

be made by means of a light harrow. Sometimes, too, it may be made by a roller. The roller has usually just the opposite effect; under certain conditions, however, it is of value in this connection. To illustrate, it often happens that two or three weeks after seeding, before the grain is up high enough to protect the soil surface from winds and sunlight, a crust forms and moisture evaporation goes on apace. Going over such a field with a light roller breaks the crust and forms a soil mulch which effectually stops the loss.

Humus Conserves Moisture.—Humus absorbs and retains moisture much more readily than any other constituent of the soil. Hence one of the best methods of improving the moisture-storing and moisture-conserving powers of a soil is to increase its humus content. This may be done by the frequent turning under of sod and by the use of barnyard manure.

WARMTH.

For plants to grow rapidly, warmth as well as moisture is an absolutely necessary condition.

Drainage Warms Soils.—Drainage was shown to be probably the most important factor in making for moisture conservation. Drainage as an influence affecting soil temperature is of even greater importance. Undrained soils are always cool, usually too cold to favour plant growth, save in the case of certain species accustomed to such peculiar conditions. Practically all cultivated plants require warm soils. Drainage will warm the soil by carrying off surplus moisture and enabling air to enter.

Soil Mulch Affects Soil Temperature.—Once a crust has formed on the surface of the soil, water escapes rapidly through the pores, evaporating as it passes off. The change from liquid to gaseous form means the absorption of large quantities of heat by the escaping water, and in this way much heat is taken out of the soil. Thus in spring, when heat is of such paramount importance, it not infrequently happens that a field lying under a bright sun is going down in temperature rather than rising, for the reason that much moisture is escaping from the surface by evaporation. To prevent this and stop the cooling-off process, all that is necessary is a cut with a common harrow; that is, a mulch should be formed.

Humus Warms the Soil.—After drainage and the soil mulch, the colour of the soil is an important factor affecting soil temperature. Dark soils absorb heat readily and rapidly. Humus has the effect of darkening soils, hence the increasing of the humus content of a soil is an important and practical method of raising the temperature of a soil that, due to its colour, might otherwise be slow in warming up.

PLANT FOOD.

The supply of plant food in a soil is very commonly supposed to be of its crop-producing powers. Such, however, is not exactly the case. Even the barren soils, so far as plant food is concerned, may in a few years be made to produce most excellent crops provided the other conditions of plant growth be right. Any soil to which humus can be added at not too great expense will shortly be found to yield profitable crop returns.

Commercial fertilizers might be of some value in building up a worn-out or barren soil, in as much as they will supply more or less immediately available plant food, and in the case of certain fertilizers being used, such as land plaster, lime or ashes, will do something toward rendering available such plant food as may be already in the soil. They will also correct any acidity in the soil, and in the case of ashes and lime will do something to improve the physical condition.

Humus, however, is the material required to get the soil in good crop producing shape. The farmer's aim should be, therefore, not to find out by chemical analysis what elements of plant food appear to be lacking in whole or in part, but rather to improve the physical condition of his soil by adding humus, draining properly and performing the necessary cultural operations in the right way, at the right time.