IRRIGATION EFFICIENCY STUDIES

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A cooperative study of irrigation practice has been made the past four summers on two dozen test farms in western Oregon. These were selected to give a cross section of irrigation practice for study with a view toward improving efficiency of plant design and of water use. Following up results of 25 years irrigation and soil moisture investigations, an extension project aided in extending irrigation to some 40,000 acres in northwestern Oregon where sprinkler irrigation is much used. (Used by two-thirds of 117 irrigators in Eugene district, 1936.) Summer irrigation of pastures pays near Tillamook although annual precipitation is some 90 inches. A survey of 37 farms using irrigation in 1938 in the Tillamook area showed 1,046 acres were irrigated there and a dozen more systems were being installed.

Annual precipitation in Willamette Valley averages approximately 37 inches, yet it is only some 2 inches in the three summer months. Irrigated crops include ladino clover for pasture or seed, mixed pastures and the more intensive late growing season field crops, small fruits, and truck crops. Soils used are slightly to moderately acid, of medium available phosphate and sulfate supply and organic matter content unless improved therein. Their texture ranges from loamy sand to silty clay loam.

METHODS OF STUDY

Soil tests were made to determine useful soil moisture capacity of the profile, but only the surface 2-foot average is represented herein. Studies have been made of permeability, rate of infiltration or of advance over the surface, uniformity of distribution, and utilization, by means of weirs, pressure gauges, rain gauges, soil moisture tests by six-inch layers, water variation trials. Rain cans 3 to 36 inches across were used and the large ones were found better for low pressure tests. This summary of results do not include infiltration data for it was previously reported. Where irrigation was from tidal streams near the coast numerous tests of total salt concentration were made.

RESULTS OF EXPERIMENTS

The useful moisture capacity of soils was found to range from approximately 1 inch per foot of soil depth in fine loamy sand to 2 inches or more for silty clay loam and greater in muck and peat.

It appears that irrigation for the conditions studied should be measured and applied according to the depletion of moisture below the field capacity of 2 feet or so from which ladino clover or green bean roots were found to extract most of the moisture used (Fig. 2).

Irrigation is most effective for the soils studied when applied when the soil moisture content of the first 2 feet is still well above the wilting point. The moisture range is lower late in season even with frequent and heavy irrigation (Fig. 3). Harrowing in lime and manure; use of phosphate and sulfate to promote competition by clover and rotational grazing should tend to keep pastures in absorptive condition. Useful moisture capacity has tended to increase with manuring and legume residues in related studies.