

# REGIONAL RECYCLING BACKYARD COMPOSTING

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# GUIDE



REGIONAL RECYCLING GROUP

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# GUIDE



This backyard composting guide is brought to you by your city's or county's waste reduction and recycling program.

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# Foreword

## STATE RECYCLING REQUIREMENTS

California state law AB 939, signed in 1989, required California jurisdictions to divert 50% of solid waste going to landfills by the year 2000.

AB 341, signed in 2011, established a policy goal that 75% of solid waste generated be reduced, recycled or composted by 2020.

## YARD CLIPPINGS

California has thousands of acres of beautifully landscaped lawns, and many of us spend a large amount of time and money maintaining our yards. The result of our endeavors is tons of yard waste being generated every year. The materials that make up our yard waste (grass, leaves, and shrub and tree prunings) can easily be processed into compost. Backyard composting reduces collection costs and gives you a source of compost for home use.

## BACKYARD COMPOSTING PROGRAM

Backyard composting makes good sense – and good dollars and cents. Rather than having your yard waste collected for processing or disposal, you can recycle this material into a rich, dark humus material for use as a soil amendment. All you need to get started is a compost technique and a bin or a pile. Your local jurisdiction may have a program to encourage backyard composting that includes the distribution of compost bins and literature, and may also have workshops where you can learn about compost techniques.



# Composting Questions & Answers



## **Q: What is composting?**

Composting is a natural process by which organic materials decompose. Making compost is a controlled or managed version of the natural process. By concentrating the activity in one place and balancing yard, food and paper waste with air and water, compost happens faster.

## **Q: What is compost?**

Compost is an organic soil conditioner created by decomposing organic matter under proper composting conditions. The end product of the compost process is a soil- or humus-like material that will increase the health of the soil.

# Composting Questions & Answers

## **Q: How does compost benefit the soil?**

Compost is like a multivitamin for your soil. It will aid in erosion control, promote soil fertility, and stimulate healthy root development. Compost improves soil structure by adding organic content and also increases the water-holding capacity of soil so that you will not need to water as much. Additionally, compost helps keep heavy-clay-content soil from compacting, meaning that the soil is easier to work and root systems will develop better. It also gives sandy soil needed structure.

## **Q: Is composting recycling?**

Yes. Just like plastic beverage containers or aluminum cans, yard clippings and fruit and vegetable scraps are a valuable resource that can be recycled. Organic materials can be recycled into a soil amendment that will improve and maintain the health of your soil.



# Composting Questions & Answers



## **Q: How long does it take to produce compost?**

Composting happens, but your level of labor dictates how quickly. Generally, it should take from one to six months to make a single batch of compost, depending upon the blend of materials, how often the pile is turned, and the moisture content.

## **Q: Why should I compost?**

Backyard composting allows you to recycle your yard clippings and fruit and vegetable scraps into a valuable soil amendment right in your own yard. It is a great way to save money, reduce the amount of waste that is disposed or processed, and improve the quality of your urban environment. Another reason composting is beneficial is that it helps to keep grass clippings and other green waste from entering our storm drains and potentially polluting our waterways.

# The Essentials of Composting

## ORGANIC MATERIALS

These are your yard clippings and the food that the decomposer feeds on, turning them into compost. The materials that are suitable for composting are either carbon materials (brown and dry) or nitrogen materials (green and moist).

### Carbon materials

include fallen leaves, sawdust, straw, and dry grass clippings.



### Nitrogen materials

include freshly cut green grass and fruit and vegetable scraps.



## JUST ADD WATER AND STIR

Composting is a very basic process. You can simply put yard clippings into a pile and let nature do the rest in its own time. Compost will happen; yet it will happen very slowly. You can help it along by providing a balanced diet and an enriched environment for the organisms that do the work of composting.

Decomposer organisms are made up of both microorganisms, such as bacteria, and macro-organisms, such as worms. Supplying them with their basic needs, food, water, and air, will increase the efficiency of their compost efforts.

# The Essentials of Composting

## **MOISTURE**

Decomposer organisms also need water to compost efficiently. The compost pile should be watered periodically, depending upon temperatures and rainfall. A moisture content of 40% is desired. This is the moisture content of a damp sponge.

## **AIR**

Like most living creatures, the decomposer organisms need oxygen to survive. A properly aerated (aerobic) pile will compost faster and more thoroughly than an oxygen-starved (anaerobic) pile. The pile is aerated when you turn and mix the material. The pile should be turned every one to two weeks to maintain proper aeration.

## **SURFACE AREA**

It is best to have your materials properly shredded before putting them into a compost pile. Doing so will increase the surface area that the decomposer organisms have to feed upon, which makes the organisms more efficient and able to create compost faster. Always mow or chop up material before it is added to the compost pile. Proper particle size reduction can be explained by an analogy using a block of ice. A block of ice will melt very slowly. Crush that same amount of ice, and it will melt much more quickly. The same principle works for a compost pile. A large piece of organic material will decompose slowly, taking longer to compost. That same item, when chopped up, will decompose much more quickly.

# Choosing What to Compost

## DO COMPOST

### NITROGEN

- Barnyard manure
- Coffee grounds
- Flowers
- Fruit and vegetable trimmings
- Grass clippings
- Green leaves
- Sod
- Weeds

### CARBON

- Ash – small amounts
- Bread
- Coffee filters
- Dry leaves
- Eggshells
- Hair
- Lint
- Paper products with no ink, small amounts
- Sawdust
- Straw
- Tea leaves with bags
- Wood shavings

## DO NOT COMPOST

- Bones
- Butter
- Cat litter
- Cheese
- Chicken
- Diapers
- Diseased plants
- Dog or cat feces
- Fish
- Greasy foods
- Invasive weeds
- Lard
- Meat
- Milk products
- Oils
- Peanut butter
- Salad dressing
- Sour cream
- Unchopped woody waste
- Vegetable oil

# Choosing What to Compost



As a rule of thumb, avoid any substance or material that could be harmful to you or to the decomposer organisms. Always avoid wood and other yard waste materials treated with chemicals. If you are unsure of an item, it is always better to err on the side of safety and not add it. Check with your local jurisdiction if you have any questions.

There is no single “right” compost technique. There are several variations based upon some basic principles of aerobic decomposition. The technique you start with may be modified as you gain experience. Keep it simple, convenient, and suited to your lifestyle.

# Composting Techniques

## HOT PILE TECHNIQUE FOR COMPOST IN THREE MONTHS

### *BUILDING YOUR PILE*

Microorganisms will do the majority of work in your compost pile. They need a blended and balanced diet of organic materials to thrive. The technique calls for a three-to-one mixture of carbon materials to nitrogen materials.

A 3:1 ratio of carbon-to-nitrogen will compost very efficiently. The problem is that the availability of carbon items is usually highest in the fall and during the leaf season.

During leaf season, combine the leaves from trees (carbon) with grass clippings and any fruit and vegetable trimmings. To increase the surface area, it is recommended that the leaves



# Composting Techniques



be mowed and collected utilizing a grass catcher. This will mix the material, reduce the particle size, and you should have a 3:1 ratio of carbon to nitrogen.

In the spring, summer, and early fall, carbon material will not be as plentiful as in the late fall. Composting, while still practical during this time of year, does require some creativity. Your yard waste stream will be high in nitrogen but low in carbon. The goal is to come as close to the 3:1 carbon-to-nitrogen ratio as possible. Here are some suggestions:

- 1) Check your yard and neighborhood for trees that lose their leaves all year long. If you do not have any trees that lose their leaves throughout the year, perhaps your neighbors do. Leaves are an excellent source of carbon.

# Composting Techniques

- 2) Let grass clippings, cut flowers, or weeds dry out and turn brown. As this material dries out, it changes from a high-nitrogen material into a carbon material.
- 3) In order to maintain the correct carbon-to-nitrogen ratio, consult the list of what to compost on page nine to determine which materials are high in carbon or nitrogen.
- 4) If you decide to compost grass waste and other high-nitrogen-content material, be prepared to turn the material more often and recognize that this material may have a stronger odor.

If you incorporate fruit and vegetable trimmings into your compost pile, please follow these guidelines:

- 1) Incorporate a week's worth of trimmings at one time. You may want to store the trimmings in a sealed container (a coffee can with lid will make a good storage container) in your refrigerator.
- 2) Always chop up this material. Remember, material that is shredded or chopped up will compost faster than material that is not.



# Composting Techniques

- 3) When you incorporate this material into the pile, dig into the center of the pile, six to twelve inches down. Pour the material in and then cover the trimmings. This will prevent pests (rodents and insects) from infesting your compost pile. It is important to avoid having exposed food waste on the exterior of your pile.
- 4) Infestation by either rodents or insects is usually an indication that too much fruit or vegetable trimmings are being added to the pile. Stop adding this material; add some fresh green material to increase the heat of the pile. After the infestation has ended, you can begin to add trimmings to the pile, but in reduced amounts.

## *WATERING THE PILE*

Moisture content of 40% is the desired moisture level. Begin adding water when you begin to build your pile. Water should be distributed evenly throughout the pile. The sponge test is a simple and effective method of checking for a 40% moisture content. Take a handful of material and squeeze. When released, the material should clump in your hand and there should be a drop or two of water between your fingers. If the material is dry and there is no water between your fingers, then water should be added to the pile. If the pile is saturated with moisture, turn several times in the coming week to dry out the pile.

# Composting Techniques

## AIR

Your compost pile receives air when you turn the pile. Remember that the decomposer organisms need oxygen to survive. Without turning, the pile will become anaerobic and the compost process will stop. It is recommended that you turn your pile once every one to two weeks. In the fall, turning your pile once every two weeks will generally be sufficient. In spring, summer, and early fall, once a week is recommended.



# Composting Techniques



## **HOT PILE TECHNIQUE FOR COMPOST IN THREE TO SIX MONTHS**

### *BUILDING YOUR PILE*

The same seasonal conditions apply to this technique as the one mentioned previously. Carbon material is more abundant in the fall of the year, while nitrogen material is abundant during the spring, summer, and early fall. Combine your yard waste material in a 50/50 mixture of carbon to nitrogen. Remember to reduce the particle size of your material to increase the surface area that the decomposer organisms have to feed upon. Fruit and vegetable trimmings are incorporated in the same manner mentioned in the three-month recipe.

# Composting Techniques

## *WATERING THE PILE*

Moisture content of 40% is the desired moisture level. Begin adding water when you begin to build your pile. Water should be distributed evenly throughout the pile. Use the sponge test mentioned previously to check the moisture content.

## *AIR*

Turn the pile once a month. The decomposer organisms still need air to survive. You are simply trading an increase in composting time for less labor under this recipe. Compost takes place at a slower rate when utilizing this technique.



# Compost Troubleshooting

SYMPTOM	PROBLEM	SOLUTION
<b>The pile smells bad.</b>	<ul style="list-style-type: none"><li>• Too much moisture.</li><li>• Too much nitrogen-rich material in the pile.</li></ul>	<ul style="list-style-type: none"><li>• Turn the pile.</li><li>• Do not water as often and turn the pile to dry out the material.</li><li>• Add leaves or other carbon-rich material to the pile.</li></ul>
<b>The pile will not get hot.</b>	<ul style="list-style-type: none"><li>• Not enough water.</li><li>• Pile too small.</li><li>• Not enough nitrogen-rich materials in the pile.</li><li>• Particle size too large.</li></ul>	<ul style="list-style-type: none"><li>• Add water.</li><li>• Gather more material and build the pile to at least 3' x 3' x 3'.</li><li>• Mix in fresh nitrogen-rich materials, such as grass or fruit and vegetable trimmings.</li><li>• Chop or grind material to reduce the particle size.</li></ul>
<b>The pile is attracting flies, rodents, or other pests.</b>	<ul style="list-style-type: none"><li>• Protein-rich, fatty, or sugary foods are present in the pile.</li><li>• Food is exposed.</li></ul>	<ul style="list-style-type: none"><li>• Be sure to leave meat, bones, oily foods, and dairy products out of the compost pile.</li><li>• Bury the fruit and vegetable trimmings at least 6–12 inches deep.</li></ul>

# How to Use Compost

## HARVESTING COMPOST

This is the first step in using the compost you have produced. The material will undergo a transformation, and instead of looking like the materials you incorporated into your backyard compost container, the materials will take on a soil- or humus-like appearance. When the entire bin has undergone this transformation, it is time to harvest the compost.

To harvest your compost, we recommend spreading it out on a tarp and leaving it exposed to the air. Drying out the material will work to cure the compost. It will also make this material easier to spread.

You may also use the screen technique. Screen material into wheelbarrows for finished product. Toss larger pieces back into pile for additional composting.



# How to Use Compost

## COMMON WAYS TO USE COMPOST

### *SOIL AMENDMENT*

Finished compost can be turned into the soil as a soil amendment. As much as six inches of compost can be added to your soil each year. When used as a soil amendment, compost reacts with soil to slowly release both plant nutrients and essential trace elements. Compost can be turned into the soil in the spring in preparation for planting. It can also be spread on soil at the end of the gardening season and allowed to leach into the soil. If only a small amount of compost is available, it can be incorporated in the seed furrow, or a handful can be added to each transplant hole of annuals,

perennials, or vegetables. Large amounts of compost can be used to plant trees, shrubs, and vegetable gardens, or to repair or replace lawn areas.

### *MULCHING*

Compost is not mulch, yet it can be applied in the same ways that mulches are used. Compost is a stable product that will not deprive your soil of nitrogen. Spread compost two to six inches thick around plants, trees, shrubs, and exposed slopes. This will deter weeds, prevent crusting, curtail erosion, attract earthworms, and conserve water.

# How to Use Compost

## *POTTING MIX*

Finished compost can be combined with equal parts of sand and soil to create an excellent potting mix. The compost should be screened to ensure that only fine particles are used in the mix. A simple screen can be made of ½-inch or other small-gauge fencing material and a wooden frame.



# The Compost Bin



Compost bins are available from a variety of sources. Check with your local jurisdiction recycling coordinator for programs offered in your area. Bins can also be purchased from various local businesses. Some bins offer labor saving features, and there are a variety of bins available.

The Internet is also a resource for finding numerous compost bins and additional educational materials. It is important to realize the purpose of the bin: it is the container in which the compost process takes place and does not compost for you. Since you control the environmental conditions, you control the process.

# The Compost Bin

The type of structure or method you choose to make compost is really a matter of personal preference. If you are the do-it-yourself type, you may want to build your own structure using materials such as wood, welded wire, concrete blocks or wooden pallets. Prefabricated, ready-built bins and drum turning units are also available.



Many manufactured bins are made from recycled plastic. If attractiveness of the bin is important, you may want to purchase a manufactured bin.



# Vermicomposting



## **WORM COMPOSTING**

### *LET WORMS EAT YOUR YARD WASTE*

Another method of composting, separate from the backyard bin or pile method, is known as vermicomposting. This is the practice of using worms to do your composting. Worms are macroorganisms that feed on your yard waste and fruit and vegetable trimmings, and decompose them for you. The goal of vermicomposting is to create the ideal environment for worms to thrive so they can efficiently decompose yard waste material. Worm composting is simple. You need a box, bedding, yard waste, fruit and vegetable trimmings, and worms.



# Vermicomposting

## THE BOX

You can either buy a worm box or make your own. You can purchase a plastic storage box from a local retailer.

A homemade worm box should be a sturdy wooden box with a tight-fitting lid. It can be made from scrap wood or constructed with plywood and two-by-fours. A tight-fitting lid keeps pests out and protects the worms. (The worms will not escape from their box. They are not attracted to light; hence, they migrate toward the center of their box.) It is best to drill  $\frac{1}{4}$ -inch holes in the bottom of the box to allow for drainage.



# Vermicomposting

The box should be sized to provide one square foot of surface area for each person in the household. For example, a 2' x 2' x 2' box will handle the food waste of a four-person household.

## THE BEDDING

Common bedding materials include shredded newspaper, corrugated cardboard, coarse peat moss, and partially decomposed leaves. Worm boxes should be filled with bedding to provide the worms with a balanced diet as well as a damp, aerated place to live.

Tear newspaper or cardboard into one-to-two-inch strips before using as bedding. Bedding material

should be thoroughly moistened by soaking it in water for several minutes. Squeeze out the excess water before adding bedding material to the worm box.

Always cover food waste with a few inches of bedding to prevent flies from becoming a problem. Rotate the location where food is buried in order to provide the worms with a balanced diet of kitchen scraps and bedding.

## THE WORMS

Red worms, known as red wigglers or manure worms, are the best for vermicomposting.



# Vermicomposting

They thrive on organic material such as yard waste and fruit and vegetable trimmings. Red worms are not the same as earthworms or night crawlers, which need mineral soil to survive.

One to two pounds of worms are needed to start a worm box. Worms regulate their own population based on how much food is available. In other words, if they have a lot to eat, they increase their population. If food is scarce, their population decreases until the food supply increases. Worms reproduce very quickly. It is estimated that eight worms can multiply to 1,500 worms in six months. Once your system is established, there will be plenty of worms to help your friends get started.



# Vermicomposting

## DO FEED WORMS



- Coffee grounds or filters
- Bread
- Fruit and vegetable trimmings
- Small plant material
- Tea leaves with bags

## DO NOT FEED WORMS



- Bones
- Citrus peels
- Dairy products
- Fish
- Greasy foods
- Peanut butter
- Pet/animal litter/ feces
- Salad dressing
- Sour cream
- Vegetable oil

# Vermicomposting

## THE HARVEST

Harvesting worm compost is very easy. Simply feed one end of the box for a week or more. The majority of the worms will migrate to that side of the box. Scoop out two-thirds of the worm castings from the opposite end and put fresh bedding in its place. Start burying food waste in the new bedding, and the worms will migrate back.

## WORM FARMS

Red wigglers can be purchased at local bait shops, from worm farms, or by mail order. Search online using the keyword “VERMICOMPOSTING” or “WORM COMPOSTING.”



# Glossary

**AEROBIC:** occurring in the presence of oxygen. For successful composting, sufficient oxygen should be provided to keep the system aerobic. This ensures that the composting proceeds rapidly and with minimal odor.

**AERATION:** bringing about the contact of the compost with air through turning, or ventilating, to allow microbial aerobic metabolism.

**ANAEROBIC:** occurring in the absence of oxygen. Anaerobic composting proceeds slowly and is odiferous.

**AMBIENT TEMPERATURE:** temperature outside the compost pile.

**CARBON-TO-NITROGEN RATIO:** the relative amount of carbon to nitrogen, e.g., a 2:1 ratio means that there is twice as much carbon as nitrogen. Bacteria, like all living organisms, require quite a bit of carbon and comparatively less nitrogen. By providing them with materials that provide these elements in the correct proportion, they thrive, grow, and multiply. Therefore, they can decompose your compost pile at their highest speed. Achieving a carbon-to-nitrogen ratio of about 3:1 is one factor in creating favorable conditions for backyard pile composting.

**CARBON:** the basic building block of organic molecules needed for plant and animal life. During decomposition, carbon is released to be reused by plants and animals.

# Glossary

**COLD COMPOSTING, COLD PILE:** when less attention is given to providing and maintaining optimum conditions for compost piles, the resulting environment that will attract psychrophilic bacteria, possibly mesophyllic bacteria, but not thermophilic bacteria. As the psychrophilic bacteria work, the compost pile will reach about 55 degrees F. This is the slow method of creating compost from a backyard pile and can take as long as six months to two years to create compost. However, there is little maintenance other than occasionally turning the pile. This type of compost piles requires the least effort.

**COMPOST:** completely decayed organic matter. It is dark, odorless, and rich in nutrients.

**CONTAMINANT:** unwanted material. Physical contaminants of compost include glass, plastic, and stones, and chemical contaminants include trace heavy metals and toxic compounds.

**DECAY, DECOMPOSITION:** the breaking down of organic materials into smaller particles until the original material is no longer recognizable.

**HARVESTING:** removing compost from the composting environment for use in the landscape, lawn, or garden.

**HOT COMPOSTING, HOT PILE:** optimum conditions for compost piles, with a 3:1 carbon-to-nitrogen ratio. Smaller particles of various sizes and textures, moisture, air, and a volume of three

# Glossary

cubic feet produce an environment that will attract psychrophilic, mesophyllic, and then thermophilic bacteria. As the thermophilic bacteria work, the compost pile temperature will reach as high as 170 degrees F. This is the fastest method of creating compost from a backyard pile and can take as little as three weeks if the pile is monitored and turned each time the temperature starts to fall.

**HUMUS:** a complex aggregate made during the decomposition of plant and animal residues; mainly derivatives of lignin, proteins, and cellulose combined with inorganic soil parts.

**INORGANIC:** substances in which carbon-to-carbon bonds are absent. Mineral matter.

**MATURE COMPOST:** the stabilized and sanitized product of composting; it has undergone decomposition and is in the process of stabilization. It is characterized as containing readily available forms of plant nutrients; it is low in phytotoxic acids.

**METABOLISM:** exchange of matter and energy between an organism and its environment, and the transformation of this matter and energy within the organism.

**MICROORGANISM:** microscopic plants and animals. They exist in soil for the purpose of breaking down organic matter into basic mineral elements. They include bacteria, fungi, actinomycetes, algae, protozoa, yeast, germs, ground pearls, and nematodes.

# Glossary

**MOISTURE CONTENT:** weight of water in material divided by weight of solids in material.

**MULCH:** covering for soil. Mulch should not generally be mixed into the soil; it is not a fertilizer or soil amendment. There are many types of mulch, including partially decomposed compost, bark, wood chips, hay, nutshells, pine needles, and others. The point is to cover bare ground so that topsoil is not washed away, soil temperature is buffered, and weeds are reduced from lack of light. A good organic mulch will also supply nutrients to the earth as it decomposes.

**NITROGEN:** a chemical element that makes up 78% of our atmosphere by volume. After

nitrogen is released into the soil during the process of decomposition, plants absorb it and use it to further the compost process.

**ORGANIC:** belonging to a family of compounds characterized by chains or rings of carbon atoms that are linked to atoms of hydrogen and sometimes oxygen, nitrogen, and other elements.

**RECYCLING PROGRAMS:** systems that may be run by private enterprise or local government to gather recyclable materials and remake them into similar or dissimilar products for market. Common products are newspapers, glass, plastic, steel, and aluminum.

# Glossary

**SOIL AMENDMENT:** matter, when added to the land, that will make the soil healthier by such means as balancing and adding nutrients, balancing the pH, and encouraging the presence of microorganisms. From a legal standpoint, this is different than “fertilizer” and is not governed by the laws that regulate fertilizers.

**STABILITY:** the degree to which the composted material can be stored or used without giving rise to nuisance.

**VERMICOMPOSTING, VERMICULTURE:** using red worms to compost food scraps, newspapers, and cardboard, yielding nutrient-rich castings.

**WORM CASTINGS:** digested and excreted food products from worms. Castings are five times richer than most fertile soil and are full of helpful microorganisms.

**YARD CLIPPINGS:** grass trimmings, leaves, weeds, and shrub and tree prunings six inches or less in diameter from a residence or business.



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