CHARACTERISTICS OF ADOBE SOILS
by
ALFRED SMITH

Introduction

For over fifty years the term “adobe” as applied to soil, has been used rather widely, particularly in the western portion of the United States, to express certain peculiar physical and chemical properties of the soil. Some authors, on the other hand, have used the term to indicate geological origin or mode of formation.

This paper attempts to analyze the opinions presented by various writers, to present data recently obtained from all the State Experiment Stations in the United States, to summarize the results, and to urge the acceptance of certain definite qualifications for use of the term “adobe” by all workers, so that in the future it will have a more consistent usage.

Review of Literature

According to the various encyclopedias, the word “adobe” is of Spanish-American or Spanish origin and is used as a noun referring to sun-dried bricks or to buildings made from such bricks. It is often pronounced “dobe” and spelled “doby.” Colloquially it has been used in the southwestern United States as a noun referring to the soil from which these bricks are made.

In 1877, Hilgard (17) described an “adobe soil” as one which is very sticky when wet and which, if plowed a little too wet, forms large clods that pulverize on drying. In subsequent reports (1, 2, 18, 19, 20, 21, 22) he described the results obtained by various forms of management for the improvement of such a soil and in some cases designated soils as “dark adobe loam” or “black waxy adobe.”

Russell (12) divided the subaerial deposits of the Arid regions of North America into four classes: 1, Eolian Sands; 2, Talus Slopes; 3, Alluvial Cones; and 4, Calcareous Clays. To the latter he applied the term “adobe”, stating that this material is widely distributed throughout the valleys of the more arid portion of the United States and is used by the Indians, Mexicans, and others in the manufacture of sun-dried bricks, known by the Spanish name “adobe”. He also stated that the earth from which these bricks are made is known as adobe. Russell therefore adopted this term to designate all fine subaerial accumulations, exclusive of eolian material. He limited the area over which adobe forms a large part of the surface soil in the United States to that region where the annual rainfall is less than 20 inches. Although he reported it from elevations varying from below sea-level in southern California to six or eight thousand feet along the western border of the Rocky Mountains, he found it only in depressions. In comparing and Spanish America are generally known as adobe.

“It is to be regretted”, he stated, “that in proportions of the United States Geological Survey has been erroneously applied to the loam component in the construction of adobe houses. Agriculture means a heavy clay soil such as could not be used in building”. He stressed the point that adobe soils are either sedimentary or colluvial and are derived from disintegration of clay shales that either underlie or occupy a higher position on the slope. In the valley adobe lands, he stated, the soils are more and represent either the finest materials suspended in slack water or sometimes the -lings of the clayey hill soils.

Clarke (3) gives the chemical analysis of soils from Utah, New Mexico, and Nevada, that although they are extremely variable in nature, they may be considered as generally calcareous. The calcium oxide content of the samples to which he refers varied from 2.49 to 38.94 per cent.

In discussing the regur or black cotton soils of southern India, Hilgard (6) pointed out their physical character, chemical composition, and characteristics, they closely resemble the regur of the cotton states and especially the black adobe of California. Like the adobe, they crack wide open during the dry season, with the result that they are converted by the surface soil falling in the fact, as Hilgard suggests, may be partly responsible for the long duration of fertility of the regur soil.

Keen (8), in describing the swelling and shrinking properties of soils, refers to the Egyptian studies of Muhammed Abou-El-Fish, who states that this shrinkage not only impairs the plowability of the heavy clay deposits in the Nile Delta but also enables the deleterious salts, which dissolve in the water, to be washed on the outside of the lumps as they dry out, thus removing them by subsequent irrigation.

Surr and Valle (14, 15, 23), experimenting with citrus culture in the foothill districts of California, emphasized the fact that adobe soils have extremely high wilting and hygroscopic coefficients and high shrinkage coefficients. The so-called clayey soils of this region, on drying under normal conditions, develop a large number of cracks, both vertical and horizontal, which cause them to break up into small fragments. If packed or puddled by improper methods or standing water, however, they break into large blocks with wide cracks between them.