

Home Composting in the Big Country

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Master Gardener

Compost Specialist

Vegetable Specialist



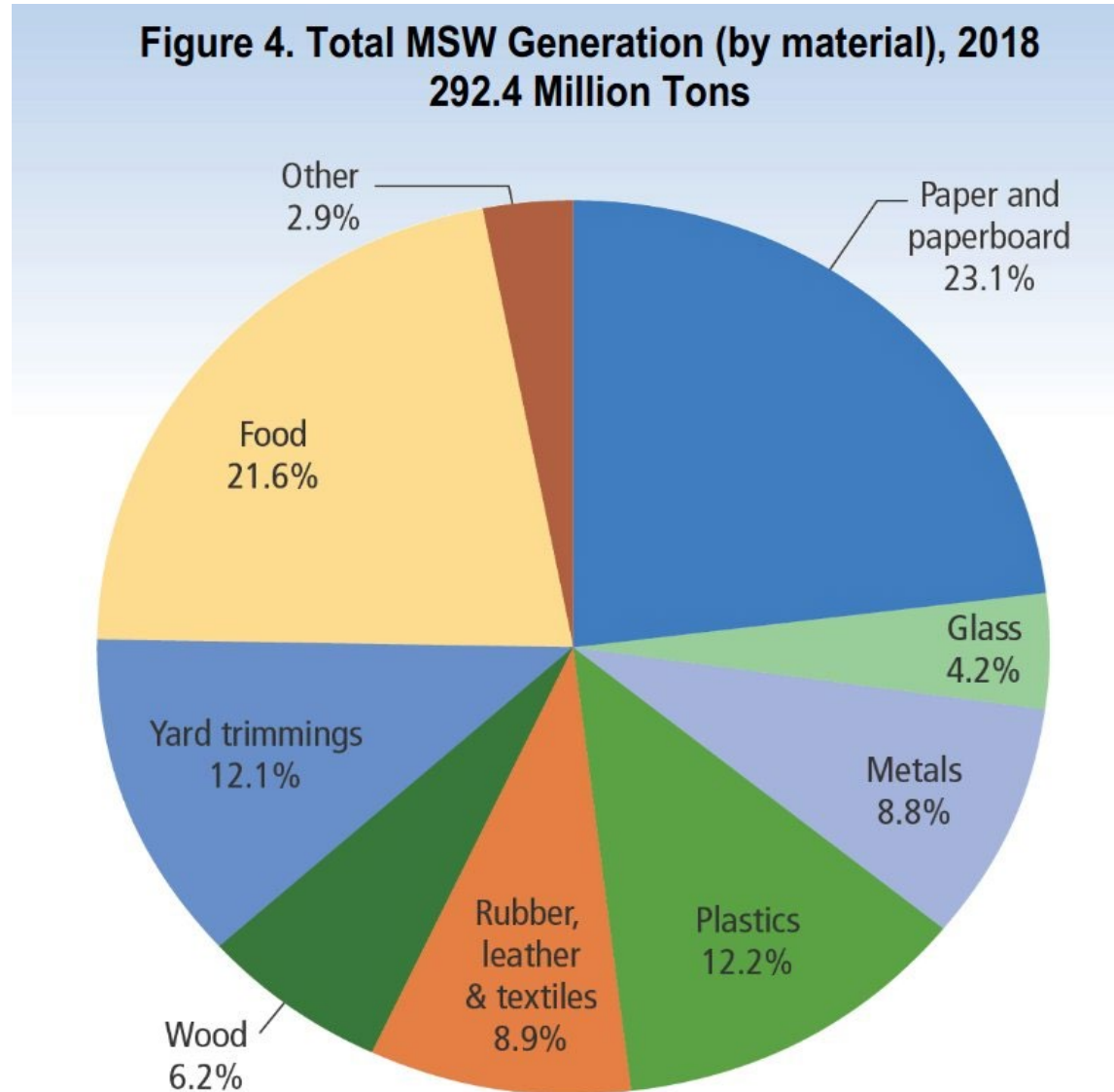
Overview

- Benefits of Composting
- Making Compost
- Composting with Worms
- Compost Tea

Benefits of Composting

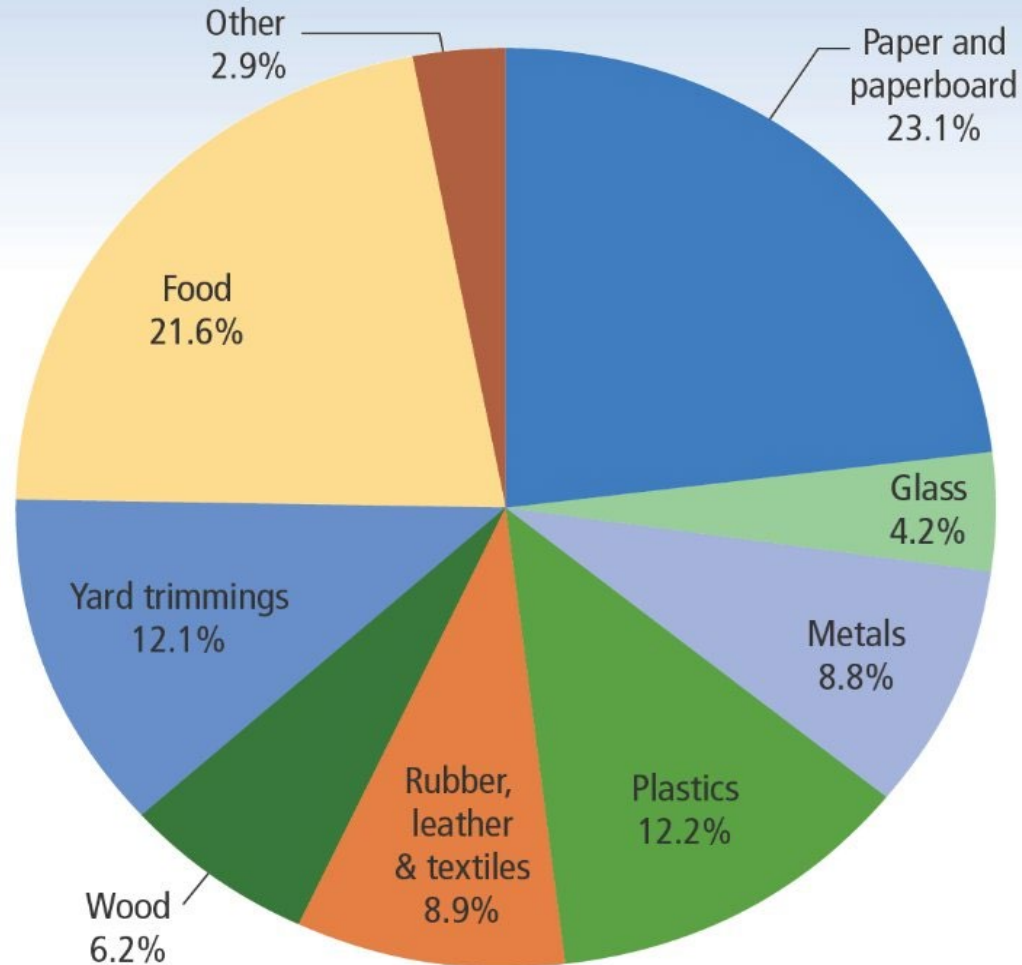
- Environmental
- Poor Soil Conditions
- Mostly comes down to \$\$\$\$

Benefits of Composting



Benefits of Composting

Figure 4. Total MSW Generation (by material), 2018
292.4 Million Tons



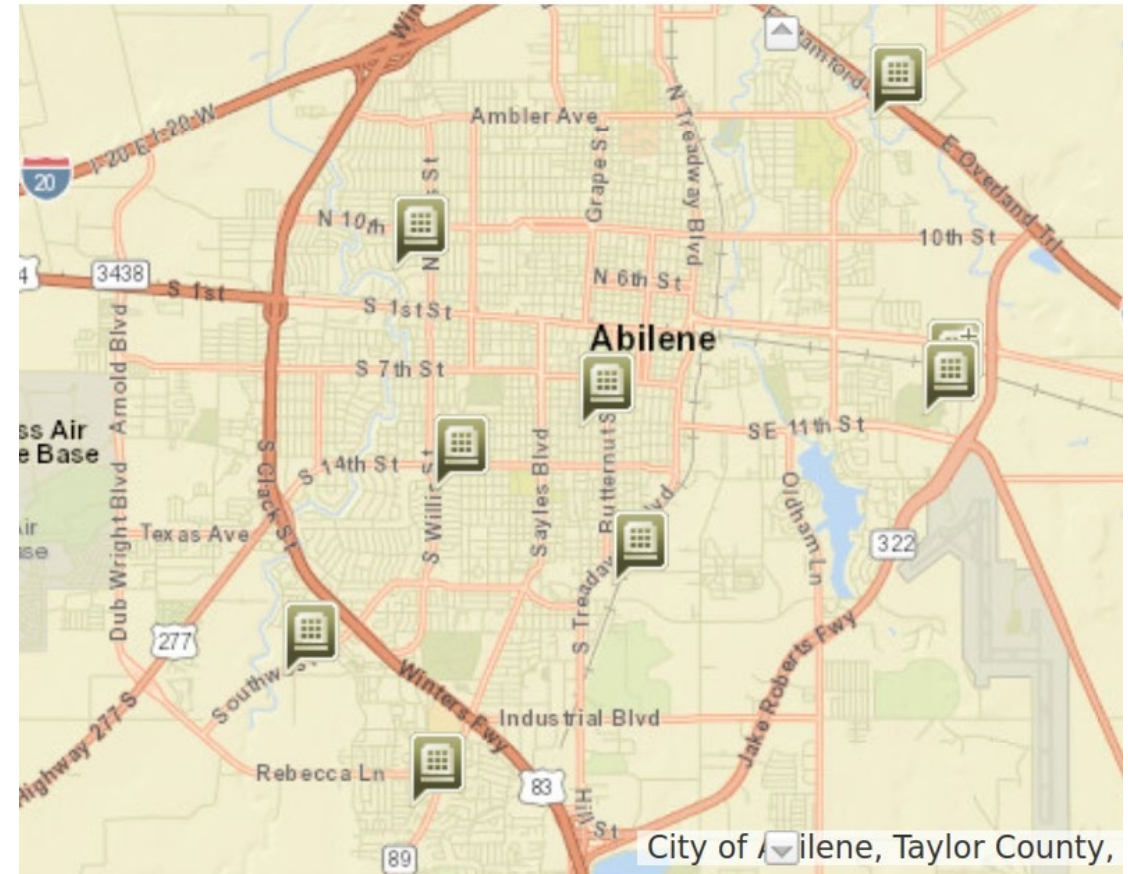
63% is
Compostable

Abilene Landfills

- Two Landfills
 - Republic
 - AEL
- Privately Owned

Abilene Recycling Efforts

- Neighborhood Recycling Centers



Abilene Recycling Efforts

- 2209 Oak St
- For non-household waste

DON'T TRASH YOUR COMMUNITY
DISPOSE YOUR ITEMS AT THESE LOCATIONS

ERC
Environmental Recycling Center

☎ 325.672.2209
📍 2209 Oak St.
Abilene, TX 79602

WE ACCEPT		WE DON'T ACCEPT	
Aluminum	Antifreeze	Concrete	Paper
Cardboard	Batteries	Glass	Plastics
Chemicals	Appliances	FREE SERVICE FOR RESIDENTS ONLY! NO COMMERCIAL DROP OFF ACCEPTED.	
Oils & Filters	Tires (FEES APPLY)	ALSO LOCATED HERE	
Paint		TEACHER RECYCLE LOCKER FREE CRAFT ITEMS FOR KIDS & TEACHERS	
HOURS TUESDAY - FRIDAY 8AM - 4PM SATURDAY 8AM - 12PM SUNDAY & MONDAY CLOSED		RECYCLING RE-STORE FREE PAINT & SUPPLIES FOR THE COMMUNITY	



 **MORE INFORMATION** • 325.672.2209 • abilenetx.gov/solidwaste

Abilene Recycling Efforts

- 2149 Sandy St
- Bulky items

DON'T TRASH YOUR COMMUNITY
DISPOSE YOUR ITEMS AT THESE LOCATIONS

CCS
Citizens Convenience Station

☎ 325.677.2149
📍 2149 Sandy St.
Abilene, TX 79601

WE ACCEPT		WE DON'T ACCEPT
Mattresses	Carpet Rolls	Construction Waste
Couches	Bulky Items	Putrescible Waste (Food, Paper)
Furniture	TVs	Tires <small>THESE ARE ACCEPTED AT THE ERC</small>
Wood Fencing	Electronics	
<small>SOME RESTRICTIONS/LIMITS APPLY</small>		

FREE SERVICE FOR RESIDENTS ONLY!
DRIVER'S LICENSE & CURRENT
CITY OF ABILENE WATER BILL REQUIRED.
NO COMMERCIAL DROP OFF ACCEPTED.

HOURS
MONDAY - FRIDAY 8AM - 4PM
SATURDAY 8AM - 3PM
SUNDAY CLOSED



 **MORE INFORMATION** • 325.677.2149 • abilenetx.gov/solidwaste

Abilene Recycling Efforts

- 2149 Sandy St
- Yard Waste
- Free and reduced cost Mulch

DON'T TRASH YOUR COMMUNITY
DISPOSE YOUR ITEMS AT THESE LOCATIONS

ABC
Abilene Brush Center

325.677.2149
2149 Sandy St.
Abilene, TX 79601

WE ACCEPT

Brush Yard Waste

WE DON'T ACCEPT

Larger Tree Trunks
Root Systems

PURCHASE MULCH HERE

Regular Mulch
Self-Loaded by Resident: Free
Loaded by City Staff: \$5/yard

Premium Mulch
Self-Loaded by Resident: \$7/yard
Loaded by City Staff: \$7/yard
DELIVERY AVAILABLE AT AN ADDITIONAL CHARGE

HOURS

MONDAY - FRIDAY 8AM - 4PM
SATURDAY 8AM - 3PM
SUNDAY CLOSED

FREE SERVICE FOR RESIDENTS ONLY!
DRIVER'S LICENSE & CURRENT
CITY OF ABILENE WATER BILL REQUIRED.
FEES APPLY FOR COMMERCIAL ACCOUNTS.



CITY OF ABILENE TEXAS

MORE INFORMATION • 325.677.2149 • abilenetx.gov/solidwaste

Poor Soil Quality

- Clay Soils
 - Breaks up soil
 - Allows for drainage
- Sandy Soils
 - Binds soil
 - Allows for moisture retention

Poor Soil Quality

- Adjusts Soil pH
- Improves Soil Environment

Benefits of Home Composting

- Recycles organic material on site: leaves, yard trimmings, kitchen scraps, paper products
- Natural recycling of plant nutrients

Benefits of Home Composting

- Poor garden soils benefit from added organic matter. Humus absorbs & releases water.
- Economical: decreases water & fertilizer use

Benefits of Home Composting

- \$\$\$\$
- Bags from Box stores:
 - Compost - \$172 / yd³
 - Soil - \$164 / yd³
- Bulk - \$80 / yd³
 - Composted Topsoil

Overview of How to Compost

- Science and art of Composting
- Composting formula & general requirements
 - What to add; leave out
- Methods of Composting
 - Hot
 - Cold
- Composting organization
- Particulars of composting in the Big Country
- Soil amending

Home Composting Literature

- Most often written by authors who do not live in the desert. Sometimes their advice is not appropriate for desert dwellers.
- Often does not clearly distinguish between hot and cold composting methods thus causing confusion about organizing & turning compost.
- Confusion about C:N ratio.

Controversial Ideas

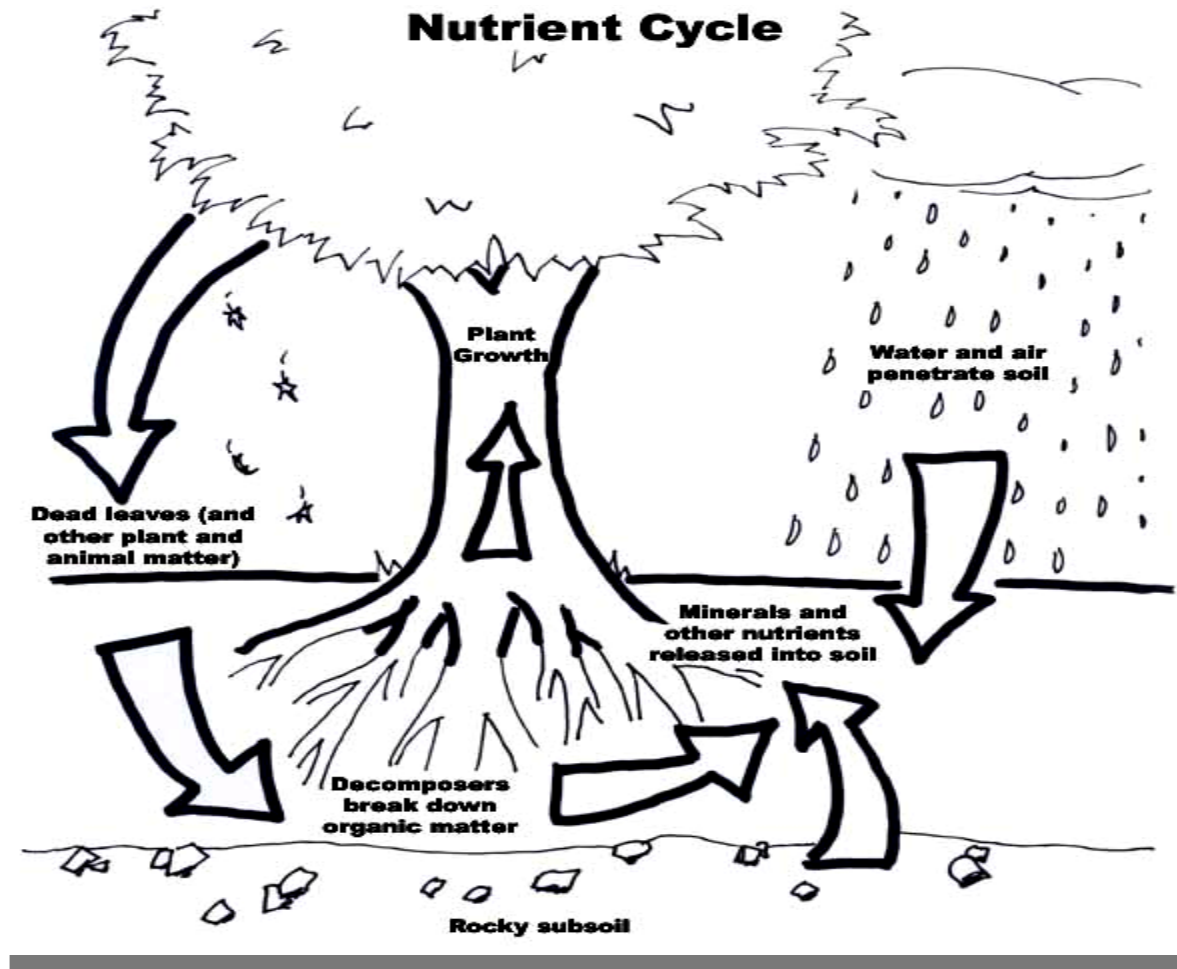
- All composting operations:
 - Need to be turned,
 - Generate appreciable heat,
 - Have an unpleasant odor,
 - Have to have soil added,
 - Need a bacterial inoculant to get them started,
 - Have a rigid set of rules to be followed and
 - Take a lot of time and effort.

Home Composting

- Is science based.
- Practiced by many so there are anecdotal reports and opinions – the art of composting
- Practice the science and you will establish your own working style (Art) and recipes.
- It is experiential ! Do it, to learn it.



Plant Nutrient Recycling



What is Composting?

- The intentional organization of organic material so as to support / enhance decomposition.



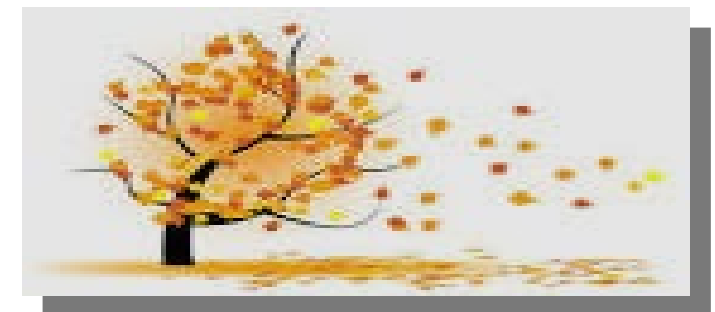
Aerobic Decomposition

- The transformation of organic material by bacteria, fungi and molds which occurs in the presence of air and water.
- End Result is HUMUS - carbon, nitrogen & nutrients.
- Finished compost is composed of
 - humus, soluble nutrients and
 - microbes- alive, dormant & dead.



Organic Material

- Anything that was once alive – plant & animal will decompose.
- Dead organic material often drops to the soil where it eventually decomposes, but not so easily in desert environment
- So we can assist the decomposition process by organizing organic material in a composting operation.



Formula - aerobic decomposition

- Organic material + Air + Water + Time = Humus
- Added considerations - interdependent variables :
 - Time
 - Temperature
 - Moisture
 - Aeration
 - C:N ratio
 - Ingredient size
 - Insects & possibly red worms



Brown & Green Organic Material

- Browns: usually have a lots of carbon which provides microbial nutrition. Often hydrophobic. Alone they decompose slowly.
- Greens: usually have more nitrogen which provides microbial nutrition and protein for cell wall formation > reproduction ! Added to browns they improve the decomposition process.

Mixing Greens & Browns

- Ideal mix approximation:
- 2 parts brown to 1 part green, by weight >
- 2 lbs. brown to 1 lb. green
- This combo will get the operation in the C:N range of 30:1
- This becomes important in hot composting methods.
- For more precision use a compost mix calculator found at nmcomposters.org

Brown (carbon) Additions

- Dried – leaves, plants, grass, yard trimmings
- Pine needles, cones, straw, hay, nut shells
- Paper – shredded, cardboard, napkins, tissue, paper towel, newspaper, etc.

Brown Additions

- Dryer lint, vacuum bag contents, cork, leather
- Natural textiles: cotton, wool, silk, felt, burlap
- Untreated wood products: chips, bark, shavings, dust, tooth picks, match sticks, twigs, sticks, pencil shavings

Green (nitrogen) Additions

- Green leaves, grass, flowers, weeds without seeds. Fresh yard trimmings.
- Fruit & veg. pulp & scraps, pits
- Coffee grounds & filters, tea & bags
- Grains & cereals, egg shells, left over food & beverages.
- Hair, whiskers, fur, feathers
- Beer & wine making leftovers
- Dry (stale) dog food



Green Additions

- Vegetarian animal manure- horse, cow, rabbit, goat, chicken
- Bone & blood meal,
- Alfalfa pellets & meal
- Fish meal & emulsion
- Urine



Avoid Adding

- Diseased plants, weeds with seeds.
- Wood ash (inorganic) small amounts OK
- Meat, fish, dairy – small amounts OK
- Oils, butter, margarine, lard, nut butters, mayonnaise- small amounts OK

Avoid

- Non organics: plastic, metal, glass
- Chemically treated wood & charcoal products
- All the “ - cides “ herbicides, fungicides, etc.
- Dog, cat, pig, pet bird manure. Chicken & duck OK
- Glossy colored paper, waxed paper

Additions / Inoculants

- Not required – composter's choice
- Rationale: Increase microbial load to improve process or modify the end product.
- Historically soil was added.
- “ Compost Maker “ in garden stores
- Lime – NO – It is alkaline

15 Minute Intermission

Choice of Methods

- HOT: Specific intention to generate heat – turning required – time & labor intense.



- COLD: No intention to generate appreciable heat – many technique choices. May remain static. Easy. Common in nature.

Hot Composting Method Requirements

- The intention is to create heat in the operation.
- A batch method where all ingredients are mixed at the same time.
- The minimum size is a cubic yard, 3'x3'x3' up to 5'x5'x5'- this mass insulates generated heat.
- The batch must be turned & churned to provide oxygen & moisture for a high energy process- about every 7 -14 days

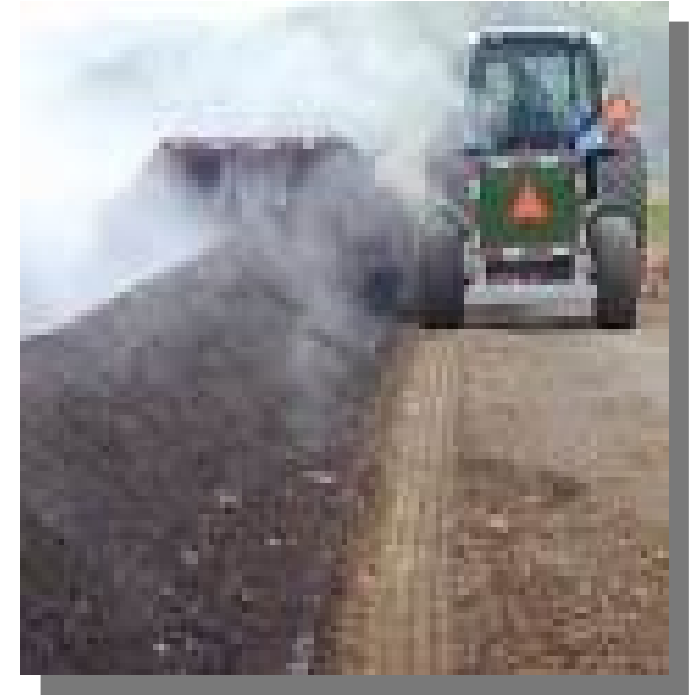
Hot Composting

- As the microorganisms proliferate, then produce enzymes which break the carbohydrate bonds heat energy is produced.
- Temperatures of 100 – 150F, which over time will destroy seeds and pathogens.

Hot Composting

- Process: 3 - 6 months depending on management.
- Often organized in a 2 - 3 bin system.
- A cold curing phase for 2 - 4 weeks after the hot.
- Pile will decrease to about $\frac{1}{2}$ original volume

Hot Composting



Large Scale
Windrows

Hot – 2 or 3 bin Set Up



Bin Minimum Size – Cubic Yard



Curing Hot Compost

- The end product of hot composting may be cured for 2 – 4 weeks after screening. Curing cold compost is a choice of the composter.
- Curing is a cold phase (fungal) which allows the actinomycetes to complete the humus formation process.
- Allows for for phytotoxic acids to dissipate.

Cold Composting

- Refers to all composting methods that do not generate appreciable heat. Often characterized by intermittent gradual additions to an operation rather than a batch. Common in nature.
- Examples: bins, piles, sheet, pit, trench & worm composting. 12 – 18 month process.
- There is no intention to create heat in the operation.
- May or may not be turned – Choice. May remain static.

Cold Composting Techniques

PIT



TRENCH



Static / Anaerobic

Bag & Wait



Cold, Anaerobic: 12-18 months



Blend & Bury Kitchen Scraps



Method Summary

- Hot piles need to be turned to aerate a high energy process in order to maintain the temp and blend feedstock.
- The intention is to create and retain heat which improves rate at which decomposition occurs.
- They are bulked as they are built.

- Cold piles do not need to be turned, they may remain static as long as bulking material is added regularly and 50% moisture maintained. It is a choice.
- There is no intention to create and retain heat. Decomposition

When is decomposition complete?

- Appearance – nearly everything transformed to humus. Can't identify original ingredients.
- No heat generation from hot method.
- Fragrance – “earthy”



Compost bins

- Organize and hold organic material.
- Neat appearance.
- Easy to add to and harvest from
- Facilitates moisture and airflow management
- Decreases animal and flying insect attraction

Bins for Desert Composting: Tape over some of the holes



Roller / Tumbler



Bins for desert composting



Cover the top of bin

Bales eventually decompose

- Size to suit your needs
- Cold or Hot



Large 3 bin system for hot composting – Corrales, NM

Straw bale enclosure - cover the top



New Zealand box

- Tight 3 bin system useful for cold/ hot composting method in the desert.



Low Porosity Desert Bins



Fence Wire Round Bin



Unlined = total evaporation

Lined wire round bin



Too Porous- Needs to be lined



Open Space Visitor Center ABQ

Too Porous for Desert



Construction Details



Coarse Bulking Material

- By decreasing compaction provides for air flow



Bulking in a Compost Pile:

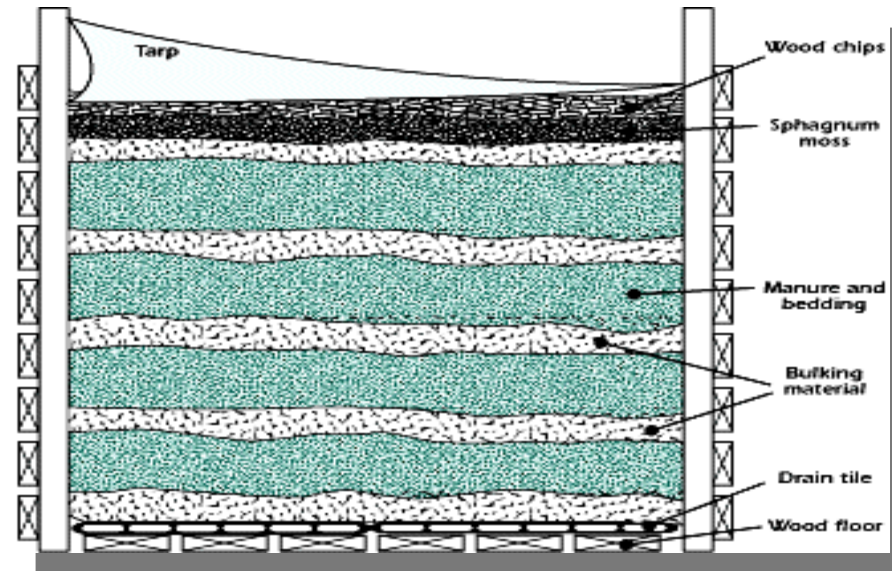
Decreases Compaction & Allows Air Flow

Cover the Top >>

More Bulking >>

Mixed Greens & Browns >>

Bulking: 12" at bottom >>



My Personal Pile



My Personal Pile



My Personal Pile



Managing air flow to decrease evaporation in the desert:

- Use a low porosity bin (container)- fewer air holes.
- The first addition is 10 – 12” of bulking material, then continue to add bulking as more material is added to the bin. This will decrease compaction and allow air flow to all layers.
- Always cover the top of the pile after each addition to decrease evaporation and flying insects.

Screening Compost: Recycle Bulking Material



Soil amending with compost

- Topical application, mulch
- Digging in
- Compost plugs
- Compost tea



Amending garden soil



1 cu. ft. of compost will cover 12 sq. ft. to a depth of 1"



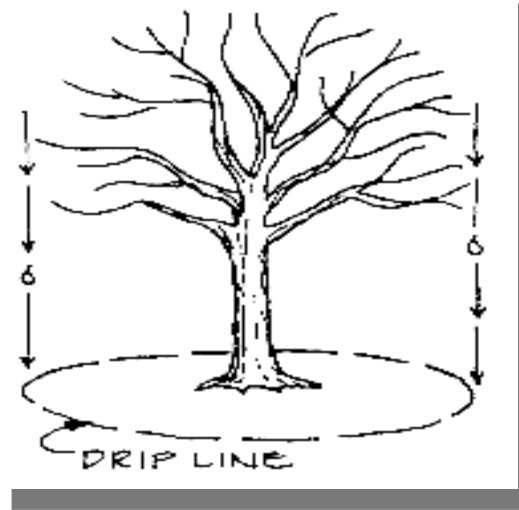
Amend Soil, Water, Then Mulch It



Compost “plugs”



Compost “plugs “ Into Dripline area

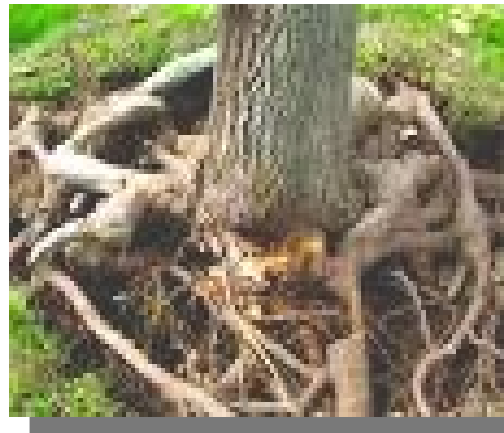


Tree & Shrub Planting

- Amend the top soil not the hole.



Girdled tree roots > >



Precautions

- Consider tetanus booster.
- Cover cuts / wounds. Wear gloves.
- Water sprinkle compost pile before turning.
- Mold allergy ? Wear a good quality mask.
- Scrub hands
- Wash garden produce



Fragrances in Composting

- Anaerobic areas in a pile will produce unpleasant smelling gases: hydrogen sulfide – putrescent (putrifaction)
- Avoid compaction of wet organic material by adding bulking materials regularly.
- 50% moisture is adequate. Too compact, too wet = unpleasant odor

Be Aware

- Broadleaf herbicides in animal feed will pass thru animals still intact. The herbicide in manures or on plants will persist thru the composting process. This has been called “killer compost”.
- It takes 3 years to biodegrade in the environment.
- Broadleaf herbicides: Imprelis, Picrolam, Aminopyralid, Clopyralid
- See summary information at nmcomposters.org - at bottom of

Be Aware

- Vermicides given to (some) animals. Their manure will be unhealthy for composting worms.
- Age manure in sun / air for 3 months before adding to worm composting operation.

Desert Composting Summary

- Use a low porosity bin / container which moderates air flow to manage evaporation.
- Place the bin on soil in the shade during hot months.
- Use coarse bulking material throughout the layers to avoid compaction and maintain air flow to all areas of the pile.
- Pre soak any dry material before adding.

Summary

- Chop, shred, cut materials before adding.
- Add greens to browns.
- Add water / sprinkle as necessary to maintain 50% moisture throughout the process. Sprinkle a pile before turning.
- Cover the top to reduce evaporation & flying insects.

15 Minute
Intermission

Vermiculture

- Basically worm farming
- Reasonably cheap
- Easy
- Can be done indoors



What are Worms

- Cold blooded invertebrates
- Breathe thru a mucous layer on the skin
- In nature they are shallow earth, leaf litter, manure
- They ingest decomposing organic matter > humus.



What are Worms

- They have no teeth and cannot bite.
- They are hermaphroditic
- Mature worms, ready to breed have a clitellum below the head.



Composting Worms

- Need correct type of worms
 - *Eisenia fetida* – Red Wiggler
 - *Eisenia andrei* – Red Tiger
- They are light red to maroon in color.
- Adults are 2 – 4” long.



Composting Worms Like:

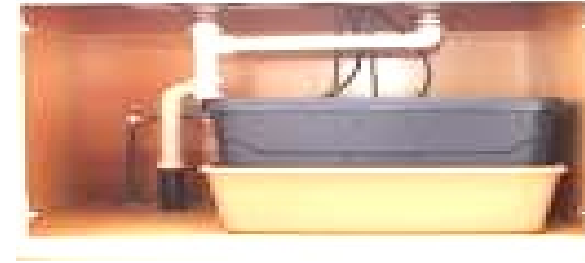
- Dark, moist (50-60%), aerated, quiet environment free of vibration.
- Temperature range for *ideal* performance about 50-85F in their bedding.
- To mate when environmental conditions are good: enough food, right temperature, moisture, population and a bedding temperature about 65F.
- To crawl out of containment if their environment is not acceptable: too hot, too wet, too dry, too acid, low food supply, overpopulation or too much vibration.

Bin Culture

- **Before getting composting worms decide where and how you will keep them.**
- **An indoor starter, opaque container should be 2'x2'x12" deep. Size the bin to your family needs.**
- **Put some drain holes in bottom of selected bin. Underline the bin with a tray.**

Indoor Locations

- Convenient
- Away from direct sun
- Moderate temperatures
- Away from vibration
- Garage, under sink, in closet, etc.



Small Bin Set Up



Bottom



Upper Sides

**A few small holes (1/4") are enough .
Cover side holes with screen material.**

Bin Culture

- **Prepare a bed on the inside bottom with 6” of shredded paper & leaves – moisturized to 50%.**
- **Add about 2 cups of worms to the top of the bedding. They will go down in a few minutes. Then cover the bin.**
- **Allow worms to acclimate for 7 - 14 days before feeding.**

Bin set up



Bedding: 4 - 6 " of shredded paper / leaves 50 % moist

Worms added to bedding



Cover & allow 7 -14 days for acclimation.

Feeding:

- Chop/cut all additions: fruit, vegetable scraps, coffee filters, tea bags, crushed egg shells, food leftovers, plant clippings, shredded paper/leaves.
- Avoid food pile up, as compacted wet matter may cause odors.
- Extra food ? Dehydrate, freeze or put in compost bin it. Add another bin.
- Add food to the top of bedding then cover with layers of newspaper, shredded paper/leaves.

Worm Nutrition-Additions

- Fruit & veg. peels & pulp, coffee & filters, tea & bags
- Grains & Cereals, leftovers, crumbs, pasta, rice
- Occasionally add $\frac{1}{4}$ cup of sand / crushed egg shell
- Shredded paper, towels, napkins, tissue, cardboard, egg cartons
- Egg shell – crushed or blended
- Dried grass clippings, shredded dry leaves, saw dust
- Manures (vegetarian) for outdoor bins

Chop up all additions



Feeding

- Scraps will begin to bacterially decompose & soften, so that worms can ingest them. They have no teeth.
- Leave out: meat, fish, dairy, grease, fats & oils.
- Caution with citrus, raw onion & broccoli.
- Avoid: chemicals, all the “- cides “, glass, metal, plastic

What you feed your worms is your choice.

- If they do not like something, they will avoid it.
- Observe & learn from your own experience.



Bin Environment:

- If bin becomes too wet: air it out, add dry shredded paper. Gently mix into bedding.
- Avoid standing liquid in a worm composting operation ! Bottom holes eventually get plugged.
- If bin becomes too dry: use a mist spray bottle to moisturize. Add moist scraps.
- Odors may be related to certain additions and /or compaction: avoid additions that cause offensive odors e.g. onion. Avoid over feeding. Gently stir the bedding to aerate it. Add dry material if bedding is too moist.

Using Your Black Gold

- Fertilizer

- Bait

Compost Tea

- Has been used for millennia.
- Minimal literature until 2000
- Water extraction of nutrients and microbes from finished compost and /or worm castings.



Compost Tea vs Compost Extract

- Extract is more concentrated nutrients.
- Not as many bacteria/microbes
- Can be too strong for foliar spraying
- More organic material

- Tea is super charged with microbial life
- Less organic material so can be used foliar spray

Making Compost Tea

- Will need the following
 - Compost
 - Agricultural Molasses
 - Burlap bag
 - Bucket
 - Air pump
 - Water



Compost Tea

- Add 4-5 cups of compost into the bag.
- 4-5 tbs of Molasses
- Place the bag in the bucket
- Ensure bag is submerged
- Turn on Aerator



Compost Tea

- Run Aerator for 24-72 hours
- Once brewed, strain/filter is using in a sprayer
- Use within 24 hours



Compost Tea

- Foliar spray can be used as a mild fungicide
 - Black Spot
 - Brown Spot in lawns
- Can be used to revive dead soil
- Fertilizer



QUESTIONS?

www.bcmgtx.org

Big Country Master Gardeners on Facebook

Big Country Master Gardeners on YouTube



TEXAS A&M
AGRILIFE
EXTENSION

