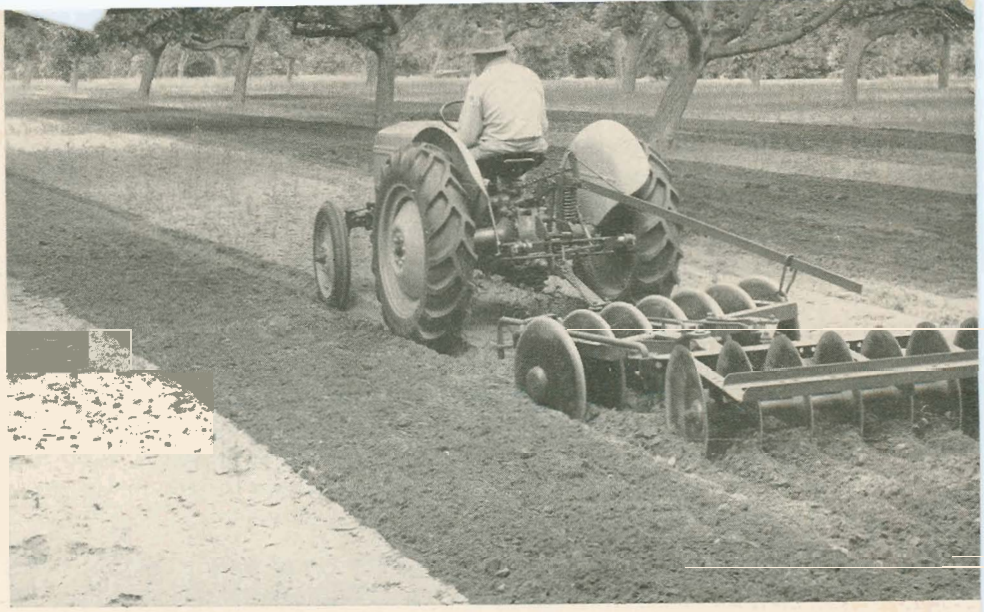
Good management practices keep soil in condition to absorb rainfall and promote efficient use of water



How to Store *More Moisture* in the Soil

by Vernon C. Jamison

THE severe drought of recent years has impressed us with the importance of moisture storage in our soils for the use of crops.

With moisture in short supply, it is unwise to miss chances to store natural rainfall by not having the soil in a condition to absorb water which falls on it. Equally unwise is the failure to follow practices which will store and use soil moisture efficiently.

There is much that we can do to improve water storage and to make better use of soil moisture reserves. Care of the soil surface is important. Where it is practical, straw or crop residues left on the surface will help.

Turn Furrow on Edge

Surface trash often creates problems for cultivation and weed control. Methods haven't been developed to turn weed seed under and to leave most of the crop residues on the surface. It may be necessary to make compromises and turn the plow furrow on edge to leave pinned residues exposed.

There is considerable promise in the new "behind-the-plow" method of seeding some crops to prevent excessive compaction and breakdown of the surface. For coarse seeds like corn, the soil should be harrowed or worked with a rotary hoe only enough to get rid of large air pockets and kill weeds. Finer seeds like Ladino clover require more thorough working of the soil to leave the surface relatively firm and to give good germination and seedling survival.

Soils Usually Overworked

The tendency usually is to overwork soils in preparing a seedbed. Cultivation should be kept to a minimum. Spraying with a weed killer may be a good alternative to cultivation if it can be done in such a way as not to compact or seal the surface. Cultivation should be done when the soil surface is dry enough to prevent puddling and glazing beneath the knives as they scrape through the soil.

The increasing use of heavy farm machinery seems to have brought an increase in compaction below the plow layer. Farmers in some areas are giving considerable attention to destruction of these traffic pans. Subsoiling and deep plowing have benefited some soils.

The effects, however, are usually of short duration, perhaps little more than a year. Also, for the treatment to be most effective, it must be done when the subsoil is dry. Shattering a dry traffic pan in the fall seems to improve wetting of the subsoil by winter rains in the Mississippi Delta area. Benefit from spring subsoiling is less certain.

Prevention Is Easier

Of numerous subsoiling tests made on soils with compact subsoil layers, many have been followed by small increases or even decreases in crop yields. Working the subsoil too wet may seal off portions of the soil and may actually slow down water movement, preventing thorough wetting of the subsoil. Or the subsoil may be left with numerous air pockets that make the spreading of moisture slower instead of making the soil more wettable.

In those areas and under conditions where controlled experiments show that subsoiling pays, farmers should

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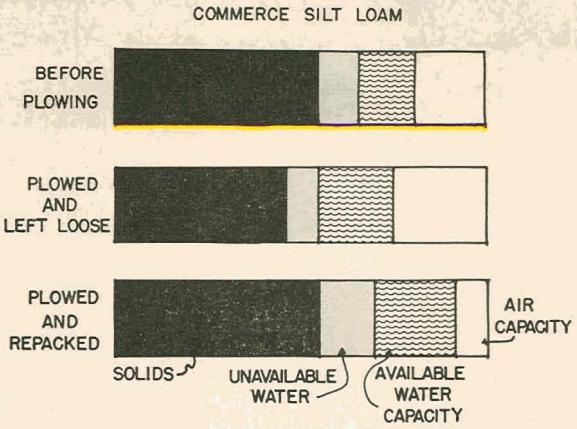
use this knowledge. Most of the time, however, it would be wise to follow practices that keep subsoil compaction from getting too much of a start. It is often easier to prevent than to cure an illness.

Some of the processes in the soil that give good stable granules or aggregates of soil particles may also at times prevent thorough wetting of the soil. The residues from the decomposition of plants, the gels or glues that stick soil particles together in stable aggregates, also tend to block off some of the small pores in the soil so they fail to wet—especially after the soil has been thoroughly dried.

It has been found that loosening and even pulverizing some soils will increase their capacity to absorb and store water. Allowing them to remain undisturbed for some time before drying out will lower their wettability and available moisture storage capacities.

There are doubtless benefits derived from tilling the soil beyond those ascribed to improved ventilation, the control of weeds, or the burial of trash. Benefits for deep subsoiling have been obtained that can't be explained on the basis of pan shattering alone. In one test conducted by Mr. I. L. Saverson on a Louisiana Delta field, more available moisture was stored in the subsoil and a bigger corn crop harvested where the soil was subsoiled deep than where the stirring was just enough to destroy the traffic pan.

Deep tillage is expensive and more often than not the yields are not increased enough to justify the extra expense. But it does appear that normal plowing and a certain amount of stirring the soil is justifiable for the production of some crops. The widely acclaimed benefits of sod and soil improving crops could not be fully realized without breaking and loosening the soil in seedbed preparation.



Plowing and then repacking this soil increased its capacity to store available water but reduced vital air capacity. The best bet is to leave soil loose.

Sometimes the reduction in water storage capacity with a soil remaining undisturbed is beneficial. If the air capacity of a soil tends to be too low, it is a good thing when wettability is reduced to some extent. It doesn't pay to have water storage capacity too high at the expense of air capacity, or vice versa.

Once water is stored in the soil does not mean that the entire job is finished. Water alone, stored, coming as rainfall, or applied as irrigation in adequate quantity, cannot be used efficiently by growing crops unless the necessary nutrients for good growth are applied.

This fact was demonstrated in 1953 at the Midwest Claypan Experiment Farm near McCredie, Mo. The corn on plots given a full fertilizer and lime treatment according to the need shown by soil tests extracted 16.1 inches of water from the surface 42 inches of soil and yielded 79 bushels per acre. Without the soil treatment, the corn extracted 14 inches of water but produced only 18 bushels of corn per acre.

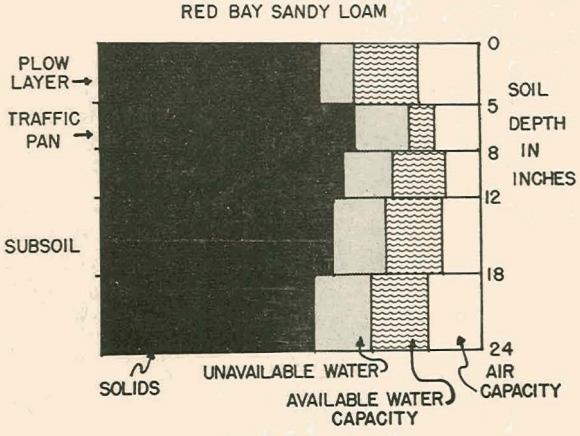
The fertilized corn not only extracted more stored water from the soil but made far better use of it in corn production. In terms of water use, only 5,600 gallons of water were required to produce a bushel of corn with full soil fertility treatments. Without soil treatments, over 21,000 gallons, or four times as much, were required to produce a bushel.

Takes More than Water

On August 17, all but one acre-inch of available moisture had been extracted from the 42-inch depth by the fertilized plants. Under the untreated corn, 4½ acre-inches remained, most of it in the lower depths. It takes more than water to produce good crops of corn.

On the other hand, fertilizer shouldn't be used blindly. In small grain production, it is possible to add too much nitrogen. Where moisture supplies are limited, too much nitrogen will stimulate rapid early growth of straw and exhaust the moisture reserves before the heading and grain maturing processes are completed.

We have much to learn yet about how best to till, fertilize, and care for our crop land, but we should take advantage of what information we have to make the best use of our land to fill the ever increasing needs of an expanding population. ★



Graph shows amounts of solids, water and air space in layers of an Alabama soil. Note less available water and air space in traffic pan just below the plow layer.

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