AGENDA

Understanding the value of waste-

Garbage Bag Activity-teaching through school

- Organic Materials - Why Compost
- Science and Practice of Composting

Composting Systems for Small to Medium Scale Composting

- Siting, Health and Environmental Effects
- Review with Jeopardy

Tools for Teaching Composting to Youth

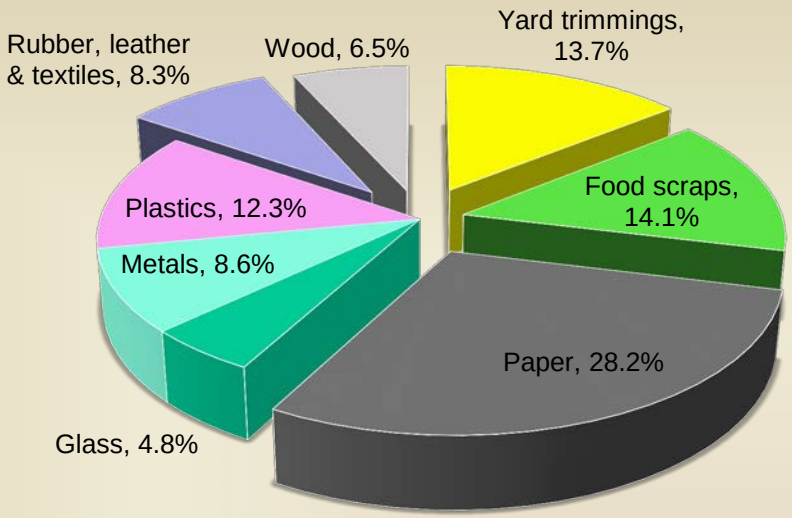
- Educational Materials/resources
- Teaching at different levels
- What is achievable
- Team planning

Multiple Goals

- Understand Waste Management Options
- Increase Knowledge of Organics Management
- Implement Composting into Everyday Life
- Set a Good Example with Method Implemented
- AND
- Teach Others About Composting

In other words: Start a Composting Revolution

US Waste Stream



Composting can also help solve our society's solid waste disposal problem. *Organic residuals can comprise over 60% of our solid wastes nationwide.

*USEPA Municipal Solid Waste in the US: Facts and Figures 2009.

Composting..How it All Works

"…because rinds, limbs, manure, leaves, garden cleanout, etc...are Terrible Things to Waste!!"

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The Process of Composting

Composting converts organic waste such as leaves, kitchen scraps and garden wastes….

into a valuable product which, when used in the garden, results in healthier plant growth when added to garden soil.

How the Composting Process Works

1. Organisms involved in the composting process
2. Variable components in the composting process
3. Types of materials (feedstocks) that can be composted
4. Home composting systems
5. Uses of compost

Why Compost?

TO……..

- Manage organic waste
- Reduce the yuk factor of organics
- Convert organics into a soil like product
- Holds moisture in the soil during dry seasons
- Helps to suppress plant disease
- Improves soil quality
- Healthy Soil = Healthy Food

Think About Residuals Available to Compost

- Food scraps
- Food processing
- Leaf and yard waste
- Garden residuals
- Manure
- Weeds

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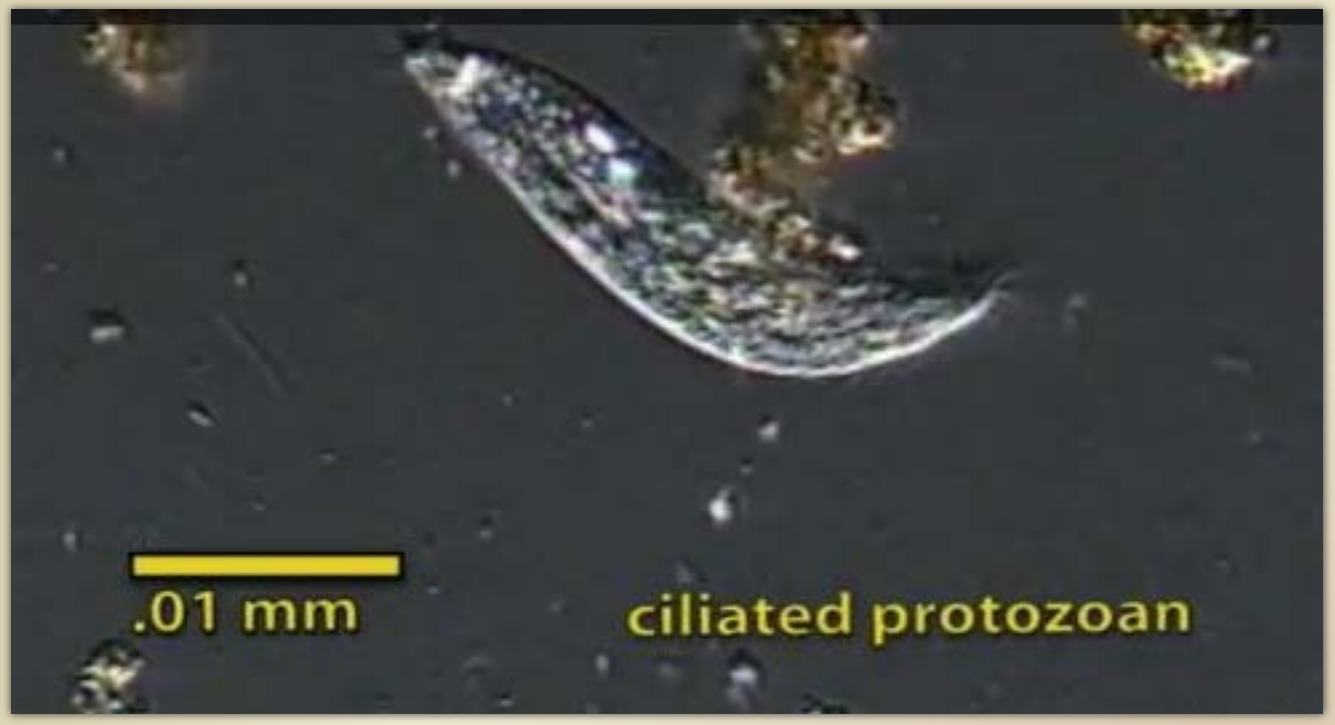
I. Organisms Involved in the Compost Process

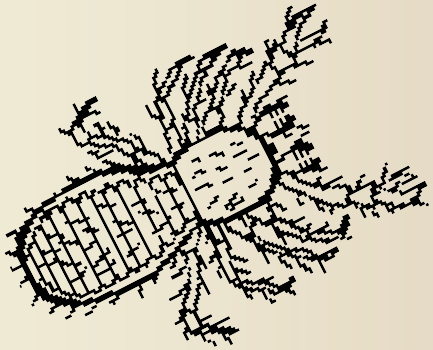


Source: Vermicompost: A Living Soil Amendment video by Allison Jack

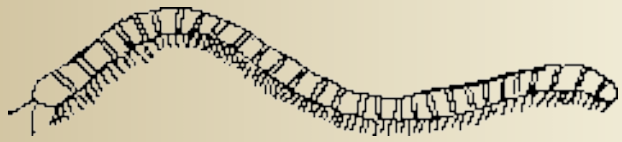
Springtails

Mites

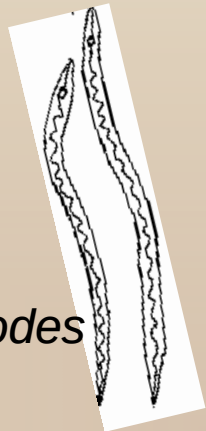
All decomposers are bound together in a complex feeding web. They turn organic wastes into a beneficial soil conditioner.



Spiders



Earthworms



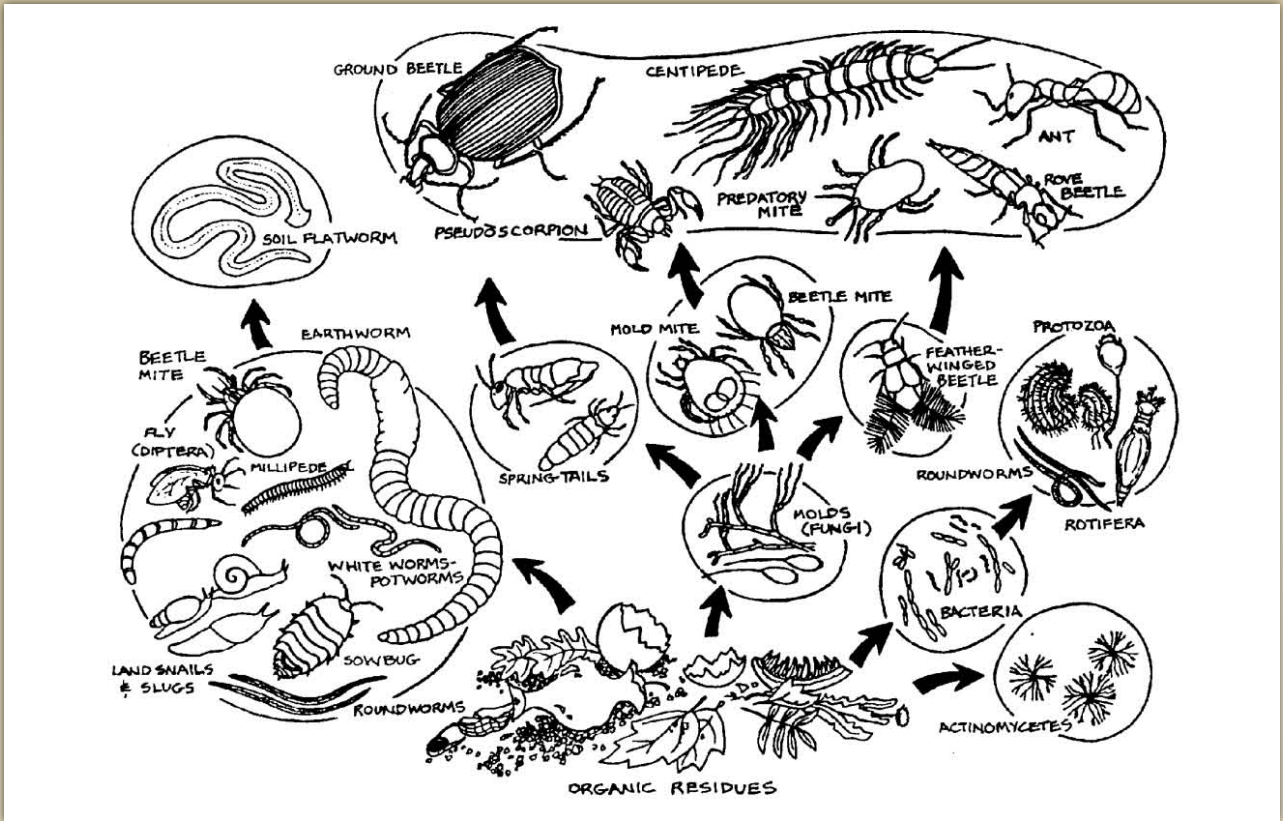
Nematodes

What Makes the Compost Process Work?

Micro and macro organisms are key….

They require

1. **Food**
2. **Shelter**
3. **Moisture**



Composting is a microbiological process. Organisms use decaying matter as their food source. Bacteria are among the simplest and most common organisms. Single-celled and microscopic, they are found almost everywhere in the environment.

Fungi and molds are also important. This *Meripilus giganteus* (giant polypore fungi) appears on stumps and at the base of some living broad-leaved trees.

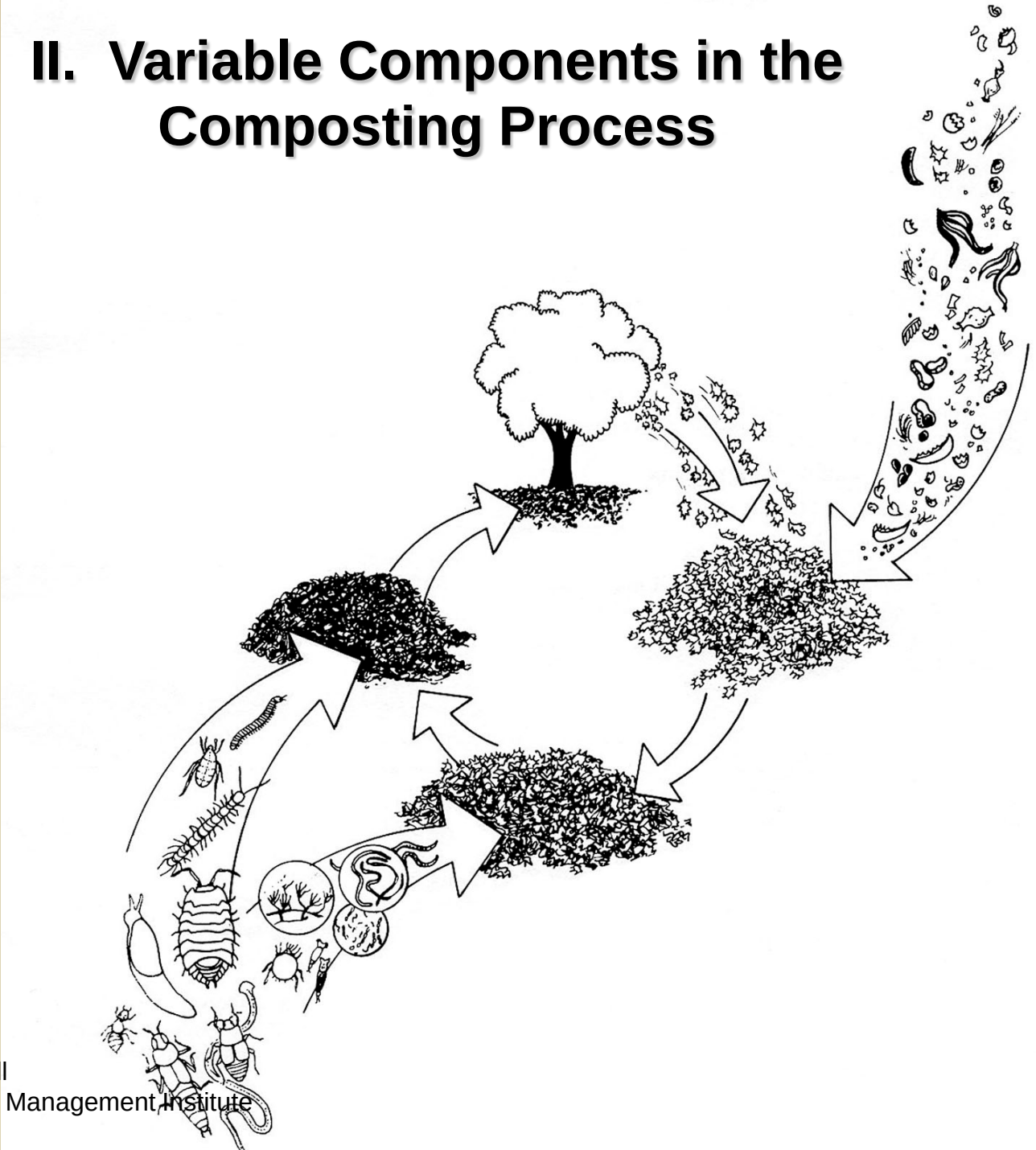
Q. Are bacterial inoculants required for composting?

No, Bacteria reproduce very quickly and are naturally present in air and soil, so there is usually no need to add them to the compost pile. Of the many inoculants, or compost starters available, the best is freshly made compost.

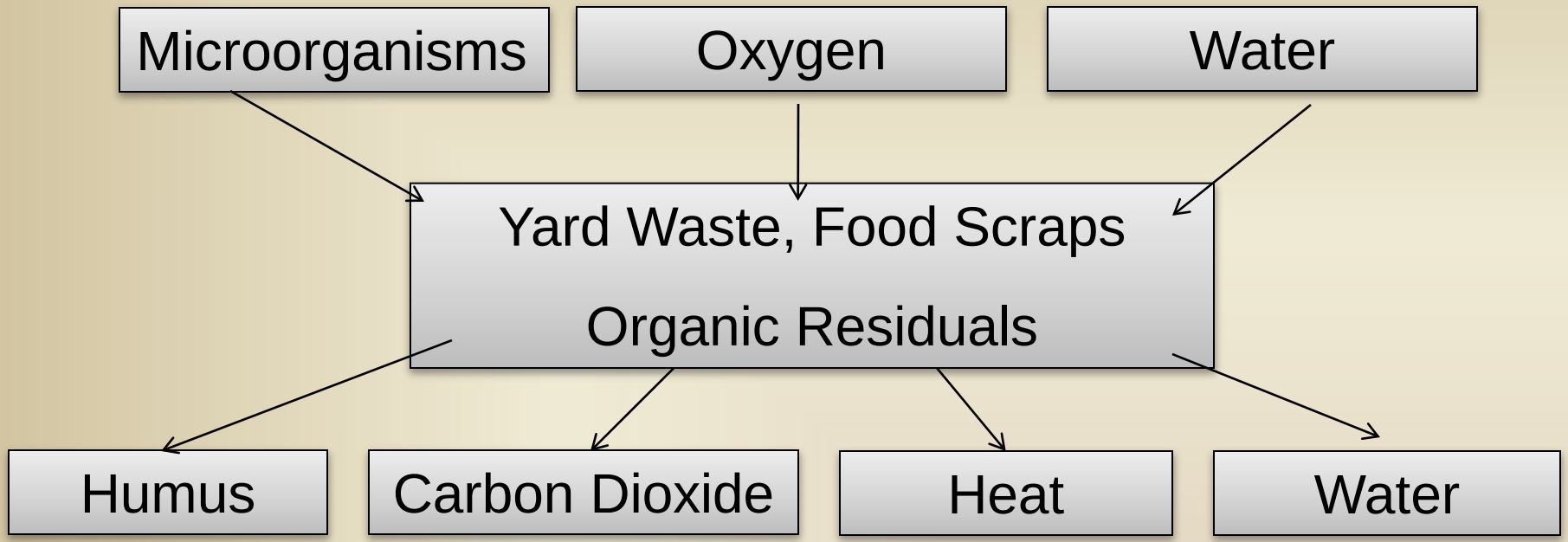
Mites and other soil invertebrates feed on bacteria and fungi, helping to keep their populations in check. Competition among the different organisms insures that only the most efficient decomposers multiply.

Earthworms are perhaps the most familiar decomposer. By blending soil and organic matter in their digestive track, they produce stable, nutrient-rich aggregates (worm castings) that improve the structure of soil.

II. Variable Components in the Composting Process

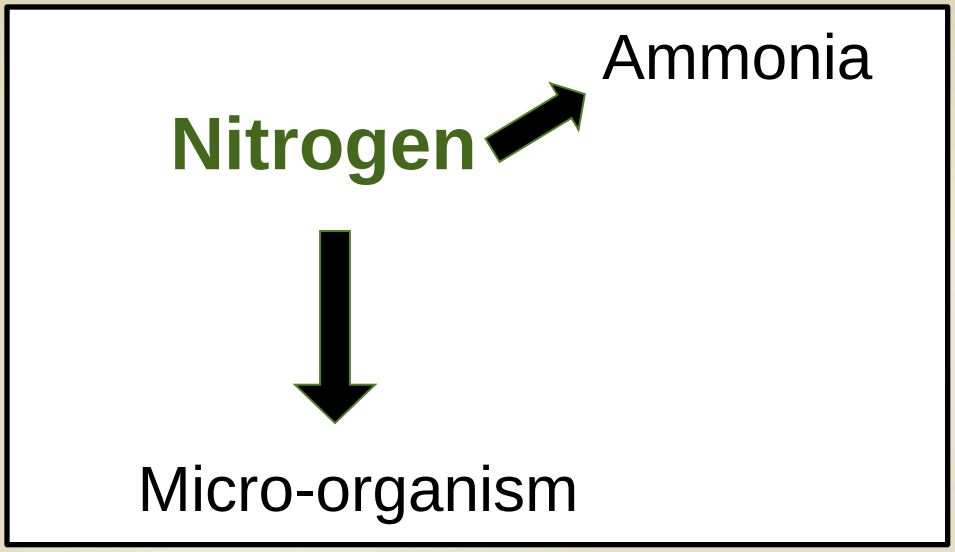


The Composting Process



While the natural process of decomposition will occur without any assistance from us, several factors can be managed to accelerate the compost process.

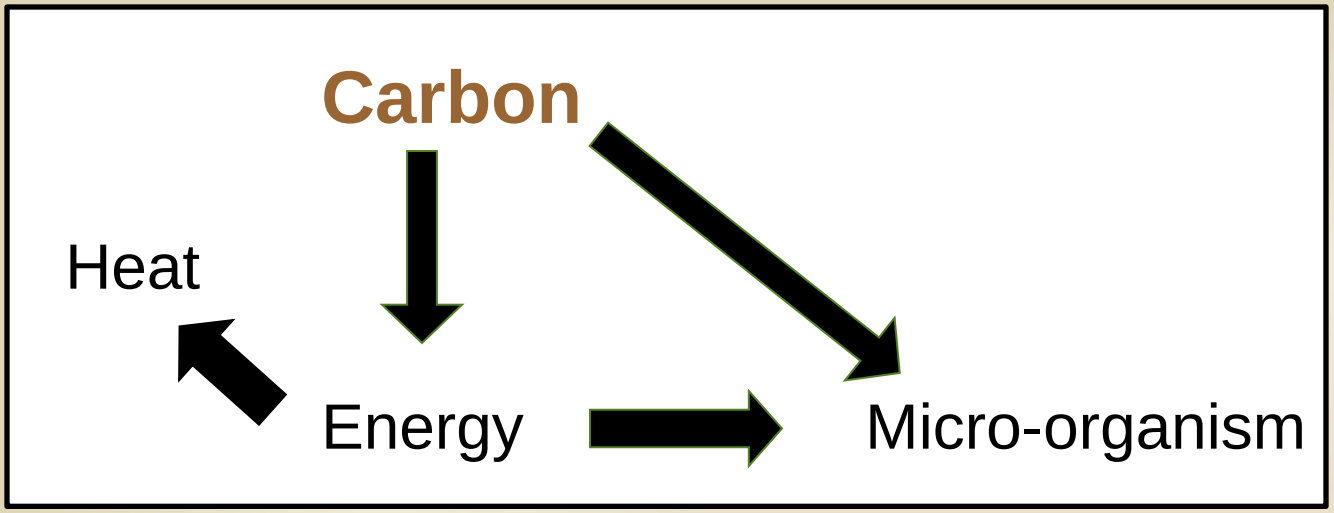
Nitrogen Cycle



Organisms use nitrogen to grow and reproduce.

Low nitrogen = slow decomposition
Excess nitrogen = ammonia will volatilize, creating odor

Carbon Cycle



Organisms utilize carbon as a source of energy.

Low carbon = wet pile, dense conditions
Excess carbon = dry pile, slow decomposition

Materials With High Nitrogen Value

Material	C:N
Humus	10:1
Food Wastes	15:1
Grass Clippings	20:1
Cow Manure	20:1
Horse Manure	25:1

The optimum C:N ratio is about 30 to 1. This ratio will make fast, hot compost. Grass, animal manures and fresh green plants are high in nitrogen.

Materials With High Carbon Value

Material	C:N
Fruit Wastes	35:1
Foliage	40-80:1
Corn Stalks	60:1
Straw	80:1
Bark	100-130:1
Paper	170:1
Sawdust	500:1
Wood	700:1

Leaves, brush, sawdust and wood chips are good sources of carbon. Blending carbon sources with nitrogen-rich materials can balance C:N ratio.

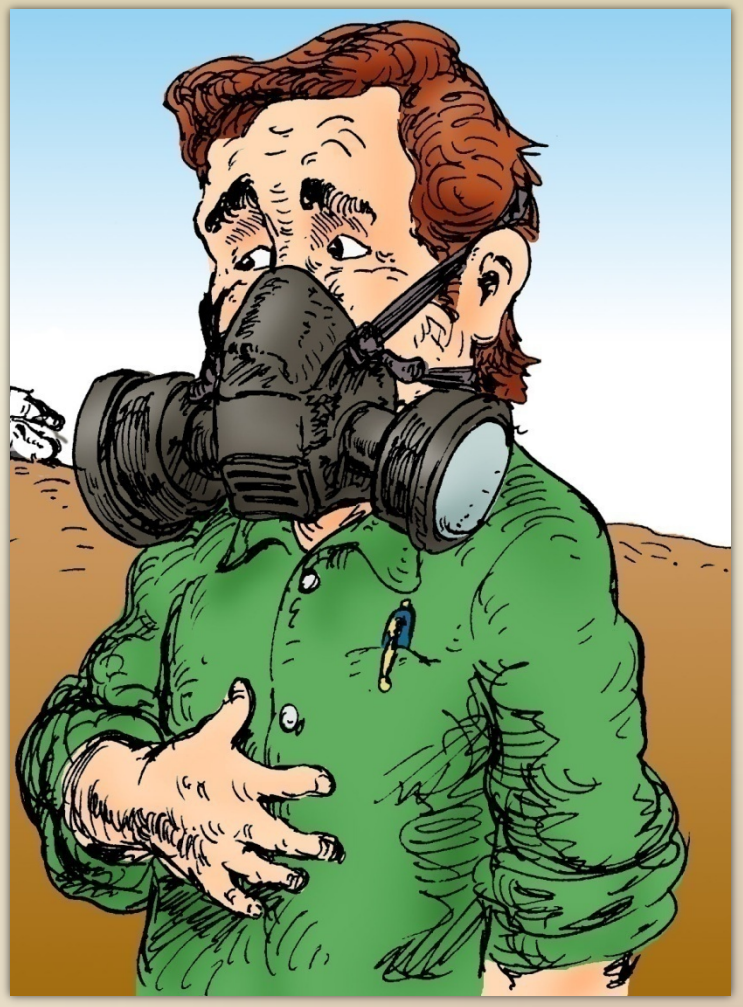
Surface area is another key factor to consider; decomposition occurs in thin films on the surface of particles. A large particle has less total surface area than the same particle chopped up.

*Large particles (woodchips) = better aeration and less labor but take longer to breakdown.

*Small particles (sawdust) = more surface area, less pore space to circulate air and more labor to aerate.

Organisms need moisture. Decomposition will slow with too much or too little moisture. The optimum moisture content for compost is 40-60%, damp enough so that a handful feels moist to the touch, but dry enough that a hard squeeze produces no more than a drop or two of liquid.

Aerobic organisms require oxygen to live. Their "aerobic" activity forms carbon dioxide and heat as by-products. If oxygen starved, the process can become "anaerobic."
IT STINKS!
The by-products of anaerobic decomposition include methane and hydrogen sulfide gas. Hydrogen sulfide smells like rotten eggs.



Oxygen will move into the pile if it is loose and there is plenty of space between particles, as when straw is mixed in the pile. Finer material may need to be aerated by turning the pile with a pitch fork or shovel. With the rapid decomposition that occurs with high nitrogen materials, turning becomes necessary to prevent anaerobic conditions from developing.

Heat will be given off as organisms feed on wastes and break them down into less complex molecules. Ideal temperatures for composting are between 90º - 150ºF. High temperatures can help kill weed seeds and disease organisms, but temperatures above 150ºF will also kill the decomposers and slow the process.

Q. What Creates the Heat in a Compost Pile?

- Sun?
- Fire?
- Heat source?
- Bacteria?
- Microbes?
- Worms?

A. What Creates the Heat in a Compost Pile?

Sun

Fire

Heat source

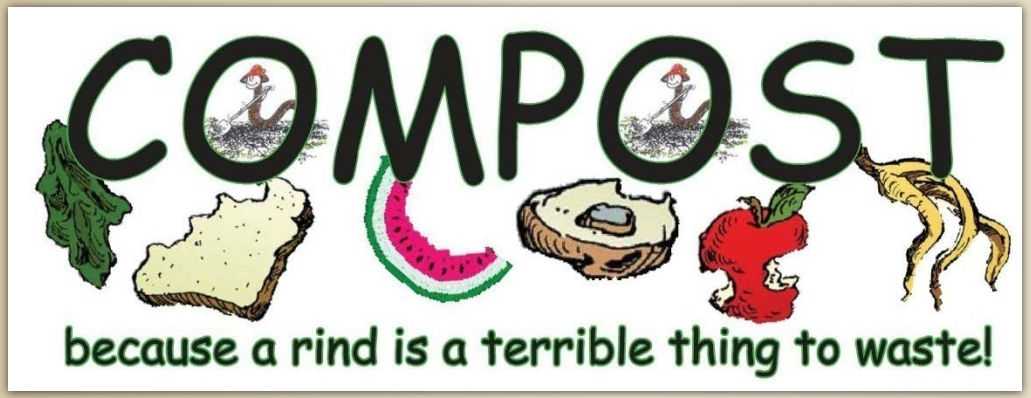
Bacteria

Microbes

Worms

Compost piles should be a minimum of one cubic yard in size. Smaller piles may not have enough mass to hold the heat of decomposition.

III. Materials (feedstocks) that can be Composted

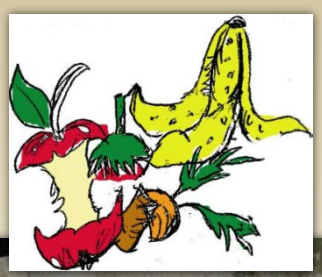


Feedstock

- Food waste
- Food processing
- Manure
- Leaf and yard waste
- Vineyard residuals
- Biosolids
- Fish waste
- Lake weeds

Organics = 60% or more of our waste stream

Feedstock



- Food waste
- Food processing
- Manure
- Weeds
- Garden residuals
- Leaves
- Yard waste
- Pond weeds

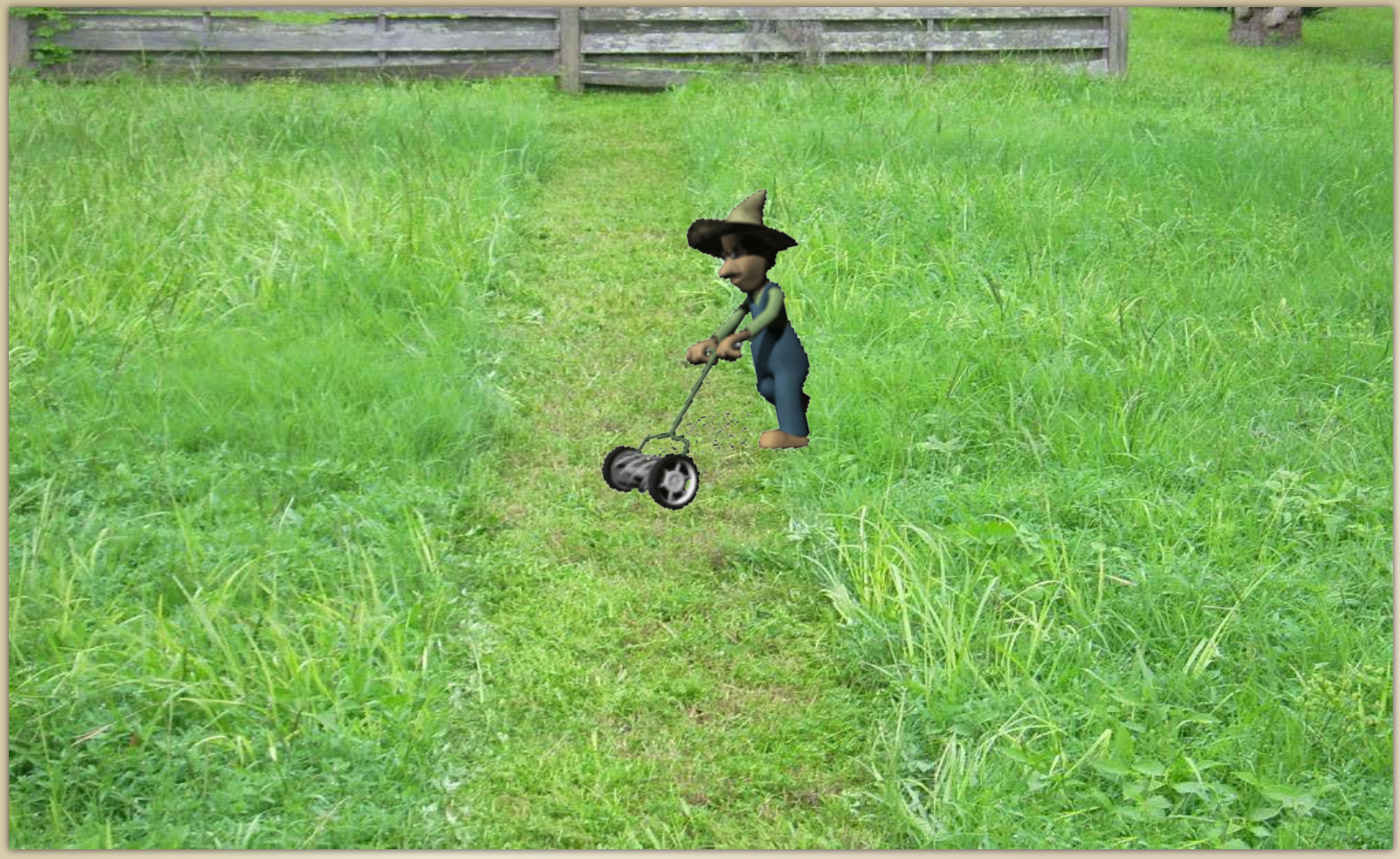
Almost any type of organic material can be composted; some decompose more easily than others.

Maple leaves have a C:N ratio near the optimum level of 30:1. With the right moisture and frequent turning, maple leaves can break down in just a few weeks time.

Oak leaves have a C:N ratio of about 60:1 and have high levels of tannins which are resistant to decay. Mixing leaves with high nitrogen material will accelerate their decomposition.

Wood Chips

1. Have a high C:N ratio, large particle size, and break down relatively slowly.
2. Are used in landscaping composting process.
3. Are often available free from tree services and utility companies for use as mulch.
4. Using chip or chunky material in any pile will help airflow and require less turning.



Leave’em on the lawn! They decompose and return nutrients and organic matter to the soil. Clippings will not contribute to thatch buildup.

Fresh grass clippings are high in nitrogen, about 20:1. They are too wet and will mat, creating unpleasant anaerobic odors. They will compost well when mixed with a carbon source such as leaves or brush.

Coarse material, such as brush, small tree and shrub limbs, can also be composted. Shredding increases the surface area that organisms can work, decreasing the time required for composting.

Clippings from home lawns treated with pesticides may contain chemical residues. With few exceptions, these residues will not persist from one growing season to the next. If the type and level of pesticide used is unknown, those materials should not be added to the compost pile.

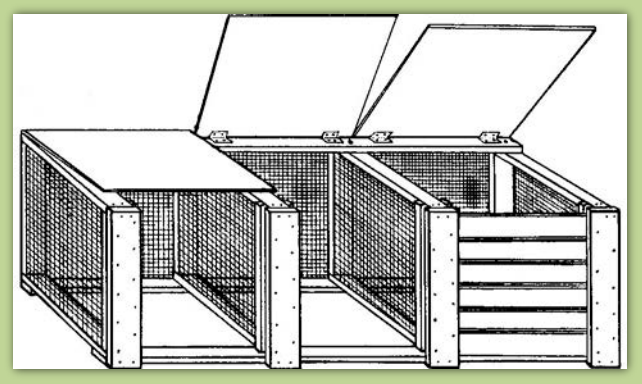
Food scraps can be composted at home. Dairy and meat products should not be composted in small piles, they attract your pets, rodents and other pests.

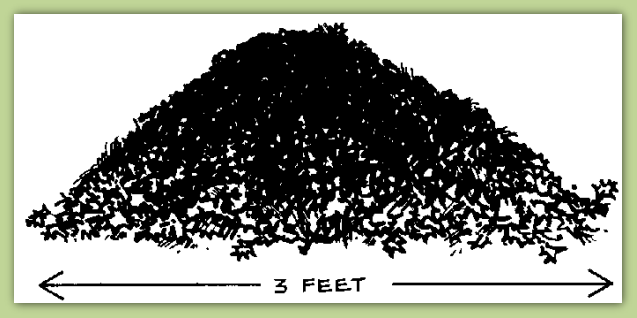
Manures are high in nitrogen and contain many organisms helpful to the compost process. While livestock manure is a great feedstock, dog and cat feces may contain parasites which can spread disease.

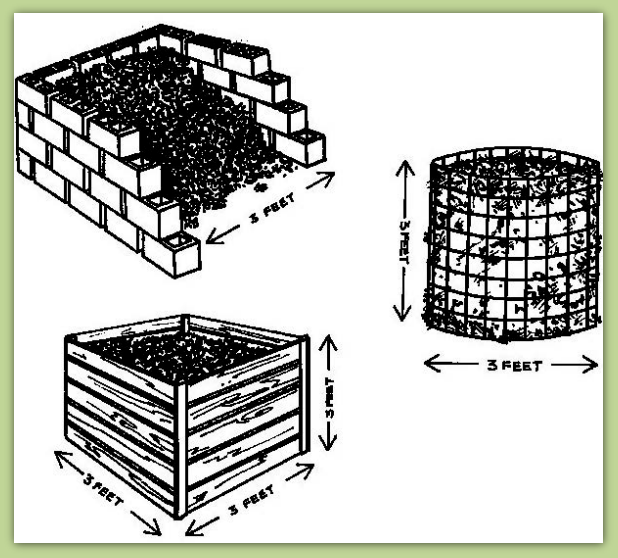
Which System Works Where?

- Space available - neighbors
- Containment or not
- Time and energy available
- Static, turned or vermi-compost
- Finances
- How putrescible (odiferous) is the waste

IV. Composting Systems

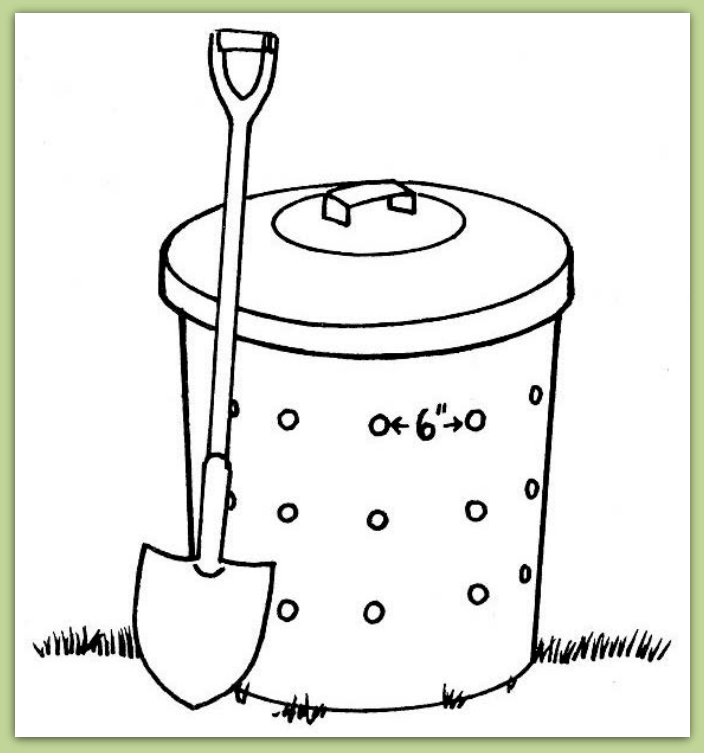






Many options are available for producing compost:

- Holding units
- Tuning units
- Direct incorporation of feedstock
- Rotating drums
- Vermicompost units



Single can composter used outside.

Two-can composter used inside.

Can composter units can be used for food or garden wastes.

A **wire holding unit** made from fencing or chicken wire. This bin works well for light materials like leaves.

Used **pallets** are often available for free from manufacturers. Tied or nailed together, they effectively contain compost in a stable structure.

Moving compost from bin-to-bin on a weekly basis makes rapid compost and provides considerable, strenuous exercise! The **turning unit** method is used to make compost quickly and is more suitable for food wastes. Compost is turned frequently to provide aeration.

Three bin **turning unit** with removable front boards.

Homemade **rotating drum.**

Rotating drums take some of the work out of turning, and are available from garden supply stores. Some units can represent considerable investment for the volume of material composted.

Direct incorporation, may be the easiest way to dispose of small amounts of organic waste by buying it in the garden or yard. Bury food waste at least 6-8” deep to keep animals from digging it up. Care should be taken not to damage the roots of nearby plants.

Mid-sized bins for institutions

St. John’s University - Rocket

Stonybrook – BW Organics Rotating Drum

Herikimer Community College – Earth bin

McGill University, Quebec, Canada – Big Hannah

McGill University, Quebec, Canada – Big Hannah

Mat and Naddie's Restaurant – home made worm bin

West Irondequoit Central School – Earth Bin

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West Irondequoit Central School – Earth Bin

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Hot Box

SUNY ESF – O2 Compost

Rotary Drum Composter

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Tractor Pulled Straddle Turner

Compost Covers

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Curing Windrows

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Vermi-Composting

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Health and Safety

At Home, in Schools and When Working With Kids

- Practice good hygiene
- Be aware of allergies, asthma, immune deficiencies
- Is in door or out door composting best for the situation
- Placement of the bin out side of school

How Do I Connect With Kids?

- Consider the school that you attended or one where the university is located
- Time of year
- Día del Planeta Tierra – Earth Day/Week
- Fairs/festivals
- Community gardens
- Youth or school gardens
- Clubs
- Science centers
- Zoos

V. Compost Uses

Recycling food and yard waste provides many benefits for soil and plant response. Compost supplies small amounts of nutrients but the organic matter significantly improves soil structure, allowing better drainage in heavy clay soils and improved water retention in light sandy soils.

Quality Issues

- Nutrients
- Organic matter
- Consistency in batches?
- Drugs

*Biosolids compost is regulated and tested

Compost Use

- Topsoil blends
- Container mix/potting soil
- Nursery beds
- Turf establishment
- Erosion control
- Tree and shrub backfill
- DOT use
- Vegetable crops

SOURCES: Rodale, USCC, and MSC

Benefits of Using Compost

1. Adds organic material.
2. Builds healthy soils where a diverse group of beneficial organism thrive.
3. Helps suppress disease.
4. Increases moisture holding capacity in soils.

Note: Immature compost should not be used for germinating seedlings and can affect the health of mature plants.

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Home composting provides households to convert waste material into a valuable soil amendment. The result is a healthier, more productive and easier to maintain garden. Composting at home reduces our carbon footprint because organics do not require trucking and it keeps a resource out of the landfill!


MINISINK SITE


January 2004

Overview of Erie Site

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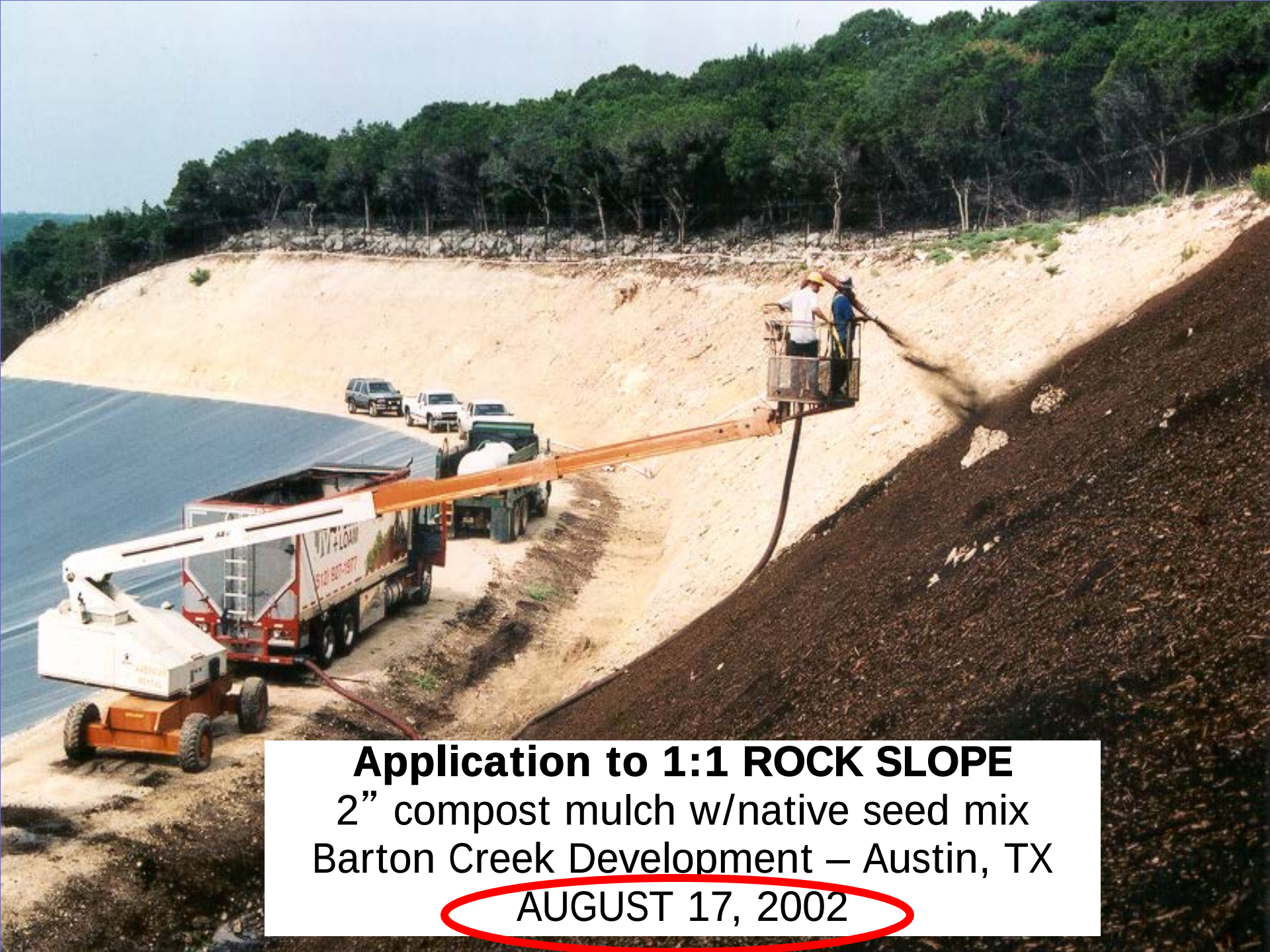
Grape Production

Hydro-seed with Road Kill Compost/Soil Mix



Application to 1:1 ROCK SLOPE

2” compost mulch w/native seed mix

Barton Creek Development – Austin, TX

AUGUST 17, 2002

8 MONTHS LATER
IRRIGATION INSTALLED, NEVER USED

West Cypress Hills on October 05, 2004. Before Compost Application


JAN 11 2005

Compost Socks


OCT 16 2003

Filter Tubes Installed for Storm Water Protection

Tree Establishment


3 years without amendment


3 years

Landscaping Project


CAUTION
CAUTION
YANMAR

http://cwmi.css.cornell.edu

Recycling Organics Makes Good Sense!

Healthy Soils =
Healthy Food!

http://cwmi.css.cornell.edu

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