Fundamentals of Organic Farming and Gardening Instructor's Guide

Unit 6

Unit Overview

Composting is a result of managing soil organisms to more rapidly break down residual materials to produce humus. Addition of compost to the planting bed enhances soil life and makes more nutrients available to the plant.

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Show a handful of compost – pass it around

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source for organic matter and plant nutrients in the soil. Composting is adapting this process to agriculture by managing large amounts of material at one time to produce more in less time.

Composting has been an integral part of farming throughout recorded history because it accomplishes two essential tasks: dealing with farm waste products and producing a soil amendment that enhances crop production. Over the years, many methods of composting have been developed due to the diversity of materials available and the broad range of farming systems.

Crops, too, dictate different types of composting methods. Most annual crops and grasses are dependent on bacterially-dominant soil biology, while woody perennials are dependent on a soil life dominated by fungi. Enhancing the soil biology for these different types of crops requires “hot” or bacterially-dominant composting for annuals and “cold” or fungal- dominant composting for woody perennials.

What we are managing in a composting operation are the organisms that feed on the composted material. One of the keys to

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INTRODUCTION

The breakdown of dead plant and animal materials is a natural process that is happening all around us. This natural process is the source for organic matter and plant nutrients in the soil. Composting is adapting this process to agriculture by managing large amounts of material at one time to produce more in less time.

Composting has been an integral part of farming throughout recorded history because it accomplishes two essential tasks: dealing with farm waste products and producing a soil amendment that enhances crop production. Over the years, many methods of composting have been developed due to the diversity of materials available and the broad range of farming systems.

Crops, too, dictate different types of composting methods. Most annual crops and grasses are dependent on bacterially-dominant soil biology, while woody perennials are dependent on a soil life dominated by fungi. Enhancing the soil biology for these different types of crops requires “hot” or bacterially-dominant composting for annuals and “cold” or fungal- dominant composting for woody perennials.

What we are managing in a composting operation are the organisms that feed on the composted material. One of the keys to successful composting is to understand these different organisms.

Compost is thought to be “fertilizer” by some. However, a chemical analysis of composts will show that they are relatively low in the elements, such as nitrogen, found in chemical fertilizers. Fertilizer standards were set to define the amount of nitrogen, phosphorous and potassium a substance contains. Using fertilizer standards, a typical compost might have an NPK analysis of 0.4, 0.4, 0.4.

The value of compost lies in its acting as an inoculant, adding organisms to expand the soil life biodiversity, and in providing the soil life with food. This soil life will build a stable structure that binds

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coarse soils together or loosens clay soils. This structure provides pore space for gas exchange and for water infiltration and retrieval. Compost also contains plant nutrients other than nitrogen, phosphorus and potassium.

COMPOSTING ASSESSMENT

Objectives:

1. *Identify two reasons why farmers make and use compost.*
2. *Relate the type of composting to the types of crops.*
3. *Identify factors to consider when deciding whether to compost.*

To compost or not to compost? This question was unheard of until recently. It was thought in the past that composting was a "must" for any organic farm. However, recent innovations in organic farming have eliminated composting in some systems. Before committing time and resources to a composting operation, an assessment of soil quality, resources and the farm plan should be considered.

Condition of the soil (soil quality) is the primary consideration in determining whether or not compost is necessary. A relatively low organic matter content of the soil indicates the need for the addition of compost. This is the fastest way of increasing soil organic matter content, provided ample compost is added.

In farming operations where a large quantity of waste plant material and/or manure is accumulated, composting is indicated. This is especially true of organic farms that accumulate animal manure. All manure must be composted completely before application to fields used for immediate food crop production. In the case of accumulated plant material, these can either be composted or incorporated into the soil.

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The type of farming is another consideration. Fields and beds that are continuously cropped will need compost added to build and maintain the organic matter levels. However, fields where green manure crops are part of a rotation may not need additional material added. Also, pastures used for regular grazing may not need compost added, depending on the grazing management. The soil life present should be able to break down any manure on the surface in a properly managed operation.

SUMMARY

Farmers have composted throughout history because composting uses the farm waste products and produces a valuable soil amendment. Annual crops benefit from a “hot” bacteria-dominated compost while herbaceous crops are better served with a “cold” fungal-based compost. Before deciding to compost a farmer should consider the type and amount of farm waste, the condition of the farm’s soil, and the intensity of crop production.

TYPES OF COMPOSTING

Objectives:

1. *Identify the active organism in hot and cold composting and vermicomposting.*
2. *Describe the differences between hot and cold composting.*
3. *List three high nitrogen materials and three high carbon materials used for composting.*
4. *Describe a vermicomposting structure that provides the ideal conditions for worms.*

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There are two main methods of composting: hot and cold. These methods use specific materials and are done to provide food and increase biodiversity to soils for different kinds of crops. A third type of composting uses worms to break down the material.

Hot composting is the method most commonly associated with composting. This mixes carbon and nitrogen-bearing materials together to promote a rapid breakdown of the material. Cold composting is not as well known and understood as hot methods. It is used to promote the fungal decay of plant material for use with herbaceous crops. Vermicomposting uses earthworms to break down the materials.

No matter what type of composting is used, it is important to understand the biological processes involved and to manage the process properly. This will make it possible to produce a finished product of high quality with the least amount of management.

HOT COMPOSTING

Hot, or bacterial, composting refers to a technique where the temperature of the material is raised significantly during composting, to between 120 and 140 degrees F. The materials are mixed to attain a carbon to nitrogen ratio of around thirty to one. (Thirty parts carbon to one part nitrogen.) This is a ratio that provides a good balance of food for the decomposition of materials by bacteria.

With hot composting, we are managing the process to maximize the bacterial decomposition of the material used. The bacteria involved in this process need the same things that we do to thrive: oxygen, water, and food.

Availability of oxygen is important because bacteria that thrive in its presence turn material in the compost pile into plant nutrients and food for aerobic life in the soil. When oxygen is excluded from a compost pile, anaerobic bacteria reproduce and feed on the pile's contents. These anaerobic bacteria produce plant and animal toxins such as methane and formaldehyde.

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Maintaining a sufficient amount of oxygen in a compost pile can be accomplished in a number of ways. The first is by incorporating some coarse materials in the construction of the pile. This will help prevent settling and compaction of the pile and keep channels open for an exchange of air between the pile and the atmosphere. Another is to regularly turn the pile. Turning releases the built-up carbon dioxide and introduces oxygen-rich air. Some experimentation has been done with layering perforated tubing to provide air exchange channels.

Managing water levels is also important in providing an optimal environment for aerobic composting. The bacteria in a compost pile need water to metabolize the contents of the pile and to reproduce. If there is not enough water available in the pile, the bacteria population will start to go dormant, slowing down the composting process. On the other hand, if too much water is present, the water will fill the air spaces in the pile. This will exclude the oxygen rich air and will also slow down the process. In the case of too much water, anaerobic bacteria will begin dominating the pile.

During periods of heavy rain, compost piles may become soaked with water, slowing down the decomposition. This can be avoided by covering the piles with tarps. There are also compost covers available. These exclude most of the water falling on a pile but allow air to circulate. During drought periods, piles may dry out rapidly and require regular watering.

The third thing necessary for successful composting is the right kind of materials or food to promote rapid decomposition by aerobic bacteria. This is commonly referred to as the carbon to nitrogen ratio (C/N). The usually recommended ratio is 30/1, or 30 parts carbon to 1 part nitrogen. Grass clippings and other green vegetation, manure, and urine-soaked bedding are relatively high in nitrogen content.

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Brown, dry vegetation such as leaves and straw are high in carbon content and have low or no nitrogen. By mixing these two types of materials in the proper proportions, we can provide the food needed to promote rapid decomposition.

Hot composting begins with accumulating enough materials to build a pile of sufficient size to provide a good environment for the decomposers. The minimum size for a pile is between three and four feet on any side. Windrows are the most common types of piles built in agricultural applications. These are piles that are built to any width and height, usually determined by turning equipment, and can be the length of the composting area.

Since the carbon and nitrogen content of materials varies (and the materials themselves vary from farm to farm), it is usually difficult or impractical to attempt to compute these in all cases. A good starting combination is to mix the high carbon with the high nitrogen materials in a 1/1 ratio by volume, or about half-and-half. The pile should then be monitored and the mixture adjusted until the right mixture is found.

Materials for composting are available on most farms, whether or not animals are part of the operation. It has been thought in the past that animal manure was necessary for producing quality compost, but quality compost can be created by using available plant materials only, like fresh grass, leaves, hay or straw and crop residues.

One of the traditional ways of composting has dictated that the different materials should by layered separately in the pile. This results in compaction and matting of the materials, making turning the pile more difficult. The matting also creates areas where oxygen is excluded and anaerobic bacteria flourish. Mixing the materials when initially building the pile will result in faster decomposition and easier management.

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As the pile is built, the materials should be moistened to provide water for the decomposers. The nitrogen-rich materials may be moist enough, but it is usually necessary to add water to the dry, carbon-rich materials. Both of these should be as moist as a wrung-out sponge or rag.

Providing air circulation in the pile is the other important part of building a pile. Using coarse materials like whole leaves and straw will accomplish this. Shredding the materials to a small size will promote faster decomposition, but will mean faster compaction and require more frequent turning to provide air.

A properly built compost pile, meaning a good combination of materials, adequate moisture and air circulation, will “heat up” within 24 hours. This means that the metabolism of the bacteria in the pile will increase, increasing the temperature within the pile. A good range of temperature is between 120 and 140 degrees F. If the pile fails to reach this range, it means that there is not enough nitrogen material, there is too much or too little water, or the pile isn’t circulating air. Opening the pile and observing is the best way to determine what adjustments need to be made. If the pile’s temperature reaches 150 degrees or higher, too much nitrogen material has been used. The temperature can be lowered by adding more carbon material. The other option is to let the pile cool down on its own and adjust the mixture in the next pile.

After a pile reaches its maximum temperature, it will maintain that temperature over a period of time, from a few days to a few weeks. Then the temperature will begin dropping slowly over time. This is due to the pile running out of air, water and/or nitrogen. When the pile reaches 90 to 100 degrees F and stays there for a few days, it’s time to turn the pile. During turning the moisture content should be assessed and water added if necessary. The turning action will incorporate oxygen into the pile while breaking up compaction. If nitrogen-rich material is abundant, some more may be added and

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mixed in during the turning. The pile will then heat up again and go through the same cycle.

The compost is "finished," or ready for use, when it has turned a dark brown to black color and most of the material is broken down enough that it is not recognizable. This takes from two to four months, depending on how the pile was built and managed.

COLD COMPOSTING

Cold composting is a fungal process that requires a different mix of materials and different management. Since it is a fungal process, the C/N ratio is different: 60/1. Fungi require a diet high in complex carbon compounds, or woody material. This includes wood chips and dry stalks from crops. These are moistened, mixed and piled up just like a hot pile.

It will take longer for the fungal population to reach the point where the maximum temperature of the pile will be reached. This maximum temperature should be approximately 10 degrees F above the air temperature. Piling fresh wood chips from live trees will mean a faster and higher initial temperature. This is caused by bacteria flourishing until the easily metabolized sugars and carbohydrates are used up. Then the temperature will slowly drop.

Managing a cold compost pile is much simpler than a hot pile. Management consists of monitoring the temperature and adding water occasionally. When the temperature of the pile drops to the air temperature, it usually means that the pile is too dry. Adding water should cause the temperature to go up again slowly. The pile is finished when the material is dark brown to black and mostly broken down.

VERMICOMPOSTING

Vermicomposting uses worms to decompose material in worm beds. These are beds that are constructed to contain the material

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and worms. The worms produce high quality compost that includes worm castings. The castings contain plant nutrients and growth hormones.

Using worms to compost requires an investment of time and money. It also takes education and skill development. Initial cost includes beds and protective coverings. Composting worms love cool, damp and dark environments and will breed optimally when these conditions are maintained. They will tolerate temperatures from 40 F to 80 degrees F. This means that in areas where temperatures go above 80 degrees, some type of shade must be provided. And in areas where winter temperatures are lower than 40 degrees, the beds should be enclosed in a heated shelter. For this reason, most commercial worm composting operations are indoors.

Bedding in a worm bin is the living medium for the worms but is also used as a food source. Material that is high in carbon is used and is to mimic the worms' natural habitat, the forest floor. The bedding needs to be moist (often related to the consistency of a wrung-out sponge) and loose to enable the earthworms to breath and to facilitate aerobic decomposition. A wide variety of bedding materials can be used, including newspaper, sawdust, hay, cardboard, or peat moss.

The worms can be fed a variety of available materials from manure to crop residues. Any coarse material added should be shredded to encourage rapid breakdown.

SUMMARY

Three types of composting are hot, cold, and vermicomposting. Hot composting is based on the decomposition of materials by bacteria. Fungi are the primary decomposers in cold systems, and worms eat the organic material in vermicomposting systems. Materials used for both hot and cold composting are the high carbon, brown materials and high nitrogen, green materials, but the proportions are different. In vermicomposting, worms actually eat the

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bedding and food material and the compost is their waste products or castings.

USING COMPOST

Objectives:

1. *Identify two benefits to using compost as a soil amendment.*
2. *Describe how to use compost in a soil mix.*
3. *Identify the key to good quality compost tea.*

Compost is primarily used as a soil amendment to increase or maintain the organic matter in the soil. It can also be used in a starting and potting mix for plants. Another use is to prepare "compost tea" for use in a sprayer.

SOIL AMENDMENT

Finished compost added to the soil maintains or increases the amount of organic matter, depending on the amount used per unit of land. It also acts as an inoculant, adding to the diversity of the soil life, and adds food for these microorganisms.

Contrary to most advice on the subject, compost should be added to the surface of the soil. The action of tilling in or mixing compost into the soil does more harm than good. The mixing action harms the soil in two ways. The first is through the destruction of any existing structure that has been built by the soil life. The second is the mixing action introduces an abundance of oxygen. This stimulates a population explosion among the bacteria. The bacteria feed on the foods present, resulting in a net decrease in soil organic matter. The mixing action also kills off the beneficial fungi. This is especially important to avoid when adding compost to soil used for herbaceous plants that are dependent on a fungal-dominated soil community.

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The soil life will be able to utilize any food spread on the soil surface and incorporate the organic matter into the soil, working from the surface downward. This is the way it happens in nature-the plant and animal debris accumulates on the surface and is used as the soil structure and quality is improved from the top down.

SOIL MIX

Compost can be used as part of a soil mix or potting mix for plants. This enables organic farmers to make their own soil mixes for little or no expense, rather than ordering and paying shipping on large quantities of certified mixes. It can be added to soil or soilless mixes to create a superior starting mix. Compost has been shown to help prevent disease in seedlings, such as damping-off disease. The same mixes can be used to produce seedlings.

An excellent starting mix can be made by mixing soil from the farm itself with compost. Soil is selected from the most fertile area or bed and mixed with sifted compost. Compost can be sifted through half-inch mesh hardware cloth mounted on a wood frame. The amount of compost added is determined by the soil type used. A loam soil may require only 10 to 15 percent compost added to the soil. A sandy or clay soil may need as much as 50 percent compost.

COMPOST TEA

Compost tea is a liquid extract of compost. It is made by "brewing" compost in a container with water. The tea is used to inoculate microbial life into the soil or onto the foliage of plants, and to add soluble nutrients to the foliage or to the soil to feed the organisms and the plants present.

The key to producing high quality compost tea is in keeping the oxygen content of the brew high to promote the growth of aerobic microorganisms. This can be done using a purchased mechanism or by constructing one from common materials.

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Compost tea should be used within 24 hours after brewing. It can be applied directly to the plants. This inoculates the plant surfaces with beneficial microbes and provides some foliar nutrients. It also increases foliar uptake as beneficial microorganisms increase the time stoma stay open, while at the same time reducing evaporative loss from the leaf surface. Compost tea can also be added directly to the soil as an inoculant to increase soil biodiversity and to increase the rate of breakdown of a green manure crop.

SUMMARY

The primary use of compost is as a soil amendment to add organic matter to the soil, and inoculate the soil with a diversity of soil organisms. Compost can also be used with either soil or a soilless mix to prepare an inexpensive, organic soil mix. Brewing the compost with water and adequate oxygen results in a tea which can be used as a foliar spray or applied directly to the soil.

UNIT SUMMARY

Compost is a result of the decomposition of organic material in a managed environment. The organic materials used are high-carbon, brown materials and high-nitrogen, green materials. Water and air are necessary for the action of the organisms, whether bacteria, fungi, or worms. The resulting compost is primarily used as a soil amendment, but can also be used in soil mixes and in compost tea.

Appendix

Lesson Plans

I. and II. COMPOSTING ASSESSMENT

OBJECTIVES:

1. Identify two reasons why farmers make and use compost.
2. Relate the type of composting to the types of crops.
3. Identify factors to consider when deciding whether to compost.

LESSON PLANS:

1. Show students **a handful of compost** and remind them of the discussion in the soil chapter on humus. Make the point that composting is just a speeded up version of what happens naturally.
2. Use Unit 6 power point presentation slides 1-18 to present the information on composting.

III. TYPES OF COMPOSTING

OBJECTIVES:

1. Identify the active organisms in hot and cold composting and vermicomposting.
2. Describe the differences between hot and cold composting.
3. List three high nitrogen materials and three high carbon materials used for composting.
4. Describe a vermicomposting structure that provides the ideal conditions for worms.

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Lesson Plans

LESSON PLANS

1. Download and show the short video on making a compost pile found at http://www.taunton.com/finegardening/pages/gvt004.asp

2. Make a **hot compost pile.** Plan to use the compost with the next year's demonstration plot.
3. Make a **cold compost pile.** Plan to use the compost on landscaping shrubs next year.
4. Set up a **vermicomposting** project for the classroom. Use the castings in the demonstration plot.
5. If it is not possible to compost outside, check out **the composting alternatives** page.

IV. USING COMPOST

OBJECTIVES:

1. Identify two benefits to using compost as a soil amendment.
2. Describe how to use compost in a soil mix.
3. Identify the key to good quality compost tea.

LESSON PLANS:

1. Discuss the way the compost that the students make will be used as a soil amendment.
2. Make up a soil mix using compost.
3. **Brew compost tea**. Use the tea on the plants in the demonstration plot.

Appendix

Vermicomposting

Purpose: to establish a worm bin that will produce worm castings for use in the demonstration plot.

This activity can be done either inside or out, but temperatures of 55-77 degrees F are best for the worms. A portable bin allows for movement inside when it gets cold.

Gathering materials:

1. A 12 gallon plastic storage bin, styrofoam cooler or a wooden box can be used for the worm bin. Ventilation holes need to be punched or drilled in the bottom and sides of the bin, approximately every four inches. Use blocks to raise the bin off the ground. A tray underneath will catch any worm "juice" that seeps out.
2. Worms can be ordered from supply houses, purchased from bait stores or from another worm farmer. Two species of red worms, *eisenia foetida* and *lumbriscus rubellus*, work best for vermicomposting. They're also called bandling, red wigglers, or manure worms. You will need about a pound of worms for a standard bin. Do not buy nightcrawlers because they will not be happy in the bin.
3. The bedding can be shredded newspaper, shredded corrugated cardboard or shredded leaves. The bedding should be thoroughly wetted by letting it soak in water then thoroughly draining and wringing it out. It should feel like a wrung out sponge when you put it in the bin.
4. Vegetable scraps can be accumulated to feed the worms, but do not feed them for the first few days, as they get acclimated. They will be eating the bedding. Do not feed the worms meat or greasy food.

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Vermicomposting

Building the bin:

1. Fluff up the bedding material and place a thick layer in the bottom of the bin. Place the worms on top of the bedding material and watch them disappear into the bedding.
2. Cover the bin and wait a few days to feed them. The scraps should be buried under at least an inch of bedding material. The location may be determined randomly or divide the bin into quadrants and feed in a different quadrant each time. With the quadrant method you can check to see that all the food is being eaten. Excess food will start to rot and smell, so don't feed too much.

Harvesting the castings

1. As the castings start to build up they can be harvested in several ways. Worms like it dark and where there is food. If you open the bin, the worms will go deeper and you can remove the top layer, where most of the castings can be found. Alternately, you can consistently bury the food on one side of the bin, and harvest the other side where there will be few worms.
2. If you want to harvest the whole bin at once, it can be emptied into a small swimming pool and the worms removed and placed in a newly prepared bin.

Using the castings

1. The castings make wonderful soil amendment which can be used on the demonstration plot.

Data sheets:

1. A data sheet can be kept on the amount of food the worms eat.
2. A data sheet can be kept on the reproduction and production of castings by the worms.

Appendix

Vermicomposting

Resources for more information about vermicomposting:
http://www.bae.ncsu.edu/topic/vermicomposting/pubs/worms.html

http://www.ciwmb.ca.gov/Publications/Schools/56001007.pdf

Feeding Data Sheet

Date	Weight of food	Total weight of food	Temperature	Burying location #	Type of food

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Vermicomposting

Food burying locations- write these on the lid of the bin, so you can keep track of where to bury food next. Each day worms are fed, put the food in the next space. Check to see if there is left over food in the previous feeding location.

1	2	3
4	5	6

Calculate the average weight eaten per day. _____

Calculate the average temperature in the bin. _____

Data Sheet on Reproduction of worms and production of castings

Date bin set up _____

Date bin taken down _____

Total days worms in the bin _____

Initial weight of the worms _____

Final weight of the worms _____

Difference between the final and initial weights _____

Approximate initial number of worms _____

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Vermicomposting

Approximate final number of worms _____

Difference between final and initial numbers _____

Initial weight of castings _____

Final weight of castings _____

Questions:

1. About how much food do the worms eat in a week?
2. What kind of food do they seem to prefer?
3. Did the number of worms increase?
4. What kind of worm behavior did you observe?
5. What happened to the bedding material?
6. Draw an illustration of the vermicomposting cycle from establishing the bin through harvesting the castings, to putting on a vegetable plot, to vegetable scraps, etc.

Appendix

Building a Compost Pile — Hot

Purpose – Build a hot compost pile that is at least 3'x3'x3' to produce compost for the demonstration plot.

This activity should be done outdoors, though modified versions may be done in the classroom.

1. Find a location for the pile that is convenient to water.
2. Gather at least ½ cubic yard of high-carbon, brown material such as fallen leaves, sawdust or straw. Gather an equal amount of high- nitrogen, green material such as grass clippings, vegetable scraps, or green weeds.
3. Loosen the soil under the proposed site of the pile and then cover with corn stalks, small twigs or other rough materials that will allow air flow under the pile.
4. Place small amounts of green and brown material in the pile and mix together, instead of layering. This will prevent compaction. Add water every 6-8 inches so the pile is damp but not soggy.
5. Small amounts of soil or finished compost can be added to ensure the composting organisms are present.
6. To ensure adequate heating of the pile, make sure that it is at least 3 feet high.
7. The pile may be covered with a tarp to prevent rainwater from leaching out the nutrients.
8. Measure the temperature in the center of the pile twice a week. The pile should heat up to 120-140 degrees F and stay there from a few days to a few weeks.
9. When the pile reaches 90 degrees F it is ready to turn.
10. Turn the pile using a fork. This will incorporate more air and the pile will heat up again.
11. The pile is ready when it has turned a dark brown to black color and most of the material is broken down and unrecognizable. This usually takes two to four months.

Appendix

Building a Compost Pile — Hot

Data sheet

Identify the materials used in the pile.

Brown materials

_____

Green materials

_____

Size of the pile _____

Temperature of the pile

Date																		
Temp.																		

Questions:

1. What are the organisms most responsible for decomposing the materials in the compost pile?
2. List the basic requirements of these organisms.
3. How is composting like what naturally happens on a forest floor?
4. What is the benefit of composting to an organic farmer?
5. What is the disadvantage of composting to an organic farmer?

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Building a Compost Pile — Cold

Purpose – to build a cold compost pile to produce compost for the demonstration plot.

This activity should be done outdoors.

1. Locate an out of the way location that will be easy to water.

2. Loosen the soil under the proposed site and pile high carbon materials such as wood chips and dry stalks from crops up into a 3'x3'x3' bed.

3. Moisten the bed as it is made.

4. Take the temperature of the bed once a week. The temperature should slowly rise until it is about 10 degrees F above air temperature. When the temperature falls, moisten the bed again.

5. The compost is done when the color is dark brown to black and the materials are mostly broken down. This will take longer than the hot compost bed.

Data sheet

Identify the types of materials used

_____

Size of the pile _____

Appendix

Building a Compost Pile — Cold

Temperature

Date																		
Temp.																		

Questions:

1. What are the organisms most responsible for decomposing the materials in the compost pile?

2. List the basic requirements of these organisms.

3. How is this type of composting different from hot composting?

4. Which parts of the pile seemed to be the slowest to decompose?

5. Explain why these areas were slower to decompose?

Appendix

Brewing Compost Tea

Purpose – to prepare compost tea to use on plants in the demonstration garden.

This activity can be carried out either outside or inside. It is based on the description by Dr. Elaine Ingham in *Kitchen Gardener* Magazine found on the web at
http://www.taunton.com/finegardening/pages/g00030.asp

Materials needed are a 5 gallon bucket, a little molasses, good well-aged compost, an aquarium pump, plastic tubing, a gang valve and three bubblers.

1. Fill the bucket half full of compost, but do not pack. Compost should be loose.
2. Connect the pump and the gang valve with a piece of tubing. Attach three lengths of tubing to the ports on the gang valve. Each tube should be long enough to reach the bottom of the bucket when the gang valve is hung on the lip of the bucket. Attach a bubbler to the end of each tube.
3. Fill the bucket to the brim with water. Arrange the bubblers under the compost equidistance from each other, to aerate the whole bucket.
4. Add about 1 tablespoon of molasses and stir the mixture vigorously with a stick. Readjust the bubblers to be equidistance from each other.
5. The tea should brew for about 3 days. Stir the tea several times a day.
6. After three days, turn off and remove the aeration equipment and allow the mixture to sit for a half hour so the solids settle on the bottom.
7. Pour the mixture through a strainer (fine mesh screen, cotton material, etc.) into another bucket.

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Brewing Compost Tea

8. Use the compost tea immediately to spray on the leaves of the plants of the demonstration plot.

Questions:

1. What is the purpose of making compost tea and spraying it on plants?

2. Why do you need to aerate the tea as it brews? What organisms are of concern?

Appendix

Composting Alternatives

Composting can also be done in the classroom in 2 liter plastic bottles. Both worms, hot composting and cold composting can be done in bottles. Visit this web site for specific directions on making decomposition columns.

http://www.bottlebiology.org/