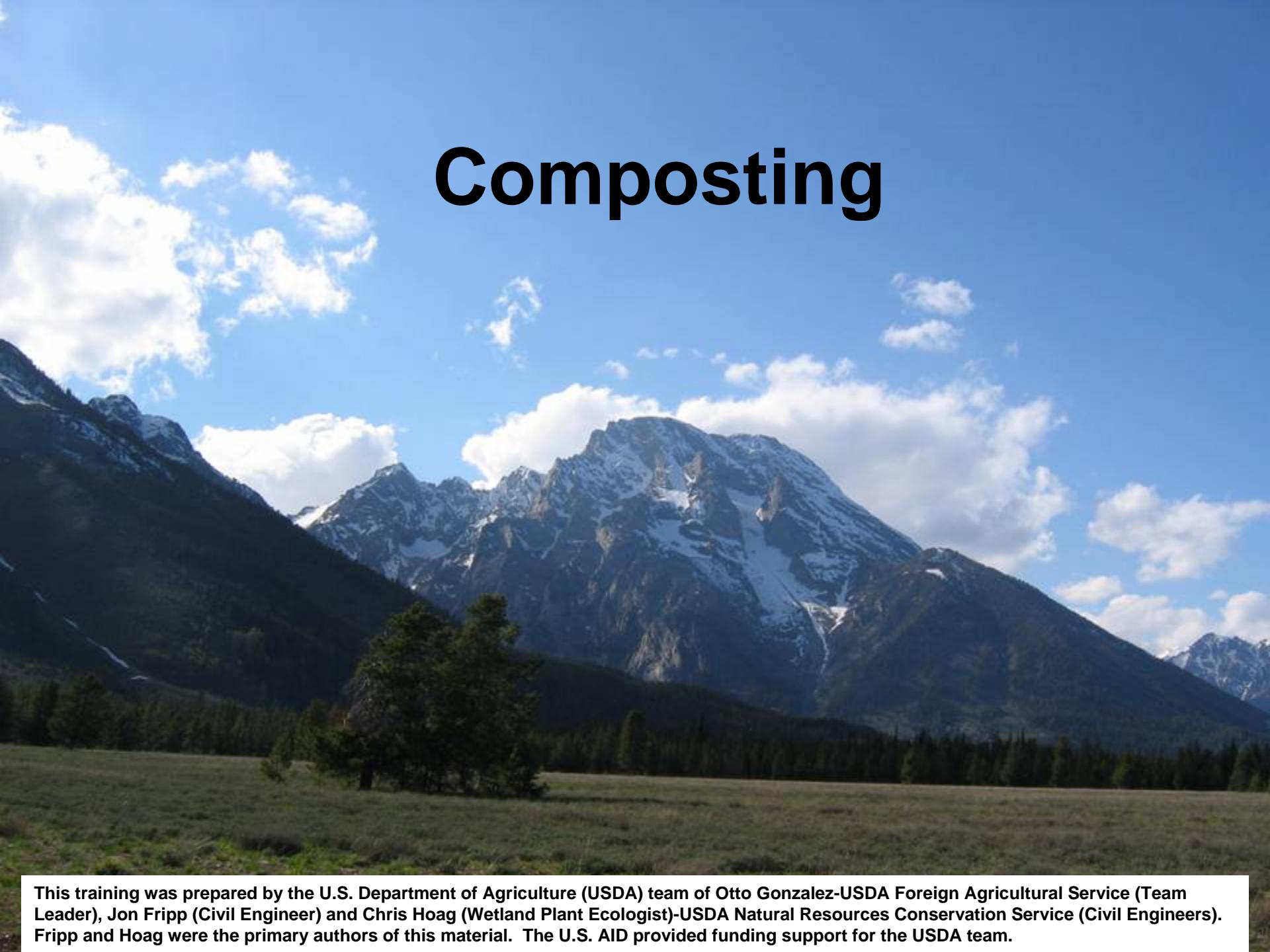


Composting



This training was prepared by the U.S. Department of Agriculture (USDA) team of Otto Gonzalez-USDA Foreign Agricultural Service (Team Leader), Jon Fripp (Civil Engineer) and Chris Hoag (Wetland Plant Ecologist)-USDA Natural Resources Conservation Service (Civil Engineers). Fripp and Hoag were the primary authors of this material. The U.S. AID provided funding support for the USDA team.

Composting turns organic waste into good soil



- Composting can be done in any zone.
- Composting is often done where there is excess organic waste and a need for soil that is healthier for plants

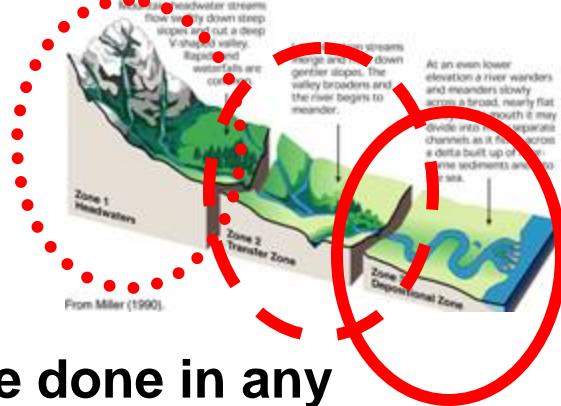


Photo from Cornell Waste Management Institute

Why would we want to compost?

- To make garden plants healthier
- To make good growing medium to start plants
- To make good soil for transplanting trees
- To handle excess organic waste



How does compost do these good things?

- It adds nutrients to the soil
- It can loosen clay soil so air can get in
- It can help sandy soil hold water
- It turns organic waste into good soil



Dead material will naturally rot and create good soil that has important nutrients for plants



Photo from Cornell Waste Management Institute



Photo from Cornell Waste Management Institute

Composting is a series of techniques that help speed up this natural process

Making Compost is Like Cooking

You need the proper mix of ingredients, a place to put them, and some time. The **compost ingredients** are:

- Brown Organic Material
- Green Organic Material
- Water
- Good Microbes



*The brown material provides the carbon
The green material provides the nitrogen
The ratio of Carbon to Nitrogen should be 30:1 to 50:1*

Compost Cooking: Containers

Compost can be made in a container or in a large pile



A container will cook the compost quicker than a pile and will work better in the winter

Compost Ingredients

Green Organic Material

can be:

- Food Scraps
- Horse Manure
- Camel Manure
- Cow Manure
- Goat Manure
- Hair
- Used Tea and Coffee
- Grass Clippings



Green material has Nitrogen in it

Compost Ingredients

Brown Organic Material

can be:

- Leaves
- Waste Straw
- Waste Hay
- Corn Stalks
- Saw Dust
- Dead Dry Plants
- Wood Chips
- Shredded Paper



Brown material has Carbon in it

Compost Ingredients

The green and brown ingredients should be added in 5 to 30 cm layers



Start with the brown material

Then add a layer of green material

Ingredients that are chopped up will cook faster

Compost Ingredients

Use twice as much green material as brown material by weight



For example: use 25 cm of leaves (brown material) then 5 cm of manure (green material)

Compost Ingredients

Keep adding the green and brown ingredients in layers until you fill the container or run out of material.



Add some water at each layer

Compost Ingredients



Water

- Water is needed for making compost.
- Add some water with each layer
- Not too much
- Not too little
- It should be damp enough so that a handful feels a little moist
- But it should be dry enough that a hard squeeze produces only a drop or two of water.

Compost Ingredients

Good Microbes

The good microbes that are needed for composting are naturally present in the air, soil and water. They will grow naturally.



Photo from Cornell Waste Management Institute

But you can give the compost process a head start by adding a few handfuls of compost from another compost pile and mixing it in.

Compost Cooking: Stirring

The compost pile should be stirred. This gives air to the good microbes and move the material to the center were most of the compost cooking is happening.



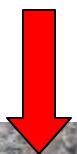
Can use a shovel
or a pitch fork

Compost Cooking: Stirring

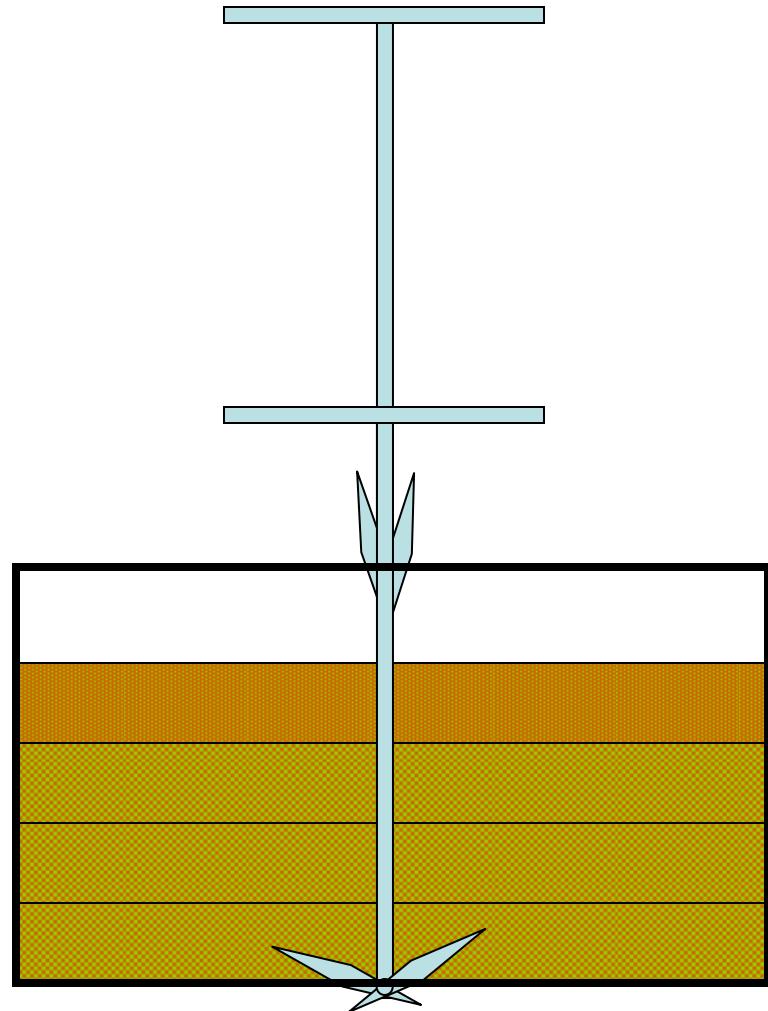
Can also use a compost mixer



These have spikes that stay closed
when it is pushed into the pile



These spikes open as it is pulled back
and mix the compost ingredients



Compost Cooking: Stirring

Can also use a barrel to turn the mixture



This works for small mixtures

Compost Cooking: Time

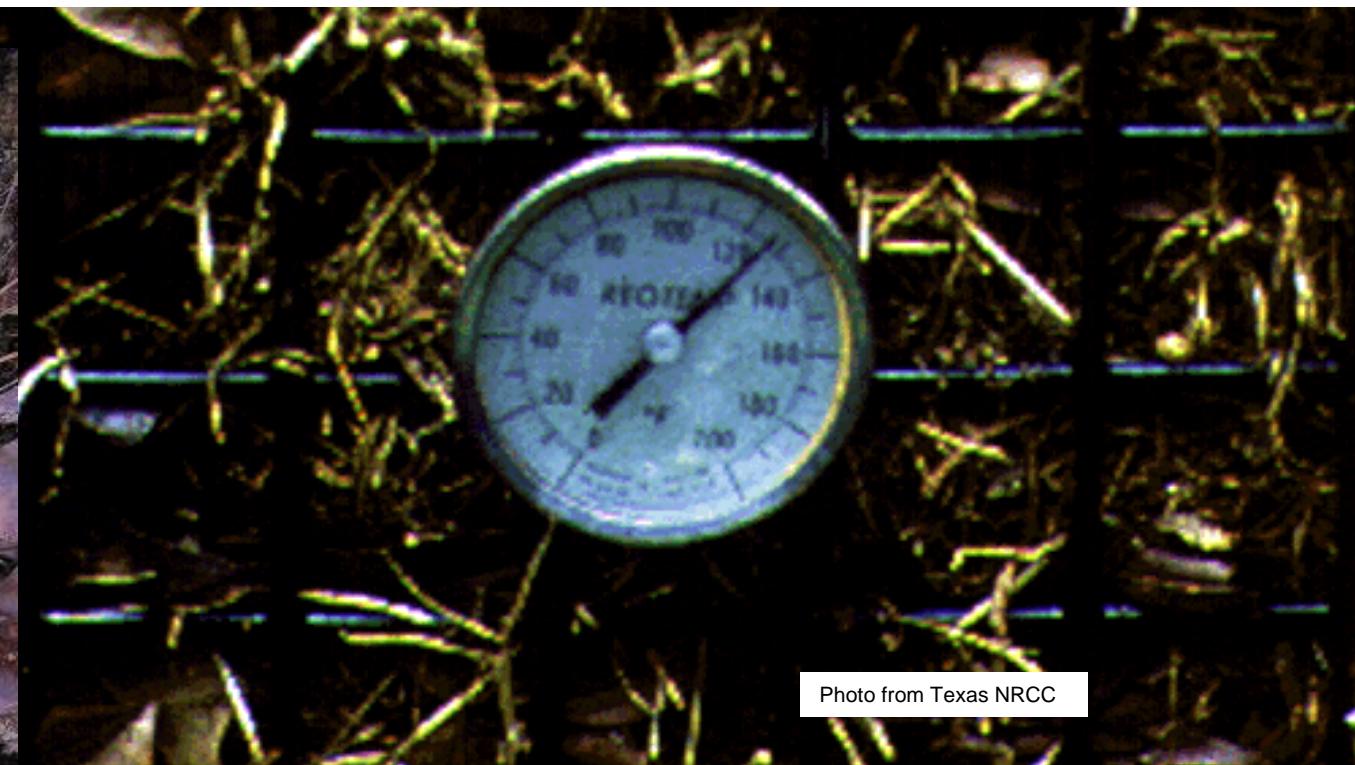
The compost will start to get hot as the good microbes start to work



Compost that is cooked in a container will get to a higher temperature than compost in an open pile. This makes it cook faster

Compost Cooking: Time

The temperature should reach 20 to eventually 60 degrees centigrade



The higher temperatures will kill bad microbes, most pathogens, plant deceases and weed seeds

Compost Cooking: Time

- Compost made in an open pile is called slow compost
- Compost made in a container is called fast compost



A fast compost pile will get hotter and take 1 to 3 months to make compost



A slow compost pile will take 3 to 8 months to make compost

Compost Cooking: Stirring

- The compost pile should be stirred at least once a week.
- Add water if it is drying out.
- Do not add too much water



Photo from Texas NRCC

Compost Cooking: Time

When the compost is complete:

- The temperature will drop
- You will not be able to recognize the initial ingredients.
- The compost will be dark brown or black
- The compost will be crumbly and have an earthy smell



Compost Cooking: Problems

What if the compost smells bad?

- The compost should not get too wet.
- It may smell badly if it gets too wet.
- The good microbes will not work well if they are too wet

The solution to this is to:

- Avoid watering it too much
- Cover the pile to keep rain off
- Add more brown material and mix it in
- Provide drainage at the bottom of the pile



Compost Cooking: Problems

**Drainage can be provided with a pipe that has holes in it.
The pipe runs under the bottom of the pile and out the
end of the container**



The drainage can be collected and used as fertilizer

Compost Cooking: Problems

You can also cover the compost area to shield from rain



Photo from Tim Brasuell

Compost Cooking: Problems

What if nothing is happening and the compost is not getting hot?



- There may not be enough green material.
- There may not be enough water.
- The compost may need to be stirred.

Compost Cooking: Problems

What if the pile is damp and only a little warm in the middle?



Photo from Rosanna Brown

- There might not be enough green material so add some more.
- The pile might not be large enough. It should be at least 1 cubic meter in size



Compost Cooking: Problems

- Too much pine needles or pine bark may be too acidic for the good microbes to work well



If you have a lot of pine tree material to compost, you may need to add some lime to the pile. Mix the lime into the pile

Compost Cooking: Problems

What if you see worms or slugs in the compost pile?



Photo from Texas NRCC

- This is not a problem
- Worms and slugs will help the compost to cook
- You may even want to add worms

Using the compost

You can mix it into poor soil to make it better for the plants



Mix about 5 to 7 cm of compost into the top 15 to 20 cm of soil

- It will provide valuable nutrients
- It will loosen clay soil
- It will make the soil hold more water

Using the compost

You can spread the compost on top of soil

Use about 2 to 5 cm of compost

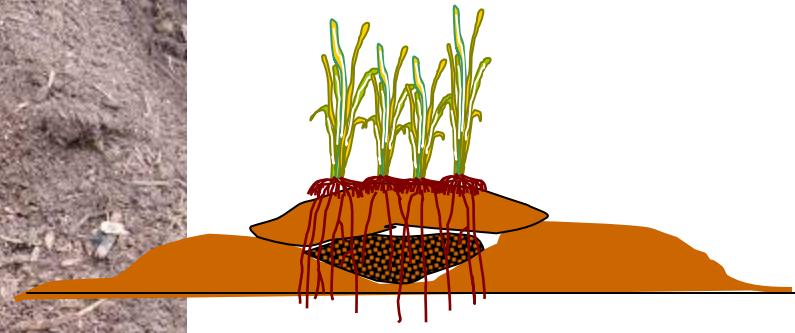


Photo from Texas NRCC

- It is easier than mixing it into the existing soil
- It will provide valuable nutrients
- It will act as a mulch and make the soil hold more water

Using the compost

You can bury compost in the middle of a garden bed



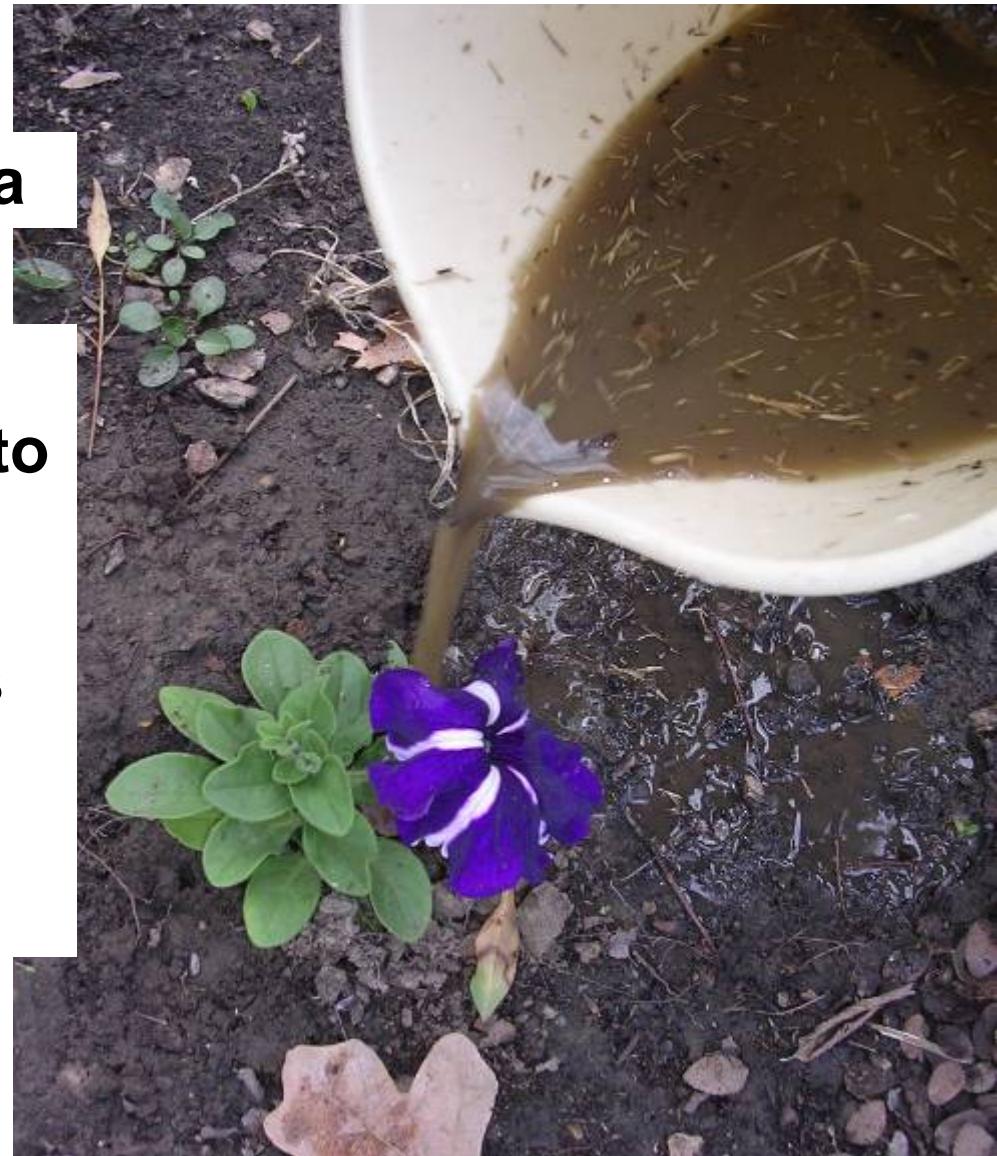
Use a long pile that is about
5 cm high by 15 cm wide

It will slowly release nutrients to the plants

Using the compost

You can make compost tea

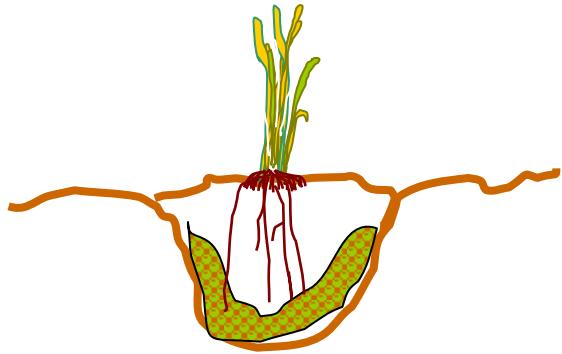
- This is done by adding a few handfuls of compost to a bucket of water
- Let the bucket and compost sit for a few days
- The nutrients from the compost will mix in the water



Pour the compost tea on fragile seedlings or plants.
Use it as fertilizer

Using the compost

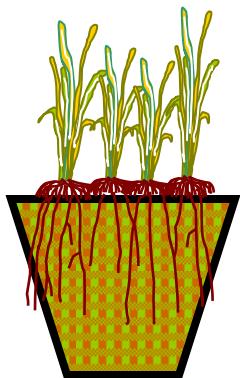
You can add compost to the planting hole when planting a seedling



It will provide valuable nutrients to the young plant

Using the compost

You can use the compost
to start plants in small
containers



You may need to pull out the larger material

Using the compost

**Unfinished compost can be used as mulch
Use about 5 to 7 cm of unfinished compost**



Photo from Cornell Waste Management Institute

This provides nutrients for the soil and helps conserve water.

Compost: Some more ideas

It is a good idea to collect brown material in a pile until ready to start a compost pile



**Stockpile the brown material until you have enough to make a large pile.
A pile that is too small may not cook well**

Compost: Some more ideas

A three box system for composting is often a good idea



Photo from Texas NRCC

Each box has a compost batch that started cooking at different times

Test Time

- *What if the compost pile begins to smell?*



Too little air – mix it more
Too much water – do not add so much
-add some more brown material
-provide better drainage

Test Time

- *What is wrong in this picture?*

Hint: look at this



Plants have started growing in the compost pile.
The compost pile was not stirred enough

The End

