Genesis and Classification of Red-Yellow Podzolic Soils

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Theories of soil genesis and schemes of soil classification reflect the state of knowledge in the soil science of their time. For that reason, concepts of soil forming processes and schemes of soil classification need to be re-examined periodically. In this paper, past concepts of the genesis of Red-Yellow Podzolic soils are reviewed, and certain modifications are suggested. The relationships of this one group to other great soil groups in our present scheme are also considered, especially the relationship to Gray-Brown Podzolic soils.

PRESENT DEFINITION OF RED-YELLOW PODZOLIC SOILS

The definition used in this paper was prepared in 1948 by a Committee on Great Soil Groups in the Division of Soil Survey, U. S. Dept. of Agriculture. The definition follows: "A group of well-developed, well-drained acid soils having thin organic (A0) and organic-mineral (A1) horizons over a light-colored bleached (A2) horizon, over a red, yellowish-red or yellow more clayey (B) horizon. Parent materials are all more or less siliceous. Coarse, reticulate streaks or mottles of red, yellow, brown, and light gray are characteristic of deep horizons of Red-Yellow Podzolic soils where parent materials are thick." This definition was intended to include most of the soil series in the Red Podzolic and Yellow Podzolic groups as defined in the 1938 Yearbook, Soils and Men (4). These latter groups include most of the well-drained soils of the Red and Yellow group as defined by Marbut (10). The Red-Yellow Podzolic group, as defined in 1948, does not comprise all of the well-drained soils included in the two groups recognized in 1938 or in the one group recognized earlier by Marbut.

The Red-Yellow Podzolic soils are well represented and widely distributed in the southeastern United States (Cecil, Fullerton, Orangeburg, Ruston, Norfolk, and Madison series). They also occur extensively in other parts of the world (11). They are found characteristically under humid, warm-temperate climates, but they extend into tropical climates as well. In the United States, the Red-Yellow Podzolic soils have been formed from granites, gneisses, schists, sandstones, shales, limestones, and various unconsolidated sediments. All of these parent materials contain appreciable quantities of quartz or its equivalent in the sand and silt fractions, and most of them are relatively low in calcium. Red-Yellow Podzolic soils have been formed from vegetation which may be any one of several types, as for example along the prairie-forest margin in the central United States. The forest was deciduous, broadleaf evergreen, coniferous, or mixed. In tropical regions the soils are found under broadleaf evergreen, coniferous, or mixed. The topography on which the soils occur is commonly undulating to hilly.

PAST CONCEPTS OF GENETIC PROCESSES

Relatively few investigations have been made of the genesis of Red-Yellow Podzolic soils as compared to the Podzols, Gray-Brown Podzolic soils, and Prairie soils. Past concepts of genesis applied to the soil group have come and gone with the changing climates of the earth, but the climate now prevailing in the southeastern United States has indicated that lateritic weathering, as generally understood, is occurring under the present climate.

One concept of the genesis of Red-Yellow Podzolic soils widely held in the United States 20 years ago attributes the present profile features to the podzolization on parent materials accumulated through lateritic weathering (9). As a part of this concept, it was postulated that the lateritic parent materials accumulated under a warmer and more humid climate than now prevails. We do know that there have been important changes in the climates of the earth; but we do not know that the lateritic weathering now prevailing in the southeastern United States differs greatly from that common to the widely recognized zones of Podzols. Furthermore, studies of lateritic weathering in the Piedmont of the southeastern United States have indicated that lateritic weathering, as generally understood, is occurring under the present climate (2). Consequently, postulating a marked shift in climate seems unnecessary in explaining the development of the present soil profiles.

A second slightly different concept of the Red-Yellow Podzolic soils has been drawn from observations of vegetation zones. It is well known that there are "tension" zones between regions of vegetation types, as for example along the prairie-forest margin in the central United States. By analogy, it has been suggested that the southeastern United States constitute a "tension zone" between the regions of podzolization and laterization were dominant concepts. This concept becomes less tenable when Red-Yellow Podzolic soils are recognized in tropical regions where they may be considered tension zones.