (Na ppm) and percent saturation (Na Sat %). Sodium is not a nutrient, and it is typically a major component of the soluble salts value (see the following section on soluble salts). High levels of Na are detrimental to both plant growth and soil structure, and many of the guidelines are based on the percent saturation of Na.

Soluble Salts (Salts)

Soluble salts are reported as a measurement of electrical conductance of the soil solution called millimhos/centimeter (mmhos/cm). This value increases as the salt content of the soil increases. High levels of soluble salts are generally damaging to plant growth. However, plant tolerance of soluble salts is highly variable between species.

Nitrate-N ($\text{NO}^3\text{-N}$)

Nitrate-N is the predominant form of N used by most plants. It is also the form most easily lost through adverse environmental and soil conditions. The level of nitrate reported is NOT used in the nitrogen recommendation due to the many variables that can affect ultimate plant availability.

Texture

Soil texture refers to the percent sand, silt, and clay contained in the soil. The proportions of these components determine the name assigned to the soil (sandy loam, silty clay, etc.) as shown in the USDA textural triangle. The name of the texture is reported in one column, with the percentages of sand, silt, and clay in the following 3 columns. This information has several applications, but is probably used most frequently to identify drainage characteristics of the soil.

Recommendations

Nutrient recommendations are made in pounds per acre or pounds per 1000 square feet of the element or oxide listed. Lime is recommended in pounds per acre of 100% calcium carbonate equivalent (CCE) material. The agricultural crops and reports have an assumed sampling depth of 7 inches;, while turf samples and reports have an assumed sampling depth of 4 inches. Corrections should be made for actual **purity of lime**, **fineness of grind**, and **depth of sample**. The philosophy behind fertilizer recommendations at Spectrum Analytic is to: 1) recommend enough nutrients to produce the listed yield goal, and 2) when the soil test level of a nutrient is less than optimum (Good), recommend additional nutrients to correct the soil test over a 3 to 5 year period. All recommendations are assumed to be as a broadcast application, unless otherwise noted. Rates should be adjusted for the application method used, and the actual land area that is fertilized.

Comments

This section will contain appropriate comments related to crops or plants and results indicated in the report. You will also find recommendations for calcium in this area as needed.

