

## HORTICULTURE

# Chemistry Aids Garden Soil

**Chemical soil conditioners promise better soil structure for problem gardens. They work like organic matter to keep cloddy soils light and porous for good plant growth.**

By HORACE LOFTIN

► THE PHYSICAL condition of your garden soil can spell success or failure for your efforts to grow healthy, productive plants this spring. Hard-packed soils through which water and air cannot properly circulate are not likely to produce thriving plants.

So let us look at a shovelful of your own soil. Light loam or sandy soils will not need as much attention as heavier silt loam or clay soils. Roll some between your fingers. Is it crumbly, or cloddy? Crumbly soil is an indication of good soil structure, or "tilth."

Now make a mud pie. Mix some of your soil with water and note whether the resulting "pie" turns into a gooey, dense mass or whether the soil stays in small clusters that tend to crumble apart.

The crumbly "pie" denotes good tilth again. If your garden has poor structure, you can picture to yourself the condition of your garden beneath the surface after a hard rain.

There are two general methods of correcting poor soil structure. One is as old as agriculture itself; the other represents the latest advance of industrial chemistry. The first is to add organic matter to the soil; the second, to use one of the brand new chemical soil conditioners.

## Products Differ Widely

Good soil structure comes about when the soil particles are bound together in small, crumbly and more or less distinct lumps, or aggregates. These aggregates result in a loose, porous soil through which air and water can freely circulate and roots can easily force themselves.

Chemical soil conditioners, then, are substances added to well-worked soil to bind together these small aggregates. Generally, these soil conditioners are of the nature of synthetic resins, a sort of chemical rubber band, which hold the particles of soil together.

Tests by the U. S. Department of Agriculture on 28 different commercial soil conditioners have shown wide differences in effectiveness of the different products. However, nearly all of them show a beneficial effect on the general condition of soil structure when properly applied. But they can be worthless, or even harmful, if improperly used.

Another point brought out by the Agriculture Department scientists: there is no evidence that soil conditioners can form

aggregates by themselves. They seem merely to preserve a condition that already exists. What this means to you is that you must work your soil, to which you have added the right amount of conditioner, into a loose, porous state. The presence of soil conditioner then insures that the soil will maintain that healthy condition.

Many different chemical compounds have appeared on the market as soil conditioners. The five principal chemical groups used, however, are acrylates, polyacrylates, polyacrylonitrile compounds, maleic acid derivatives and silicates.

How much soil conditioner should you use? Dr. M. S. Anderson, soil specialist of the Department of Agriculture, recommends the following as a general, though not hard-and-fast, rule:

With soil conditioners containing 100% active ingredient, use one pound for each 25 square feet of garden when you work the soil to a depth of six inches; one pound per 50 square feet, to a depth of three inches; and one pound per 150 to 400 square feet when sprinkled on the surface for temporary effect.

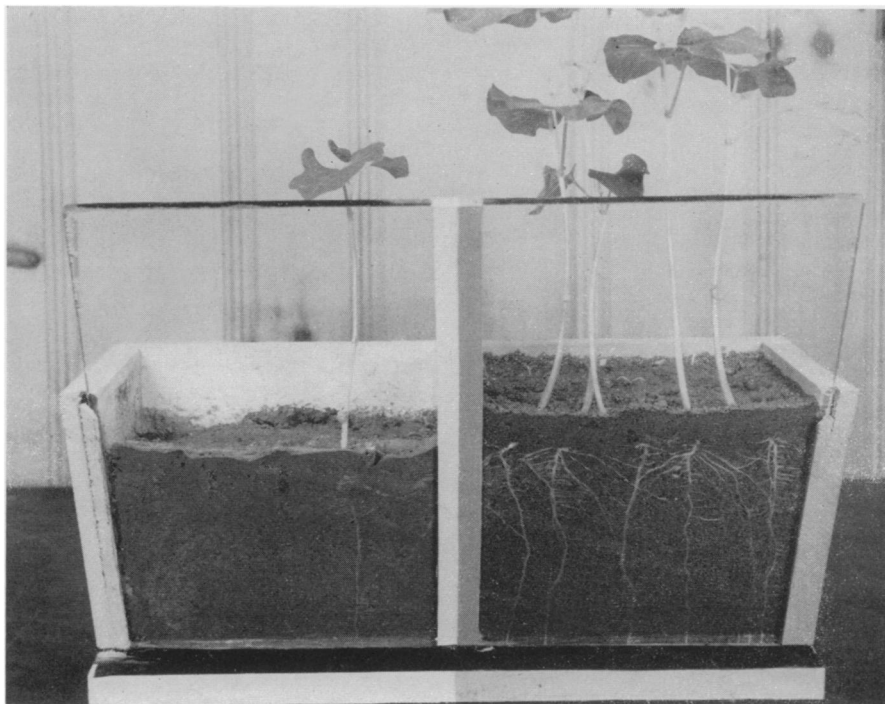
Concentration of active ingredients in soil conditioners varies according to the brand. So, when you choose a soil conditioner, always check the percentage of active ingredient to compare price and usefulness. The amounts recommended above are on a basis of 100% active ingredient. If your conditioner contains less than this amount, you should increase the amount used proportionately.

In terms of soil conditioner to soil weight, use of these recommended quantities results in a one-tenth of one percent mixture of conditioner in the soil. Lesser concentrations of conditioner to soil may be ineffective, while concentrations above two-tenths of one percent can be toxic to your plants. Insufficient mixing of conditioner in the soil can adversely affect plants, too.

## No Nutritive Value

Before you buy a soil conditioner, remember that it has no nutritive value for plants. You will still have to add fertilizers to your garden.

Adding organic matter, such as old leaves and stems, to your garden is another way of obtaining good soil structure. Chemically, the breakdown of organic matter in the soil results in the creation of natural resins which work similarly to soil conditioners to bind soil particles into aggregates.



**EFFECT OF CONDITIONERS**—Roots push through the light porous soil containing conditioner (right) and yield flourishing plants. Same soil without conditioner is tightly packed, retarding good growth.

Physically, the mere presence of the large pieces of organic matter helps to keep the soil porous.

Organic matter does contain mineral nutrients necessary for plant growth, differing from the chemical soil conditioners. And when it is broken down by bacterial action in the presence of nitrogen, it adds to the supply of soil humus in your garden.

On the debit side, pound-wise it takes much more organic matter to do a job on soil structure similar to the soil conditioners. And because of bacterial decomposition of the natural resins, organic matter must be added regularly to preserve soil structure.

**Advice on Fertilizers**

Concerning fertilizers for your soil, you will have to use them if you expect to get the best results from your garden. Organic material alone is not enough. For general gardening purposes, the best fertilizer formula you can use is an old favorite, 5-10-5. One to two pounds per 100 square feet is often a suitable rate of application. The first figure in a fertilizer formula indicates the percentage of nitrogen present; the second, available phosphoric acid; and the third, potash.

Commercially prepared liquid fertilizers have recently become popular on the market. But Dr. Anderson suggests that there

is no especial advantage in buying fertilizer in liquid form for gardening purposes. If for some reason you want liquid fertilizer, just add your 5-10-5 to an appropriate amount of water and shake well before using. That is the secret of liquid fertilizers.

Highly concentrated fertilizers for dilution with water by the consumer, and properly labeled as such, are often useful because of the convenience of putting a lot of fertilizing material in a small package. These are mostly for use with house plants.

Besides the nutrients and minerals used in large quantities by growing plants, there is a group of minerals called the "trace elements" which must be present in the soil, though in very minute amounts, to insure proper plant growth.

The most important trace elements for plants are iron, boron, manganese, copper, zinc, selenium and molybdenum.

A new class of commercially prepared chemical mixtures has come into existence to supply trace elements in deficient soils. These substances release trace elements by dissolving very slowly in the soil water. This insures a constant supply of trace elements while preventing too high a concentration of them free in the soil at any one time.

Now you have a well-fertilized soil of good tilth. It's time to plant your seeds.

Science News Letter, April 11, 1953

**ELECTRONICS**

**Transistors of Al, Ga, In**

► THE REVOLUTIONARY transistor itself may soon be revolutionized. Newly-developed, low-cost materials, revealed for the first time at the American Physical Society meeting in Durham, N. C., may do it. The materials have electrical properties similar to the expensive germanium now used in transistors.

Transistors are the most likely devices to replace fragile vacuum tubes in radios, television sets, hearing aids and giant electronic computers. They are pea-sized chunks of germanium that can be harnessed to amplify radio signals with practically no power consumption. They are lightweight, long-lived, rugged and small. These qualities are all much sought after by manufacturers of electronic equipment, particularly those who make military equipment.

The new materials are compounds of aluminum, gallium and indium with arsenic and antimony. They are now being tested by scientists at Battelle Memorial Institute, Columbus, Ohio, at Bell Telephone Laboratories and at the National Bureau of Standards. They have already been successfully used to change small amounts of alternating current into direct current. To the various scientists working on the new compounds at these three laboratories, this means that the material may be suitable for transistors.

Costwise, the compounds are less expensive than hard-to-get germanium. Both

aluminum and antimony, for example, sell for less than 50 cents a pound. Germanium costs \$350 a pound.

Scientists speculate that the aluminum-antimony compound may even be better than germanium where high operating temperatures are met. Such conditions often appear in military equipment.

Science News Letter, April 11, 1953

**AERONAUTICS**

**Flying Repair Shop Fixes Plane Gunsights in Korea**

► A FLYING repair shop now is being used in Korea to fix electronic gun sights on the Air Force's F-84 Thunderjet and F-86 Saberjet fighters.

The shop, a specially equipped trailer that can be hauled in transport planes, was designed and built at Wright-Patterson Air Force Base, Dayton, Ohio, in less than 30 days. It is designed to give on-the-spot emergency repairs to radar-controlled gun sights that otherwise would have to be shipped elsewhere for fixing, a costly and time-consuming process.

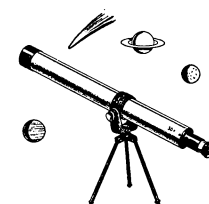
Manned by a team of specialists, the trailer is to augment regular maintenance shops in the field. It will be available anywhere in the combat zone on an emergency-call basis.

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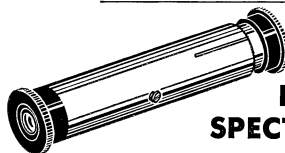
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