

GREENCYCLING HANDBOOK



*Learn how to compost and grasscycle
to enrich your garden and landscape*

Authored by University of California Master Gardeners

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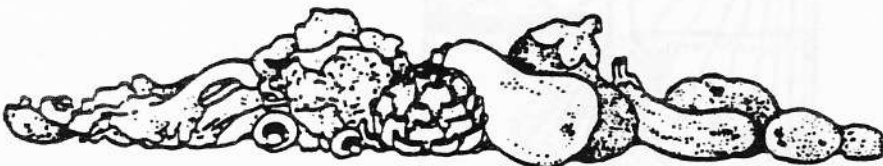
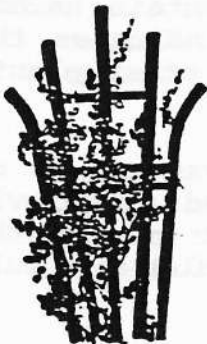
GREENCYCLING OPTIONS FOR ATTAINING 'ZERO GREENWASTE ACCUMULATION'

The good news is that you don't have to throw away any more lawn clippings, dead plants, or shrub and tree prunings! There are several environmentally-friendly options for reusing greenwaste that result in a healthier landscape and garden. These methods may be used singularly or in combination to achieve your 'zero accumulation' goal. 'Zero accumulation' means that you reuse all the greenwaste you generate.

Options for reusing greenwaste ('greencycling') include: mulching, grasscycling, incorporating, soil amending, and making your own potting soil. The greencycling system that is best for you largely depends on the kinds of greenwaste you produce and your specific home horticulture needs for the end products.



Composting Handburl •





USES FOR FRESH GREENWASTE

Some greencycling options make use of non-composted greenwaste. Mulching, grasscycling, and incorporating are examples. A description of each follows.

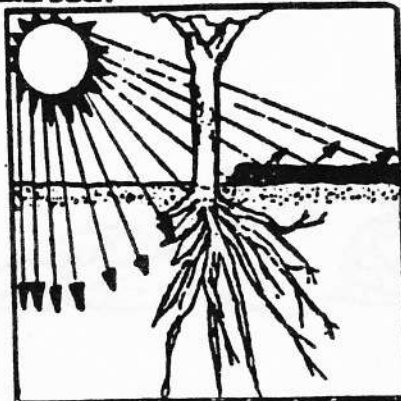
Mulch. Most plants benefit from an application of mulch. Mulches are products spread on top of the soil, around landscape and garden plants.

Using mulches made from grass clippings, leaves, shrub and tree prunings, and old garden plants is a great way to divert greenwaste from landfills and provide many benefits to your plants. A layer of mulch can reduce soil evaporation and runoff, aid in weed and erosion control, buffer soil temperatures, and, result in a more attractive planting.

If you have been on vacation and your lawn has grown too tall to effectively grasscycle (leave clippings on the lawn as you mow), you can bag clippings the next time you mow and apply them as a mulch around trees and garden plants. Remember to let the clippings dry down first, and avoid clippings recently treated with pesticides. If in doubt, leach clippings thoroughly before using them as mulch.

Chopped tree and shrub leaves make great mulch; just mow over the leaves. Then, rake them up and they are ready for use. If you bag leaves as you mow, make sure you allow any grass that is also collected to dry down before use. Leaves from some trees, such as Acacia, Eucalyptus, Camphor, Oak, and Pittosporum contain harmful chemicals that may damage plants. While research indicates that mulches made from some of these species do not harm other plants, compost them to play it safe!

Pine needles acidify the soil, which is often an advantage in our alkaline conditions, and is especially useful around acid-loving plants such as Azalea and Rhododendron. For other plants that prefer a more neutral pH, the amount of pine needles in mulch applications should be limited.



Shredded or chipped wood is a popular slowly-decomposing mulch that can be placed on the soil around plants and also on walkways. Since wood products added to compost piles generally lengthen the amount of time it takes for decomposition, using them as a mulch is often preferred.

Mulch should be thick enough to prevent weed seeds from germinating, but not so thick that oxygen is restricted in the soil below. In general, a three to four inch layer of mulch is about right. Due to settling, you may have to replenish the mulch occasionally when less than two inches is left. Since wood chip mulches do not decrease much in size and decompose slowly, they do not need to be replenished often, and adding a two to four inch layer works well. Coarse wood chip mulches are often preferred for erosion control since they do not wash away readily.

Adding a leaf mulch to a vegetable or flower garden using deciduous tree leaves in the fall is a great way to maintain high soil temperatures into the winter. Remember to remove the mulch early in spring so the soil can warm up quickly!

Mulch is of great benefit around trees if it is placed several inches away from trunks. This will avoid wet crowns and infestations of small rodents.

Grasscycling. Grasscycling is one of the best ways to greencycle. In grasscycling, clippings are simply left on the lawn to decompose, rather than being bagged and dumped.

Besides diverting organic matter from landfills, grasscycling supplies valuable organic material and nutrients to the soil. Studies indicate that grass clippings contain about four percent nitrogen, one-half percent phosphorus, and two percent potassium. Grasscycling reduces mowing time, buffers soil temperatures, reduces evaporation, and aids in erosion control.

Contrary to popular belief, grasscycling does not contribute to thatch (a partially decomposed layer of turfgrass stems, shoots and roots accumulating at the soil surface). Grass clippings are composed mostly of water and decompose rapidly when left on the lawn. However, it is necessary to mow at least weekly when grasscycling to avoid a build-up of excess clippings on your lawn.



While a mulching mower recuts the clippings and reduces decomposition time, conventional mowers can also be used to grasscycle. A convertible mulching mower or a traditional bagging model are good choices for homeowners who recycle clippings by both grasscycling and composting.

If you choose to purchase a convertible mulching mower, select one with blades that change easily. Horsepower rating is very important to the performance of a mower. A model supplying at least four or five horsepower is recommended. Prices for dedicated mulching mowers and convertible mowers do not vary greatly, although convertible types often cost ten to fifteen percent more. Typical prices for convertible mowers range from \$250 to over \$700.

Maintaining your lawn at or slightly below the recommended mowing height is important when grasscycling. In general, you should mow often enough so that you never reduce the leaf height by more than one-third during any given mowing. This is one of the most important elements of successful grasscycling.

RECOMMENDED MOWING HEIGHTS FOR YOUR LAWN

<u>Grass Type</u>	<u>Mower Setting (inches)</u>	<u>Mow when Grass Reaches This Height inches</u>
Bermudagrass (common)	1 to 1-1/2	1-1/2 to 2-1/4
Perennial Ryegrass	1-1/2 to 2-1/2	2-1/4 to 3-3/4
St. Augustinegrass	1 to 2	1-1/2 to 3
Tall Fescue	1-1/2 to 3	2-1/4 to 4-1/2
Zoysiagrass	1/2 to 1-1/2	3/4 to 2-1/4

Incorporating. Burying organic matter such as dead plants, grass clippings, and tree and shrub prunings, along with small amounts of kitchen waste, such as fruit and vegetable peels, improves soil texture and may add nutrients over time. Find a vacant patch of ground, remove a shovelful of soil at least six inches deep, deposit your organic matter, and replace the soil. Most waste will decompose within one month. Avoid adding oils, meat, and dairy products.



USES FOR COMPOSTED GREENWASTE

Compost can be a valuable addition in your garden, landscape, and container plants. Compost contains much higher levels of organic matter than are found naturally in Southern California soils. It has excellent water and nutrient holding capacity, and better aeration than most native soils.

Compost should be thought of as a soil conditioner rather than as a fertilizer, since it contains relatively low amounts of plant nutrients. Therefore, a soil amended with compost will require virtually the same amount of fertilization as before the addition.

Compost can be used as a mulch, soil amendment, or potting soil. A description of each follows:

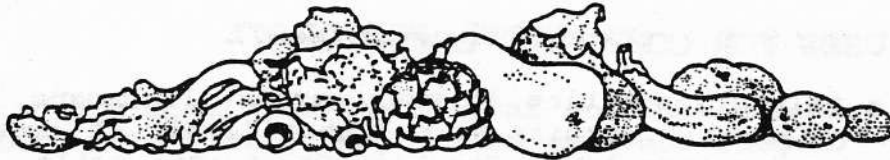
Mulch. While most greenwaste may be safely applied as fresh mulch, some species contain chemicals that may be harmful to other plants if not composted first. These include Acacia, Eucalyptus, Camphor, Oak and Pittosporum. In addition, plants receiving recent pesticide applications should be composted before they are used as mulch.

Application and use of composted mulch follows the same guidelines as discussed under the fresh mulch section (page 2).

Composted lawn clippings are useful additions to newly planted lawns. They add beneficial organisms that often combat harmful soil-borne pests, and may prevent or reduce the occurrence of several common turfgrass fungal diseases, such as Brown Patch, Fusarium Patch, and Dollar Spot.

Established lawns often benefit from a shallow layer (up to one-half inch) of compost applied as a topdressing on top of the grass. Microorganisms and earthworms will help move the topdressing down into the soil. Heavily compacted soils should be aerated before the application; the topdressing will settle in the aeration holes, improving air movement and drainage.





Soil Amendment. The addition of organic matter into the soil improves soil texture and water and nutrient-holding capacity. Flower beds, vegetable gardens, lawns, and foundation plantings often benefit from soil amended with organic matter prior to planting.

Contrary to popular opinion, research studies indicate that soil amendments should not be added to soil where trees will be planted. Since soil amendments tend to hold more water than the native soil, shallowly rooted trees with a greater chance of uprooting may result. This is because tree roots tend to grow in the amended layer where most of the water is, rather than venturing deeper.

Instead, plant trees in the pre-existing soil in your yard after digging a planting hole that is the same depth as the potting container but twice as wide. The side edges of the planting hole should be etched slightly with a shovel to encourage good root distribution over time. Then, fill in the hole with the soil that was removed, and gently tamp it down. More information on tree planting techniques is available from University of California Master Gardeners at the phone numbers listed at the back of the handbook.

Only completely decomposed compost should be used as a soil amendment. Undecomposed or partially decomposed organic matter may contain high levels of harmful salts or pesticides that can damage new plantings. Organic matter should be mixed evenly into the soil, so that the final mixture contains at least 40 percent compost. Compost should be added to a depth of at least six inches to encourage deeply rooted plants.

New lawns often benefit from the addition of compost into the soil. Mix the compost with the native soil evenly to a depth of six to eight inches before seeding.



Potting Soil. Compost makes an excellent potting soil for indoor or outdoor container plants; it compares favorably to similar products sold at nurseries or discount stores. Use it as you would other potting mixes.



COMPOSTING

The Process. Composting is the decomposition of organic matter into a humus-like substance. It occurs naturally, but can be accelerated and improved by controlling environmental factors. The length of the composting process depends on aeration, moisture, temperature, carbon to nitrogen ratio, surface area, and pile size.

Aeration is the introduction of oxygen into the compost pile. It occurs naturally when air warmed by the composting process rises through the pile and draws fresh air from the surroundings. Regular turning of the pile also increases air movement and is essential for making the decomposition process as efficient as possible.



Moisture is necessary for decomposition, as well. It is required by microorganisms that break down the organic matter. The ideal moisture level is that of a wrung out sponge. A pile that is either too moist or too dry will not decompose readily.

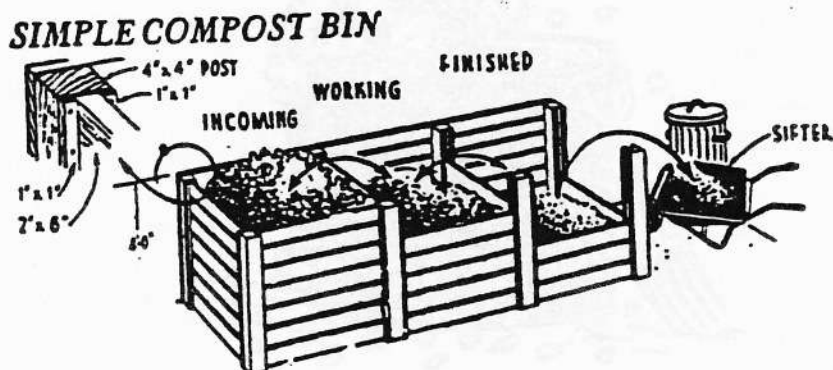
The ideal temperature for rapid decomposition is between 90 and 140 degrees F. Temperatures above 160 degrees F may result in the depletion of beneficial organisms that aid in the decomposition process, while temperatures that are not warm enough will be too low to kill disease-causing organisms and weed seeds.

Microorganisms need both carbon and nitrogen to break down the organic matter. Organic matter containing carbon tends to be brown and dry, such as twigs, branches, brown leaves and plant material, paper, straw, sawdust, and wood chips. Organic matter high in nitrogen is usually greener and more moist, and includes green leaves and grass. A rule of thumb is to include about 50 percent 'browns' and 50% 'greens' in the pile for the highest quality end product.

Since grass clippings contain higher levels of nitrogen than other greenwaste, they help balance the carbon to nitrogen (C:N) ratio, and are a welcome addition to a compost pile. While leaves alone will decompose, leaves mixed with lawn clippings and kitchen waste will decompose even faster and more completely. (Kitchen scraps composted alone often have an undesirable smell and attract pests.) Also, since lawn clippings are small and herbaceous, they will decompose readily and can be added 'as is' to a compost pile without further chopping or cutting.

Grass clippings should not be composted alone; unfavorable conditions resulting from low levels of oxygen will result. If you have a large amount of wet clippings, dry them before adding them to the compost pile.

Constructing a Compost Pile. While there are several ways to produce high quality compost, there are some general principles and guidelines regarding pile construction that will result in a high quality finished product generated in a timely way. A few plans are included in the reference section of the handbook for your reference and use.



Location and Size. Choose a location that is convenient and near a water source (preferably a hose). Since the pile needs to be at least three feet wide, three feet long, and three feet high, make sure there is ample room to turn it regularly. A pile smaller than these dimensions will not generate temperatures high enough to be effective, while too large a pile may be hard to manage.

If you generate lots of greenwaste and have use for a large amount of compost, maintaining three bins may be useful. One pile would be used for fresh greenwaste, one for actively decomposing greenwaste, and the third for finished product.

Type of Pile. You may construct a bin, buy a commercial bin, or use a pile. It is useful to place coarse material, palm fronds, or a pallet on the bottom of the pile to aid in aeration. Simple plans are included in the 'Additional Resources' section in the back of the book.

Adding Materials. All kinds of greenwaste, including grass clippings, leaves, dead plants, and shrub and tree prunings, may be added to your compost pile. Chop, shred, or chip large pieces of greenwaste into smaller pieces to hasten decomposition. Layer collected material four to six inches high and moisten. The pile should be kept moist but not soggy; test a handful from a few places in the pile to make sure it oozes only a small amount of water when squeezed. Green materials require somewhat less water than brown materials.

If you wish, add a small amount of nitrogen fertilizer between layers. In some cases, this practice hastens decomposition. Continue to add greenwaste as it becomes available. Food scraps may also be added as long as fatty material, oil, and bones are not included.

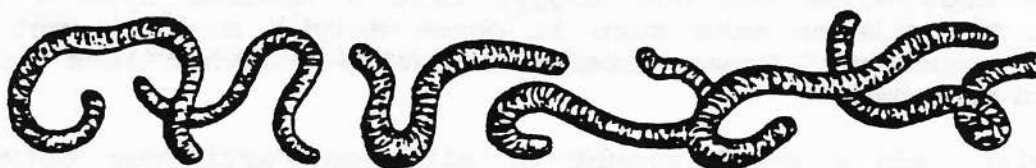
Turning the pile in a timely way is important for uniform decomposition. It should be turned more often in the summer than in winter, preferably once a week.

Knowing When It's Ready. Compost that is ready for use will appear dark and crumbly, resemble peat moss, and smell sweet and earthy. It will have shrunk to about one-third of its original size. If you can recognize any of the original greenwaste that was added, it is not ready! During ideal conditions, the process takes between one and three months; it may take much longer in fall and winter. Particle type and size, temperature and moisture level, and microorganism population determine the rate of decomposition. It is important to be patient and not use unfinished compost (unless it will be for an application of mulch). If the composting materials have not completed their natural breakdown process, pesticides applied to plants added to the compost pile, as well as unfavorable pathogens, insects, and nematodes, may persist.



Troubleshooting Compost Pile Problems

<u>Problem</u>	<u>Cause</u>	<u>Solution</u>
Ammonia odor	excess nitrogen	Add more carbon ('browns')
Rotten odor	poor air movement	Turn pile and let it dry out
Center damp and cold	lack of nitrogen	Add more nitrogen ('greens') and turn pile
Low overall temperature	cold weather, pile too small, or lack of moisture, aeration, nitrogen	Add lacking input; if due to cold weather, be patient!
Varmints	Prohibited input material such as meat scraps	Remove prohibited material, turn pile to raise temperature



VERMICOMPOSTING

Vermicomposting (also known as worm composting) is the process of using redworms and microorganisms to convert food scraps into dark brown, nutrient rich humus. Vermicomposting, when properly managed, smells fresh and has no objectionable odor. If you detect an odor, you may be overfeeding your worms!

Materials Needed. To get started, you will need a worm composting bin, bedding materials, worms, and worm food (food scraps). Redworms can be purchased from various outlets or bait shops, and can be found in manure piles or separated from an existing worm bin.

Worm Bin. Worm composting can be successfully undertaken in many different types of containers. A plastic storage container (washed well with detergent), wash basin, or sturdy wooden box can be adapted for worm composting. Containers can also be purchased or built.

There are two methods for determining worm bin size: calculation or estimation. In either case, since worms are surface feeders, an eight to sixteen inch depth is suggested.

To calculate size, weigh kitchen scraps each week for several weeks to get an average. You will need one square foot of surface area for each pound of scraps per week.

If you prefer to estimate bin size needed, studies suggest that two square feet of bin surface area per person is needed. For one to two people, a two foot by two foot box should do. To accommodate three to six people, try a two foot by three foot container. For larger needs, consider using two smaller containers instead of one larger one to reduce down time when harvesting.

Bedding Materials. The bedding functions as a home for the worms and kitchen scraps, and helps retain moisture and aeration. Suggested materials are shredded newsprint, computer paper, aged manure and leaves. Peat moss that has been leached can be used in small amounts.

Bedding material should be moistened but not saturated. Glossy paper should be avoided. A handful of garden soil can be added for grit.

Worms. All worms are not created equal. Garden worms (earthworms) are great for garden soil but will die in the confined conditions necessary for worm composting. Redworms (*Eisenia foetida* or *Lumbricus rebellus*) are your desired worm bin residents.

In general, you should start with two pounds of worms for every pound of kitchen scraps. Or, start with one pound and your worms will multiply. Just don't overfeed them. The populations will grow and adapt to the amount of food available.

Worm Food. Examples of what you can feed your worms include fruit and vegetable peelings, coffee and tea grounds, crushed egg shells, bread, rice, and leftovers. Avoid feeding worms meat, oil, dairy products, and acidic food.

Getting Started. Locate your bin in a convenient place, out of the sun. Worms prefer temperatures under 80 degrees. Protect them from temperatures below freezing. Cover your bin to protect it from drying out and from unwanted varmints; make small airholes in it to avoid anaerobic conditions that will occur in an airtight bin.

Place your moistened bedding material in the bin. Put the worms on one side, and deposit kitchen scraps in one corner; worms will migrate to the food. Bury the food under some bedding. Each time you add food, place it next to where the previous food was positioned, rotating it around the bin. When you return to the first feeding place, much of the food will be 'composted'. If it isn't, feed your worms a little less for awhile!

Harvesting. After a few months it will be time to harvest. Withhold food from your worms for a couple of weeks and harvest the

whole bin by separating the worms from the vermicompost. Or, coax the worms to one side of the bin by feeding only on that side for a few weeks. Then remove the other side and replace it with fresh bedding and repeat the process.

Using Vermicompost. Use vermicompost like you would use finished compost. Limit it to twenty five percent of a potting soil, though!