

At the University Farm at Davis, and at several of the agricultural colleges visited, field laboratories for testing and demonstrating the use of standard irrigation measuring-devices are in process of development. These devices are installed to enable the farmer to view them and decide which is most suitable for his purpose. These water-gauges are a necessary concomitant to successful irrigation, enabling the farmer to apply just what quantity of water he desires to any given area.

Only a small portion of the University Farm (25 acres) is set aside for irrigation. The experiments, which were begun in 1907, are planned and carried out for determining the water-requirements of various standard crops—lucerne, barley, sugar-beet, corn, and potatoes.

From the experiments conducted with lucerne certain conclusions can be drawn from the results obtained, and the knowledge may be of service to farmers in New Zealand who purpose sowing this crop under irrigable conditions—viz., that “heavy spring irrigation, when followed by long periods throughout the summer without water, did not benefit lucerne.” Examination of the root-growth under these conditions shows that water applied to the little plants in the early spring produces a root-growth outwardly along the surface of the soil rather than downward, and when this is followed by long dry periods the soil, drying out, leaves the young plants stranded above the moisture-zone. Far better results were obtained by delaying irrigation until the root-growth was well established, and even until the little plants seemed to be stunted and suffering from want of moisture. Well-developed, deep-rooted plants mean heavier yields. Late and very late summer irrigations tend to produce sturdier plants and heavier yields the following summer.

After the root-growth is well-established the growth may then be forced by frequent and, if the soil will stand it, heavy irrigation. In general, however, experience indicates that frequent shallow irrigations are to be preferred to occasional heavy floodings. From observations an irrigation of about three acre inches ten days before cutting the lucerne brings the best results on most soils. Irrigating at this time before cutting has a tendency to overcome leaf-shedding, and it should be remembered that the best part of the food-value of lucerne is in the leafage. Lucerne should not be allowed to become too mature before cutting, as when this occurs there is sure to be considerable leaf-dropping and food lost. There are two good rules to follow in determining time to cut. The first is to cut when an occasional blossom is to be seen in the field—this is a fairly good rule; but the second is to cut when new growth appears at the crown of the plant, and is perhaps more reliable.

Finally, the lucerne-planter should remember that he is dealing with a growth of high food-value, capable of being used as a ration for all farm-animals, and a plant that will continue to produce well through a generation and perhaps longer, and he should therefore spare no pains in getting the best results from his plantings. Proper care at all points is eminently essential, particularly so in the initiatory stages in having the land thoroughly clean, a good firm seed-bed, the seed drilled in in straight rows to admit of intercultivation being given, and the keeping thoroughly free from weeds until the plant becomes properly established.

Although farming by means of irrigation is to play a most important part in the future development of the State of California, still there is much land which must be farmed without water or not at all. On many extensive areas dry farming is largely practised. California is a large producer of cereals, wheat and barley being the principal ones. Large tracts are therefore farmed for their production, and dry farming is practised, which necessitates one-half of the land lying idle in summer fallow to retain sufficient moisture for the succeeding crop. This practice of dry farming is tersely summed up as follows: “Soil-moisture moves upward as oil climbs a wick, by capillary attraction. To prevent its rising to the surface and evaporating is the first aim of the wise farmer. This he accomplishes by cultivating, by extra and repeated harrowing, breaking the surface connection with the soil-pores or capillaries, and at the same time forming an open porous bed upon which the rain falls and percolates into the unstirred soil beneath. The ‘Campbell method,’ as it is called, involves the use of special instruments for packing the subsoil and for stirring and pulverizing the surface, but we need not consider these. Deep ploughing, harrowing the surface well as fast as ploughed, and then harrowing it after each rain until ready to seed, drilling the seed in deeply, and still harrowing the ground after every rain until the growing crop is too far advanced to make this safe, are the main features.”

My next objective was the Truckee-Carson Irrigation Project, Nevada. Before dealing with this project it is advisable to refer to the “reclamation law” under which the vast irrigation projects throughout the United States are carried out.

Following a series of National Irrigation Congresses and extensive discussion during a number of years throughout the western country, an Act of Congress was finally passed, and approved 17th June, 1902. This Act, with its various amendments, has come to be known as the “reclamation law.” The main provision of the law is for setting apart all moneys derived from the sale of public lands, and for the expenditure of this fund, under the direction of the Secretary of the Interior, in the construction of irrigation-works. Provision is also made for the perpetuation of the fund through repayment of the construction-costs to the Government by the beneficiaries of the system. Under these provisions the settlers on the reclaimed lands are virtually given a long-term loan without interest, the Government and local communities secure the productiveness and the settlement of their lands, while eventually the cost of reclaiming and utilizing these great latent resources in land and water is paid back into the fund for successive use in the same manner.

This Act, appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation-works for reclamation of arid lands, refers to Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming, in all of