

Graduating Thesis

Practical Methods of Conserving the
Soil Moisture in Riley County.

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I Introduction.

II Methods of Tillage.

- 1 Plowing.
- 2 Subsoiling.
- 3 Harrowing.
- 4 Discing stubble.
- 5 Frequent inter tillage.

III Action of Manures.

IV Straw-mulch.

V Wind-breaks and Groves.

VI Lakes and Ponds.

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Introduction

Our average rainfall in this part of the state for the past thirty years has been thirty inches per annum, an amount, which, if properly stored up until needed, would be sufficient to ensure us abundant crops. Yet, a careful study of the station record of the rainfall, shows that the rain has come at irregular intervals, often great quantities falling at once, and that there has

usually been one or more periods of drowth each season, which caused a greater or less shortage of crops. It is the object of this production to set forth, in a brief and informal manner, some of the views the writer has gathered on this subject.

Methods of Tillage.

The plow is the most important of all the farm implements, and the farmer's success depends largely upon its selection and the skill and discretion with which he uses it. The selection of a plow is a subject broad enough for a thesis in itself, yet, suffice it to say in passing that the larger the plow and the more bold and overhanging (curved) the moldboard is the cheaper and more efficient will be the plowing. There can be no hard and fixed rules layed down for plowing, any more than there can be

211
for any other farm operation; yet general suggestions may be given, and from these each farmer must work out his own individual problem. Treatment that produces excellent results on one piece of land may prove a positive injury to another.

On most of our soils deep plowing will prove advantageous, forming a reservoir for our dashing showers and letting the water percolate to the sub-soil more freely. Water, in large quantity, held too close to the surface, not only checks the growth of the plant and delays work in the field, but it also seals up the pores, excludes the air, and results either in a soggy, soupy soil, or in forming a crust and cracking. In starting to increase our depth of plowing, it is best to turn up only an extra inch or so at a time, preferably in the fall, so that it will get the full benefit of all the freezing and thawing possible.

On certain of our loose sandy soils, where the water gains ready access,

and percolation is too great, perhaps the best results are obtained by plowing moderately shallow and always at the same depth. In this way, by the tamping of the horses and the plow-man, and the friction and weight of the plow, a more compact surface or hard pan is formed. This hard pan checks the water in its downward passage, and at the same time strengthens capillary attraction. For these reasons we should make constant variations in the depth to which we stir our more solid and clayey soils.

A few years ago, the subsoil plow was the chief subject of discussion among the farmers and the agricultural papers. A part of these writers pronounced it a complete solution of the drouth problem while others designated it a delusion and a snare. Both of these statements are lacking in truth. There is no doubt that, where we have a fine grained tenacious subsoil, this implement can

be used to advantage. However, the effects of a subsoiling of this kind do not last over three years at most, and, where alfalfa, or some other crop with large deep roots, can be made to grow, it is better to plan a rotation with such a crop. This method is more thorough, adds fertility to the soil, and as the roots lay in the ground and rot, they form humus which keeps the land in good condition for years to come.

On deep loam, or even on land with a jointed clay subsoil, it is very doubtful if it pays to subsoil, and in our climate it is a positive injury to use such an implement on a loose or sandy soil. In no case should ground be subsoiled immediately before putting in a crop, but should be given time to settle. Fall is the time most generally recommended for this work.

It is quite a common custom among our farmers to wait until they have

finished plowing the whole field before they start the harrow. This is a great mistake. The earth as it falls from the plow is left loose and more or less rough with the air circulating through it quite freely and considerable surface exposed to the drying affect of the sun and wind. If left lying in this condition for a few days or a week, the amount of moisture lost is considerable, and may make the difference between a paying crop and a failure. The harrow should follow the plow as soon as possible. It firms the soil, excluding the surplus air, and strengthening capillarity thus enabling the water to pass from the subsoil up near the surface, where it is held, not being able to pass through the layer of loose fined earth the harrow has left. This harrowing should be repeated after every rain until the crop is planted. Such treatment will prevent the formation of a crust and its excessive evaporation, and can certainly do no harm, if

there is a reasonable amount of humus in the soil.

Our not being able to get the ground plowed in good shape and in proper season is the most common cause of our light wheat crops. How often we cut off the wheat or oats when the ground is in prime condition for plowing, and yet let it go until it is so hard and dry we can hardly keep the plow in at all! Would we not get good pay for our trouble if we followed right after the binder with the disc and harrow?

Before the corn gets in tassel, we turn out of the field with the cultivator and leave the crop to shift for itself, and rely on its shade to keep the weeds down, and to prevent excessive evaporation. If rains come, the ground is packed down and the water easily rises clear to the surface where it is dissipated by the sun and wind. If the rain has been heavy, wide fissures open up greatly increasing the evaporating

surface. The writer has known of several instances where great benefit has been derived by continuing shallow cultivation at intervals of about every ten days (or oftener if it rained) until the crop was mature.

Action of Manures.

It has been shown by experiment that by the addition of farmyard manure we can increase the amount of moisture in the upper two or three feet of the soil. If coarse unrotted manure is plowed under, it at first holds the furrow up, and by the capillary connection between it and the moisture below, thus stopping all the water that comes up to it, and, as evaporation is going on, the surface soil soon becomes so dry that young plants cannot survive long enough to send their roots to the moist soil below. When ever

manure of this class is plowed under in our climate, before seeding the ground we should use the roller and harrow without stint, in order to establish capillary connection with the soil below.

Prof. King, in his book "The Soil," says, "Under field conditions as a mean of three years work for manured fallow ground, the surface foot contained 18.75 tons more water per acre than adjacent and similar, but unmanured land did, while the second foot contained 9.28 tons and the third 6.38 tons more water, making a total difference in favor of the manured ground amounting to 34.41 tons per acre. The largest observed difference was 78.04 tons in the dry season of 1891."

The influence of manure is felt for a number of feet below the level to which it is applied, and although it is claimed that the rate of evaporation from the surface is decreased by the addition of manure yet there

218
are many experiments on record that go to prove that such dressing of manure also draws the water from the subsoil to the surface. All such facts as this, together with the comparative root systems of the various crops must be taken into consideration, if the farmer would plan the most practical rotation.

Straw - mulch.

Under favorable conditions, a mulch of straw can be used to advantage on certain crops. It has advantages over the soil - mulch which are worthy of our careful consideration. On early planted crops like the Irish potato (one of the chief crops treated by this method) the straw can be put on in early spring, before the great rush of work begins, and thus serve not only to hold the moisture, but also to keep down the weeds, rendering cultivation unnecessary. Potatoes thus treated

produce the tubers close to the surface of the ground and are said to be less liable to the attack of the Colorado Potato Beetle. This mulch has been objected to for perennials, on the ground that it induces the roots to feed so near the surface that when the mulch has rotted and gone, they are injured by the exposure. The application of the straw-mulch is more far reaching in its effect than we might at first be led to believe. The straw contains a certain amount of fertilizing elements which are readily made available for future crops. Yet one of the chief reasons for the popularity of the straw-mulch lies in the fact that it so greatly improves the physical condition of the land. By the addition of humus it greatly increases the water-holding capacity. It makes the land more loose and porous, it enables the soil to take in what water falls on it, it prevents the formation of a crust and cracking, it supplies warmth, moisture, and organic

material - the ideal conditions for the development of nitrifying organisms. Valuable as the straw mulch is, its application is very expensive and must of necessity be limited to small areas. We will have to look to other methods for the solution of the drowth problem, as far as our average field crops are concerned.

Wind-breaks and Groves.

We Kansas farmers might do a great deal toward beautifying our homes and enhancing their value by planting more forest trees to check the hot winds in their mad rush of destruction. Such groves would help protect our stock from the heat of summer and the cold of winter, lessen the number of broken fruit trees in our orchards, and protect the blossoms from severe winds thus enabling the bees to go from tree

to trees and so ensure fertilization. These groves by the decay of leaves and underbrush would enrich the land and improve its physical condition, they would hold what snow fell on them and catch much of that drifting off of the open tract. This snow being more or less shaded and protected would melt slowly and the water being checked by the loose mulch of dead leaves and rotten branches, would not all rush off but gradually seep down to be drawn out again by the trees or to feed the wells and springs. It is claimed by many of our foresters that large groves of trees will increase the rainfall in their vicinity; but this claim is not yet proven. Although the ground and atmosphere of the forest are as a rule, more moist than that of the open, yet this is probably due to the fact that the shade, together with the loose mulch of leaves etc usually found on the surface tend

to save the water that does fall. The principal value of such wind-breaks lies in their ability to check our hot south winds, and so retard evaporation. To quote Prof. King "The writer has observed that when the rate of evaporation at 20, 40, and 60 feet to the leeward of a grove of black oak 15 to 20 feet high was 11.5 C.C., 11.6 C.C., and 11.9 C.C., respectively from a wet surface of 27 square inches, it was 14.5, 14.2, and 14.7 at 280, 800, and 320 feet distance, or 24 percent greater at the three outer stations than at the nearer ones."

If time and space permitted I could cite experiments by the dozen proving the same thing in as marked or more marked manner.

Lakes and Ponds.

If when our snows are melting fast or when we have a dashing rain, we could

store up the surplus water here in lakes and ponds instead of having it rush off to swell the already overflowing Mississippi, I believe it would have a very beneficial affect on our climate. If such ponds were numerous enough, they would undoubtedly make the atmosphere more moist and cool in summer. They would, at the same time, increase the amount of rainfall and decrease the rate of evaporation and transpiration. There are locations on almost every upland farm where good sized ponds or lakes could be built at little expense, and so planned that an acre or so of rich valley or "draw" land could be irrigated to advantage. The day is a long way off when it will pay the farmer to irrigate the average farm crop in this part of the state; yet an acre or two of small fruit or garden truck planted in such a location, and well cared for, will often yield a greater profit than many acres of the field crops tilled in the usual way. Besides

the benefits we have already called attention to, these ponds can, in many instances, be made large enough to be of ornamental value. Shade trees may be planted along their borders and a few good kinds of fish started in them. Then these attractions, together with the skating in winter, the duck shooting in fall and spring, and the swimming in summer, will go a long way toward solving the problem how to keep the boy on the farm.