

THE PRINCIPLES OF SOIL CULTIVATION

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“What are the real principles underlying the cultivation of the land?”

This article, reprinted from ‘Amateur Gardening’ by kind permission, summarises the problems involved and gives practical tips to the man behind the spade or the machine.

THERE are few subjects more controversial than that of methods of practical cultivation of the soil. In past times it is safe to say that the majority of experts would have come down heavily in favour of deep as opposed to shallow cultivation. Yet today we have seen the rise of the so-called “no digging” school and we have also seen the arrival of the small rotary cultivators which are supposed to do away with digging, although on many soils the depth at which these implements will work is often only a matter of inches.

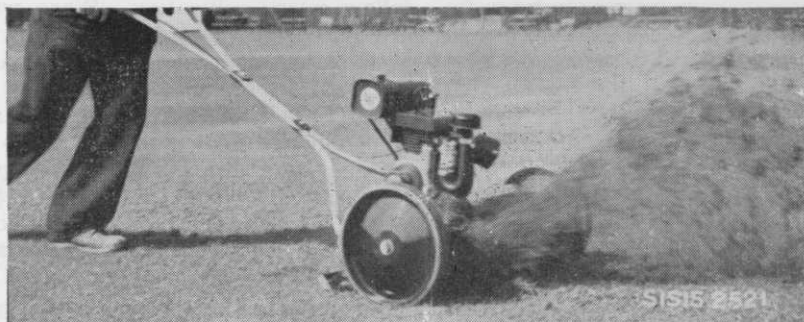
Exponents of the various schools of thought on this subject often become very dogmatic in their assertions and in the defence of their theories. Is it possible to make sense out of this controversy? What are the real principles underlying the practical cultivation of the land?

First and foremost let it be recognised that the soil is not just one material the world over. It is a variable substance differing from garden to garden; differing sometimes in the space of a few feet.

The most important factors are texture and structure. Soil texture is a permanent feature of the soil in question. The term is used to denote the relative proportions of coarse and fine soil particles. The coarser particles are termed sand, the intermediate ones silt and the finest clay. Texture is a thing that cannot economically be altered on large areas. A sandy soil remains a sandy soil and a clay soil remains a clay soil regardless of materials normally applied, although the horticultural value of the soils may be greatly improved by good management.

What Structure Means

The term structure is used to signify the condition of the soil, especially the relationship of the soil particles to one another. A clay soil, for instance, may form crumb-like aggregates on weathering if lime is adequate. This is further improved by the addition of organic matter. The process is known as flocculation. The key to good management of clay soils is to aim at producing this condition. Careful timing of cultivations is



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of utmost importance if good structure is to be maintained on such soils.

These are fundamental points. We will now see how an appreciation of these helps us to understand the practical problem of soil cultivation. It is a fallacy to suppose that roots penetrate only as far as the cultivations go. Wheat roots will penetrate to a depth of many feet although much of the wheat land may be ploughed to a depth of only 5 to 8 ins., and this applies to many plants, provided drainage is good and the sub-soil free from "panning."

Types of Panning

Panning is an important thing. The "plough pan" which is produced by ploughing to the same depth for many years is not likely to worry the gardener very much, but rotary hoe panning is common on certain types of soils, especially those that form a surface crust or "cap" as they dry out. Such soils are

often found to have a fairly high percentage of sand, but also possess enough clay to bind the sand grains together. If one has such soil the effect of rotary hoe panning can be demonstrated most effectively by cultivating alternate strips to a depth of about two inches with an ordinary fork and an L-bladed rotary hoe. The differences between the strips after rain has fallen is really most striking. It will be possible to walk on the forked strips without difficulty, but the rotary-hoed strips may be a sea of mud through the water failing to penetrate the pan at the bottom of the cultivated depth.

Chemical Panning on Acid Soil

Chemical panning is an entirely different matter. This is liable to occur on certain types of acid (lime deficient) soils. Aggregates of iron compounds cementing pebbles or gravel together may occur at a depth of a foot or two.

When one attempts to make rules about how to cultivate one is forced to the conclusion that the rules are dictated by the soil in question and the man on the spot is the best judge.

It is probably safe to say that if there is nothing wrong with the sub-soil, deep cultivations will be of limited benefit, but if there is anything leading to impeded drainage or any other hindrance to root penetration then deep cultivation will undoubtedly be of value. A light to medium loamy soil, free from any sub-soil troubles, with a fairly high organic matter content and adequate supplies of lime, can probably be cultivated in any manner the owner chooses and to any depth he cares to go provided it is done deeply enough to give a satisfactory planting tilth. On such soils shallow rotary cultivation often produces all that is required for growing most crops.

When soil is trenched or double dug it may take some years for consolidation to reach its original state. The treading that takes place during work in a crop rarely produces consolidation for more than a few inches down. If this layer is broken up in some convenient way it is probably all that is required. On soils liable to panning the use of straight tines instead of hoe blades on rotary cultivators is desirable.

Effect on Weed Seeds

To many people one of the values of digging is the burial of weeds and refuse. This is of even greater value than is sometimes realised. Shallow rotary cultivation keeps many of the weed seeds within the layer from which they can germinate readily and it is well known that heavy crops of annual weeds usually

follow rotary cultivation. When weeds are buried fairly deeply, say 4 to 8 ins., germination does not take place until the seeds are brought nearer to the surface. In fact few weed seeds germinate from a depth greater than about 1½ ins. At the depth of normal digging many weed seeds die in the course of a year or two. On the other hand, very deep burial, say 4 ft. or more, may keep seeds dormant for many years.

Spade or Fork?

Perhaps we may close with a few hints on the choice of hand tools for basic cultivations. Whilst the spade is the most popular tool for digging with most people it is far from being an ideal tool. A good flat-pronged three-tined fork is not only lighter in weight, and this is a point of great importance, but it offers less frictional resistance to being pushed into the soil. This becomes especially noticeable on firm stony ground where the output of work may be doubled with the same effort. The somewhat rougher top presented by digging with such a tool provides a better surface for weathering action than smeared chunks left by the spade when digging heavy soils.

On the heaviest clays, why not try to get hold of one of the Evesham pattern two-tined forks. At one time of day, before the tractor had replaced hand labour, many hundreds of acres were dug annually with this tool at speeds that would have made the most skilled spadesman look pathetically slow, and the two-tiner would have done a better job into the bargain. There is no special merit in the square-chopped trench once one has overcome the initial prejudice.

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