A general physical constitution of the soil is determined by a certain combination of some particular grades or forms of texture, structure, consistence, porosity, cohesion, and moisture.

Among these six characteristics only soil texture can be looked on as a relatively irreversible and constant property of a given soil material, whereas each of the other five refers to the state of this material rather than to its fundamental quality. This means that the texture of any given soil remains the same under different conditions, and that the consistence, structure, porosity, and cohesion of this soil are subject to certain changes according to the different conditions. These conditions refer especially to soil moisture. For example, a soil having a texture designated as silt loam has it regardless of whether it is in an air-dry, moderately moist, or water-saturated condition, but the consistence of this soil may be hard or crumbly in the dry state, plastic in the moist state, and more or less fluid when the soil is saturated with water. The structure, as a rule, is best expressed in a dry soil and gradually slackens in connection with an increase of wetting. Soil moisture, although it is a condition of the soil material rather than its inherent property, appears, therefore, as a modifying factor responsible for an existence of different reversible types, forms, grades, or classes of soil consistence, cohesion, structure, and porosity.

Consistence and Structure

Soil consistence, in general, refers to the state of soil material rather than to its quality. It is not a constant characteristic of any particular soil but is subject to changes according to different conditions. In a general sense soil consistence refers to a degree of stability of certain natural orders in which the primary particles of soil material are arranged in regard to each other. This relative stability indicates a faculty of soil material to maintain its natural arrangement and to resist any external rearrangement of this order by external physical forces, such as pressure, shaking, breaking, and rubbing.

As used in soil science, however, consistence, has a definite limitation. Soil consistence does not refer to the arrangement of primary soil particles into aggregates. This order or arrangement is referred to as soil structure, which is considered a specific form or type of cohesion but an independent feature.

As contrasted with soil structure, physical consistence is determined by certain physical forces uniformly distributed throughout the entire mass of soil material, whereas structure is determined by the localization or centralization of these forces within the aggregates and their loosening or complete disruption along the cleavages which separate the aggregates from each other. Consistence refers to the state of a physically homogeneous material. This should not be interpreted, however, that the soil having a structural arrangement of its primary particles cannot be qualified as to its consistence. Each aggregate individually has or that consistence, and to a certain degree the consistence can be regarded as a consistence of the soil material as a whole.

An arrangement of the primary particles in the soil, and especially the tendency to retain this particular arrangement, depends on several factors, such as: shapes, sizes, and relative amounts of particles of different sizes in the soil; (2) forces of cohesion, or ability of particles to stick to each other in contact and to resist separation one from the other; (3) the total volume and general arrangement of the pore spaces which separate the particles from each other between points of contact; and (4) a moisture condition. Therefore, it may be assumed...