TILE DRAINAGE

Solves Salinity Problems in Tulelake Basin

Drainage problems have been corrected on 45 Tulelake Basin farms in Modoc and Siskiyou counties through installations of tile drain lines. Studies have shown excellent reductions of soil salinity and high water tables, with no failures reported since installation of the drains over five years ago.

K. G. BAGHOTT • C. E. HOUSTON

The Tulelake Basin in northeastern California consists of 70,000 acres of fertile farmland and 26,000 acres of lake and marshlands reserved for fish and game. The U. S. Bureau of Reclamation began diverting water from the Basin in 1905 to permit reclamation. In 1906, a homestead program was started, but water was not delivered to the area until 1909. Since then, 684 homesteads have been allotted, and 146 farm units are leased annually to the highest bidders.

Major crops now grown in the area are barley, durum wheat, potatoes, onions, alfalfa hay, and pasture.

In many areas of the Basin, it was impossible to grow economical yields of grains or potatoes before drains were installed. Decreasing crop yields—apparently caused by the high water table and soil salinity—were investigated by the Bureau of Reclamation and Agricultural Extension Service in 1953. The Tulelake Irrigation District began a vigorous program of deepening, cleaning, and pumping existing open drains. However, open drains spaced every half mile did not adequately eliminate the salt problem on much of either the private or government lease lands.

Farmers requested assistance of the Tulelake Agricultural Extension Service office in solving the problem. The farm advisor, in cooperation with Bureau of Reclamation and California Agricultural Experiment Station soils and water specialists, studied the soil, water tables, salt content of both water and soil, and soil water movement. The study (from 1954 to 1958) indicated that properly installed tile drains might solve most of the drainage problems. This method of drainage had previously been considered unsuitable to the area by many farmers.

A tile system was designed by the Agricultural Extension Service in 1959 to reclaim one of the highly saline soil areas (8 to 11 mnhos/cm). Field observations revealed seepage from an irrigation canal and an average water table of 1½ ft in the area to be reclaimed. To correct the problem of seepage and high water table, a 3,700-ft tile line was installed adjacent to the irrigation canal at an average depth...
of 4 ft. Another line was installed 500 ft from the first line in the field to pick up surplus water and aid in drainage. Both tile lines were surrounded with a 6-inch envelope of wheat straw. The original irrigation water had a conductivity of less than 0.5 mmhos/cm. Prior to the first irrigation, the soil was tested in four locations, and after three irrigations, the same locations were checked again. Two surplus water and aid in drainage. Both tile lines were surrounded with a 6-inch line which runs into a sump or drains into the open drain running adjacent to the field. All individual lines drain in two directions to remove water more rapidly from fields (see diagram).

Average costs of 6-inch tile drains installed in the Tulelake Basin have been 70 cents per running foot. Costs increase when it is necessary to use an envelope for the tile. Gravel is not available in the area but cinders or straw are proving a suitable substitute as an envelope material and fiberglass has been used successfully in some locations. However, where a tile line is installed adjacent to an irrigation canal to stop subbing into the field, it has been found best to use either a straw or cinder envelope to increase rate of flow into the tile line.

Recently, the U. S. Bureau of Reclamation installed 15,000 ft of tile in the southwest sump lease area because open drains would not correct the high water table.

Kenneth G. Baghott is Farm Advisor, Tulelake, Modoc and Siskiyou counties, and Clyde E. Houston is Extension Irrigation and Drainage Engineer, University of California, Davis.