KITTITAS FARMERS' INSTITUTE.

Continued from Page Five.

We must first get some idea of why moisture is such an important factor, and how much of it plants require for their best development.

Through every growing plant a stream of water is constantly flowing. This stream begins at the roots and proceeds upwards to the leaves, being lost by evaporation from the surface of the leaves. The life of the plant depends on this stream. It brings the plant its food, and the amount of food the plant can obtain depends, amongst other things, on the amount of water that must flow up through a plant and out at its leaves for each pound of growth produced in the plant. The figures below show the water thus required to make a given growth of dry matter, that is, of plant material free from water. It has been found that to produce one ton of dry matter (equivalent to about 1½ tons of ordinary hay) there must pass up through the plant into the air not less than 233-912 tons of water.

The dryer the atmosphere, and the more wind there is, the higher these figures, other things being equal. Assuming then that in this country the amount is 500, which is not far from correct, this means that to produce one ton of hay on one acre requires 430 tons of water, equivalent to 3.8 inches of rainfall, or irrigation water enough to cover the ground 3.7 inches deep. And this takes no account of water lost by percolation into the soil and by evaporation from the soil surface.

Prof. King, of the Wisconsin station, found that in 64 days a well-tilled summer fallow lost by evaporation water equivalent to 8.24 inches in rainfall, or .67 pounds of water per day from each square foot of surface. "If we take the average daily loss from the soil at only .25 pounds per square foot from May 1 to September 1," says he, "this would be equivalent to 5.77 inches of rain." I am aware that you people of the Kittitas valley have water enough that you can afford to drink it and use it in other useful ways, but I am sure it will do no one harm to know how much water a crop really needs, and this knowledge ought to be especially valuable to men who pay for water by the inch.

If we could entirely prevent evaporation of water except from the plant itself, we could, on an average, produce 5 tons of hay with 19 inches of water (water enough to cover the ground 19 inches deep). The amount of water used in irrigated countries is usually about 50 inches. We thus see that crops use but little more than one-third of the water applied to them under irrigation. Where rain must be depended on the proportion is much smaller, for rainfall does not come to order; but much of it comes at a time when it cannot be utilized before it has had time to get away into the soil and air.

Experiments have demonstrated that crops make the largest growth when the amount of moisture in the soil is between 40 and 60 per cent of the total amount it can hold, some crops, of course, requiring more than others.

The effort of the farmer should therefore be to maintain this amount of moisture in the soil. The simplest case to deal with, as far as methods are concerned, is that of too much water. Excessive moisture is injurious in two ways. It excludes air, which is as necessary to the roots of the plants as it is to other forms of life; and the constant evaporation of water from the surface keeps the soil cold. This cooling effect may amount to as much as 12-15 degrees, and we all know what a marked contrast exists between soils where the average temperature differs only two or three degrees. The difference between the kinds of crops adapted to the Kittitas and Yakima valleys illustrates this.

I have not time here to discuss different methods of drainage, but will refer to them briefly. At one time in English agriculture a system of cultivation known as the "ridge system," was very commonly practiced. It consisted in plowing the fields in narrow lands, throwing the ridges in the same place each year. Instances are recorded of ridges built up this way until horsemen riding in adjacent furrows were hidden from each other. On wet lands this resulted in strips of productive soil on the ridges with bare strips along the furrow. As is apt to be the case with any system that has some merit in it, and with many even that have no merit, this system became a fad, and was used on soils that did not need it. This plan, however, has its value on some low lands. The ditch system of drainage succeeded this and was, in most cases, an improvement. But in all cases where the value of the reclaimed land will warrant it, the tile system of drainage is the most effective, though very expensive. The cost of tile drains properly laid is usually about $30 per acre.

It sometimes happens, especially in old cultivated soils, that water applied to the surface does not readily enter the soil, thus saturating the top while below the soil remains comparatively dry, or running off and thus becoming lost, while at the same time it cuts up the soil into ditches. Ground that has reached this condition may be improved by deep plowing, and especially by incorporating into it large quantities of barnyard manure.

But the great problem before the farmer under ordinary circumstances is how to prevent waste of moisture. Moisture may be lost in four ways.

We have just spoken of loss from running off before having opportunity to soak into the soil, and pointed out the only remedy we can apply.

It may also be lost by percolating into the deeper layers of soil. We can do little to prevent this. In loose, sandy soils, however, the addition of well rotted manure gives the soil the power of retaining more moisture and thus prevents percolation to some extent.

A third, and serious cause of loss is from weeds. It should be remembered that every pound of dry matter produced in the growth of weeds costs you 500 lbs of water. A ton of weeds on an acre means the loss of from 200 to 500 tons of water. I cannot here go into details as to the best methods of eradicating the various classes of weeds. There is one principle however, which underlies them all. This consists, as Ben Johnson, whose fame rested principally on his use of big words would have said, in severing the connection between the growing weed and the matrix in which its roots are established.

The most important of all the causes of loss, however, lies in evaporation from the surface soil, important both on account of the large losses due to it and on account of the control we may exercise over it.

We have already seen that this loss may amount to a rainfall of six

"Guard Your Sight." MISS WILZINSKI, GRADUATE OPTICIAN, 705 Second Ave, Near Cherry, Seattle, Wash. Consultation Free.