

SOIL PHYSICAL PROPERTIES

GENERAL

The estimates of some characteristics and features that affect soil behavior are based on field observations and on test data for these and similar soils. Information includes depth, percent sand, percent silt, percent clay, moist bulk density, permeability (ksat), available water capacity, linear extensibility, percent organic matter, erosion factors (Kw, Kf, and T), wind erodibility group, and wind erodibility index. See National Soil Handbook Part 618 for specific criteria used in these ratings (1).

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Depth to the upper and lower boundaries of each layer is indicated.

Sand percentage is the weight percentage of the mineral particles less than 2 mm and greater than or equal to 0.05 mm in equivalent diameter in the less than 2 mm soil fraction.

Silt percentage is the weight percentage of the mineral particles greater than or equal to 0.002 mm but less than 0.05 mm in the less than 2 mm soil fraction.

Clay percentage is the weight percentage of the mineral particles less than 0.002 mm in equivalent diameter in the less than 2 mm soil fraction.

Moist bulk density is the weight of soil (oven dry) per unit volume. Volume is measured when the soil is

at field moisture capacity; that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. The estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 mm in diameter.

Permeability (ksat) refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone.

Linear extensibility percent is the linear expression of the volume difference of natural soil fabric at 1/3 bar or 1/10 bar water content and oven dryness (a measure of soil shrinkage). The volume change is reported as percent change for the whole soil.

Organic matter percent is the weight of decomposed plant and animal residue and expressed as a weight percentage of the soil

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material less than 2 mm in diameter.

Erosion factors (K_w, K_f, and T) – soil erodibility factors (K_w and K_f) and soil-loss tolerances (T) are used in an equation that predicts the amount of soil loss resulting from rainfall erosion of cropland. Factor K_w considers the whole soil, and factor K_f considers only the fine-earth fraction which is the material <2.0 mm in diameter. The (T) factor is the soil loss tolerance. It is defined as the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained. The rate is expressed in tons of soil loss per acre per year.

Wind erodibility group is a grouping of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to blowing. Soils are placed into wind erodibility groups on the basis of the properties of the surface layer of the soil.

Wind erodibility index (I) used in the wind erosion equation, is assigned using the wind erodibility groups. Wind erodibility index values are assigned because of the difficulty in directly measuring “I” values. The conditions necessary for the measurement of “I” rarely exist in the field since crop management factors affect the surface properties of the soil.

Source of Information

Standard national and state specific reports are developed that utilize these and other soil properties and qualities listed in Part 618 of the National Soil Survey Handbook. This information is presented in a table that displays the physical soil properties for components of selected soil map units or as interpretations of specific land uses in which the soil properties are identified as a suitability or limitation. This information can be accessed through the Soil Data Mart (2) or the Web Soil Survey (3).

REFERENCES

- (1) National Soil Survey Handbook part 618.
<http://soils.usda.gov/technical/handbook/>
- (2) Soil Data Mart.
<http://soildatamart.nrcs.usda.gov/Survey.aspx?State=WV>
- (3) Web Soil Survey.
<http://websoilsurvey.nrcs.usda.gov/app/>