

Tucholsky Wagner Zola Scott
Turgenev Wallage Fonatne Sydon Freud Schlegel
Twain Walther von der Vogelweide Fouqué Friedrich II. von Preußen
Weber Freiligrath Frey
Fechner Fichte Weiße Rose von Fallersleben Kant Ernst Richthofen Frommel
Engels Fielding Hölderlin Eichendorff Tacitus Dumas
Fehrs Faber Flaubert Eliasberg Eliot Zweig Ebner Eschenbach
Feuerbach Maximilian I. von Habsburg Fock Ewald Vergil
Goethe Elisabeth von Österreich London
Mendelssohn Balzac Shakespeare Rathenau Dostojewski Ganghofer
Trackl Stevenson Lichtenberg Doyle Gjellerup
Mommsen Thoma Tolstoi Lenz Hambruch Droste-Hülshoff
Dach Thoma von Arnim Hägele Hanrieder Hauptmann Humboldt
Karrillon Reuter Verne Rousseau Hagen Hauff Baudelaire Gautier
Garschin Defoe Descartes Hebbel Hegel Kussmaul Herder
Damaschke Darwin Dickens Schopenhauer Bebel Proust
Wolfram von Eschenbach Bronner Melville Grimm Jerome Rilke George
Campe Horváth Aristoteles Voltaire Federer Herodot
Bismarck Vigny Gengenbach Barlach Heine Grillparzer Georgy
Storm Casanova Lessing Tersteegen Gilm Gryphius
Chamberlain Langbein Lafontaine Iffland Sokrates
Brentano Strachwitz Claudius Schiller Bellamy Schilling Kralik Gibbon Tschchow
Katharina II. von Rußland Gerstäcker Raabe Gleim Vulpius
Löns Hesse Hoffmann Gogol Morgenstern Goedicke
Luther Heym Hofmannsthal Klee Hölty Kleist
Roth Heyse Klopstock Puschkin Homer Mörike Musil
Luxemburg La Roche Horaz Kraus
Machiavelli Kierkegaard Kraft Kraus Moltke
Navarra Aurel Musset Lamprecht Kind Kirchhoff Hugo
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Nietzsche Nansen Lassalle Gorki Klett Leibniz Ringelntz
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Organic Gardener's Composting

Steve Solomon

Imprint

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Foreword

Back in the '70's, I made the momentous move from the East Coast to the West and quickly discovered that much of my garden knowledge needed an update. Seattle's climate was unlike anything I had experienced in Massachusetts or Ohio or Colorado, and many of my favorite vegetables simply didn't grow well. A friend steered me to a new seed company, a tiny business called Territorial Seed, unique in that, rather than trying to tout its wares all over the country, it would only sell to people living west of the Cascade Mountains. Every vegetable and cover crop listed had been carefully tested and selected by Steve Solomon for its performance in the maritime Northwest.

The 1980's saw the revival of regional gardening, a concept once widely accepted, but since lost to the sweeping homogeneity of the '50s and '60s. Steve Solomon and his Territorial Seed Company directly influenced the return of regional garden making by creating an awareness of climatic differences and by providing quantities of helpful information specific to this area. Not only could customers order regionally appropriate, flavorful and long-lasting vegetables from the Territorial catalog's pages, we could also find recipes for cooking unfamiliar ones, as well as recipes for building organic fertilizers of all sorts. Territorial's catalog offered information about organic or environmentally benign pest and disease controls, seasonal cover crops, composts and mulches, and charts guiding us to optimal planting patterns. Every bit of it was the fruit of Steve Solomon's work and observation. I cannot begin to calculate the disappointments and losses Steve helped me to avoid, nor the hours of

effort he saved for me and countless other regional gardeners. We came to rely on his word, for we found we could; If Steve said this or that would grow in certain conditions, by gum, it would. Better yet, if he didn't know something, or was uncertain about it, he said so, and asked for our input. Before long, a network of environmentally concerned gardeners had formed around Territorial's customer base, including several Tilth communities, groups of gardeners concerned with promoting earth stewardship and organic husbandry in both rural and urban settings.

In these days of generalized eco-awareness, it is easy to forget that a few short years ago, home gardeners were among the worst environmental offenders, cheerfully poisoning anything that annoyed them with whatever dreadful chemical that came to hand, unconscious of the long-term effects on fauna and flora, water and soil. Now, thank goodness, many gardeners know that their mandate is to heal the bit of earth in their charge. Composting our home and garden wastes is one of the simplest and most beneficial things we can do, both to cut down the quantity of wastes we produce, and to restore health to the soil we garden upon I can think of no better guide to the principles and techniques of composting than Steve Solomon. Whether you live in an urban condo or farm many acres, you will find in these pages practical, complete and accessible information that serves your needs, served up with the warmth and gentle humor that characterizes everything Steve does.

Ann Lovejoy, Bainbridge Island, Washington, 1993

To My Readers

A few special books live on in my mind. These were always enjoyable reading. The author's words seemed to speak directly to me like a good friend's conversation pouring from their eyes, heart and soul. When I write I try to make the same thing happen for you. I imagine that there is an audience hearing my words, seated in invisible chairs behind my word processor. You are part of that group. I visualize you as solidly as I can. I create by talking to you.

It helps me to imagine that you are friendly, accepting, and understand my ideas readily. Then I relax, enjoy writing to you and proceed with an open heart. Most important, when the creative process has been fun, the writing still sparkles when I polish it up the next day.

I wrote my first garden book for an audience of one: what seemed a very typical neighbor, someone who only thought he knew a great deal about raising vegetables. Constitutionally, he would only respect and learn from a capital "A" authority who would direct him step-by-step as a cookbook recipe does. So that is what I pretended to be. The result was a concise, basic regional guide to year-round vegetable production. Giving numerous talks on gardening and teaching master gardener classes improved my subsequent books. With this broadening, I expanded my imaginary audience and filled the invisible chairs with all varieties of gardeners who had differing needs and goals.

This particular book gives me an audience problem. Simultaneously I have two quite different groups of composters in mind. What one set wants the other might find boring or even irritating. The smaller group includes serious food gardeners like me. Vegetable gardeners have traditionally been acutely interested in composting, soil building, and maintaining soil organic matter. We are willing to consider anything that might help us grow a better garden and we enjoy agricultural science at a lay person's level.

The other larger audience, does not grow food at all, or if they do it is only a few tomato plants in a flower bed. A few are apartment dwellers who, at best, keep a few house plants. Yet even renters may want to live with greater environmental responsibility by avoiding unnecessary contributions of kitchen garbage to the sewage treatment system. Similarly, modern home owners want to stop

sending yard wastes to landfills. These days householders may be offered incentives (or threatened with penalties) by their municipalities to separate organic, compostable garbage from paper, from glass, from metal or from plastic. Individuals who pay for trash pickup by volume are finding that they can save considerable amounts of money by recycling their own organic wastes at home.

The first audience is interested in learning about the role of compost in soil fertility, better soil management methods and growing healthier, more nutritious food. Much like a serious home bread baker, audience one seeks exacting composting recipes that might result in higher quality. Audience two primarily wants to know the easiest and most convenient way to reduce and recycle organic debris.

Holding two conflicting goals at once is the fundamental definition of a problem. Not being willing to abandon either (or both) goals is what keeps a problem alive. Different and somewhat opposing needs of these two audiences make this book somewhat of a problem. To compensate I have positioned complex composting methods and the connections between soil fertility and plant health toward the back of the book. The first two-thirds may be more than sufficient for the larger, more casual members of my imaginary audience. But I could not entirely divide the world of composting into two completely separate levels.

Instead, I tried to write a book so interesting that readers who do not food garden will still want to read it to the end and will realize that there are profound benefits from at-home food production. These run the gamut from physical and emotional health to enhanced economic liberty. Even if it doesn't seem to specifically apply to your recycling needs, it is my hope that you will become more interested in growing some of your own food. I believe we would have a stronger, healthier and saner country if more liberty-loving Americans would grow food gardens.

CHAPTER ONE

What Is Compost

Do you know what really happens when things rot? Have other garden books confused you with vague meanings for words like "stabilized humus?" This book won't. Are you afraid that compost making is a nasty, unpleasant, or difficult process? It isn't.

A compost pile is actually a fast-track method of changing crude organic materials into something resembling soil, called humus. But the word "humus" is often misunderstood, along with the words "compost," and "organic matter." And when fundamental ideas like these are not really defined in a person's mind, the whole subject they are a part of may be confused. So this chapter will clarify these basics.

Compost making is a simple process. Done properly it becomes a natural part of your gardening or yard maintenance activities, as much so as mowing the lawn. And making compost does not have to take any more effort than bagging up yard waste.

Handling well-made compost is always a pleasant experience. It is easy to disregard compost's vulgar origins because there is no similarity between the good-smelling brown or black crumbly substance dug out of a compost pile and the manure, garbage, leaves, grass clippings and other waste products from which it began.

Precisely defined, composting means 'enhancing the consumption of crude organic matter by a complex ecology of biological decomposition organisms.' As raw organic materials are eaten and re-eaten by many, many tiny organisms from bacteria (the smallest) to

earthworms (the largest), their components are gradually altered and recombined. Gardeners often use the terms organic matter, compost, and humus as interchangeable identities. But there are important differences in meaning that need to be explained.

This stuff, this organic matter we food gardeners are vitally concerned about, is formed by growing plants that manufacture the substances of life. Most organic molecules are very large, complex assemblies while inorganic materials are much simpler. Animals can break down, reassemble and destroy organic matter but they cannot create it. Only plants can make organic materials like cellulose, proteins, and sugars from inorganic minerals derived from soil, air or water. The elements plants build with include calcium, magnesium, potassium, phosphorus, sodium, sulfur, iron, zinc, cobalt, boron, manganese, molybdenum, carbon, nitrogen, oxygen, and hydrogen.

So organic matter from both land and sea plants fuels the entire chain of life from worms to whales. Humans are most familiar with large animals; they rarely consider that the soil is also filled with animal life busily consuming organic matter or each other. Rich earth abounds with single cell organisms like bacteria, actinomycetes, fungi, protozoa, and rotifers. Soil life forms increase in complexity to microscopic round worms called nematodes, various kinds of mollusks like snails and slugs (many so tiny the gardener has no idea they are populating the soil), thousands of almost microscopic soil-dwelling members of the spider family that zoologists call arthropods, the insects in all their profusion and complexity, and, of course, certain larger soil animals most of us are familiar with such as moles. The entire sum of all this organic matter: living plants, decomposing plant materials, and all the animals, living or dead, large and small is sometimes called *biomass*. One realistic way to gauge the fertility of any particular soil body is to weigh the amount of biomass it sustains.

Humus is a special and very important type of decomposed organic matter. Although scientists have been intently studying humus for a century or more, they still do not know its chemical formula. It is certain that humus does not have a single chemical structure, but is a very complex mixture of similar substances that vary

according to the types of organic matter that decayed, and the environmental conditions and specific organisms that made the humus.

Whatever its varied chemistry, all humus is brown or black, has a fine, crumbly texture, is very light-weight when dry, and smells like fresh earth. It is sponge-like, holding several times its weight in water. Like clay, humus attracts plant nutrients like a magnet so they aren't so easily washed away by rain or irrigation. Then humus feeds nutrients back to plants. In the words of soil science, this functioning like a storage battery for minerals is called cation exchange capacity. More about that later.

Most important, humus is the last stage in the decomposition of organic matter. Once organic matter has become humus it resists further decomposition. Humus rots slowly. When humus does get broken down by soil microbes it stops being organic matter and changes back to simple inorganic substances. This ultimate destruction of organic matter is often called nitrification because one of the main substances released is nitrate—that vital fertilizer that makes plants grow green and fast.

Probably without realizing it, many non-gardeners have already scuffed up that thin layer of nearly pure humus forming naturally on the forest floor where leaves and needles contact the soil. Most Americans would be repelled by many of the substances that decompose into humus. But, fastidious as we tend to be, most would not be offended to barehandedly cradle a scoop of humus, raise it to the nose, and take an enjoyable sniff. There seems to be something built into the most primary nature of humans that likes humus.

In nature, the formation of humus is a slow and constant process that does not occur in a single step. Plants grow, die and finally fall to earth where soil-dwelling organisms consume them and each other until eventually there remains no recognizable trace of the original plant. Only a small amount of humus is left, located close to the soil's surface or carried to the depths by burrowing earthworms. Alternately, the growing plants are eaten by animals that do not live in the soil, whose manure falls to the ground where it comes into contact with soil-dwelling organisms that eat it and each other until there remains no recognizable trace of the original material. A small

amount of humus is left. Or the animal itself eventually dies and falls to the earth where

Composting artificially accelerates the decomposition of crude organic matter and its recombination into humus. What in nature might take years we can make happen in weeks or months. But compost that seems ready to work into soil may not have quite yet become humus. Though brown and crumbly and good-smelling and well decomposed, it may only have partially rotted.

When tilled into soil at that point, compost doesn't act at once like powerful fertilizer and won't immediately contribute to plant growth until it has decomposed further. But if composting is allowed to proceed until virtually all of the organic matter has changed into humus, a great deal of biomass will be reduced to a relatively tiny remainder of a very valuable substance far more useful than chemical fertilizer.

For thousands of years gardeners and farmers had few fertilizers other than animal manure and compost. These were always considered very valuable substances and a great deal of lore existed about using them. During the early part of this century, our focus changed to using chemicals; organic wastes were often considered nuisances with little value. These days we are rediscovering compost as an agent of soil improvement and also finding out that we must compost organic waste materials to recycle them in an ecologically sound manner.

Making Compost

The closest analogies to composting I can imagine are concocting similar fermented products like bread, beer, or sauerkraut. But composting is much less demanding. Here I can speak with authority, for during my era of youthful indiscretions I made homebrews good enough have visitors around my kitchen table most every evening. Now, having reluctantly been instructed in moderation by a liver somewhat bruised from alcohol, I am the family baker who turns out two or three large, rye/wheat loaves from freshly ground grain every week without fail.

Brew is dicey. Everything must be sterilized and the fermentation must go rapidly in a narrow range of temperatures. Should stray

organisms find a home during fermentation, foul flavors and/or terrible hangovers may result. The wise homebrewer starts with the purest and best-suited strain of yeast a professional laboratory can supply. Making beer is a process suited to the precisionist mentality, it must be done just so. Fortunately, with each batch we use the same malt extracts, the same hops, same yeast, same flavorings and, if we are young and foolish, the same monosaccharides to boost the octane over six percent. But once the formula is found and the materials worked out, batch after batch comes out as desired.

So it is with bread-making. The ingredients are standardized and repeatable. I can inexpensively buy several bushels of wheat- and rye-berries at one time, enough to last a year. Each sack from that purchase has the same baking qualities. The minor ingredients that modify my dough's qualities or the bread's flavors are also repeatable. My yeast is always the same; if I use sourdough starter, my individualized blend of wild yeasts remains the same from batch to batch and I soon learn its nature. My rising oven is always close to the same temperature; when baking I soon learn to adjust the oven temperature and baking time to produce the kind of crust and doneness I desire. Precisionist, yes. I must bake every batch identically if I want the breads to be uniformly good. But not impossibly rigorous because once I learn my materials and oven, I've got it down pat.

Composting is similar, but different and easier. Similar in that decomposition is much like any other fermentation. Different in that the home composter rarely has exactly the same materials to work with from batch to batch, does not need to control the purity and nature of the organisms that will do the actual work of humus formation, and has a broad selection of materials that can go into a batch of compost. Easier because critical and fussy people don't eat or drink compost, the soil does; soil and most plants will, within broad limits, happily tolerate wide variations in compost quality without complaint.

Some composters are very fussy and much like fine bakers or skilled brewers, take great pains to produce a material exactly to their liking by using complex methods. Usually these are food gardeners with powerful concerns about health, the nutritional quality

of the food they grow and the improved growth of their vegetables. However, there are numerous simpler, less rigorous ways of composting that produce a product nearly as good with much less work. These more basic methods will appeal to the less-committed backyard gardener or the homeowner with lawn, shrubs, and perhaps a few flower beds. One unique method suited to handling kitchen garbage—vermicomposting (worms)—might appeal even to the ecologically concerned apartment dweller with a few house plants.

An Extremely Crude Composting Process

I've been evolving a personally-adapted composting system for the past twenty years. I've gone through a number of methods. I've used and then abandoned power chipper/shredders, used homemade bins and then switched to crude heaps; I've sheet composted, mulched, and used green manure. I first made compost on a half-acre lot where maintaining a tidy appearance was a reasonable concern. Now, living in the country, I don't have to be concerned with what the neighbors think of my heaps because the nearest neighbor's house is 800 feet from my compost area and I live in the country because I don't much care to care what my neighbors think.

That's why I now compost so crudely. There are a lot of refinements I could use but don't bother with at this time. I still get fine compost. What follows should be understood as a description of my unique, personal method adapted to my temperament and the climate I live in. I start this book off with such a simple example because I want you to see how completely easy it can be to make perfectly usable compost. I intend this description for inspiration, not emulation.

I am a serious food gardener. Starting in spring I begin to accumulate large quantities of vegetation that demand handling. There are woody stumps and stalks of various members of the cabbage family that usually overwinter in western Oregon's mild winters. These biennials go into bloom by April and at that point I pull them from the garden with a fair amount of soil adhering to the roots. These rough materials form the bottom layer of a new pile.

Since the first principle of abundant living is to produce two or three times as much as you think you'll need, my overly-large gar-

den yields dozens and dozens of such stumps and still more dozens of uneaten savoy cabbages, more dozens of three foot tall Brussels sprouts stalks and cart loads of enormous blooming kale plants. At the same time, from our insulated but unheated garage comes buckets and boxes of sprouting potatoes and cart loads of moldy uneaten winter squashes. There may be a few crates of last fall's withered apples as well. Sprouting potatoes, mildewed squash, and shriveled apples are spread atop the base of brassica stalks.

I grow my own vegetable seed whenever possible, particularly for biennials such as brassicas, beets and endive. During summer these generate large quantities of compostable straw after the seed is thrashed. Usually there is a big dry bean patch that also produces a lot of straw. There are vegetable trimmings, and large quantities of plant material when old spring-sown beds are finished and the soil is replanted for fall harvest. With the first frost in October there is a huge amount of garden clean up.

As each of these materials is acquired it is temporarily placed next to the heap awaiting the steady outpourings from our 2-1/2 gallon kitchen compost pail. Our household generates quite a bit of garbage, especially during high summer when we are canning or juicing our crops. But we have no flies or putrid garbage smells coming from the compost pile because as each bucketful is spread over the center of the pile the garbage is immediately covered by several inches of dried or wilted vegetation and a sprinkling of soil.

By October the heap has become about six feet high, sixteen feet long and about seven feet wide at the base. I've made no attempt to water this pile as it was built, so it is quite dry and has hardly decomposed at all. Soon those winter rains that the Maritime north-west is famous for arrive. From mid-October through mid-April it drizzles almost every day and rains fairly hard on occasion. Some 45 inches of water fall. But the pile is loosely stacked with lots of air spaces within and much of the vegetation started the winter in a dry, mature form with a pretty hard "bark" or skin that resists decomposition. Winter days average in the high 40s, so little rotting occurs.

Still, by next April most of the pile has become quite wet. Some garbagey parts of it have decomposed significantly, others not at all;

most of it is still quite recognizable but much of the vegetation has a grayish coating of microorganisms or has begun to turn light brown. Now comes the only two really hard hours of compost-making effort each year. For a good part of one morning I turn the pile with a manure fork and shovel, constructing a new pile next to the old one.

First I peel off the barely-rotted outer four or five inches from the old pile; this makes the base of the new one. Untangling the long stringy grasses, seed stalks, and Brussels sprout stems from the rest can make me sweat and even curse, but fortunately I must stop occasionally to spray water where the material remains dry and catch my wind. Then, I rearrange the rest so half-decomposed brassica stumps and other big chunks are placed in the center where the pile will become the hottest and decomposition will proceed most rapidly. As I reform the material, here and there I lightly sprinkle a bit of soil shoveled up from around the original pile. When I've finished turning it, the new heap is about five feet high, six feet across at the bottom, and about eight feet long. The outside is then covered with a thin layer of crumbly, black soil scraped up where the pile had originally stood before I turned it.

Using hand tools for most kinds of garden work, like weeding, cultivating, tilling, and turning compost heaps is not as difficult or nearly as time consuming as most people think if one has the proper, sharp tools. Unfortunately, the knowledge of how to use hand tools has largely disappeared. No one has a farm-bred grandfather to show them how easy it is to use a sharp shovel or how impossibly hard it can be to drive a dull one into the soil. Similarly, weeding with a *sharp* hoe is effortless and fast. But most new hoes are sold without even a proper bevel ground into the blade, much less with an edge that has been carefully honed. So after working with dull shovels and hoes, many home food growers mistakenly conclude that cultivation is not possible without using a rotary tiller for both tillage and weeding between rows. But instead of an expensive gasoline-powered machine all they really needed was a little knowledge and a two dollar file.

Similarly, turning compost can be an impossible, sweat-drenching, back-wrenching chore, or it can be relatively quick and

easy. It is very difficult to drive even a very sharp shovel into a compost pile. One needs a hay fork, something most people call a "pitchfork." The best type for this task has a very long, delicate handle and four, foot long, sharp, thin tines. Forks with more than four tines grab too much material. If the heap has not rotted very thoroughly and still contains a lot of long, stringy material, a five or six tine fork will grab too much and may require too much strength. Spading forks with four wide-flat blades don't work well for turning heaps, but *en extremis* I'd prefer one to a shovel.

Also, there are shovels and then, there are shovels. Most gardeners know the difference between a spade and a shovel. They would not try to pick up and toss material with a spade designed only to work straight down and loosen soil. However, did you know that there are design differences in the shape of blade and angle of handle in shovels. The normal "combination" shovel is made for builders to move piles of sand or small gravel. However, use a combination shovel to scrape up loose, fine compost that a fork won't hold and you'll quickly have a sore back from bending over so far. Worse, the combination shovel has a decidedly curved blade that won't scrape up very much with each stroke.

A better choice is a flat-bladed, square-front shovel designed to lift loose, fine-textured materials from hard surfaces. However, even well-sharpened, these tend to stick when they bump into any obstacle. Best is an "irrigator's shovel." This is a lightweight tool looking like an ordinary combination shovel but with a flatter, blunter rounded blade attached to the handle at a much sharper angle, allowing the user to stand straighter when working. *Sharp* irrigator's shovels are perfect for scooping up loosened soil and tossing it to one side, for making trenches or furrows in tilled earth and for scraping up the last bits of a compost heap being turned over.

Once turned, my long-weathered pile heats up rapidly. It is not as hot as piles can cook, but it does steam on chilly mornings for a few weeks. By mid-June things have cooled. The rains have also ceased and the heap is getting dry. It has also sagged considerably. Once more I turn the pile, watering it down with a fine mist as I do so. This turning is much easier as the woody brassica stalks are nearly gone. The chunks that remain as visible entities are again put into

the new pile's center; most of the bigger and less-decomposed stuff comes from the outside of the old heap. Much of the material has become brown to black in color and its origins are not recognizable. The heap is now reduced to four feet high, five feet wide, and about six feet long. Again I cover it with a thin layer of soil and this time put a somewhat brittle, recycled sheet of clear plastic over it to hold in the moisture and increase the temperature. Again the pile briefly heats and then mellows through the summer.

In September the heap is finished enough to use. It is about thirty inches high and has been reduced to less than one-eighth of its starting volume eighteen months ago. What compost I don't spread during fall is protected with plastic from being leached by winter rainfall and will be used next spring. Elapsed time: 18-24 months from start to finish. Total effort: three turnings. Quality: very useful.

Obviously my method is acceptable to me because the pile is not easily visible to the residents or neighbors. It also suits a lazy person. It is a very slow system, okay for someone who is not in a hurry to use their compost. But few of my readers live on really rural properties; hopefully, most of them are not as lazy as I am.

At this point I could recommend alternative, improved methods for making compost much like cookbook recipes from which the reader could pick and choose. There could be a small backyard recipe, the fast recipe, the apartment recipe, the wintertime recipe, the making compost when you can't make a pile recipes. Instead, I prefer to compliment your intelligence and first explore the principles behind composting. I believe that an understanding of basics will enable you to function as a self-determined individual and adapt existing methods, solve problems if they arise, or create something personal and uniquely correct for your situation.

CHAPTER TWO

Composting Basics

Managing living systems usually goes better when our methods imitate nature's. Here's an example of what happens when we don't.

People who keep tropical fish in home aquariums are informed that to avoid numerous fish diseases they must maintain sterile conditions. Whenever the fish become ill or begin dying, the hobbyist is advised to put antibiotics or mild antiseptics into the tank, killing off most forms of microlife. But nature is not sterile. Nature is healthy.

Like many an apartment dweller, in my twenties I raised tropical fish and grew house plants just to have some life around. The plants did fine; I guess I've always had a green thumb. But growing tired of dying fish and bacterial blooms clouding the water, I reasoned that none of the fish I had seen in nature were diseased and their water was usually quite clear. Perhaps the problem was that my aquarium had an overly simplified ecology and my fish were being fed processed, dead food when in nature the ecology was highly complex and the fish were eating living things. So I bravely attempted the most radical thing I could think of; I went to the country, found a small pond and from it brought home a quart of bottom muck and pond water that I dumped into my own aquarium. Instead of introducing countless diseases and wiping out my fish, I actually had introduced countless living things that began multiplying rapidly. The water soon became crystal clear. Soon the fish were refusing to eat the scientifically formulated food flakes I was sup-

plying. The profuse variety of little critters now living in the tank's gravel ate it instead. The fish ate the critters and became perfectly healthy.

When the snails I had introduced with the pond mud became so numerous that they covered the glass and began to obscure my view, I'd crush a bunch of them against the wall of the aquarium and the fish would gorge on fresh snail meat. The angelfish and guppies especially began to look forward to my snail massacres and would cluster around my hand when I put it into the tank. On a diet of living things in a natural ecology even very difficult species began breeding.

Organic and biological farmers consider modern "scientific" farming practices to be a similar situation. Instead of imitating nature's complex stability, industrial farmers use force, attempting to bend an unnaturally simplified ecosystem to their will. As a result, most agricultural districts are losing soil at a non-sustainable rate and produce food of lowered nutritional content, resulting in decreasing health for all the life forms eating the production of our farms. Including us.

I am well aware that these condemnations may sound quite radical to some readers. In a book this brief I cannot offer adequate support for my concerns about soil fertility and the nation's health, but I can refer the reader to the bibliography, where books about these matters by writers far more sagely than I can be found. I especially recommend the works of William Albrecht, Weston Price, Sir Robert McCarrison, and Sir Albert Howard.

Making Humus

Before we ask how to compost, since nature is maximally efficient perhaps it would benefit us to first examine how nature goes about returning organic matter to the soil from whence it came. If we do nearly as well, we can be proud.

Where nature is allowed to operate without human intervention, each place develops a stable level of biomass that is inevitably the highest amount of organic life that site could support. Whether deciduous forest, coniferous forest, prairie, even desert, nature makes the most of the available resources and raises the living dra-