

Developed Soils in the Desert And Desert Grassland of Arizona

By S. W. Buol

Arizona is probably best known to pedologists (soil scientists) for its reddish colored soils that have developed under the high annual temperature and low annual rainfall of the southern part of the state. Although areas in California, Nevada, New Mexico and Texas have similar soils, Arizona is often recognized as the area characteristic of these soils in the United States.

These reddish colored soils have been classified into three great soil groups: the Red Desert, the Reddish Brown and the Reddish Chestnut. In general the Red Desert soils develop in those areas of the state with elevations below 2500 feet above sea level, while the Reddish Brown and Reddish Chestnut soils develop at elevations between 2500 and 5000 feet above sea level.

Generally the Red Desert soils receive less than 11 inches of rainfall annually, and the Reddish Brown and Reddish Chestnut soils from 11 to 20 inches of annual rainfall. As these soils require from several hundred to thousands of years to develop, they are found only on the geologically older landscapes, such as old fans and terraces rather than on the steeper mountain slopes or the alluvial valley bottoms.

Little Organic Matter

Of the soil series recognized in the Red Desert group the Mohave series is probably the most widely recognized. (This series was named for Mojave, California. However, the spelling was eventually changed to Mohave.) Mohave soils have less than six inches of top soil which con-

This is the sixth and final article in a series by Dr. Buol, who has been engaged in a cooperative project for mapping Arizona soils. He is a member of the Department of Agricultural Chemistry and Soils. Dr. Buol expresses deep appreciation to Mr. Harmon Havens, an SCS soil specialist stationed at The University of Arizona. He has helped in preparation of these articles and is responsible for classification and correlation of Arizona soils.

tains less than one percent organic matter and is therefore light colored. The subsoil is noncalcareous to a depth of about 20 inches and is medium to moderately fine textured.

Below about 20 inches the soil usually becomes calcareous and soft nodules of lime are present. Another Red Desert series recognized in Arizona is the Bitter Spring series which is thinner and contains more lime than the Mohave series. Bitter Spring soils also have a well developed "desert pavement" which is a layer of gravel on the surface that acts to stabilize the soil surface against wind erosion.

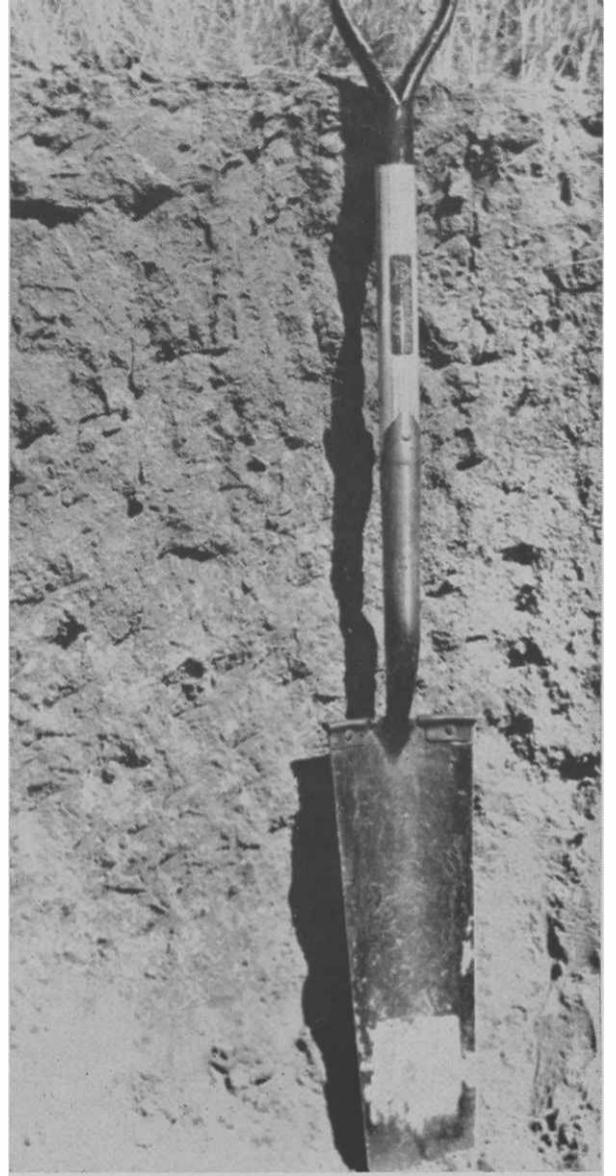
Two other soils quite similar to the Mohave but differing mainly in texture are the Adelanto series and the Vekol series. The Adelanto series has a coarse-textured topsoil and a moderately coarse-textured subsoil, whereas the Vekol series has a medium-textured topsoil and a moderately fine to fine-textured subsoil. Adelanto soils derive their name from a town in southern California, while Vekol soils are named for a railroad siding near Casa Grande, Arizona.

Sonoita Series Typical

Reddish Brown soils are generally developed where there is over about 11 inches of rainfall and the temperatures are not quite as high as in the Red Desert areas. Reddish Brown soils usually contain less than one percent organic matter in their topsoils. The Sonoita series is quite characteristic of the entire group. Sonoita soils have about 10 inches of moderately coarse-textured topsoil that is underlain to a depth of about 40 inches by a developed, moderately fine-textured subsoil. Carbonates are usually not present above a depth of about 30 inches.

Another Reddish Brown soil that is extensive in Arizona is the Continental series. It differs from the Sonoita mainly by being finer textured and by the presence of greater carbonate contents in the subsoil. Names for both of these series were taken from towns in Arizona.

The Reddish Chestnut soils are very similar to the Reddish Brown



MOHAVE PROFILE, a typical Red Desert profile. Note the carbonate in the subsoil.

soils. However, they contain more organic matter in their surface horizon. The White House series is typical of the Reddish Chestnut group, having a dark-colored surface horizon containing over one percent organic matter and a clay-textured subsoil free of carbonates to a depth of about 30 inches.

Primarily Rangelands

Most of the soils in these groups are used primarily for range; however, some of them when leveled and irrigated are used for cropland. There is difficulty in obtaining a uniform soil depth in a field after leveling because of the variable depth of carbonate in these soils. Often, when leveling is done, the calcareous subsoil layers are exposed at the surface and a feature known as a "hardspot" is formed.

The value of these soils for range depends almost entirely on the amount of rainfall they receive. The Red Desert soils provide only seasonal grazing. The Reddish Brown and Reddish Chestnut soils produce somewhat more grass, as can readily be seen by driving through the Sonoita area in late summer.