SO YOU WANT TO MAKE A COMPOST PILE

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Compost can be made in large quantities for industrial purposes, by the farmer himself for home consumption, or in small quantities for the gardener. In all cases there exist innumerable directions regarding "How to make a compost pile." The difficulties encountered are similar regardless of size. If the materials are fairly much the same in both instances, then the question of whether a pile is to contain 2 cubic yards or 200 changes relatively little in the making of it.*

The methods of handling do change considerably if machinery is to be used. This is necessary if wages are high, efficient machinery not too expensive and costs of chemical fertilizers relatively low. The farmer and the truck and fruit growers have to compare their costs of composting with the cost of chemical fertilizers. This is one of the basic costs that determine the selling price of the crops or produce. The two direct considerations are the making of compost as inexpensively as possible and, particularly, the making of as high a quality of compost as possible.

The low cost of chemical fertilizers has had some unexpected results on the thinking of the grower, particularly the commercial grower. He was led to believe that fertility could be purchased in bags. His very concept of the fertility of the soil was changed from the original idea that fertility had to be carefully

* This article pertains to compost made with the B.D. Starter.

nurtured to the idea that the crop yield has to be maintained by adding more and more chemical fertilizer. As a result, the idea of composting was discarded, the spreading of manure looked upon as a way of disposing of a waste material. The ever-growing canning, freezing and food processing plants are faced with the same problem in regard to their disposal of organic waste materials.

Then there are some people who consider that compost piles are not necessary, that fertilization can be achieved by mulching. The primary purpose of a mulch, however, is to keep the weeds from growing and to maintain the moisture in the ground. The materials used for mulching are generally straw, hay and other inexpensive materials containing a lot of cellulose but few plant nutrients. The author has seen land mulched with other materials such as fresh manure and even garbage. The odors were such as to keep him from lingering too long. Such decomposition also tends to produce an uneven growth in the different parts of a field or garden patch, and meantime the sun has been leaching out the largest part of the fertilizing value of the material. At the same time, the moisture next to the soil can produce a growth of fungus if the manure or garbage mulch is too heavily applied.

One really mulches in order to increase the surface area with a loose material. There is a differential between the temperature directly above a mulch and that underneath it. It is this which creates condensation and adds moisture to the soil. The same principle is in use in many areas where dry land farming is practiced by cultivating the soil deeply and often to keep it friable, thus preserving moisture.

The fertilizing value of mulching material is generally not sufficient to meet the needs of the land.

The purpose of composting is to prepare the fertilizing materials in such a way that they are of the highest value possible for soil and crop. After all, we prepare our own food for ourselves and do not, for instance, eat carrots with their tops, feeder roots and attached soil as they come from the garden. It has even been reliably reported that most people *cook* their potatoes one way or another before eating them.

All of this is not to say that one should on no account ever plow in fresh organic materials. Plowing under is indeed feasible in some cases and for certain materials, if the soil is given a chance to break down the materials plowed under. The purpose of composting, however, is to use the materials available

to the best advantage. At worst it may take a little longer in the beginning, but it pays off in the long run when the soil is improved by making and using as good a compost as possible.

In the making of a pile, the directions read: Take a shovel, use your elbow grease, etc., etc. The *first* problem really is, where to place it. That depends on climate and your terrain.

What really goes on inside a compost pile? If you are looking at a good pile, you will notice that after you take off the top few inches it feels cool, cooler than the top layer because there is more moisture. To help in keeping a pile moist, we should not expose it to the sun or drying winds. Direct sunlight should be avoided wherever possible. A thoroughly finished compost should smell and feel somewhat like the soil beneath the leaves in the woods.

The location selected for the pile should also be well drained. Trees such as White Birch can be beneficial for the pile, but care should be taken to protect it from their feeder roots as well as from weeds. Under a large tree the feeder roots grow mostly near the crown drip, less near the trunk. Piles can be placed near the trunk of a large tree, provided they are not left there too long.

Most gardeners do not need any machinery in connection with their composting. However, if the gardening is on a large enough scale to grow sufficient vegetables to feed a family the year 'round, then a compost grinder may be advisable. The difficulty in grinding is that there are many different types of materials to be run through the same machine. Dry materials are relatively easy to grind; wet materials have a tendency — and sometimes a very annoying tendency — to pack. Some materials, such as cornstalks, have to be cut rather than ground. If a cutting grinder is used, care has to be taken to avoid such things as stones and bones. The hammermills, or impact grinders, easily plug up with manure and have to have such material fed to them carefully to avoid this. They can be used for larger operations, where the quantity of stuff to be handled warrants the investment.

The most indestructible tool to use for smaller quantities is a concrete mixer — bulky as even a small one is. The various materials, soil and all, are put together, along with sufficient water if the mix is too dry. The mixer is run about 15 to 20 minutes per batch. The Starter is added after about 10 minutes.

The moisture can be controlled very accurately by observing the material. The mixture forms balls. If these are small, water should be added until they are the size of a child's fist or a horse-dropping. If they are larger than that, the mixture is too moist and shredded paper, dry soil or some other dry, moisture-absorbing material can be added.

If machinery is used in connection with composting, and the available soil contains a lot of stones, it is preferable to screen it first. If stones are a bother when composting by hand, the soil can either be screened to start with, or they can be taken out as one goes along.

If large quantities of compost material have to be handled, mechanical processing has its advantage, in that the compost will be ready sooner and the storage period is reduced. In a small garden, the storage problem is generally not such as to warrant the use of machinery.

It is essential to spray the Starter over the materials as they are ground (sprayed over the succeeding layers if it is a hand operation). This permits the Starter to be evenly distributed all over, and gives the bacteria a chance to do their work quickly and effectively.

The materials available to be used for composting vary tremendously from place to place, with the exception of one: that is soil. It is advisable always to use some soil, along with other materials, when making compost. The mixture is broken down more quickly, and the structure of the product is improved. If soil is simply not available for the purpose, one can substitute a reasonably well-finished compost.

What kind of soil is to be used? The first thought generally is of subsoils, but these are poorly aerated and generally devoid of soil life. A good topsoil makes for a better compost sooner. The problem is generally, where to get the topsoil. It is preferable to make piles on bare ground, first skimming off the surface growth and some soil — this gives you a little to work with. Sometimes it is possible to take some out of the garden if it needs drainage (a ditch) or levelling. Often real estate developments sell some topsoil; sometimes farmers do so. In one case I knew of, a garden was over-run with honysuckle. Here the topsoil was shaved off with a bulldozer and piled up until the roots had broken down.

A good loam is the best soil to use in a compost pile. A sandy soil is a bit too porous. If only one could obtain clayey soil for

composting in sandy regions, and vice versa, that would help the gardens very much in both places. In no case should the very finest colloidal clays — that is, those that accumulate at the bottom of a lake or in canals and the like — be used in composting. The particles of these are so fine that they enter the pores of the other materials, exclude air, and do not permit the bacteria to do their work.

How much soil is to be added to a compost pile? By weight, a minimum of 10%, preferably more. It is possible to get away with using so little in the case of mechanical handling, as this permits a more even mixture of all the materials. Loose soil weighs 80 lbs. and more per cubic foot, whereas a wettish manure weighs about 50 lbs. per cubic foot and garbage anywhere from 15 to 35 lbs. per cubic foot before grinding. As the weight of anything per cubic foot varies with the looseness of the material, we prefer to figure the percentages in weight rather than volume. The remaining variable is the moisture content.

That brings up the moisture problem. How moist should a compost pile be? There should be 50 to 60% moisture during the composting itself, with the figure reduced to 40 or 45% when the pile is finished. It is not feasible to test the moisture of the various materials going into the pile, so in practice one adds moisture or adds dry materials, as noted above. Remember that a material containing 25% moisture is one fourth liquid and three fourths solid; 75% moisture means only one quarter of the material consists of solids and three fourths of it is liquid. While it is relatively easy to add water if a pile is too dry, it is by no means as easy to balance the situation if it is too moist, particularly in a moist climate. The "dry" materials you add also contain a certain percentage of moisture. Paper, for instance, can have a moisture content of 25% in a moist climate. You can very soon get into some complicated mathematics.

There are some simple rules that can be of help, particularly for the setting up of smaller home-garden piles. If the materials you want to use are too moist, use more soil. Try to put the moist material on top of the pile to give the moisture a chance to drain. Wet materials are heavier per cubic foot, so you need, by volume, more dry materials to balance them out. Mix your wet materials with loose materials, to permit any surplus moisture to drain. If you live in a moist climate, try to keep some dry materials on hand. Keep the soil you are going to use in the pile covered with a tarpaulin, tar paper, or Vis-

Queen (Visking Company, Terre Haute, Indiana), which costs 1.5 to 3 cents a square foot, depending on its thickness. This latter, by the way, can also be used for mulching. When dry, an absorbent material (such as paper, or Staysdry, a material used for chicken litter) can take up a lot of moisture; when it is once wet it has the opposite effect. To find out whether soil is too wet or not, take some in your hand and close your fist and then open it again: if the soil crumbles loosely it is dry, if it balls up it is too wet and should not be used or worked with in that state.

Many materials can be used for composting—see the Spring, 1954 Issue of Bio-Dynamics. These materials are of either animal or vegetable origin. As a whole, those of animal origin have a higher nitrogen content. Remember that most of the vegetables, and many flowers and berries, are nitrogen-consuming or soil depleting plants. Sufficient nitrogen has to be supplied for a vegetable garden to at least maintain its fertility. If no raw materials of animal origin are available, a considerably larger quantity of vegetable raw materials has to be used.

The most used materials of animal origin are, of course, the manures. A compost pile should contain from 10 to 20% manure. Cow manure is the most used, and the most important for a balanced fertilization. If cow manure is hard to get, a solution of one part manure to 100,000 parts of water can be sprayed over the mixture. Poultry manure is higher in mineral content than cow manure, and makes for a more rank growth. It is more desirable for corn than for root vegetables.

Poultry manures are difficult to compost. They have to be well mixed with soil and other materials to break down. Poultry manure with litter is much easier to handle than roost or battery droppings. The litter provides air spaces between the droppings and keeps them from packing. Horse manure has a tendency to heat up. It generally contains a lot of straw. When using horse manure care should be taken that there are not too many air pockets in the pile.

In the garden itself, the most common raw materials for composting are the weeds. It is preferable to pull them before they go to seed, to avoid growing a new crop of weeds from them. In the pile itself, if it is large enough, there is apt to be sufficient heat generated to destroy any weed seeds that might have gotten into it. But please do not simply pile up a lot of weeds and call the result a compost pile.

Lay the weeds down in a layer, spray the Starter over it, and cover with a little soil. A layer should not be over 2″ thick. Household garbage can be composted in the same pile with weeds. The latter are often too dry, while garbage can be quite wet. Care should be taken to spread the garbage out well, and cut up the larger pieces. This can be done with the edge of a shovel. Suppose for instance there is an apple in the material you want to compost. If it is sliced, even once, the bacteria can attack the inside of the apple. If it is not, their progress is retarded by the skin and its waxy coating. Paper will break down more easily if it is shredded or torn — something that can be done by hand. A compost pile made with garbage, or with many different materials, can be used when some or most of the materials are ready — taking out and re-composting those that have not decomposed.

Leaves take a very long time to compost if they are not ground. When shredded and mixed with other materials, they will break down very readily. (Note: in all cases the mere breakdown is not sufficient, time must be allowed for the upbuilding bacteria to develop the material into a good, usable humus). On whole leaves, the waxy coating delays the bacteria in getting at them. If no shredder is available, leaves can be composted with some soil and a little lime. The result, in a partially broken down condition can be used as a mulch, which will gradually break down. The value of leaves as a fertilizer is not very high from a mineral point of view. They do, however, contain trace elements, and some tannic acid, which is not relished by beetles.

Market leftovers can provide a good supply of materials for composting. Chicken entrails, fish cuttings and the like, are excellent. It is to be pointed out that they have to be handled carefully. Mix with other materials that are absorbent, and use plenty of soil. If you want to keep your neighbors from asking what kind of a perfume factory you are running, spray the Starter in a fine spray over the materials, and ascertain that each particle has been sprayed. Such raw materials may be sprayed a couple of times when they are dumped preparatory to setting up the pile.

Sewage sludge should never be used uncomposted. Properly treated, it can be a reasonably good fertilizing material. Some people do not particularly relish handling it. Unless it is carefully prepared it is preferable to use it for flowers and ornamental bushes rather than for vegetables.

The remaining materials for composting are those that contain mostly cellulose. Peat moss generally has a mediocre fertilizing value. It can be slow to break down, but it absorbs a lot of moisture. Wood shavings can be broken down, but the process is slow and the result has little fertilizing value. Sawdust can be too fine, in which case the same difficulties are encountered as with a fine clay.

Compost materials should be mixed in such a way as to obtain a carbon:nitrogen ratio of from 1 to 8 to 1 to 20 or a little more. Thus, for instance, wood shavings, which have a C:N ratio of 1 to 40 could be mixed with chicken droppings if not enough paper or other cellulose is available.

In order to make a pile, the following tools are required: shovel, pitchfork and horse sense.

It is, as stated previously, preferable to make the pile on bare earth. Skim off the top and pile this soil on the side for use in making the pile. If you have a thin topsoil and your pit is therefore in subsoil, put some topsoil on the bottom before starting to layer in the compost material. The farther South you live, the deeper the pit should be. In Northern New England the pile should be practically on the surface. In the deep South the pit should be 1½ feet deep. In a heavy soil the pit should be less deep than in a light, sandy soil. The purpose of making a relatively deep pit is to help preserve the moisture in the pile. If a pile dries out, nothing happens in the way of producing compost. If it is too wet you have troubles too.

If conditions make drainage desirable, you can dig a trench lengthwise in the pit and stuff it with branches and boughs. A hole dug at the lower end of the ditch, just beyond the pile, will, in a heavy soil, collect the excess juices which can then be poured over the material if it gets too dry.

The shape of the pile should be an oblong pyramid with the top cut off. Length can be as desired. The other dimensions, if sufficient materials are available, can be up to 12 feet wide at the bottom, 4 feet high and 6 feet wide at the top upon completion of the piling up. In case wet raw materials are to be composted, it is advisable to make the pile less high and proportionately less wide. For instance, not so long ago we composted some poultry manure with soil, garbage and paper. It had been raining, no dry materials were available, yet the materials had to be composted then and there — the odor of the raw, fresh chicken manure was a cogent reason. The pile was made between 2½ and 3 feet high. Proper drainage was pro-

vided, and care was taken to aerate the pile. A very good compost was achieved without any turning of the pile.

In the old days, directions for compost heaps used to speak of layering. How thick should a layer be? By handling the raw materials with machinery we have learned that the mixture of a lot of different compost materials gives a better result than if different things are set up in layers separately as they come along. Thus in composts made by hand there can and should be quite a degree of mixing in setting up the horizontal layers. If cornstalks are used for a pile, lay them next to each other and not on top of each other, and put other materials in between. Do not — to put it extremely — pile corn stalks 4 feet deep, put a little soil on top and hope for the best.

Corn stalks, by the way, provide a lot of air spaces and so are best used in the bottom of the pile (drainage), while a predominance of more compact materials should go in the upper part where the air can get at them more easily.

Dolomitic lime can be used in making a pile*. On the basis of the author's personal experience, he only uses it when a pile is made with vegetable materials, to be used on acid soils. Whether the acid condition is cured depends also on proper tillage and handling of the soils. A light sprinkling of the lime is generally sufficient. By using the Starter, sufficient heat should be created to break down the cellulose materials for which unslaked lime was formerly used before the Starter had been developed.

The use of the B.D. Compost Starter, referred to as the Starter, is a great help in the making of a pile. It speeds up the breakdown, and the development of soil bacteria. A pile made by hand (layered), takes, with use of the Starter, roughly half the time such a pile would otherwise need. If it is properly handled, the quality, where the Starter is used, is also higher than it would otherwise be. Most of all from the point of view of time and labor, there is the factor that piles do not have to be turned as often. In fact the author has found it very rarely necessary to turn a pile made with the Starter, even in cases where the pile was too wet to begin with.

In order to give the Starter a chance to do its work to best advantage, the directions should be followed: Reactivate the Starter by moistening, the day before, as much of it as is to be used. Dry Starter keeps several months, and can be left in the original container or in a jar, but preferably not in direct sun-

* This lime has a higher magnesium content than ordinary limes. Magnesium is a minor element important as a fertilizer.

light. It is reactivated best at room temperature. The Starter solution should be sprayed reasonably finely. If the nozzle plugs up, take it off and hold your thumb over the opening to get a spray effect.

It is most important that the Starter solution is well mixed with the raw materials. When the compost is made with machinery, the Starter solution is, as previously noted, sprayed just before the grinding. This permits a thorough mixing of raw materials and Starter. The Starter is diluted with water at a rate of 2 to 5 gallons for one unit of the dry material. This is enough to treat 1 ton of raw compost materials. As a rule of thumb one can figure 1 ton of a moist material to equal about 1½ cubic yards.

Do not pack a compost pile while you are making it. If it is too loose that may be because of insufficient binding material such as soil or manure. If the material is too wet, and a board is used for getting onto the pile with a wheelbarrow, the area under the board is compacted and air is excluded from this part of the pile.

To test whether it is necessary to aerate a pile, put your foot on the side of it and press gently. If the resilience is very low, the pile is too compact and needs aeration. In severe cases it has to be turned. Otherwise holes can be punched into the pile, using either a crowbar or a discarded rake handle that has been pointed. The holes should be made right down to the bottom of the pile, and placed from 6 to 12 inches apart, depending on the need for air. Push the tool all the way in, and, while not widening the sides of the hole unnecessarily, make sure that the hole is not plugged up. This procedure may have to be repeated.

If a sufficiently large pile — say 2 or more cubic yards — is set up at one time, it may heat up. The temperature should not be allowed to rise above 140°F. A special compost thermometer can be used, or a small hole made and a dairy thermometer inserted — or you dig out part of the pile and touch it with your hand, or put a steel pipe in the pile and leave it there for a while. If material or pipe are definitely too hot to touch, then the pile is too hot. To reduce heat, ventilate. If the pile is too dry and you are not getting rain, add water.

While making a pile, keep its form in mind: an oblong pyramid with the top cut off. It is preferable to cover a pile all over with soil if there is enough available. In that case the sides should have an angle of about 45°. If not enough soil is available, then in a hot climate it is advisable to cover the pile with

corn stalks or straw or whatever can be obtained, to maintain the proper moisture and to permit the outer and upper parts of the pile to go through the decomposition process instead of drying up.

When a pile is finished, check it about a week later. If you are in a hurry for the finished compost, repeated checking is helpful. It is preferable not to disturb a pile during the initial heat period. The heat of a pile starts to rise when it is made, remains constant for some 4 days, and has dropped by the tenth day. This initial temperature is independent of the outside temperature. If a pile is to be turned, do it after the tenth day or later.

Take care in making your pile to do it with care, so as to avoid turning as much as possible and thus not have double work.

If a pile is made by machine, it should be kept intact for at least three weeks to give the nitrate forming bacteria a chance to develop. If the pile is made by hand the whole process takes considerably longer. Often parts of such a pile can be used and the rest re-composted.

If compost is to be stored, it can first be spread out to dry.

Compost with a high nitrogen content and in a relatively raw state can be used for corn. Most crops, however, prefer a thoroughly broken-down compost. Compost that is a year old can be used as is for flowerpots, without adding soil.
