

gravel. Under these conditions the trees are very shallow-rooted and the soil dries out very rapidly. The result is a freezing of the roots of the tree. The water is drawn from the protoplasmic-cell contents and frozen in the intercellular spaces, from which it evaporates very rapidly. This in effect is a condition of drought, and steps should be taken to guard against it. Having some crop between the trees during the winter, to form a mulch that will catch and hold the snow, prevent evaporation, and prevent deep penetration of frost, and irrigating after all growth ceases in the fall, are the necessary precautions to take against the trees freezing dry.

COVER CROPS AS HUMUS-FORMERS.

The maintenance of the productive power of soils depends in a large degree upon the upkeep of the vegetable or organic matter in the soil. This must be kept up to supply the humus to the soil. Humus is not a definitely defined substance, and suffice it to say here that it is one of the last stages in the decomposition of vegetable or animal matter in the soil. Originally this was supplied by nature, but when orchards were planted and clean cultivation adopted, especially in districts where the natural vegetation was small, the supply of humus was soon depleted. Humus is necessary to productive soils, and its benefits may be summed up as follows:—

- (1.) A well-drained soil rich in humus is rich in nitrogen.
- (2.) Evidence shows that in the process of the formation of humus, acids are produced which are capable of dissolving mineral plant-food, and in all probability this is how they become available to the plant.
- (3.) Humus increases the water-holding capacity of light soils by consolidating them and making them less porous. It acts as a soil sponge.
- (4.) It ameliorates heavy soils, making them less liable to bake and puddle, so that proper aeration is secured.
- (5.) Humus generally increases the warmth of the soil. The dark surface draws more heat than a lighter-coloured one.
- (6.) Humus furnishes food material for bacterial action in the soil.

There are not many farmers who will deny the fact that, in spite of the low percentage of plant-food in barnyard manure, it is the best general manure known. The fact is, it serves two purposes, adds organic matter as well as plant-food to the soil, and the former is often more necessary than the latter. In this country, where it is impossible to obtain barnyard manure in sufficient quantities, green manures must be used, and it behoves every fruit-grower and farmer to keep up the supply of humus in the soil. Without humus, as the circular on commercial fertilizers (No. 28) makes clear, artificial manures cannot be used economically, and in districts of light rainfall the depletion of humus in the soil will reduce its moisture-holding capacity, and it will only be a short time until there will be a decided decrease in the size of the crops produced. This has been the history of all the agricultural countries that followed the general cultural methods that are at the present time followed in British Columbia. To prevent the depletion of humus in orchards, cover crops of some nature are the cheapest and best way.

SYSTEMS OF COVER-CROPPING IN GENERAL USE.

Three systems of cover-cropping that are in general use and giving satisfaction under the proper conditions are alfalfa and red-clover sod, summer ~~cover~~ crops, and annual cover crops.