

Irrigation in Willamette Valley

By Prof. W. L. Powers.

Proper irrigation may be of great value to farmers in the Willamette Valley, according to the Oregon Agricultural College. In the following article Professor W. L. Powers shows how this is true.

(Special to the Farm Magazine.)

FROM experiments and observations made by the Oregon Agricultural College it appears that proper irrigation in the Willamette Valley will provide a more favorable moisture content of the soil, and will also aid in the liberation of plant food and in its solution and conveyance to the plants. Likewise it will increase the bacterial activity of the soil and lead to a greater root and top development of the plant. Furthermore, extra root development of the plant will tend to offset any running together of the soil due to irrigation.

Irrigation farming tends to remove larger crops from the land and consequently larger amounts of fertilizer in the way of refuse must be returned to the land if its fertility is to be maintained. It is more important to practice a careful rotation of crops that will permit the growing of clover or some other soil building crop on the land every few years, in irrigation farming than in other methods. It is also more necessary that irrigated fields be plowed up deeply at frequent intervals to maintain a good state of tilth.

Crop Rotation.

Crop rotations in irrigation farming should provide for the growing of a good proportion of cultivated crops each year, since cultivated crops require less water and use it later in the season than do the meadow crops. A rotation of soil-building crops together with the application of manure maintains the water holding capacity and fertility of soils, thereby lowering the water cost of dry matter.

Larger amounts of manure can also be used without making the soils too open where irrigation is practiced. A free working soil can be built up and kept in a higher-state of productivity by the use of rotation including legumes and the use of manure, in connection with proper irrigation.

Irrigation farming finds its highest development in connection with intensive cultural methods. It will become of increasing importance in Western Oregon on all free working soils in connection with intensive dairying, hop production and truck farming.

Moisture Points.

Willamette Valley silt loam under field conditions has several important moisture points. It will be recalled in this connection that water in the soils has three distinct aspects—free, capillary and hygroscopic. The free moisture appears as water and moves chiefly by gravity. The capillary water moves merely by contact of one soil particle with another, and while its effect on the soil is clearly seen, the water itself is not visible. The hygroscopic water clings to the soil particles and is practically stationary with the soil. Of the valley silt loams the maximum capillary water content is about 34 per cent, the maximum amount proper for cultivation is 27 per cent, the optimum water content best for cultivation and crop production is about 23 per cent, the drought point about 14 per cent, and the minimum moisture content is about 11 per cent. Irrigation during a seven years' test gave a higher seasonal moisture content, which was associated with higher yields of nine standard Willamette Valley crops.

Interesting and Important.

Some of the incidental effects of irrigation as shown by these tests are not only interesting but highly important to the irrigation farmer as well. It was shown among other things that irrigation is associated with a temporary loss of moisture in the sub-soils due to reversed capillary movement.

The highest seasonal moisture content in irrigated plants was obtained in connection with early spring plowing, manuring, crop rotations including

legumes, and frequent cultivation, thereby maintaining a crumb soil mulch 2½ to 3 inches in depth over the surface.

Irrigation likewise caused a lowering of the temperature to the extent of as much as 4 degrees of soils in cultivated plots and as much as 10 degrees in meadow plots.

Aside from these and other incidental features irrigation is shown to have accomplished its main purpose by producing an increase in the crop yields. During the seven years the average increase of all crops has been 65 per cent. It altered the shape and size of the plants and affected the seed products, causing better shaped ears and a higher germination of corn with a lower germination of beans.

Effect on Market.

Irrigation has likewise altered the percentage of marketable products, causing more beans in proportion to plant, more beet in proportion to top, but fewer potatoes in proportion to the top produced. Irrigation has also caused a slight change in the chemical composition of the products.

The effect of continued irrigation upon the soil for several successive years varies with the character of the crops grown. The soils show a slight tendency to decrease in water capacity and increase in volume weight with irrigation where rank feeding crops were grown, but to be improved in these respects where soil building crops were grown. Irrigation has caused a decided increase in organic content where leguminous crops were grown. This comparison was made with soils upon which legumes were grown without irrigation.

Profit Possible.

Irrigation had but little appreciable effect upon the acidity of soils and on the content of available plant food, although it assisted in the solution of available plant food and in its transmission to the proper parts of the growing plant.

Altogether these field experiments and observations have shown that under proper management there is a good profit in irrigation in all cases where the water can be supplied by pumping or otherwise at a cost of not to exceed \$1 per acre-inch for all the water used. Properly managed irrigation practice taken in connection with the free-working soils will give the farmers of the Willamette Valley such control of the moisture content of their soils as will not only increase the volume of the crop, but will likewise increase the profits and improve the tilth and fertility of their soils.

Emergency Rate

A REQUESTED emergency rate of 10 cents reduction to all points East, asked for by the Northwestern Fruit Exchange in behalf of growers and shippers of the Northwest, has brought to the surface an almost universal plea. All of the railroads in the Northwest carrying fruit were addressed in a memorial setting forth the need for alleviation of marketing cost of apples this year.

Business men generally and newspapers have added to the strong arguments as given by the Exchange with a comprehensive analysis of conditions as they see them. Growers and shippers are endorsing the request on every hand so that it may well be said that the request is unanimous.

It is the belief that the railroads will decide to do everything in their power to aid the grower in the face of this year's conditions which are represented by an immense crop over the entire country and the closing of dependable exports. The railroads are vitally interested in the marketing of the crop. It has been pointed out that aid from this source will allow the grower to place upon the market undoubtedly a much larger percentage of his crop than he would otherwise do, and it is possible to figure out that the railroads will be able to make more money this year hauling apples at a temporary reduced rate than they could at their regular rates. This cer-

tainly will be so in the long run if, as it is believed, it will mean the saving of many ranches of well producing orchards from the creditors' hands. The Northwestern Fruit Exchange reports that many of the railroads have replied to their request in a way to indicate that they themselves appreciate the situation facing the industry this year.

Cover Crops

ALL SOWING of catch or cover crops in the orchard and on ground that has had a crop removed by the harvest is a good plan in many instances. The object is to add humus to the soil and turn it back to the farm as nature prepared the soil in the beginning. In many soils the mineral elements remain but the humus has been removed by successive cropping of land.

The average soil of many orchards show a considerable amount of potash, phosphate and other necessary elements, by sowing of leguminous crops nitrogen is added to the soil and a large amount of cheap fertility obtained.

Where a cover crop, such as crimson clover, hairy vetch, cow peas, soy beans, etc., are sowed on ground after the last cultivation, and then turned under in late fall or early spring, not only is fertility increased, but this green manure acts as a sponge, makes soil more porous, and holds water longer. It will lighten stiff clay soils, which is often desired and makes the soil darker, hence warmer in the early spring.

A good plan to follow in the central west in orchards is to provide clean cultivation through the spring months until the middle or latter part of June, then seed to cow peas or soy beans, either broadcast or in drills. We prefer broadcasting. Red clover can also be sown any time up to the middle of September, as can hairy vetch. In latitudes where crimson clover (annual) will stand the winter months, it makes one of the best cover crops that can be sown. In the spring after the few weeks' growth, it can be turned under to good advantage.

Where orchard land is subject to washing of soil, cover crops should be sown every fall before fall rains come. In conjunction with cover crops, a coating of well rotted manure applied during winter or early spring, and turned under with the cover crops, is a

good plan, and the time and money spent in adding this necessary humus and fertility to the soil will prove a profitable investment.

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