

Agricultural Department

Deep Fall Plowing and the Seed Bed

Bulletin U. S. Dept. of Agriculture.

At the commencement of the Farmer's Cooperative Demonstrative Work in the Southern States it was found necessary to outline the fundamental principles of good farming and to insist that the tillers of the soil should become familiar with them and practice them as a first step in the betterment of farm life. We have previously stated these first principles, but possibly they should be more fully explained.

Prepare a deep and thoroughly pulverized seed bed, well drained; break in the fall to a depth of 8, 10, or 12 inches, according to the soil, with implements that will not bring too much of the subsoil to the surface. (The foregoing depths should be reached gradually.)

The presence of heat, air, and moisture is essential to chemical and germ action in the preparation of plant food in the soil. The depths to which these penetrate the soil depend upon the depth of the plowing, provided the soil is well drained. There is no use in plowing down into a subsoil full of water.

It has been proved beyond question that the roots of plants penetrate the soil deeper and feed deeper in deeply plowed land. Thus, in general, it may be stated that when the soil is plowed 3 inches deep the plants have 3 inches of food; when plowed 6 inches deep, they have 6 inches of food, and when plowed 10 inches deep they have 10 inches of food. The fact that the bottom portions of the plowed land are not as rich in available plant food as the top portions shows the necessity of getting more air and heat down to them by deeper tillage.

The most essential condition for fertile soil is a constant supply of moisture, so that a film of water can envelop the soil particles and absorb nutritive elements. The hair roots of plants drink this for nourishment. If there is any more than enough to serve as films for the soil particles and capillary water, there is too much and it should be drained off. This can be determined by digging a hole 2 inches deep. If there is standing water in the bottom of the hole, it indicates too much water in the soil or subsoil.

The capacity of a given soil to hold film and capillary moisture depends upon how finely it is pulverized and upon the amount of humus in it. Unplowed lands retain but little water. Thoroughly pulverized soil 3 inches deep can not store enough to make a crop.

In all Southern States there are every year periods of drought, sometimes not serious, but generally sufficiently protracted to reduce the crop. The remedy for this is increased storage capacity for moisture. This can be accomplished by deep and thorough tillage and filling the soil with humus (partly decayed vegetation). The effect of deep tillage has been explained. The effect of humus is to greatly increase the storage capacity of soils for water and to reduce evaporation. A pound of humus will store seven and one-half times as much moisture as a pound of sand, and the sand will lose its water by evaporation three and one-half times more rapidly than the humus. A clay soil will store only about one-fourth as much moisture as humus, and will lose it by evaporation twice as rapidly.

Plants use an enormous quantity of water. An acre of good corn will absorb and evaporate

during its growth nearly 10 inches of water. About three-fourths of this amount will be required during the last seventy five days of its growth, or at the rate of 2 2/5 inches of water a month. This is in addition to evaporation from the soil, which, even with the retarding influence of a dust mulch, will amount to several inches each month in midsummer. In case the land is plowed only 3 or 4 inches deep, though thoroughly pulverized, it will store an amount of moisture entirely insufficient to supply crop requirements in any protracted drought. These shallow and generally poorly prepared seed beds are the principal cause of the low corn yields, in the South, and they affect the cotton yields similarly, but not so much, because cotton is more drought-resisting plant than corn. If planting is done at all, it is folly to prepare a seed bed so shallow as to bring about the almost total loss of the crop some years and a reduced crop every year.

Many farmers plow or cultivate their corn nearly as deeply as they break their land in preparing a seed bed; this leaves no space for roots in the pulverized and aired soil. Roots occupy a large space. If all the roots of a single vigorous corn stalk were placed end to end they would reach more than a mile, and if allowed by the plowing they will fill the soil to a considerable depth and feed in all portions of it.

At the Wisconsin Agricultural Experiment Station it is found that when corn was 3 feet high the roots had penetrated the soil for 2 feet and thoroughly occupied it. At maturity the roots were 4 feet deep. At this time the upper laterals were about 4 inches from the surface.

WHAT IS DEEP PLOWING?

Plowing 3, 4, 5, or 6 inches deep is only common plowing. In our instructions nothing less than 8 inches is considered "deep" plowing. We are not advocating a single plowing of 8 inches in depth once in two or three years, but the preparation of an 8 inch seed bed thoroughly pulverized and filled with humus. It should be plowed and cross plowed to that depth, or if cross plowing can not be safely done on account of hills then it should be plowed twice in the same direction and disked thoroughly or the smoothing harrow repeatedly used.

Always plow in the fall before the winter rains set in; the earlier after the first of October the better. Always use a cover crop of oats, barley, wheat, or rye, if possible. Every observant farmer has noted that seeds germinate more quickly and that plants grow more rapidly on fall breaking than on spring breaking. Fall plowing renders more plant food ready for use, while the preparation of the land in the fall saves work in the spring, when everything on the farm is crowding. A cover crop is a net gain. It keeps the soil from washing; it utilizes the plant food that otherwise might escape into the air, and it adds humus. The soil is improved by the crop and winter grazing is provided. In plowed land the loss of plant food is less than in unplowed land; more plant food may be produced and more can be stored. In case a cover crop is used the loss of plant food is slight.

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An objection is sometimes urged that fall plowed soil becomes saturated with water during the winter and remains wetter and colder later in the spring than land unbroken in the fall. This is true only upon land not sufficiently drained and where the breaking is shallow. Water passes through deep breaking readily, and with reasonable drainage it is ready for planting earlier than lands broken in the spring.

When land is nearly level and drainage poor, the soil should not be flat-broken, but left in ridges or narrow lands about 5 or 6 feet wide, suitable for planting, with a dead furrow between. This provides winter drainage and keeps the pulverized soil out of the water, which is important even if unbroken.

The advice to go down gradually is given solely because the inexperienced farmer may try to plow too deeply the first time and bring to the surface too much of the subsoil. The best plan is to double plow; that is, to follow the breaking plow in the same furrow with a narrower plow or a scooter (with sides removed) and go down as deeply as desired. Generally the disk plow may be sent down 8 or 10 inches with impunity if the plowing is done in the fall, and especially if the land is plowed twice or more.

There is no question that breaking and pulverizing to a depth of 8 to 10 or 12 inches is economical. The cost of breaking 10 inches deep when done with a disk plow should not be more than 50 cents and acre in excess of breaking 6 inches deep. Whether a plant has plenty of food all the time or only part of the time makes the difference between a good crop and a poor crop.

Had a Close Call.

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