NRCS Natural Resources Conservation Service

THE SOIL QUALITY TEST KIT GUIDE

Measuring soil quality in the field

What is it for?

To compare soils under different land management systems.

To track changes in soil quality over time.

To demonstrate the effects of practices, such as conservation tillage, on soil quality.

To create an awareness of the importance of soil quality.

Who is it for?

NRCS and Conservation District staff

Farmers and ranchers

Ag professionals

Educators

What's in it for you?

The Guide has two user-friendly parts. The **Instructions Section** describes the relatively simple procedures for 12 diagnostic tests of the physical, chemical, and biological properties of soil. (See back of this page.) It includes worksheets for recording data and calculating results. It also lists types and sources of supplies needed to build a field test kit. The **Interpretations Section** provides information for evaluating, primarily for agricultural purposes, the results of each test in the kit.

Procedures were field tested by NRCS state and field staffs in each region, whose comments led to further refinement of test procedures. The Guide was developed by the Soil Quality Institute in partnership with the Agricultural Research Service and the National Soil Survey Center.

The Guide offers **educational and marketing opportunities** for field days and other special events.

How to get a copy

Download the guide from the http://soils.usda.gov/sqi.

What tests are in the kit guide?

Measuring soil quality-provides guidelines for sampling and site characterization.

Soil respiration-measured using an aluminum cylinder that is 6 inches in diameter and 5 inches long. The cylinder is capped and accumulated carbon dioxide respired by soil organisms and plant roots is measured. Respiration provides a measure of biological activity, which is related to nutrient cycling and breakdown of pollutants in the soil.

Infiltration-measured using the same cylinder as in the soil respiration test. Infiltration is important to reducing runoff and storing water in the soil for plant growth.

Bulk density-measured by inserting a 3-inch-diameter cylinder 3 inches into the soil surface and removing the intact soil. Bulk density is related to root growth, biological activity, and movement of water and air in the soil.

Electrical conductivity (EC)-measured with a pocket EC meter. It provides a measure of salinity (excess salts) in the soil.

Soil pH-measured with a pocket pH meter. It relates to nutrient availability and plant growth.

Soil nitrate-measured by dipping nitrate test strips into the solution filtered from a 1:1 ratio soil/water mixture. Soil nitrate levels are important for plant growth and water quality.

Aggregate stability-determined by sieving soil in water and measuring the amount of aggregates greater than 0.25 mm in diameter that remain on the sieve. Aggregation is important in decreasing erosion, increasing water and air movement, and preserving organic matter in the soil.

Soil slaking-determined by putting soil fragments or aggregates in water and estimating the degree of slaking. Slaking is important to reducing erosion and development of surface crusts.

Earthworms-determined by counting the number of earthworms found in a square-foot hole. They are important in nutrient cycling and creating large pores for water and air movement in the soil.

Soil physical observations and estimations-shows how to observe soil structure and root patterns and to estimate topsoil depth, penetration resistance, and soil texture in the soil profile. These properties are important to the physical environment for plant growth.

Water quality-estimates salinity and nitrate and nitrite levels in water.

Who developed the kit?

The test kit was developed by the Agricultural Research Service (Sarrantonio et al., 1996). The Soil Quality Institute adapted the kit for general use by adding the Guide and several tests, including aggregate stability, earthworms, soil slaking, and selected soil morphological observations.

Reference: Sarrantonio, M., J.W. Doran, M.A. Liebig, and J.J. Halvorson. 1996. On-farm assessment of soil quality and health. p.83-106. In: J.W. Doran and A.J. Jones (eds.) *Methods For Assessing Soil Quality. SSSA Spec. Publ. 49.* SSSA, Madison, WI.