Soil Profile Characteristics in Relation to Drainage and Level Terraces

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In recent years there has been rapid expansion in the construction of terraces in Iowa as one of the measures for control of soil and water losses. On the Marshall, Monona, and Ida soils, areas 3 and 4 (Fig. 1), level terraces operate satisfactorily. On the Grundy and associated soils, areas 5 and 6, graded terraces are required. Here the slowly permeable subsoil will not allow water to penetrate fast enough and overtopping or drowning out of plants in the terrace channel result. Between these two areas, the one where level terraces will work satisfactorily and the other where they will not work, is the Sharpsburg soil, area 2. This soil has a gradual gradation in characteristics from those of the Marshall soils to those of the Grundy soils. Requests have been received from Soil Conservation District Commissioners in this area for information or procedures that may be used in the field to separate sites on which level terraces may be safely used from those where failures are likely to be encountered.

Drainage is also an important problem on several million acres of land in Iowa. It is recognized generally that the permeability of the soil largely determines the depth and spacing at which drain tiles should be placed. On the Edina soils, area 5, in southeastern Iowa, experiences by farmers indicate that it is not economical to tile drain these soils. The Taintor soils, area 2 in southeastern Iowa, will drain satisfactorily with tiles. Between these two areas are the Haig and associated soils, area 6, with a gradual gradation in soil characteristics from those of the Edina soils to those of the Taintor soils. Some farmers in this area are installing drain tiles despite the fact that in the past satisfactory drainage has not been obtained with tiles on numerous fields.

The physical and chemical properties vary widely. They are the major factors in determining the requirements for conservation practices such as fertilizer, crop rotation, crop varieties, and crop management practices. It is necessary to establish long time comprehensive data on each of the soil types now being mapped. It will therefore, be most important to other soils, obtain additional data from the most important soils to other soils on which information is not available. This can be done with greater accuracy if the physical and chemical characteristics of the soil are known.

Soil surveyors are continuously confronted with the problem of detecting land and crops that are significant in the delineation of soil types. Physical and chemical data, obtained in the laboratory, are valuable supplements in determining the need for conservation and for more accurate mapping in the field.

These and other problems emphasize the need for obtaining additional physical and chemical data on soils to serve as the basis for developing recommendation for soil and crop management. This paper reports physical and chemical data on samples of six important soils in Iowa. Analysis of additional profile samples will be required to establish long time comprehensive experiments on all soil types now being mapped. It will be necessary, therefore, to extrapolate the data from a few of the most important soils to other soils on which information is not available. This can be done with greater accuracy if the physical and chemical characteristics of the soil are known.

PROCEDURE

Samples were taken to a depth of 30 to 60 inches from sites selected as representative of the Sharpsburg, Ida, Tama, Grundy, Glencoe, and Marcus soils by exposing the profile either in a road cut or in the field. Quadruplicate samples were collected at 4-inch intervals to a depth of 30 to 50 inches at 4-inch intervals, depending upon the rate of percolation. Samples were collected in a beaker and measured at 5 inches intervals, depending upon the rate of percolation. Samples were collected in a beaker and measured at 5 inches intervals, depending upon the rate of percolation. Samples were collected in a beaker and measured at 5 inches intervals, depending upon the rate of percolation. Samples were collected in a beaker and measured at 5 inches intervals, depending upon the rate of percolation. Samples were collected in a beaker and measured at 5 inches intervals, depending upon the rate of percolation.