RELATIONSHIP BETWEEN SOILS, TOPOGRAPHY, VEGETATION, AND LAND USE ACROSS THE NORTHERN SACRAMENTO VALLEY OF CALIFORNIA

FRANK HARRADINE

Recent detailed soil studies (2, 3, 6) in the northern Sacramento Valley have revealed certain relationships between the soils, topography, vegetation, and present land use. The pedological relations between soils are always interesting to a soil scientist, but of immediate concern to the farmer is the relationship between soils and crop production. However, certain observations and studies of a technical nature are necessary to understand the specific needs of crops and to eliminate as far as possible the trial and error procedure of the past. In this brief paper only a preliminary discussion of the major soils of the region is possible, but the 15 soils selected are representative of the various physiographic areas.

PHYSIOGRAPHY

The Sacramento Valley forms the north half of the Great Interior Valley of California and comprises an area of approximately 6,300 square miles with a long north-south axis (about 180 miles) and 40 miles across at its widest point in the middle. It is a structural trough formed by the uplift of the bordering mountains with its original floor deeply buried by transported alluvium from the uplands. Practically all of the valley fill is now far enough above sea level to be unaffected by brackish or salt water. The older deposits were laid down when the valley floor was nearer sea level and are now exposed only along the sides of the valley. Continued filling by streams entering and traversing the valley has buried most of the older deposits. In the northern end of the valley, old alluvial fans from opposite sides met in the middle of the Valley and consequently built it up to a higher elevation than farther south. The valley widens toward the south and only the lower flatter ends of the fans reach the axis. The Sacramento River is an aggrading river and has built natural levees along its banks which stand several feet higher than the flat ends of the alluvial fans entering the valley trough. This low flat area bounded by natural river levees and alluvial fan slopes is referred to as basin land and is divided into five major basins by transversing stream ridges, alluvial fans, or sloughs of the Sacramento River.

The western slope of the Sierra Nevada mountains forms the eastern border of the valley proper; an impressive mountain range 75 miles wide rising to about 7,000 feet or more above sea level. The east side of this mountain block has been repeatedly faulted and uplifted with a result that the eastern slope is abrupt and the western slope comparatively gentle. The Coast Ranges which form the western border of the valley consist of a series of rugged, nearly parallel ridges with intervening valleys. Most ridges average 6,000 feet or less above sea level with some isolated peaks exceeding 7,000 feet.

CLIMATE

The climate of the Sacramento Valley is divided into two distinct seasons: a rainy winter from November to April with short cold periods and a hot, dry, and rainless summer from June through September. Spring and fall are transitional periods with blending climates. Rainfall increases northward from an annual mean of 14 inches at the southern end of the valley floor to about 30 inches at the northern end. The effectiveness of the rainfall in the north-central portion of the valley is reduced considerably by frequent drying north winds. The precipitation is considerably greater on the east side of the valley than at corresponding points on the west side. Rainfall in the uplands increases with elevation up to 100 inches annually with snow beginning to accumulate above an elevation of 5,000 feet.

The mean annual temperature at low altitudes is around 60° at the southern and 63° at the northern end of the valley. Temperatures at 7,000 feet elevation will average 42° with extremes varying from 98° in the summer to 12° below zero during the winter. Seasonal extremes ranging from 108° to 19° are not uncommon at valley floor elevations.

NATURAL LAND DIVISIONS

In the main, the physiographic grouping of the soils in the cross-sectional diagram corresponds to what Storie (4) designates as Natural Land Divisions, and defined as "natural bodies of land occupying a definite position on the surface of the earth having certain well defined characteristics of soil, drainage, slope, erosion, etc." This grouping of soils is fundamental to any type of successful land classification work in California and will be used in the following text because it also arranges the soils in a convenient order for the discussion of their relationships. The Natural Land Division symbol is briefly described as follows, with primary divisions delineated by capital letters:

A—Alluvial fan or flood plain. Smooth topography, valley land.
B—Basin. Smooth, generally lowest part of valley.
C—Lower terrace land. Generally smooth, occurs along sides of valleys.
D—Higher terrace land. Smooth to rolling.
E—Upland. Hilly, rolling, to steep.