Master Composter Manual

Cornell Waste Management Institute

http://cwmi.css.cornell.edu

Acknowledgments

This manual is the result of a grant from the Cornell Waste Management Institute in support of a proposal to gather the myriad of existing composting materials from all over the United States and compile this information into one comprehensive Master Composter Manual. The project was initiated by Celeste Carmichael, former Cornell Cooperative Extension Agent in Cayuga County.

Illustrations unless otherwise noted were provided by Sarah Major, Cornell Cooperative Extension of Cayuga County. Cover design by Peter Borst, Cornell Waste Management Institute. The manuscript was revised and edited by Karen Rollo, Cornell Waste Management Institute.

Special thanks to the Texas Natural Resource Conservation Commission for permission to reproduce and/or adapt Chapters two and three of the Clean Texas 2000 "Master Composter Training Manual."

Thanks also to those who reviewed, commented, and contributed to this manual: Jean Bonhotal, Ellen Harrison, Charlie Mazza, Erin McDonnell, and Nancy Trautmann, Cornell University; Cornell Cooperative Extension Staff--Veet Deha, Tompkins County; Kevin Mathers, Broome County; Mark Wheeler, Putnam County; Resource Recovery Personnel--Knowlton Foote, Onondaga County RRA, and Emilie Hauser, Ulster County RRA.

The Cornell Waste Management Institute, a program of the Center for the Environment, was established in 1987 to identify and address the environmental problems associated with solid waste management, and to focus University resources and capabilities on this pressing economic, social and environmental issue. Through research, outreach and teaching activities, CWMI staff and affiliated researchers and educators work to develop both technical and policy solutions to waste management problems and to address broader issues of waste generation and composition, waste reduction, risk management, environmental equity, and public decision-making, as well as the technical issues of disposal through incineration, digestion, and landfilling.

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How To Use This Manual

This publication is divided into two sections. The first, "Master Composter Program Implementation Guide," is designed for program staff wishing to implement a Master Composter Program within a community. This section provides details on recruiting a Master Composter Program Coordinator, outlines the responsibilities of the program coordinator, and presents ideas and examples for implementing comprehensive community outreach and educational programs.

The second section, "Master Composter Resource Manual," is aimed at the Master Composter volunteer. This section describes the Master Composter Program, teaches the science of composting, illustrates methods for composting at home including vermicomposting, and contains numerous detailed educational and outreach activities that can be conducted by Master Composters.

The "COMPOST: Truth or Consequences" video tape currently available for $25 by itself, may be ordered with the above materials for an additional purchase option. This new entertaining 15-minute video is designed for people who would like to take the mystery out of home composting. Using a few basic science concepts, the video shows how to avoid odors, achieve rapid decompostion and how to get a "hot" compost. The information is presented in an informal, entertaining way to make learning about composting fun!

***NOTE: These items are now available for free downloaded at:**
http://cwmi.css.cornell.edu/resources.htm

Pricing Information:

The two-part "Master Composter Program Implementation Guide and Resource Manual" is available for $12.

The "COMPOST: Truth or Consequences" video by itself is available for $25.

Combined Purchase Option: "Master Composter Program Implementation Guide and Resource Manual" and "COMPOST: Truth or Consequences" video can be purchase for $30.

Ordering Information:
These materials can be ordered through:

Cornell University Press
PO Box 6525
750 Cascadilla St
Ithaca, NY 14851-6525
Phone: 800-666-2211 (US only) or 607-277-2211
Fax: 800-688-2877 (US and Canada) or 607-277-6292
Email: orderbook@cupserv.org

Master Composter Program Implementation Guide

Cornell Waste Management Institute

Master Composter
Program Implementation Guide

TABLE OF CONTENTS

Chapter One

Implementing A Master Composter Program

Master Composters are volunteers trained to educate and enthuse the public about home composting. The educational information is disseminated through a variety of activities, including conducting classes, workshops, and demonstration sites. The goal of the Master Composter Program is to assist communities to reduce the amount of waste going to the landfill or incinerator, and to develop a useable soil enrichment product.

THE MASTER COMPOSTER PROGRAM COORDINATOR

A Master Composter Program Coordinator is essential to implementing an effective Master Composter Program. The coordinator has several responsibilities including initiating the program, recruiting volunteers, providing Master Composter training, and scheduling and advertising public events.

A Program Coordinator is essential to implementing an effective Master Composter Program.

The program coordinator position does not necessarily have to be a full-time or paid position, and there are many possible ways to fill this role. It must be someone, however, who is willing to set aside several hours a week to coordinate the Master Composter Program. The amount of time will vary with the size of the area served.

Potential Master Composter Program Coordinators

- Cooperative Extension Agent
- Recycling Coordinator
- Master Composter Volunteer
- Part-time Paid Employee
- Garden Staff or Volunteer

Volunteers working within an organization who are already in a Master Gardener Program or other related program areas may be willing to initiate a Master Composter Program on a volunteer basis as well. Or, if the resources can be obtained, another possibility is to hire an additional part-time staff member to coordinate the program.

RESPONSIBILITIES OF THE MASTER COMPOSTER PROGRAM COORDINATOR

Recruiting Master Composters

In order to sustain a Master Composter Program, volunteers will need to be recruited on a regular basis. The program coordinator should organize a volunteer recruitment campaign at least once a year. The following are a few ideas for attracting new volunteers.

Word of Mouth - Approach people who are involved in local gardening organizations or topsoil/landscaping businesses to see if anyone is interested in participating in a Master Composter Program.

Direct Mail - Direct mail is also an effective method of sparking interest within your community, however formulating a mailing list may be difficult. Mailing lists can be compiled from former workshop participants, people requesting literature either over the phone or by mail, or by taking advantage of other resources that are available to you. As an example, many people associated with the Master Gardener Program are excellent Master Composter candidates. Not only are they aware of the benefits of composting, they also have experience working with the public. After you have created your mailing list, a letter similar to the sample letter at the end of this chapter may be sent along with an application form.

In addition, whenever a composing workshop is conducted in your region, it is important that the instructor keep a record of the attendees, including addresses and phone numbers. These participants can be contacted at a later time to see if they are interested in becoming a Master Composter. The workshop facilitator can also briefly explain the Master Composter training program and hand out information brochures and application forms. See sample brochure and application form at the end of this chapter.

Media Advertisement - Newspaper, television and radio advertising is another method of recruiting volunteers for your program. Keep in mind that Public Service Announcements (PSAs) and news releases may be a more inexpensive way of utilizing the media. See the sample PSA that can be used for recruiting Master Composters at the end of this chapter.

Brochures and Flyers – Brochures, flyers and application forms can be displayed at local garden centers or other businesses you feel appropriate.

Special Events - County fairs and other special events are a perfect place to promote your program because of the volume of people who attend. You can hand out Master Composter information and applications at a composting display booth or walk around the grounds with Master Composter Program information.

Coordinating Master Composter Training Sessions

It is also the responsibility of the program coordinator to arrange the training for Master Composter candidates. This involves organizing course content, scheduling instructors, reserving a training room, and preparing training materials (Master Composter Resource Manual, slides, etc.). At the conclusion of the Master Composter training, volunteers should be knowledgeable of the technical aspects of composting and feel comfortable presenting this material to a public audience. When designing Master Composter training sessions, there are essential elements that should be included.

Does your Master Composter Curriculum...

- Give a thorough and basic explanation of the compost process?
- Explain the benefits of composting?
- Show how composting is related to reducing the waste stream?
- Share a variety of composting methods?
- Explain the benefits of using compost in the garden?
- Teach volunteers to motivate people to change their disposal habits?
- Provide learning tools for both children and adults?
- Provide a list of resources?
- Give participants the means to obtain audio visual aids and equipment?
- Prepare participants for speaking to public audiences?
- Include practice teaching sessions?
- Provide project ideas for Master Composters and assist them to formulate their outreach project before they graduate?

At the conclusion of the Master Composter training, volunteers should be knowledgeable of the technical aspects of composting and feel comfortable presenting this material to a public audience.

A sample training format for Master Composter training, which is intended to be used with the *Master Composter Resource Manual* as the accompanying text, is included at the end of this chapter. The *Resource Manual* is specifically designed to teach Master Composter candidates the necessary skills they will need to become a "compost expert," and how to design and conduct a compost outreach program.

Master Composter Resource Manual Overview

Chapter One:	The Master Composter Program
Chapter Two:	Composting: Nature's Recycling System
Chapter Three:	Home Composting of Organic Materials
Chapter Four:	Educational Tools
Chapter Five:	Workshops and Special Activities
Appendix A:	Resources
Appendix B:	Bin Building Plans
Bibliography	

Managing Volunteers

In addition to enrolling and training new Master Composters, the coordinator is also responsible for keeping a record of the outreach programs conducted by Master Composter volunteers. These records are used to track volunteer hours, evaluate the success of their programs, and provide documentation for later reference. These reports are also an excellent way to determine what types of programs are the most successful. The section "Consideration for Next Time:" will enable the Master Composters to learn from each other and help them avoid making the same mistakes twice. See samples of recordkeeping for workshops, youth education programs, and special programs at the end of this chapter.

Designing Community Outreach Programs

The program coordinator will be the link between the Master Composter volunteers and the sponsoring organization. The coordinator will determine the needs of the Master Composters and match these needs with resources that are available through the organization. In addition, the coordinator will work with Master Composters to design training programs that fulfill community needs. As the program coordinator begins to design a community outreach program, it is helpful if someone within the organization can supply the names of contacts such as school teachers and local event coordinators. The program coordinator, especially a volunteer, may not have the necessary contacts needed to implement a community outreach program and will appreciate referrals and/or introductions.

Scheduling Educational Programs

If your organization is fortunate enough to have several Master Composters, it is also the responsibility of the Master Composter Program Coordinator to ensure that the programs offered by these volunteers do not conflict with one another. The coordinator must consider the dates as well as the geographical area of the programs offered to the public. If two similar workshops are scheduled during the same weekend or even during the same month, the attendance may be lower than if the workshops were combined or scheduled farther apart. Compost workshops should also be scheduled around local events and holidays. The geographical location of the workshops should also be taken into consideration. If your region covers a large area, then participation may be greater if workshops are offered at various locations throughout the entire region. The program coordinator should coordinate compost training activities in a way that will most benefit the community.

Consider dates as well as geographical areas of the programs offered to the public.

Coordinating Master Composter Meetings

It's also a good idea for the program coordinator to regularly schedule some time for Master Composters to share the progress of their current educational projects and plan new community outreach activities. This could take the form of a formal meeting or a more social gathering, such as a potluck dinner. Meeting times should be convenient and follow an agenda so unsettled topics are resolved.

Sample - Direct Mail Recruitment

MASTER COMPOSTER

Educating For A Better Environment

Cornell Cooperative Extension
Cayuga County
248 Grant Avenue
Auburn, NY 13021
(315) 555-1234 Fax (315) 555-1235

January 31, 199_

Dear Resident:

Are you concerned about the environmental impacts of our county's waste stream? Are you familiar with the benefits of composting? Are you interested in sharing these benefits with other members of your community? If so, we would like to invite you to participate in our Master Composter training program.

Master Composter volunteers offer their time and knowledge to members of their community who wish to learn how to build and maintain their own backyard compost and reap the benefits of recycling organic waste into a soil amendment. And, as more and more residents learn how to compost organic waste, our community's waste stream will decrease and consequently the threat to our landfill space will be lessened.

Master Composter volunteers are the backbone of our community composting education program. But, more volunteers are needed to sustain the program. Please consider donating your enthusiasm and composting skills to our compost education program so that we can work together to teach others how to create an organic soil conditioner and how they can reduce the amount of waste that is deposited in their local landfill. The next Master Composter training is scheduled for March 15 through April 27. Won't you please join us?

> Requirements: **Interest in composting** and willing to work with the public
> Training: Complete **18 hours** of training. Six (3 hour) sessions.
> Volunteer commitment: Donate **20 hours** to developing and conducting community compost education, such as **workshops**, **demonstrations,** and **youth programs.**

Please see the attached brochure for a training schedule and to learn more about the Master Composter program. If you are interested in becoming a Master Composter, please return the attached Registration form by February 15, 199_. We look forward to working with you.

If you would like additional information, please call our offices at 555-1234.

Sincerely,

Sandra Smith
Environmental Agent

Attachment

Sample – Media Advertisement

MASTER COMPOSTER

Educating For A Better Environment

Cornell Cooperative Extension Cayuga County
248 Grant Avenue
Auburn, NY 13201
(315) 555-1234 FAX: 315 555-1235

FOR IMMEDIATE RELEASE

CONTACT: Sandra Smith
PHONE: (315) 255-1234
DATE: March 1, 199_

CORNELL COOPERATIVE EXTENSION INTRODUCES THE MASTER COMPOSTER COMMUNITY VOLUNTEER PROGRAM

Cayuga County residents interested in promoting composting within their community are invited to participate in the recently established Master Composter Volunteer Program.

In an effort to promote composting within Cayuga County, Cornell Cooperative Extension has initiated a Community Compost Education Program. Since organic wastes make up twenty to thirty percent of our county's waste stream, composting these items will significantly reduce the amount of waste being deposited in local landfills. The goal of this program is to influence as many county residents as possible to compost their organic wastes via backyard composting.

In order to reach members of our county, Cornell Cooperative Extension is recruiting Master Composter Volunteers to provide community education. These volunteers are the backbone of the Community Compost Education Program and are responsible for conducting workshops, working within county schools, building and maintaining compost demonstration sites and various other outreach activities.

In order to become a Master Composter, volunteers must participate in a training program that covers the technical aspects of composting as well as teaching and community outreach skills. Anyone interested in helping others learn how to recycle their kitchen and yard waste into a valuable soil conditioner and wish to initiate composting within their community are asked to contact Cornell Cooperative Extension at 555-1234 for program details and an application form.

-30-

How does a Master Composter program benefit the community?

The Master Composter program benefits the whole community by furthering the goals of the Department of Public Works to reduce the amount of compostable materials going into the Allegany County landfill.

Master Composter projects in Allegany County will include ...

- compost bin evaluations
- compost bin demonstration sites
- workshops and presentations
- exhibits at community events
- composting newsletter
- monthly volunteer meetings
- school and youth programs

Got a question? Give us a call ...

(716) 268-9230

Master Composters are at your service ...

- slide presentations and lectures for your group
- technical assistance
- home consultations
- public workshop dates
- bin plans and suppliers
- fact sheets and bulletins
- school and youth programs

To learn more about the Master Composter program or home composting, contact:

Master Composter Program
Allegany County
Department of Public Works
Rm. 210, County Office Building
Belmont, New York 14813
(716) 268-9230

or

Cornell Cooperative Extension
of Allegany County
RD 1, Box 226
County Road 48
Belmont, New York 14813
(716) 268-7644

printed on recycled paper

Master Composters

Volunteer Program

Become involved in community by teaching others to compost!

A cooperative project of
Allegany County Department of Public Works
and
Cornell Cooperative Extension
of Allegany County

Who are Master Composters?

Master Composters are a group of volunteers trained to educate the public about, and instill enthusiasm for home composting. Volunteers achieve these gols in a number of ways. They conduct workshops at Demonstration Sites throughout the county. Through exhibits and demonstrations, they provide information at community events held during the year in various locations. Volunteers also offer troubleshooting and technical assistance to home composters.

Anyone who has an interest in or basic knowledge of home composting can become a Master Composter. The only requirements are enthusiasm for acquiring and sharing knowledge about composting and the interest and time to participate.

Become a Master Composter!

- **acquire new knowledge and the skills shared by composting experts**
- **reduce waste and produce some wonderful humus for gardening**
- **improve your teaching and leadership skills through community education**
- **gain a sense of satisfaction by initiating community composting effort**
- **make new friends and work as a team with others who share your interests**

Master Composters have fun while helping their community!

* attend and lead workshops and demonstrations
* write articles or fact sheets
* assist with youth programs
* help manage the demonstration sites
* speak about composting to local civic groups and clubs
* staff information booths at public events

How do I become a Master Composter?

To become a Master Composter, request a volunteer job description and application by calling the Department of Public Works at 268-9230. After we review your application, we'll schedule an interview and notify you about Master composter activities and training program dates. The Master composter training includes classroom sessions and field trips. Individuals with composting expertise provide in-depth instruction about various aspects of composting and the importance of composting in waste management. Workshops, field trips, and periodic meetings keep Master Composters abreast of the latest developments in composting.

Master Composter Volunteer Application (SAMPLE)

Name _____ Phone _____

Address _____ City _____ Zip_____

Are you currently composting? ❒ Yes ❒ No

What type of composting system do you use?
❒ Pile/Heap ❒ Compost Bin ❒ Vermicompost Other_____

Why are you interested in becoming a Master Composter?

_____

_____

Are you able to participate in the Master Composter Training scheduled for March 15 to April 27? (Six three-hour sessions)
❒ Yes, I wish to attend the Master Composter Training
❒ No, I will not be able to attend this training but would like to participate in the next scheduled training.

What type of compost training activities would you be interested in conducting?
❒ Adult Workshops
❒ School Programs
❒ Compost Demonstration Site Development
❒ Promotion at Local Special Events
❒ Other _____

Please return this application to:

Sponsoring Organization

ATTN: Master Composter Volunteer Program

MASTER COMPOSTER TRAINING (Sample Format)
Six Sessions, Three Hours Each

SESSION ONE	*Resource Manual Accompanying Text Page(s)*
Introduction (15 minutes)	
Personal Introduction	
Organization Introduction	
Master Composter Program Introduction	*1*
Ice Breaker Activity (30 minutes)	
Students' Introduction	
Solid Waste Management (30 minutes)	
Why Reduce?	*2*
Alternatives to Disposal	*2*
The Master Composter's Role	*3*
Break (15 minutes)	
Introduction to Composting (1 hour)	
What can be Composted?	*5*
The Compost Process	*6*
Decomposers' Role in Breaking Down Organic Matter	*7*
Compost Critter Guess Who (Activity)	*75*
Composting of Organic Materials (30 minutes)	
Compost Factors:	*11*
Carbon:Nitrogen Ratio	
Temperature/Size, Aeration (anaerobic vs aerobic)	
Moisture and Particle Size	
Compost Truth or Consequences Video (See Bibliography)	
Compost Benefits and Uses	*17*
Homework: Read Chapters One and Two	

SESSION TWO	
Successful Compost (45 minutes)	
What Can and Cannot Be Composted	*24*
Composting Methods	*26*
Composting Structures	*26*
Building a Hot Compost Pile	*27*
Break (15 minutes)	

	Resource Manual Accompanying Text Page(s)
Building a Compost (45 minutes)	
Two Can Compost Bioreactor (Activity)	*53*
OR	
Construction of an Outdoor Compost	*28*

Choose one of the above composts for your students to build. During the construction of the compost, students will learn the importance of layering and mixing high nitrogen and high carbon materials.

Using Compost (45 minutes) *19*
- Mulching
- Soil Amendment
- Mulching
- Class Suggestions (Brainstorming)

Review (30 minutes)
- Compost Factors
- Compost Structures
- Building a Compost
- Questions?

Homework: Read Chapter Three.

NOTE: Students interested in building a worm bin should bring a *plastic* container (approximately 12"x24"x8") or homemade box to the next class.

SESSION THREE

Composting in Small Spaces (30 minutes)
- Vermicomposting *31*
- Redworms Experiments/Activities *58-61*
- *Recycling With Worms* Video (See Bibliography)

Break (15 minutes)

Building a Worm Bin (30 minutes) *32*
- Students with worm bin materials will build a worm bin

Composting in Urban Areas (15 minutes)
- Trash Can Compost *38*

Compost Problems and Troubleshooting (30 minutes) *11-16*
- Odor
- Temperature
- Slow decomposition
- Pests

	Resource Manual Accompanying Text Page(s)
Troubleshooting Role Play Activity (30 minutes)	
My Compost Stinks, What Do I Do?	*68*
Compost Jeopardy (Activity) (30 minutes)	*75*

Homework: Read Chapter Four.

SESSION FOUR

Educational Tools (1 hour)	
Experiments	*44*
SODA BOTTLE COMPOST REACTOR (Activity)	*55*
Break (15 minutes)	
More Educational Tools (45 minutes)	
Demonstrations	*40*
Rubber Band Red Wiggler	*41*
Audiovisuals	*42*
Questions/Discussions	*43*
Interviews	*44*

Introduction of Practice Session Project (1 hour)
Students will have class time to prepare a 15-minute presentation, either individually or with another classmate (see Project Assignment Sheet, page 14).

Homework: Read Chapter Five and work on presentations.

SESSION FIVE

More Educational Tools (45 minutes)	
Experiments	*44-61*
Discovery Activities	*64*
Checklists	*65*
Role Play Activities	*68*
Projects	*71*
Field Trips	*72*
Guest Speakers	*72*
Games	*73*
Workshops and Special Activities (30 minutes)	
Adult Workshops	*85*
Youth Programs	*92*
Workshops for Teachers	*94*

	Training Manual Accompanying Text Page(s)
Special Outreach Activities (15 minutes)	
Demonstration Sites	*97*
Promoting Community Composting	*101*

Break/Resource Display (30 minutes)
Books
Videos
Other Resources
Students will have a chance to browse through resource materials.

Field Trip (1+ hours)
Possible field trips: compost demonstration site, municipal compost site.

Homework: Prepare for final presentation.

SESSION SIX (Student Presentations)

Indoor Presentations (1 hour)
Students with indoor presentations
Discussion of presentations

Break (15 minutes)

Outdoor presentations (1 hour)
Students with outdoor presentations
Discussion of presentations

Refreshments/Graduation Party (in time remaining).

STUDENT PRESENTATION PROJECT

You will either work individually or in pairs to develop a final compost education presentation, which will demonstrate your knowledge of constructing and maintaining a compost, as well as your ability to present this information to an audience. You will give this presentation to your classmates during the last session of your Master Composter training, which is _____ (date). Your presentation should incorporate the following requirements. You may refer to Chapter Four of the *Master Composter Resource Manual* for sample program activities.

Presentation Requirements:

1. 15 minutes (individual presentation).
   30 minutes (group presentation).

2. Teaches outdoor or indoor composting.

3. Designed specifically for either children or adults.

4. Must include at least one "hands-on" activity.

5. Must include one of the following learning tools, in addition to the "hands-on" activity: experiment, discovery, checklist, discussion, demonstration, display, role play, game, or audiovisual.

6. Must include at least one educational handout.

7. Must include questions from your audience.

The following form may help you organize your presentation project.

STUDENT PRESENTATION PROJECT

Presentation Topic:

Individual or Group Presentation:

Audience: (children or adults)

"Hands-on" activity:

Second activity (chosen from #5):

Handouts:

Materials needed:

My goal is to teach my audience...

Following are some examples of recordkeeping worksheets.

MASTER COMPOSTER WORKSHOP REPORT

Name of Master Composter(s):

Total number of volunteers hours:

Title of workshop:

Date of workshop: Time:

Location:

Method of promoting workshop:

Number of participants:

Number of first-time composters:

Main topics discussed:

"Hands-on" activities used:

Audiovisuals used:

Program successes:

Considerations for next time:

YOUTH EDUCATION PROGRAM REPORT

Name of Master Composter(s):

Total number of volunteer hours:

Title of program (if any):

Date: Time:

Length of presentation:

Location (name of school):

Names of teachers involved:

Grade level(s):

Number of children:

Brief description of how program was coordinated and promoted:

Topics of discussion:

"Hands-on" activities:

Program successes:

Considerations for next time:

SPECIAL PROGRAM REPORT

Name of Master Composter(s):

Total number of volunteer hours:

Title of program:

Description of program:

Date: Time:

Location:

Length of presentation (if applicable):

Community contacts involved:

Program successes:

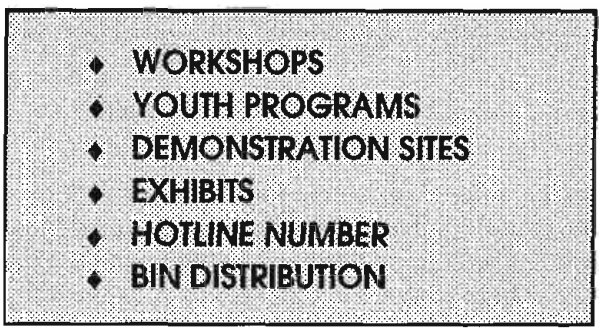
Considerations for next time:

Other comments:

Chapter Two

Community Outreach Programs

Master Composter volunteers will be the key to promoting home composting within the community. There are a variety of ways to attain community compost education goals. This chapter will explore the following Master Composter outreach programs.



Specific Master Composter projects and workshop formats are covered in Chapters Four and Five of the *Master Composter Resource Manual.* Remember that volunteers will be most successful if they are able to undertake projects of interest to them.

WHAT WORKS?

The University of Wisconsin Extension and the University of Wisconsin College of Natural Resources conducted a survey of bin manufacturers, extension agents, and recycling coordinators throughout the United States to determine what outreach activities and Master Composter Program elements are the most effective. Listed below are ten program elements thought to be the most successful for reaching local communities.

1. Master Composter Training
2. School Projects
3. Education Workshops
4. Demonstration Sites
5. Books and Booklets
6. Portable Displays
7. Utility Bill Inserts
8. Bag Tag Programs
9. Subsidized Bin Distribution
10. Bin Distribution At Cost

COMPOSTING WORKSHOPS

Offering composting workshops is a popular and effective way to bring compost information to the community. During a composting workshop, members of the community will have a chance to learn how and why to compost with their fellow residents. Workshops should be at a time you feel is most convenient for the particular audience. When scheduling workshops, keep in mind that an hour and a half is usually an adequate amount of time to teach a group of people about composting.

To ensure that your workshop demonstrates how to build a compost pile, participants should be given the opportunity to construct a pile during the workshop. Informative compost literature with your organization's name and telephone number should also be made available to the attendees.

To ensure that your workshop demonstrates how to build a compost pile, participants should be given the opportunity to construct a pile during the workshop.

You and your Master Composters may spend hours pulling together a superior compost workshop, however your efforts will not be well recognized if attendance is low. For this reason, it is important that the workshop is well publicized and appealing to the community. There are many incentives you can offer to help attract more people to your workshops.

Free Stuff! - Free drawings for books or tee-shirts can be promised to workshop participants, which will help persuade them to take part in your compost training. Distributing compost bins or materials to build a bin can also be offered at compost workshops.

Specialty Workshops - Workshops specifically designed for teachers or advanced composters may make your workshops more marketable.

Seasonal Campaigns - Offering a series of workshops that follow the seasons may be appealing to your community. For example, Spring "Grasscycling," Summer "Landscaping with Mulch," Fall "Backyard Composting," and Winter "Vermicomposting."

Another idea is to integrate composting/compost use into horticultural programs. It's easy to get a large audience for a class on perennials, so why not provide a little composting information when you have a captive audience.

YOUTH PROGRAMS

Sharing composting with children will make an impact on your community because after students have learned how to compost, they will most likely approach their parents about composting at home. Reaching school-aged children is also successful because children are more open to the idea of composting and do not have preconceived notions that composts "smell" or are "inconvenient." Lastly, young composters will grow up to be adults and hopefully continue to compost. As a result of your youth composting program, children, parents, and teachers will hopefully all be

composting. Working within schools is an excellent way to teach children about composting. You will find that many school teachers are willing to invite a Master Composter into their classroom. Master Composters may also work with children through youth organizations such as Boy Scouts, Girl Scouts, or 4-H. (See Appendix A for educational composting resources for schools and youth.)

Youth Programs

- School Classrooms
- Boy/Girl Scouts
- 4-H Clubs
- Conservation Field Days
- After School Clubs
- PTA

Another way to promote composting within schools is to create a workshop especially for teachers. During these workshops, Master Composters can introduce composting activities to teachers that they can later conduct with their students. Composting activities can relate to science, environment, language arts, and math courses. Teachers should also be taught the basics of composting so they have the background to successfully conduct the composting activities.

DEMONSTRATION SITES

Compost demonstration sites are an important outreach tool and should be a component of any Master Composter Program. Demonstration sites are effective because they serve as an ongoing promotional piece and allow people who have never seen a compost pile to observe first hand how they are constructed. These sites also provide a location for workshops and a source of sample compost. For those skeptical citizens who say "I'll believe it when I see it," demonstration sites are a perfect way of revealing the benefits of composting. In addition, building and maintaining a compost demonstration site is an excellent project for a Master Composter.

For those skeptical citizens who say "I'll believe it when I see it," demonstration sites are a perfect way of revealing the benefits of composting.

Master Composters should staff the demonstration sites occasionally. It is a good idea to staff the site during special events and on the weekend for two or three hours to answer questions and provide composting advice. A sign on who to call for more information should also be prominently displayed. Information on constructing a demonstration site, along with some sample site plans are included in Chapter 5 of the *Master Composter Resource Manual.*

COMPOST EXHIBITS

A compost bin or other promotional display does not necessarily have to be located at a compost demonstration site. There are many places Master Composters can set up a working compost bin. For example, a bin could be placed at an agricultural museum, county office building, elementary school, church, or at any location where it will be seen. Not only can Master Composters influence people to start composting at home, Master Composters can also bring composting to community work places to demonstrate the benefits and simplicity of composting almost anywhere!

HOTLINE NUMBER

Offering a compost hotline number is another possible component of a successful Master Composter program. Residents can call this number if they have questions about composting, want to request information about composting, or are inquiring about upcoming workshops and events. People can also call this number if they would like to register for a workshop or are interested in becoming a Master Composter.

The compost hotline does not necessarily have to be staffed throughout the day. An answering machine or voice mail system could be used to take messages and calls could be returned within a day or two by Master Composters. The hotline could also be advertised as staffed during certain hours of the day.

One of the advantages to having a compost hotline is being able to create a mailing list for future events and Master Composter recruitment. As each person calls, their name and address can be entered into a database and used for future mailing lists.

BIN DISTRIBUTION

If you choose to implement a bin distribution program, there are many possible ways you can do this. For example, the bins can be given away for free, sold at cost, or you may subsidize the bins and sell them at a discounted price. Much of this will depend on the funds that are available. If funds are low, you may find that selling the bins at cost will work best for you. Which ever method of distribution you choose, the success of your program will largely depend on the price you pay for the bins from the manufacturer. Research as many manufactures as possible to compare prices as well as bin features. A list of compost bin manufacturers is included at the end of this chapter to help you begin your search for wholesale compost bins.

In addition to selecting an appropriately priced bin, your promotional efforts will also determine the success of your program. Your community will not be able to take advantage of your free or discounted bins if they are not aware of their availability.

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Next, you will need to decide how you will distribute your bins. If you are interested in a small scale bin distribution program, you could start by giving out or selling discounted bins to workshop participants. Another alternative is to set up the bins at a shopping center for a particular weekend in conjunction with an intense advertising campaign. The following are other ideas for issuing bins.

Distributing Compost Bins

- Door-to-Door
- Shopping Centers
- Through Membership Clubs
- Contract with Garden and Hardware Stores
- Composting Workshops

If program participants cannot pick up their bins directly from a distribution site, volunteers will need to personally take the bins to these households and if possible provide a short educational session describing how to use the bin efficiently. Lastly, after you have distributed the bins, it is worthwhile to survey program participants approximately six months and again in 12-18 months to account for seasonal differences in use. Your survey should indicate how many households continue to use the bins and to what extent they are using them. This will help determine the effect of the bin distribution program on diverting wastes.

Bin Distribution Program Factors To Consider

- Bin Price
- Program Promotional Costs
- Delivery Costs
- Educational Costs (guides, brochures)

NOTE: Some follow-up surveys have shown that there was less use of the bins, if the bin distribution project was not coupled with educational information on composting.

(From *Resource Recycling*, June 1994)

Composting bin distribution yields waste diversion

By Marvin Tucker

The job of distributing 18,000 composting bins over an area the size of Centre and South Hastings (996 square miles) would be an enormous one. Much of the area is rural in nature and presents its own set of problems for the distribution crew. Work began in June of 1992. Staff were hired and went through an intensive one-week orientation and training period.

Urban Distribution

Distribution in the urban areas was handled primarily by door-to-door service. Various methods were tried. The most efficient method was a simple pass through neighborhoods to distribute composting bins and collect money. This was preceded by a flyer that was sent to each household. People who were not home to receive delivery received a "We Missed You" flyer, encouraging them to call the Composting Hotline. All information collected was fed into a database and in many cases, residents who were not home received a second visit or a phone call.

Residents also had the option of picking up a composting bin at two permanent depots that were set up in the main urban centers. Here, residents could choose from a wider variety of composting bins, including larger waste units.

Rural Distribution

Distributing composters in rural areas proved to be a very difficult task. The first approach was to encourage residents to go to a depot and pick up their composting bin. To accomplish this, temporary weekend depots were set up on two consecutive weekends. The depots, which were advertised in advance, were located at grocery stores that serve the rural community. One third of the rural composters were distributed in this manner.

For the remainder of the rural distribution, delivery of composting bins was preceded by a phone call. In this way, distribution crews went only to prearranged addresses, thereby minimizing the amount of driving. Although many staff hours were spent on the telephone, this method still proved to be more cost effective. Telephone staff found that in the vast majority of cases, residents were aware of the program and were often anticipating the phone call.

Promoting the Program

Promotion of the program was considered to be of prime importance. To cover promotional costs $2 ($CN) per distributed compost bin was built into the program budget. Program planners believed that the program should have a high profile in the community with plenty of press coverage, focusing on the positive aspects of composting.

The problem of promoting a new program over a large geographical area was overcome by dividing the area into six subregions. A local service club from each region participated by constructing a thermometer to monitor the local compost effort and kickoff events were staged in each area which received good press coverage. Probably the most effective tool in getting information about the program to residents was the flyer that was delivered to every household before bin distribution. The flyer contained all relevant information about the program and even had a tear-off portion that residents could fill out to speed up the service.

Newspaper articles and ads were also very useful in promoting the program.

Educating the Public

Of the approximately 18,000 composting bins distributed in 1992, about two thirds were taken by residents who had no previous composting experience. This statistic underlines the extreme importance that education plays in this program.

The best opportunity to get information to residents is at the front door at the time of delivery. During the program, staff were allocated 10 minutes per household for bin delivery. It was felt that this would be sufficient time to speak briefly to the householder and answer questions, and even assisting setting up the compost bin if this were necessary.

With each composting bin, a brochure was provided that included the telephone number for

the Composting Hotline for those who had questions later on.

Throughout the distribution period (summer and fall), well-advertised workshops were held in each municipality. Attendance was disappointingly poor. As has been the case in many municipalities, it is very difficult to get residents to come out and get involved in workshops. Considering the relative cost to notify residents about these events, it is hard to justify this expenditure.

Mastering Composting

In many municipalities, trained Master Composters provide composting information. In Centre & South Hastings, training began with the onset of winter in late 1992. Twenty enthusiastic individuals completed 30 hours of training: in return, the volunteers put in 20 hours per year of volunteer time in order to maintain their Master Composter status.

Many volunteers fulfill this obligation by visiting residents who have experienced problems with their compost bin. Other common volunteer activities include staffing compost clinics in plazas and malls, conducting seminars and workshops on composting, and developing and maintaining a compost demonstration site.

The compost demonstration site has been a very useful way to convey information about composting to residents. During 1993, a site was found in Centre & South Hastings that was adjacent to a developing community garden project. This demonstration project was built largely with donations and volunteer labor of Master Composters. Many of the composting bins on the site are in use, so residents can see what their composting bin should look like.

The demonstration site is used in various ways. Workshops are planned throughout the warm months. School groups make field trips during spring and fall. A series of videos, using the demonstration site, were developed in conjunction with the local cable television station.

Bin Distribution Results

To gauge the impact that the program has had on waste diversion, distribution staff documented the process thoroughly. The highlights of the distribution:

- A total of 28,707 households were contacted either by a staffer talking to the resident at his or her home or by the householder visiting the depot. This represents 86 percent of the 33,337 single-family households in Centre & South Hastings.
- Of the residents that were visited by staff, 20 percent (5,693) had no one at home. When the not-at-homes and the non-approached homes were added together, the number of households actually spoken with at depots and at the door was 23,014 or 69 percent of the total households. This indicates that the limits of this program have in no way been reached.
- Of the total number of composting bins distributed, 34 percent were distributed at a depot.
- Of the residents who were contacted at their homes, only 20 percent were not interested in getting a compost bin.
- Thirty-four percent of households approached were already composting.
- Once the distribution phase of the program was completed, an estimated 70 percent of households were composting. For various reasons the program hit a plateau at this point:

  — The available municipal funding was exhausted, essentially putting an end to the offer of free composters distributed door-to-door.

  —The response to this free offer by people who were already composting was much greater than anticipated.

  —31 percent of all households in Centre & South Hastings were either not contacted or were not home.

Results of the Survey

After the YIMBY program in 1992, it was estimated that 70 percent of the residents had a composting bin. Most of these people were fairly new to composting. This along with the fact that composting bins were distributed free, led to speculation that some of these composting bins were not being used or were being used improperly. To

measure the level of householder participation in composting, an in-depth survey was conducted in 1993.

Surveys were conducted with 408 rural and urban residents at their homes. To verify responses, survey canvassers went into 153 backyards of those residents surveyed and evaluated the composting bins on the use of kitchen waste, yard waste, and the volume of material in the bin. A maximum of three points could be scored in each category, with nine the highest possible score; six points were needed to be considered "in use." Scores and their distribution are shown in Table 1.

Table 1. Backyard Composting Evaluation Results

Score (0-9) (9 = highest)	Percentage of Householders
0	.7%
1	.7%
2	2%
3	1.3%
4	1.3%
5	11.3%
6	20.7%
7	13.3%
8	14%
9	35.3%

Of the 153 composting units examined, 125, or 82 percent, received a score of six or higher. The remaining 28 composters, although being used, were clearly not being used in an effective way, i.e. to divert a significant amount of waste. The 82 percent can be considered an effective-use rate, which can be useful in calculating real diversion rates.

Sixty-five percent of those surveyed were using a composting bin. When the 82 percent effective-use rate is applied, 53 percent of the residents are using backyard composting bins in a way that is effectively diverting organic waste from landfill.

The survey suggests that 24 percent of the households have a positive attitude about composting but are either not composting or are doing it ineffectively. Data collected during distribution puts this figure much higher, at about 32 percent. Although we have achieved a rate of 53 percent effective participation in composting, we have in no way reached the limit of what can be achieved in householder participation.

Forty-six percent of those composting have been doing so for less than a year, while 52 percent have not harvested finished compost—a significant portion. A key factor in measuring the sustainability of composter usage is whether a person has made use of the finished compost. This is a very precarious stage in the movement toward widespread sustainable use of backyard composting. Specific education and assistance to encourage residents to make good use of the finished product of composting will go a long way to achieving this sustainability.

Diversion and Savings

From composting bin distribution records over the past few years, we know that more than 24,000 composters have been distributed in Centre & South Hastings. Composter scoring information collected during the survey can be applied against accepted annual diversion rates for the average composting bin to derive an estimate for the annual organic waste diverted through backyard composting and the cost per ton of the program (see Table 2).

Each composter distributed will pay for itself in 2 1/2 years, by diverting landfilling costs. The municipal share of program costs will be compensated in only 10 months of composter use. As with curbside recycling collection, increasing participation and recovery rates will improve the return on investment.

The composting program in Centre & South Hastings has resulted in significant reduction of waste going to landfill, thereby saving money for participating municipalities. Each composter distributed (with a municipal cost of about $10) should result in an average savings of $200 ($CN) over the ten-year life of the composting bin.

To obtain copies of the complete report, or if you have comments or questions, contact Marvin Tucker, Centre & South Hastings Recycling Board, 270 West St., Trenton, ON K8V 2N3; (613) 394-6266 or fax (613) 394-6850.

BACKYARD COMPOSTING EVALUATION SCORE

Table 2. Diversion Rates and costs for Backyard Composting Project (expressed in Canadian Dollars)

Backyard Composting Evaluation Score	Number of Households	Percent of Householders	Estimated Diversion Rate Per Year (in Kilograms)	Total Diverted Tons Per Year
High (8-9 points)	11,760	49	300	3,528
Medium (6-7 points)	8,160	34	200	1,632
Low (5-0 points)	4,080	17	0	0
Total	24,000	100	500	5,160
Cost Of Program (10 years)				$1,166,00
Diversion Cost (per Ton)	(Cost of Program divided by 10 Years) divided by Total Diverted Tons Per Year			$ 22.60
Cost to Landfill (for 10 Years)	$114 per ton X Total diverted Tons X 10 years			$5,882,400
Net Savings	Landfill Costs - Cost of Program			$4,716,400

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BIN MANUFACTURERS

Commercially available compost bins come in many different shapes and sizes. Some are stationary; some can be rolled; and others are designed specifically for making hot compost. Some communities offer several to choose from; others only make available one type. The following lists some manufacturers and/or retail distributors of compost bins. If you are considering implementing a bin distribution program, you will want to compare prices as well as bin features. It's also a good idea to talk to others who have instituted such a program, and to contact waste management officials in your community for additional ideas and considerations.

Alsto Company
PO Box 1267
Galesburg, IL 61402
800-447-0048
(BioOrb Composting Systems)

ECO-WISE
110 W. Elizabeth
Austin, TX 78704
(512) 326-4496

Gardener's Supply Co.
128 Intervall Rd.
Burlington, VT 05401
(800) 863-1700

Planet Natural
1612 Gold Ave. PO Box 3146
Bozeman, MT 59772
800-289-6656 (Orders Only) or
406-587-5891 (for Info.)
Fax: 406-587-0223
E-Mail: ecostore@mcn.net

Rainbow Environmental Products
C/O GRN Inc.
2715A Montauk
Brookhaven, NY 11719
(The Earth Machine)

Real Goods Trading Co.
966 Mazzoni St.
Ukiah, CA 95482-3471
(800) 762-7325

Recycled Plastics Marketing
2829 - 152nd Ave. NE
Redmond, WA 98052
800-867-3201

TumbleBug®
2029 W.23 St.
Boise, ID 83702
(800) 531-0102

Chapter Three

Promoting Educational Programs

As a Master Composter Program Coordinator, it is your goal to reach as many members of your community as possible with information about composting. In order to accomplish this, you will need to set in motion a convincing publicity campaign. The quality of your campaign is important because the more residents that are aware of your compost education offerings, the greater your community participation will be. For this reason, a significant amount of time and funds should be set aside for the promotion of your programs.

There are various methods of advertising educational programs, so it will be most beneficial if you choose a plan that will utilize your resources most productively and will reach the greatest number of your residents. The following promotional methods will be covered in this chapter.

SPECIAL EVENTS

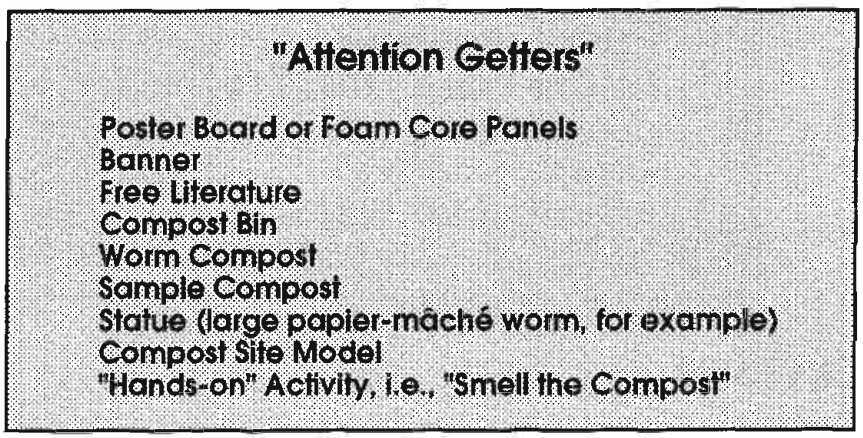
Special events are a perfect place to spread the word about your compost programs because you will have the opportunity to speak with a great number of people without spending a large amount on advertising. In fact during events such as county fairs and harvest festivals, Master Composters can easily make contact with 50 people an hour.

Earth Day and Home and Garden Shows are other events that are excellent places to publicize composting education programs. Prizes can be offered at Science Fairs for projects relating to composting. Local parades can also be an opportunity to create that "Compost Float" you have been dreaming of. If you plan to promote your programs through special events, it is important

that you keep in contact with various community groups in order to be aware of upcoming events. See Chapter 5, *Master Composter Resource Manual*, for additional information about workshops and special activities.

DISPLAYS

Displays and booths will probably be your means of contact with people at special events. If this is the case, an attractive display will help you lure people and capture their interest. Large, colorful signs demonstrating composting or an actual compost bin are great ways to make your booth more visible. When designing your booth, remember to consider how one or more of the following "Attention Getters" will be incorporated into your display.



"**Gimmicks**" are also an excellent luring technique. For example, free compost or a lottery drawing for a compost bin will become a main attraction. A "Compost Quiz" has also proved to attract people passing by and encourage them to think about composting. To make taking the "Compost Quiz" more appealing, you may want to offer a small prize to those who complete the quiz.

COMPOST QUIZ

Circle the most correct answer.

1. Composting is a...
   A. great new band out of Seattle.
   B. way to reduce your household trash by 20% or more.
   C. method of meditation.
   D. stitch used by quilters.

2. Finished compost can be used as...
   A. a soil conditioner for your gardens and yard.
   B. kitty litter.
   C. a soil substitute.
   D. food for the birds.

3. What makes compost happen?
   A. The sun.
   B. The rain.
   C. The Law of Thermodynamics.
   D. Fungi, worms, and other soil-dwelling critters.

4. What can you do to speed the compost process?
   A. Turn your compost often.
   B. Watch it.
   C. Water it.
   D. Add a "compost starter".

5. If your compost pile begins to smell bad you should...
   A. heave it into your neighbor's yard.
   B. turn it and add more dry material (carbon sources, such as leaves, straw, or brown yard trimmings.)
   C. burn it.
   D. cover it.

ANSWERS: 1, B; 2, A; 3, D; 4, A; 5, B.

MEDIA ADVERTISING

By working with the local media, you can advertise upcoming programs as well as make your community aware of the goals you and your Master Composters are working towards. Submitting articles to local newspapers will help publicize the grand opening of a new demonstration site or announce the beginning of a series of composting workshops. In addition, newspapers often have special "Home & Garden" inserts and would welcome a local article. Contacting a local television station may even get your "special volunteer project" highlighted on the evening news! Press releases and public service announcements are examples of free publicity you will probably want to take advantage of. Refer to the sample press release and public service announcement at the end of this chapter.

Display advertisements in newspapers and magazines are another advertising option. When designing these print advertisements, be sure to include all essential information, including directions to program location. Your advertisement will also be more visible if graphics and large print are incorporated into the design.

NEWSPAPER AND MAGAZINE ADVERTISEMENTS SHOULD INCLUDE:

- Date of Event
- Time of Event
- Location of Event
- Directions to Event
- Fee or "No Fee"
- Description of Event
- How to Register
- Organization's Name
- Organization's Phone Number

DISTRIBUTION OF FLYERS AND BROCHURES

Distributing flyers to members of your community is a very cost-effective method of promoting your programs, especially if the flyers are produced in-house. In order to successfully carry out this publicity technique, it is important that the flyers you design are informative and are placed in locations that will be available to many people. Distribution locations can include:

- Supermarkets
- Hardware Stores
- Garden Centers
- Shopping Malls
- Schools
- Churches
- Libraries
- Colleges
- Museums
- On Cars

Like print advertisements, your flyers should be appealing and include both text and graphics if possible. When designing your flyers, it is also critical that you incorporate all of the necessary information about your program: Location, Time, Date, Directions, Registration Fee (if it's free, make sure you indicate this on your flyer), Your Organization's Address and Phone Number. See sample flyer at the end of this chapter.

DIRECT MAIL

Direct mail is another method of promoting your compost programs. One of the most challenging aspects of coordinating a direct mail project is compiling a mailing list. Your list can be made up of association members, people who have contacted you for compost information, past workshop participants, or compiled from other resources that are available to you.

After you have compiled your mailing list, your campaign will be most effective if you put together a persuasive letter describing your program as well as an attractive program brochure. See samples at the end of this chapter.

DOOR-TO-DOOR

Approaching residents at home is another method of promoting composting within your community. Unlike a door-to-door salesperson, Master Composters will find that people will be more open to ideas when they learn the visitor is volunteering his or her time to educate the public about the benefits of composting.

When approaching a resident at home, Master Composters should begin by introducing themselves as a "Master Composter Volunteer" and asking the resident if he or she has a few minutes of free time to learn about the benefits of composting. Your Master Composter will probably be faced with one of the following replies:

A. Worst case scenario: "No." With this answer, the Master Composter should offer to leave a brochure describing the community composting program and politely leave.

B. A confused look. The Master Composter may want to elaborate on the topic and flash a few pictures of a compost bin.

C. "I'm sorry, this is really not a good time." This answer could either be a polite "No" or truly "not a good time." In this case, the Master Composter can leave some composting literature along with a telephone number to call for more information. The Master Composter may possibly return to this house at a later time.

D. "Yes, I would love to learn about the benefits of composting and how I can compost at home!" With this welcoming response, the Master Composter may sit down with the resident and talk about composting. Upon leaving, the Master Composters should be sure to leave sufficient composting literature to help the resident begin a compost bin and a number to call for additional information.

PROMOTIONAL PRODUCTS

Giving away promotional products is probably one of the more fun ways to promote your composting programs, however it is also one of the more expensive alternatives. You may order hats, tee-shirts, sweatshirts, coloring books, etc. with the name and logo of your program printed on them. Catchy compost slogans could also be included on your promotional products. As members of your community begin to see your products, they will become familiar with your program's name and the existence of your compost education projects. The following are some examples of compost slogans.

Slash your trash! Compost.

Compost! It's a rot of good sense (cent$)!

Composters like it hot and steamy.

Feed the Earth
Compost!

Send your leaves to a mulch better place. Recycle.

Give your yard waste a second chance Compost!

"Top Ten Reasons to Home Compost"

10. It keeps compulsive recyclers busy by opening up a whole new realm of things that can be "recycled".

9. It's like a backyard dating game. Carbon meets nitrogen and things begin to really heat up!

8. Prevents artichokes from clogging your kitchen garbage disposal.

7. Using a pitchfork to get some exercise is cheaper than joining a health club.

6. Because worms really WILL eat your garbage!

5. Composting will stop people from slipping on banana peels.

4. Compost bins give the plastics industry something to make out of old milk jugs.

3. Compost makes a great Christmas present for that aunt who gives you underwear every year.

2. Compost happens, whether you like it or not.

1. Using homemade compost improves your soil by increasing its water-holding ability, texture, and aeration. Compost also returns valuable nutrients to plants and reduces the need for chemical fertilizers.

Sample Press Release

FOR IMMEDIATE RELEASE

CONTACT: Sandra Smith
PHONE: (315) 555-1234
DATE: March 1, 199_

MASTER COMPOSTERS OF CAYUGA COUNTY REACH OUT TO PROMOTE BACKYARD COMPOSTING

Trained Master Composters are offering free compost workshops to residents interested in learning how to build and maintain a compost in their backyard.

Cornell Cooperative Extension is offering Compost Workshops during September and October at Emerson Park in Auburn and Center Park in Smithtown. These workshops are free to the public and will provide participants with the skills and advice they need to build and maintain a compost pile in their backyard.

Come join trained Master Composters and learn what to put in your compost pile, how to build an inexpensive hand-made compost bin and how finished compost can improve your garden and potting soil. You will learn the tricks of the trade from experienced composters that will help you produce first-rate compost with little effort.

Not only will composting generate a valuable soil conditioner for healthier and stronger plants, composting is a form of recycling that reduces the amount of waste deposited in landfills. Since 20 percent of household trash is compostable, composting this material can make a significant difference.

Sign up today and take advantage of this opportunity to learn how to build a compost in your backyard and how composting your organic wastes will help replenish the earth for a safer and healthier environment. Call Cornell Cooperative Extension, 555-1234 to register.

Workshops:	Saturday	September 14	10:00-11:30 am	Emerson Park
	Saturday	September 28	10:00-11:30 am	Center Park
	Saturday	October 12	1:00-2:30 pm	Emerson Park
	Saturday	October 26	1:00-2:30 pm	Center Park

Sample Public Service Announcement

FOR IMMEDIATE RELEASE
CONTACT: Sandra Smith
Phone (315) 555-1234
Date: July 1, 199_

PUBLIC SERVICE ANNOUNCEMENT

"Did you know your left over kitchen scraps and yard waste, such as leaves and grass clippings, can be composted in your backyard, turning them into a valuable soil amendment for your garden and houseplants?

Composting is a form of recycling. Since twenty percent of household trash can be composted, composting these materials will significantly reduce the amount of waste leaving your home. Kitchen scraps, leaves, grass clippings, and even shredded paper are just a few of the materials that can be composted.

Not only will you be doing your part to reduce the waste stream, you will also be making a product that is beneficial for your garden and plants.

Composting is easy and very inexpensive. If you would like to learn more about how you can begin a compost in your backyard, call Cornell Cooperative Extension at 555-1234.

Start composting in your backyard today!"

--30--

Sample Flyer

•COMPOST FAIR '98•

Saturday, April 25

10:00 a.m. - 2:00 p.m.

in conjunction with Ithaca Earth Day

Rain or shine

Cornell Cooperative Extension of Tompkins County

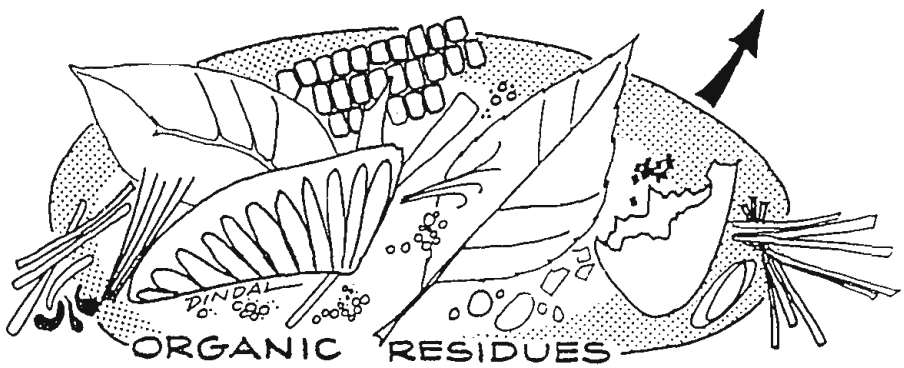
Dey Street exit, off Route 13, Ithaca (next to AAA)

FEATURING:

- **MASTER COMPOSTERS'** demonstrations and advice
- Hands-on construction of **'BIRDS' NEST' COMPOST CONDO**
- Free **BLACK GOLD** to first 50 households
- Free drawing for compost bin
- **WORMS & WORM BINS** for sale
- **KIDS' CORNER:** *make your own potting mix, plant a seed*
- Live performances of **COMPOST THEATER**
- **COMMUNITY GARDENS:** sign up for a plot
- New this year: earth-related **ART SHOW**
- **LASAGNA COMPOSTING:** a recipe for success in reducing garbage problems
- Bike safety check and parade to Commons activities
- Handmade **"NOBILES"** and collages
- County **EARTH MACHINES** for sale
- **SPRING TONICS** from JUICEWORKS

***Free and Open to the Public**, for fun and education*

For More Information, call the **ROTLINE: 272-2292**



Dan Dindal '96

Sample Direct Mail Campaign

Cornell Cooperative Extension Cayuga County
248 Grant Avenue
Auburn ,NY 13021
(315) 555-1234 Fax (315) 555-1235

MASTER COMPOSTER

Educating For A Better Environment

March 1, 199_

Dear Resident:

Do you put unwanted leaves and branches on the curb or in a garbage can for trash collection? Do you throw away kitchen scraps with the rest of your garbage? If you said yes to either of these questions, you may want to learn about how you can compost these items instead of sending them away with the rest of your trash.

Setting up a compost system is easy and you will be pleased to find after 3 - 12 months, rich dark "humus" at the bottom of your compost pile. This "humus" can be mixed with soil for your houseplants or garden or spread directly on your lawn or shrubs. Once your plants begin to thrive on the finished compost, you will see the difference. Your plants will be healthier, stronger, and more colorful than ever.

Your composting efforts will also benefit your community and environment. We are living in a time when there is much focus on recycling and reducing the amount of waste being deposited in landfills. Since yard and kitchen wastes make up at least 20% of the average household's trash, composting these materials will significantly reduce the waste stream, cutting waste disposal costs and replenishing the environment with the good things we have taken from it.

Cornell Cooperative Extension is now offering compost workshops throughout the months of September and October. These workshops will cover how to build an inexpensive compost bin and maintain an efficient compost pile that will yield quality compost with little effort.

Take advantage of these free training sessions and learn how you can do your part to reduce your trash and create a valuable soil amendment. See the enclosed program brochure for more details.

To register or for more information about the Community Compost Education Program, call Cornell Cooperative Extension at 555-1234.

Sincerely,

Sandra Smith
Community Compost Education Program Coordinator

Enclosure

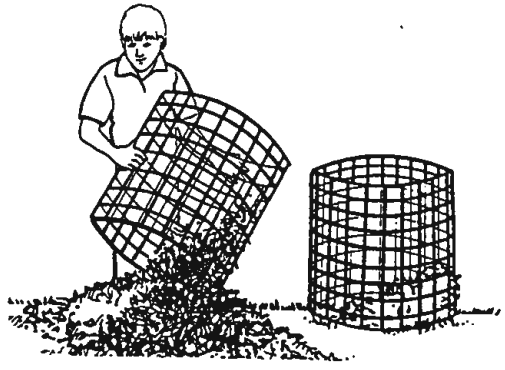
Management and Use

1. Moisture is necessary for the composting process to occur. True.
When starting a compost pile, it is best to spread refuse in layers about 6-8 inches deep. If no grass clippings are used, a cup or so of high-nitrogen fertilizer (10-10-10, cottonseed meal, or dried blood) per 30-35 square feet will provide the nitrogen needed for the decay process. All materials in each layer must be moistened thoroughly. Repeat this pattern as materials are added to the pile through the season. Keeping the center of the pile lower than the sides will direct additional rainfall into the pile.

2. A tightly constructed bin or enclosure is necessary for the production of good compost. False.
Building a compost pile is not an exact process. It begins with accumulating organic material in some out-of-the-way yet easy-to-get-to place. An enclosure made of wood, fencing, or cement block helps to keep the compost neatly stacked. Gardeners who have sufficient space can build a compost pile without walls. If a bin is used, walls should not be tight; air is needed for decay.

3. Compost can be used in a soil mix for starting flower and vegetable seedlings and transplants indoors. False.
Young seedlings and transplants are very susceptible to the disease microorganisms found in most soils and composts. To reduce the possibility of infection, it is best to use a commercially prepared sterilized soil or soilless mix when starting seedlings and transplants. It is very difficult to sterilize compost efficiently.

4. Burying organic waste directly in the garden is the simplest form of composting. True.
Yard wastes and kitchen scraps without meat, bones, or fatty foods decompose when buried directly in the garden, but because of the absence of air, some nutrients will be lost. All materials must be firmly covered with soil. Rodents and dogs may dig up wastes buried in soil less than 8 inches deep.



Cornell Cooperative Extension
of Tompkins County
615 Willow Avenue
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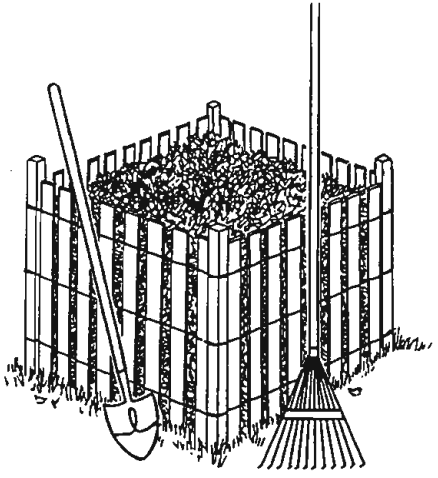
(607) 272-2292

Cornell Cooperative Extension provides equal program and employment opportunities.

Compost Facts

Answers to Commonly asked questions about your compost



Cornell Cooperative Extension

Compost Benefits

1. The disposal of solid wastes is a problem that can be dealt with only through municipal government action. False
Each of us can play our individual part to reduce the volume of solid waste that we generate. Most kitchen and yard wastes can be recycled naturally through the process of composting. Composting in the yard or at a local community garden requires much less energy and is less expensive than bagging, hauling, and processing such waste through municipal landfills.

2. The process of composting requires expensive shredders, containers, and other equipment. False.
Although certain hardware adds efficiency to the composting process, little investment is required. Chopping larger pieces of waste with a shovel or large knife hastens the decomposition process. Leaves and stems can be broken into small pieces if processed through a rotary lawn mower. Low-cost bins can be constructed from used fencing, lumber or cement block. Using a pitchfork facilitates turning and digging the compost.

3. Compost is a valuable soil amendment for use in garden and landscape plantings. True.
The use of compost improves plant growth by helping to break up and loosen clay soils, by increasing water-holding capacity in sandy soils, and by adding nutrients to all soils.

4. If you throw away grass clippings, you are throwing away money. True.
Save time and money by letting short grass clippings fall back to the lawn rather than bagging and discarding them. Clippings break down rapidly and produce nitrogen. When clippings are long and heavy they should not be allowed to remain as clumps on the lawn. When gathered and added to the compost pile, clippings can provide the nitrogen needed to break down other more woody wastes. Caution: Clippings from home lawn treated with pesticides may contain chemical residues. With a few exceptions, these residues will not persist from one growing season to the next. When information about the residue of a pesticide is not available, turf clippings treated with pesticides should not be used in the compost pile.

5. Yard waste - leaves, lawn clippings, etc. - makes up a relatively small portion of the total refuse from a typical household and need not be considered for recycling. False.
Yard waste makes up about 20 percent of a community's residential waste. On the average, each household annually produces about 600 pounds of yard waste. In addition to being a major waste component, yard waste usually is kept separate from other wastes from the home and can easily be collected for composting.

Composted Materials

1. Practically any plant material can be composted. True.
Leaves are ideal, but pieces of sod, manure, lawn clippings, fine wood chips or sawdust, straw, hay, and plant refuse from the garden or the kitchen also can be used. Shredding coarse materials such as mature cornstalks and woody prunings into smaller-sized pieces will reduce the length of time needed for them to decompose. Even newspapers can be composted, provided they are finely shredded, mixed with other materials, and supplied with nitrogen.

2. All kitchen wastes and garbage can be composted. False.
Although most food garbage can be composted, avoid grease, fat, bones, fish, and meat scraps. These materials attract dogs and nuisance animals and often develop an odor during decomposition. Fats are slow to break down and greatly increase the length of time required before compost can be used.

3. Diseased vegetable and flower plants should not be composted. True.
Diseased plants from the garden should not be used for compost if the compost is to be returned to the garden. Most diseases are killed by heating during compost formation, but unless the compost is turned frequently and allowed to remain unused for several years, some of the disease organisms may be returned to the garden with the compost.

4. For the composting process to occur most efficiently, special microorganisms, hormones, and activators need to be added to the compost pile. False.
The microorganisms needed to break wastes into compost are present in great numbers in all garden soil. In fact, there usually are sufficient microorganisms floating in the air to start the decomposition process. A few handfuls of garden soil added to the compost pile will ensure inoculation of the pile with organisms, thus eliminating the need to purchase any sort of "compost starter."

5. Weeds heavily laden with seeds should not be composted. True.
Although most plants and their seeds are killed during composting, some can be returned alive to the garden with the compost, thus creating an unnecessary weed problem. Most weeds that have been pulled or cut before developing seed can be composted. Mature, vigorous-growing perennial weeds such as quackgrass, bindweed, and nutsedge often are sufficiently hardy to survive decomposition and should not be composted.

Master Composter Resource Manual

Cornell Waste Management Institute

Master Composter Resource Manual

TABLE OF CONTENTS

Chapter One

The Master Composter Program

Master Composters are volunteers trained to educate and enthuse the public about home composting. The educational information is disseminated through a variety of activities, including conducting classes, workshops, and demonstration sites. The goal of the Master Composter Program is to assist communities to reduce the amount of waste going to the landfill or incinerator, and to develop a useable soil enrichment product.

SOLID WASTE MANAGEMENT

Thirty years ago, the average American generated about 2.5 pounds of trash each day. Now the national average exceeds 3.5 pounds per person daily! The choice of whether to produce trash in the first place, or to reuse and recycle our resources is up to us. We each make this choice every time we purchase a product or decide we no longer need something. These daily choices, multiplied by millions of people, have major effects on our environment and economy.

The materials in our garbage cans are trash only when they are all mixed together. When trash is separated into individual components, it is a "mother lode" of resources that can be reused or recycled into new products. In fact, much of our household waste can be converted to another use to avoid disposing of it. After we have exhausted the possibilities for recycling or finding new uses for our trash, only a few materials remain. These "leftovers" can then be examined to see if we could have found another reusable product or recyclable material that could have served the same purpose. These resource savings and reductions in pollution can increase the health of our community and economy.

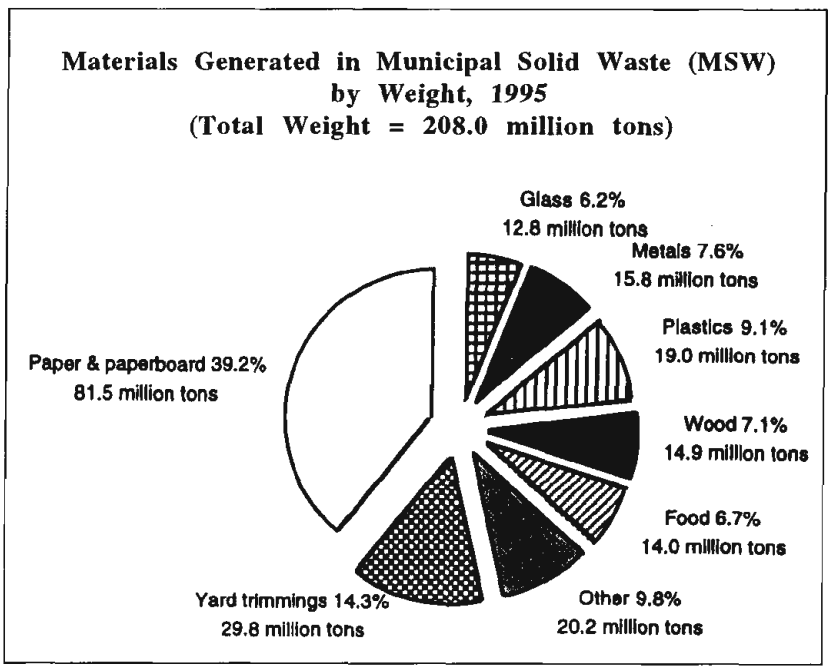


Figure 1.1 US EPA Report No. 530-R-96-015

Figure 1.1 depicts an EPA analysis of the total waste stream by weight. Paper is the largest component, with yard trimmings following in percentage. As you will learn in the following chapters, many of these components have great potential for recycling, ultimately reducing the amount of waste headed for the landfill.

Meeting Federal And/Or State Standards

Up until the mid-1980s, approximately 90 percent of America's solid waste was disposed of in landfills. However, growing environmental concern about the safety of many landfills across the nation led to the federal passage of the Resource Conservation and Recovery Act (RCRA) in 1986 requiring states to develop safe management standards for siting, operating, and closing landfills. States must either comply with federal standards established under RCRA, or develop their own standards which meet or exceed the federal rules.

Any new landfills must meet stringent siting standards related to soil geology, proximity to wetlands, impacts on neighboring land uses and ground water. RCRA standards also require both new and existing landfills to control stormwater runoff, monitor groundwater quality, and clean up contamination. Closed landfills must be covered with impermeable layers to keep water from leaching through the fill, while groundwater quality and methane build-up must be monitored for thirty years after closure. In most situations, the RCRA standards require that landfills install impermeable liners below new burial areas to collect leachate for treatment, as well as systems to collect and utilize methane gas.

Carrying out the requirements of these standards is a giant step toward minimizing many of the environmental problems associated with landfills. However, these improvements come at a great cost. Making new and existing landfills meet more stringent environmental standards is the impetus for a large part of the garbage collection rate increases around the nation in recent years.

The bottom line is that landfills are no longer an inexpensive way to dispose of solid waste, and communities across the nation are searching for economical alternatives. We have already committed to reducing and recycling wastes, and while we may never be able to completely eliminate the need for landfills, we must start to decrease the wasteful use of them as repositories for our discarded resources.

Alternatives to Disposal

In New York State, the Waste Management Act of 1988 calls for a 50 percent reduction in the amount of solid waste requiring disposal. The goal is to eliminate 8-10 percent through source reduction, and reusing and recycling 40-42 percent of the state's solid waste.

Source reduction refers to practices that reduce the amount of solid waste requiring either disposal, recycling, or composting. Examples of source reduction include packaging minimization, selective purchasing to avoid disposable products, leaving grass clippings on the lawn, and home composting.

Reusing and recycling refer to systems that collect, sort, and market individual materials such as paper, glass, metals, plastics, or yard trimmings, so they can be reused or made into new products.

"Reduce, Reuse, Recycle"

Compost Does It All!

All organic materials, over time, naturally break down into a rich, soil-like material that can be used as a soil amendment to help plants grow better, protect soil from erosion, and conserve other resources. Composting is simply a way to help speed up the natural recycling process of decomposition. Composting helps to "reduce" the amount of waste going to the landfill or incinerator, and "reuses" and "recycles" organic materials.

Why Waste "Black Gold?"

Compost is a much needed resource. It is not only useful to the home gardener, but is essential to the restoration of landscapes where topsoil has been removed or destroyed during construction or mining operations. Compost is increasingly being applied to agricultural and forest lands depleted of their organic matter. The most common use of compost today is probably in topsoil mixes used in the landscape industry. Compost is typically applied in three ways: to mulch or "top dress" planted areas; to amend soil prior to planting; and to amend potting mixes.

THE MASTER COMPOSTER'S ROLE

To recapture organic resources and reduce solid waste, changes in behavior are needed. Master Composters can play a key role in educating citizens about the beneficial uses of compost and in building an awareness of our solid waste situation. As a Master Composter you will inform and inspire people to create a valuable product, as well as help to change their current disposal habits.

The next chapter, "Composting: Nature's Recycling System," examines the special role of organic wastes in our garbage and the biology of composting. In subsequent chapters, you will learn about home composting options, educational tools for reaching out to the community, and workshops and special activities.

Chapter Two

Composting: Nature's Recycling System

In this chapter we will examine the potential for recycling organic debris through the natural process of decomposition. First we will examine the biological processes that transform organic materials into compost, then we will discuss how compost is used and how it improves soils and plant growth. We will focus on home composting of landscape trimmings and food scraps. These "wastes" are valuable resources.

WHAT IS "ORGANIC?"

Anything that is alive or was once alive is "organic." All plants and animals, and anything made from plant or animal parts, are organic. Any wastes generated by plants and animals, or remaining after we use products made from a plant or an animal, are also organic. Organic products are an important part of our economy and of our lives. Some of the common organic materials that we use and dispose of daily are listed below.

Common Organic Materials

Food - Fruits, vegetables, grains, eggs, dairy products, meat, and fish.

Clothing and Furnishings - Cotton, wool, burlap, leather, feathers, and down.

Building Materials - Untreated lumber and other wood-based materials.

Paper Products - Paper, newsprint, cardboard, and tissues.

By-products - Food processing wastes, sawdust, blood, bones, and fur.

Animal Wastes - Manure, sewage, and hair.

Landscape Trimmings - Grass clippings, leaves, prunings, fallen branches, and trees.

As you can see, organic materials account for much of what we consume and throw away every day. According to a recent analysis conducted by the US Environmental Protection Agency, paper products alone make up 39 percent, by weight, of the municipal solid waste stream. Landscape trimmings comprise more than 14 percent of our garbage, and food wastes, almost 7 percent. Due to the sheer volume of organic wastes produced, the way that we choose to handle these materials is one of the most important waste management decisions that we face today.

DECOMPOSITION: A PROBLEM AND A SOLUTION

Organic materials have many different qualities and uses, but all organic materials have a common trait that sets them apart from other materials: organic materials naturally break down, over time, into a rich, soil-like material called compost. Decomposition is inevitable. Compost happens. It's a process that has been going on for millions of years.

In some situations, particularly landfills, decomposition can create serious problems. When buried organic materials decompose in the absence of air, or anaerobically, they produce methane gas. If not properly managed, methane can build up in landfills or migrate into nearby buildings, creating a danger of explosion. As rain or groundwater percolates through a landfill, weak acids are produced by decaying organic matter. As these acids wash through the landfill they react with other trash, creating a potentially toxic leachate which can contaminate groundwater, lakes, and streams. Methane also contributes to global warming.

However, when organic materials are separated from trash and allowed to decompose with an adequate air supply (aerobic decomposition) they can be turned into a valuable soil amendment which helps plants grow better, protects soil from erosion, retains moisture, and conserves other resources.

THE COMPOST PROCESS

The natural processes of decomposition are the basis of recycling systems for many types of organic materials. Some of the organic materials management systems currently being promoted as measures to conserve organic matter and solutions to our solid waste problems include:

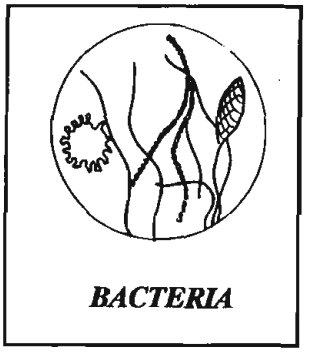
- Changing landscaping practices to reduce waste and management requirements.
- Leaving grass clippings on lawns to help recycle nutrients.
- Backyard composting of landscape trimmings and food scraps.
- Use of organic materials as mulches to protect soil from erosion and help establish new plantings on disturbed lands.
- Centralized composting by municipalities of landscape trimmings to produce soil amendments.

Each of these composting systems has advantages and disadvantages. Which system is preferred for a given situation depends on the volume and type of organic materials to be handled; if the material generators are large or small, concentrated or dispersed; and the convenience and availability of transportation and markets. Yet all of these systems work on the same biological principles described in the following sections.

Bacteria: Powerhouse of the Compost Pile

The most numerous organisms in a compost pile are bacteria. Too small to see individually, the effects of bacterial work are easy to detect. Bacteria generate the heat associated with composting, and perform the primary breakdown of organic materials, setting the stage for larger decomposers to continue the job.

Bacteria don't have to be added to the compost. They are present virtually everywhere, and enter the pile on every single bit of organic matter. Initially their numbers may be modest, but given the proper conditions (proper moisture, air, a favorable balance of carbon and nitrogen, and lots of surface area to work on) bacteria can reproduce at a remarkable rate.



BACTERIA

Bacteria reproduce by division; simply laying down a wall through the middle of their bodies and becoming two. Then they do it again and become four, then eight, sixteen, thirty-two, and so on. This might not be as impressive if it didn't happen so fast. Less than a teaspoon of the common bacteria Escherichia coli, would become a pound in three hours, and a mass the size of the earth in one and a half days if sufficient food and proper conditions were available. Luckily for us, these conditions have never been met!

Many types of bacteria are at work in the compost pile. Each type thrives on special conditions and different types of organic materials. Even at temperatures below freezing, some bacteria can be at work on organic matter. These psychrophilic bacteria (a group of bacterial species that includes all those working in the lowest temperature range) do their best work at about 55°F (13°C), but they are able to carry on right down to 0°F (-17°C). As these bacteria eat away at organic materials, they give off a small amount of heat. The temperature in the compost pile will rise whenever microbial heat production exceeds heat lost to the environment. Therefore, to increase the temperature, it is necessary to encourage heat production by supplying ideal conditions for the bacteria, or to prevent heat loss by constructing the pile appropriately. If conditions are right for them to grow and reproduce rapidly, this heat will be sufficient to set the stage for the next group of bacteria, the mesophilic, or middle-temperature-range, bacteria.

Mesophilic bacteria thrive at temperatures from 70-90°F (21-32°C), and just survive from 40-70°F (4-21°C), or from 90-110°F (32-43°C). In many compost piles, these efficient mid-range bacteria do most of the work. However, given optimal conditions, they may produce enough heat to kick in the real hot shots, the thermophilic, or heat-loving, bacteria.

Thermophilic bacteria work fast, in a temperature range of 104-170°F (33-76°C). Unless the pile is fed new materials or turned at strategic times, they will work for only 4 to 7 days until their activity peaks and the pile cools down below their optimum range. But what activity in those 4 to 7 days! In that short time, they turn green, gold and tan organic material into a uniform deep brown. If the pile is turned and kept loose and fluffy so that air can get in, the thermophilic bacteria will feast for another 4 to 7 days. (Large compost piles with a volume of several cubic yards or more can retain enough heat to keep thermophilic bacteria alive for several weeks or longer.)

Nonmicrobial Composters

In all of this work, the bacteria are not alone—though at first they are the most active decomposers. Other microbes, fungi, and a host of invertebrates take part in the composting process (see Figure 2.1). Some are active in the heating cycle, but most organisms prefer the cooler temperatures of slow compost piles or proliferate only when hot piles start to stabilize at lower temperatures.

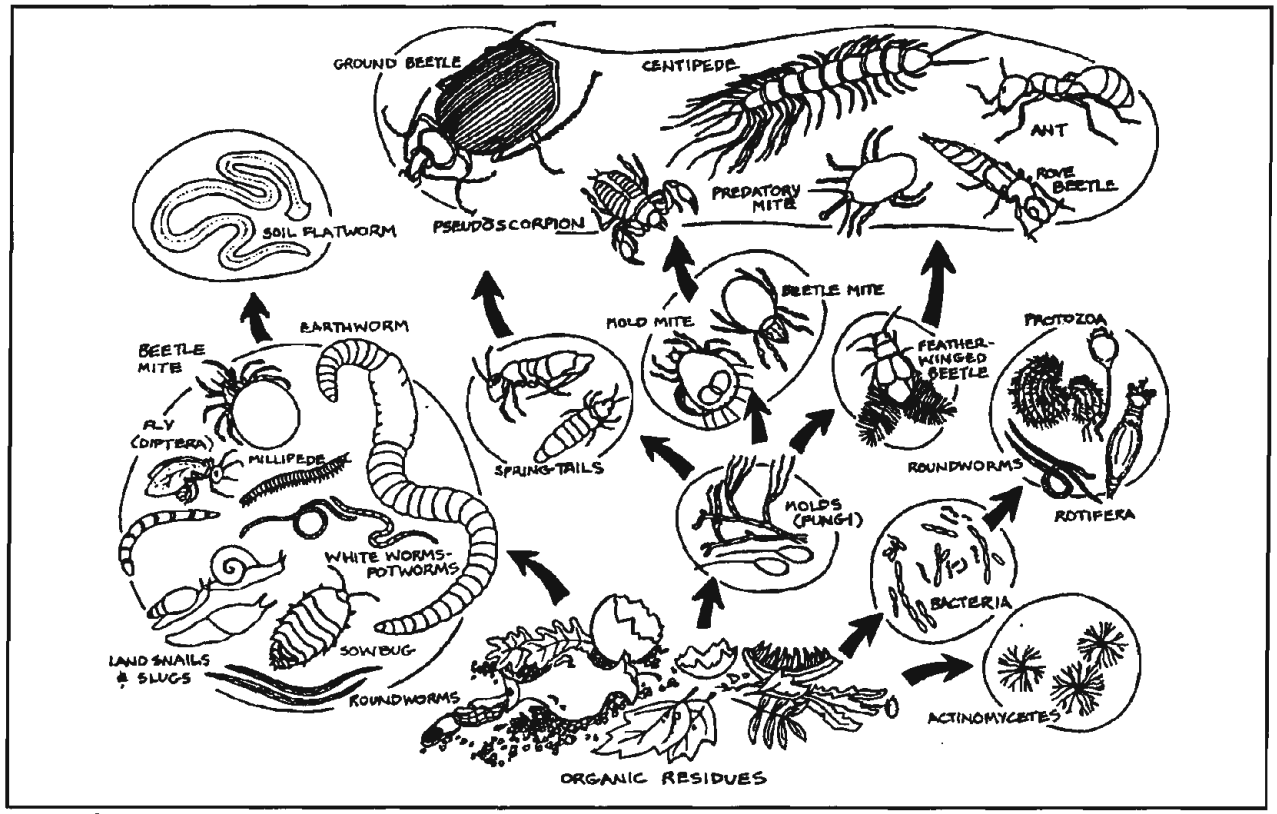
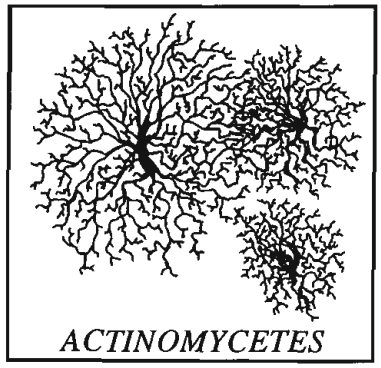
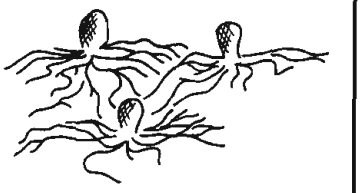


Figure 2.1 Organisms commonly found in a compost pile food web

As you can see, a compost pile is a real zoo! Besides the many types of bacteria, a multitude of larger organisms, many of them feeding on the spent bacteria and their by-products, add diversity to the compost pile. The following is just a sampling of some of the more common organisms in this diverse group.



Actinomycetes are a type of primary decomposer common in the early and late stages of the pile. Actinomycetes produce grayish cobwebby growths throughout compost that give the pile a pleasing, earthy smell similar to a rotting log. They prefer woody materials and survive a wide range of temperatures and conditions. Actinomycetes appear to be responsible for the ability of some composts to suppress plant diseases.

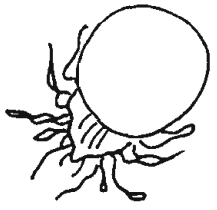


FUNGI

Fungi also perform primary decomposition in the compost pile. Fungi send out thin mycelial fibers like roots, far from their sporeforming reproductive structures. The most common of the reproductive structures are mushrooms that sometimes pop up on a cool pile. Though they are major decomposers in the compost pile, fungal decomposition is not as efficient as bacterial decay. The growth of fungi, even more than bacteria, is greatly restricted by cold temperatures. Since they have no chlorophyll, fungi must obtain their food from plants and animals. Parasitic fungi exist on living plants or animals. Most fungi are saprophytic, living on decayed vegetable and animal remains

NEMATODES

Nematodes, or roundworms, are the most abundant invertebrates in the soil. Typically less than 1 millimeter in length, they prey on bacteria, protozoa, fungal spores and each other. Though there are pest forms of nematodes, most of those found in soil and compost are beneficial.

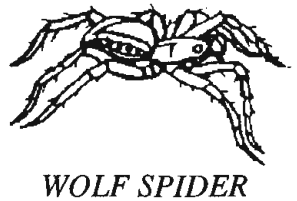


MITE

Fermentation mites, also called mold mites, are transparent-bodied creatures that feed primarily on yeasts in fermenting masses or organic debris. Literally thousands of these individuals can develop into a seething mass over a fermenting surface. As a result, they often become pest species in fermenting industries, such as wineries and cheese factories. They are not pests in the compost pile.

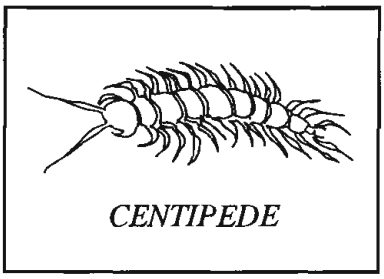
COLLEMBULA

Collembola (Springtails), along with nematodes and mites, share the numerical dominance among soil invertebrates. They feed principally on fungi, although they also eat nematodes and small bits of organic detritus. They are a major population controlling factor on fungi.



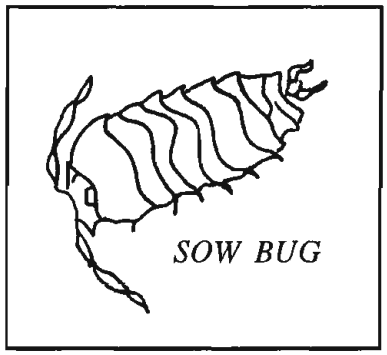
WOLF SPIDER

Wolf spiders are truly "wolves" of the soil and compost microcommunities. They build no webs, merely run freely hunting their prey. Depending on the size of the spider, their prey can include all sizes of arthropods, invertebrate animals with jointed legs and segmented bodies.



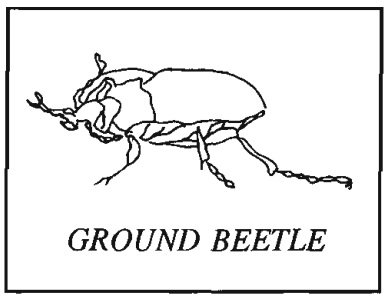
CENTIPEDE

Centipedes are frequently found in soil and compost microcommunities. They prey on almost any type of soil invertebrate near their size or slightly larger.



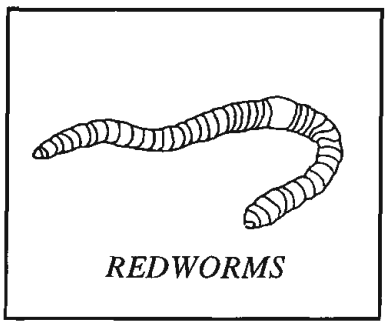
SOW BUG

Sow bugs feed on rotting woody materials and highly durable leaf tissues, such as the veins comprised of woody xylem tubes. Sow bugs that roll up like an armadillo are known as pill bugs or roly polys.



GROUND BEETLE

Ground beetles have many representatives lurking through litter and soil spaces. Most of them feed on other organisms, but some feed on seeds and other vegetable matter.



REDWORMS

Redworms play an important part in breaking down organic materials and in forming finished compost. As worms process organic materials, they coat the material with a mucus film that binds small particles together into stable aggregates and helps to protect nutrients from being leached out by rain. These stable aggregates give soil a loose and well-draining structure.

Unwanted Guests: Pests of the Compost Pile

Given a comfortable or nourishing environment, pest species will show up to "get in on the composting action." Common pests in compost systems include house and fruit flies, rodents, raccoons, and domestic animals such as cats and dogs.

Rats are probably the least-wanted guests of all. With a hospitable environment and plenty of food, their numbers increase quickly and they may become transmitters of disease. Although pests may take residence in any compost pile, they are especially attracted to the same high-quality foods that humans and our pets like to eat. So it is important to be very careful about composting food wastes. Vegetative kitchen scraps, including vegetable and fruit trimmings, grains, and coffee grounds, may be added to compost piles in moderate amounts provided they are covered by adequate layers of finished compost, leaves, straw, paper, or garden trimmings. Composting large amounts of animal products, including meat, chicken, or fish remains; cheese, butter, or other dairy products, is not recommended, but small amounts of these materials, such as those found in casseroles or plate scrapings, can be added if covered properly. If you do find that pests are attracted to your pile, you should cover the pile more completely, or discontinue adding these products.

Pet food and feces should be kept out of compost piles. Pet food may attract rodents that carry diseases, and stray dogs or cats can make a mess out of a compost pile. Pet feces may contain diseases that are dangerous to humans, particularly children and pregnant women. We will look at safe methods for composting many food materials in Chapter 3.

BASIC COMPOST FARMING

Put a pile of leaves, an old cotton rag, or a freshly cut board out in the environment and decomposition is bound to occur. How long the process takes depends on a number of factors: the makeup of the materials, the amount of surface area exposed, the availability of moisture and air, and the presence of insulating materials around the decomposing object.

It is useful to think of composting as growing microorganisms. Just as a farmer keeps in mind the basics of fertility, cultivation, irrigation, and the season when growing a crop; a good composter focuses on the materials being composted, their preparation, and keeping them moist to ensure a healthy compost crop. Fortunately, as composters we can do much more to control the conditions in a compost pile than a farmer can do to control the weather.

Understanding how to create the ideal composting conditions described here will allow you to make compost quickly and help you to diagnose and solve composting problems. But remember that provided sufficient time, perfectly good compost can be made without any preparation at all.

Materials: "Greens" and "Browns"

All living organisms need relatively large amounts of the element carbon (C) and smaller amounts of nitrogen (N). The balance of these elements in a material is called the carbon-to-nitrogen ratio (C:N). This ratio is an important factor: it determines how easily bacteria are able to decompose an organic material. The microorganisms in compost use carbon for energy and nitrogen for protein synthesis, just as we use carbohydrates for energy and protein to build and repair our bodies. The optimal proportion of these two elements used by the bacteria averages about 30 parts carbon to 1 part nitrogen. Given a steady diet at this 30:1 ratio, bacteria can decompose organic

material very quickly (Figure 2.2). The higher temperatures reached when the C:N ratio is optimal results in greater bacterial activity.

Carbon:Nitrogen Ratio Effects on Composting

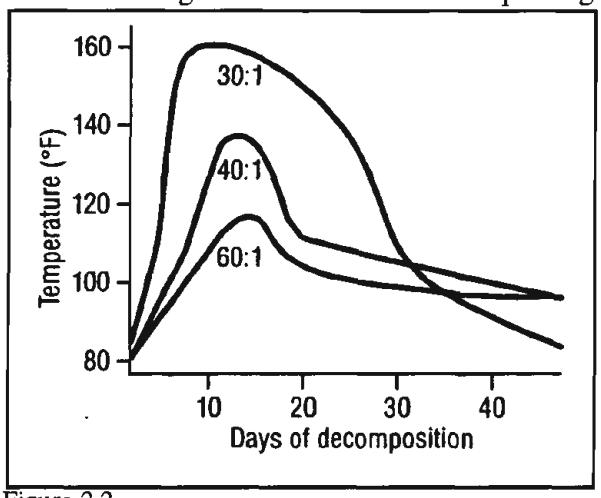


Figure 2.2

It helps to think of materials high in nitrogen as "greens," and woody, carbon-rich materials as "browns." There is often a visual correlation between high nitrogen content in green plant material and high carbon content in brown material. The C:N ratios for several common organic materials are listed below. As you will see, most materials available for composting don't have the ideal carbon-to-nitrogen ratio. One way to speed up composting is to combine nitrogen rich "green" materials such as grass clippings with carbonaceous "brown" materials such as autumn leaves, to create a mix with a 30:1 carbon-to-nitrogen ratio. For instance, a mixture of one-half brown tree leaves (40:1 ratio) could be used with one-half fresh, green grass clippings (19:1 ratio) to make a pile with the ideal 30:1 ratio. This balancing works best on a weight, rather than volume, basis.

Average Carbon:Nitrogen Ratios		
Food scraps	15:1	
Grass clippings	19:1	GREENS
Rotted manure	25:1	
	30:1	*IDEAL FOR COMPOSTING*
Corn stalks	60:1	
Leaves	40-80:1	
Straw	80:1	BROWNS
Paper	170:1	
Sawdust, woodchips	500:1	

These C:N ratios are only guidelines. For instance, brown grass clippings from an unwatered lawn will have far less nitrogen content than green clippings from an abundantly fertilized lawn.

Similarly, the leaves from different types of trees vary in the C:N balance. There are also some confusing exceptions to green-nitrogen, brown-carbon correlations. For instance evergreen leaves are low in nitrogen, brown-colored animal manures are often high in nitrogen, and brown coffee grounds are high in nitrogen.

The best way to become familiar with C:N balancing is to try to be specific about it for a while, then relax into an intuitive assessment of what a pile needs. Think like a chef varying the ingredients for a recipe. Be curious, write down the type and quantity of materials used, and take note of the temperature your pile reaches and the quality of the finished compost. After a while, the process becomes intuitive like cooking.

Surface Area

A melting block of ice provides a good analogy for how surface area effects the speed of decomposition. A large block of ice melts slowly, but when it is broken into smaller pieces the surface area increases, and the ice melts quicker. Similarly, when large, coarse or woody organic materials are chopped or shredded into smaller pieces, the composting process speeds up (see Figure 2.3). With more surface area exposed, bacteria have greater access to easily available food. However, if the pieces are too small, they may compact together and aeration might be a problem. A mixture of both large and small particles is usually best for optimum composting.

Particle Size Effects on Composting

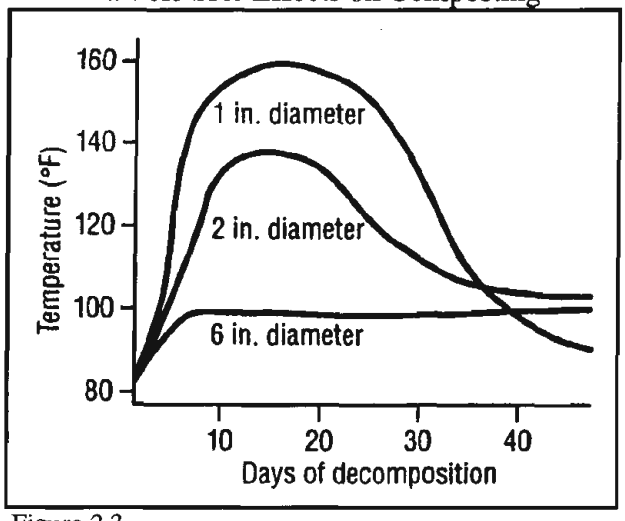


Figure 2.3

It is not essential to break organic materials into small pieces in order to compost them, it just speeds the process. In some instances, such as when using organic materials as mulches, slow decomposition is advantageous. The less surface area that is available on a mulch, the slower it decomposes and the longer it will continue to control weeds, slow evaporation, and stop soil compaction and erosion. However, if your goal is to make hot compost, increasing the surface area will speed up microbial heat production.

Moisture and Aeration

All compost organisms need a certain amount of air and water to survive. The amounts of air and water in a compost pile form a delicate balance that must be maintained for rapid decomposition to take place. Too much air circulating in the pile can make the pile too dry for bacteria to function. At less than 40 percent moisture, the bacteria are slowed by the lack of water. At greater than 80 percent moisture, the pore spaces between particles fill with water so there is not enough air for "aerobic" decomposition to continue. Anaerobic bacteria, which thrive in the absence of oxygen, can take over the pile. Anaerobic decomposition is slow and can produce unpleasant by-products, including an odor similar to rotten eggs.

Optimal moisture levels for composting occur when materials are about as moist as a wrung-out sponge. It should be obviously moist to touch, but yield no liquid when squeezed. This level of moisture provides organisms with a thin film of water on materials, while still allowing air into their surroundings.

The shape of your pile (Figure 2.4) can affect moisture levels. To help slough off water, you can build the pile in a convex shape. If the compost pile does become too wet, it should be turned (pulled apart, dry material added if available, and restacked) to allow air back into the pile and to loosen up the materials for better draining. Mixing materials of different sizes and textures also helps to provide a well-drained and well-aerated compost pile.

Conversely, if an undecomposed pile becomes dry, it needs to be pulled apart and watered as it is restacked. Simply watering an intact pile from above is usually not effective because dry organic materials often shed water. Dry materials must be gradually wetted and mixed until they glisten with moisture. Prolonged exposure to rain can effectively soak a dry compost pile. Shaping the pile to collect rain, building it in a shady spot, or covering it if you are in a really dry climate, are also methods for maintaining moisture.

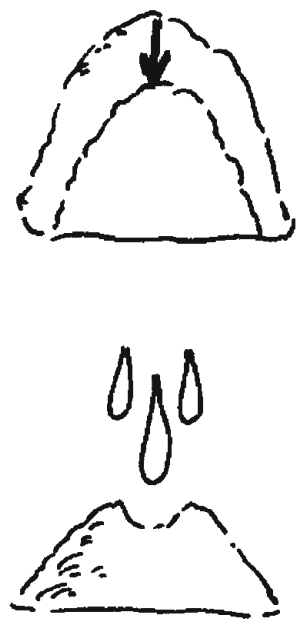


Figure 2.4

Volume

For fast, efficient composting, a compost pile must be large enough to hold heat and moisture, and small enough to admit air to the center. As a rule of thumb, compost piles need to be at least 3 ft. by 3 ft. by 3 ft. (1 cubic yard). A smaller pile will dry out easily, and cannot retain the heat required for quick composting. However, by insulating the sides of smaller piles, higher temperatures and moisture can be maintained.

Optimal Compost Pile Size

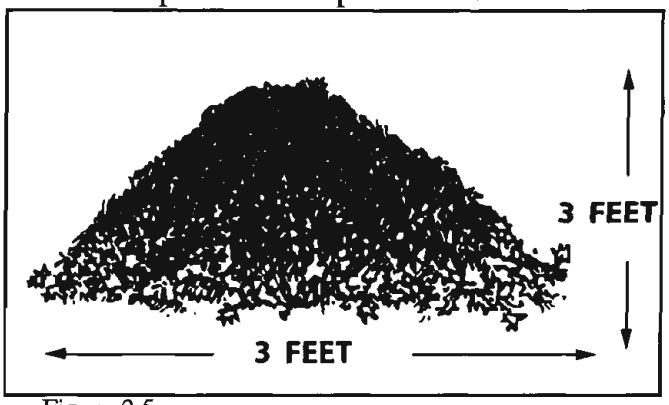


Figure 2.5

The upper limits for an aerobic compost pile are about 5 ft. by 5 ft. by any length. Larger piles must be turned frequently or have "ventilation stacks" placed throughout the pile to allow air into the interior so anaerobic conditions are prevented. Figure 2.6 shows the effect pile volume can have on decomposition.

Pile Volume Effects on Composting

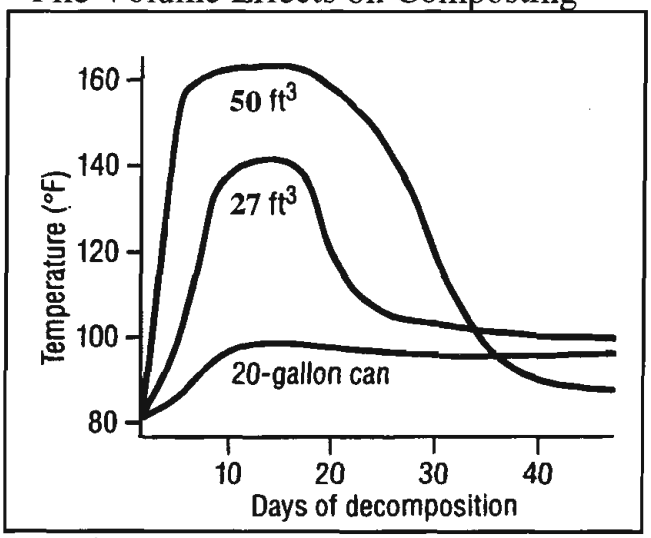


Figure 2.6

Time and Temperature

The hotter the pile, the faster the composting process. As we've seen, temperature is dependent on how we manage our microorganism farm. An intensly managed hot home compost pile built with proper consideration of carbon to nitrogen ratios, surface area, volume, moisture, and aeration can complete the hot phase of compost as quickly as three weeks. There is still, however, the need for an adequate curing period before using the compost. Following is a list of some of the most common problems with hot compost piles, and solutions.

Troubleshooting Hot Compost Piles		
Symptoms	**Problems**	**Solutions**
Pile is wet and smells like rotten eggs.	Not enough air; pile too wet.	Turn it; add coarse, dry wastes such as straw or corn stalks.
Center is dry and contains tough woody wastes.	Not enough water in pile. Too woody.	Turn and moisten; add fresh green wastes; chop or shred.
Pile is damp and warm right in the middle but nowhere else.	Pile too small, or too dry.	Collect more material and mix into a new pile; moisten.
Pile is damp and sweet-smelling, but will not heat up.	Lack of nitrogen in pile. Compost is done!	Mix in fresh grass clippings or nitrogen fertilizer.

A commercial composting operation that thoroughly shreds materials and turns or aerates piles may require 6 to 12 weeks to produce compost because the smaller particle sizes and increased pile volumes of larger systems reduce aeration in the interior of piles, slowing down the process.

Curing

Compost mixtures require a "curing period" to finish the process and to develop the desired characteristics of a mature product. Curing continues the decomposition of the compost through an aerobic process, though at a much slower pace, and can, if desired, usually take place in a separate area. Curing piles do not require turning and remixing, although the piles should be small enough to allow air circulation.

It is important to locate curing piles in well-drained areas with surface water channeled away from the piles. Slower decomposition does not generate enough heat to drive off excessive moisture, and anaerobic or sour conditions can develop, leading to odor and the development of compounds toxic to plants. Piles that contain too much moisture will need to be remixed and spread out to allow air circulation and evaporation. They can be restacked again in a day or two where active composting may occur again for a short time.

Finished compost is dark, crumbly, and earthy smelling. It looks like rich soil. The original organic materials that went into the compost pile are no longer recognizable in finished compost, except for some woody pieces. You may be tempted to use compost before it is ready. However, if incompletely decomposed material is added to the garden, compost bacteria may compete with plants for nitrogen in the soil, resulting in yellow leaves and stunted growth. Organic acids in

composting materials may also harm plant roots. If compost is still hot, smells like ammonia, or you can still recognize much of the original material which went into the pile, then it is not ready to use yet.

Curing is a critical and often neglected stage in the process during which the biological decomposition of the compost is completed. It is recommended that the curing process take a minimum of one month. Long curing periods provide a safety net helping to reduce the chances of using immature compost. The curing period may be considered complete when the temperature of the pile stays at or near the ambient level.

BENEFICIAL PROPERTIES OF COMPOST

Whether a compost pile is quick and hot or slow and cool, when the decomposer organisms have completed their work, the contents of the pile have been transformed to an entirely new material. Most of the trimmings that made up the pile are no longer recognizable in the finished compost—with the exception of some persistent, woody parts. What remains is dark, loose, crumbly material that resembles rich soil. The volume of the finished compost has been reduced to about 30 to 50 percent of what went into the pile because of biochemical breakdown and water respiration. The compost is now ready to use for growing new plants, and to begin the cycle over again.

Compost will improve the quality of almost any soil by improving the "structure" of the soil. The structure of a soil determines its ability to drain well, store moisture, and provide for the needs of healthy plants. Although compost provides important nutrients, it is not a substitute for fertilizers. More important than the nutrients supplied by compost is its ability to make existing nutrients more easily available to plants.

Improves Soil Structure

The value of compost as a soil amendment is suggested by its appearance. Even a casual observation of soil amended with compost shows that it is made up of many round, irregular "aggregates." Aggregates are groups of particles loosely bound together by the secretions of worms and compost bacteria. If these aggregates are rubbed between a finger and thumb, they break down into smaller aggregates. In between and within the aggregates themselves are many small air channels like the empty spaces left in a jar of marbles.

A well-structured soil with lots of small aggregates stays loose and easy to cultivate. The channels that aggregates create through the soil allow plant roots and moisture to penetrate easily. The smaller pores within the aggregates loosely hold moisture until a plant needs it. The larger pore spaces between the aggregates allow excess water to drain out and air to circulate and warm the soil.

By encouraging the formation of aggregates, compost improves the structure of every type of soil: silt, sand, or clay. In loose sandy soils, compost helps to bind unconsolidated particles together to retain water and nutrients that would normally wash right through. Added to a clay or silt soil, compost breaks up the small, tightly bound particles and forms larger aggregations. This allows water to drain and air to penetrate.

Promotes Plant Growth

Dark, loose compost looks like it should be rich in nutrients. Indeed, compost contains a variety of the basic nutrients that plants require for healthy growth. Of special importance are the micronutrients present in compost, such as iron, manganese, copper, and zinc. They are only needed in small doses, like vitamins in our diet, but without them plants have difficulty extracting nutrients from other foods. Micronutrients are often absent from commercial fertilizers, so compost is an essential dietary supplement in any soil.

Compost also contains small amounts of the macronutrients that plants need in larger doses. Macronutrients include nitrogen, phosphorous, potassium, calcium, and magnesium. These nutrients are usually applied in measured amounts through commercial fertilizers and lime. The three numbers listed on fertilizer bags (e.g., 10-10-10) refer to the percentage of the three primary macronutrients—nitrogen, phosphorous, and potassium (N-P-K)—available in the fertilizer.

Although compost generally contains small amounts of these macronutrients, they are typically present in forms that are not readily available to plants. When applied in 4- to 6-inch layers, compost may provide significant amounts of these nutrients. However, due to the variability and slow release of major nutrients in compost, it is considered a supplement to fertilizers that contain more reliable nutrient sources.

Stores Nutrients

To understand how compost is able to store nutrients and make them available when needed by plants requires a closer look. When viewing compost through a microscope that enlarges things 1,000 times, individual compost particles resemble the aggregates that are observed with the unaided eye. Like the aggregates, individual particles of compost contain many porous channels. Just as the channels in the aggregates provide space to store water, these spaces in the compost particles provide spaces to store nutrients.

The sides of the channels provide vast surfaces inside the particles where individual ions of minerals and fertilizers can cling. These ions are given up to plant roots as the plants require them. Thus, compost is able to store nutrients that might otherwise wash through a sandy soil or be locked up in the tight spaces of a clay soil.

The ions clinging to the surfaces of compost particles tend to be those that give soil a "neutral" pH. pH is a measure of soil acidity or alkalinity. The acidity or alkalinity of a soil affects the availability of nutrients to plants. Most important plant nutrients are relatively easily available to plants at a pH range of 5.5 to 7.5. At pH levels above this range (alkaline) or below this range (acid), essential nutrients become chemically bound in the soil and are unavailable. When mixed into soil, compost will help keep the pH at optimum levels for nutrient availability. Following is a comparison of the pH levels of some common soil amendments.

pH Levels of Soil Amendments	
Material	pH
Recycled landscape trimmings compost	5.5-7.5
Spagnum peat moss	3.5
Conifer bark	3.6-3.8

Balances Soil Ecology

Taking a step back from the microscopic view, another beneficial characteristic of compost is evident. The presence of compost organisms—redworms, centipedes, sow bugs, actinomycetes, and others—shows that compost is a healthy, living material. The presence of decomposer organisms means that there is still some organic material being slowly broken down and releasing nutrients. They are also indicators of a balanced soil ecology, which includes organisms that keep diseases and pests in check. Many experiments have shown that the rich soil life in compost helps to control diseases and pests that might otherwise overrun a more sterile soil lacking natural checks against their spread.

COMPOST USES

Compost is a much needed resource. It is not only useful to the home gardener, but is essential to the restoration of landscapes where topsoil has been removed or destroyed during construction or mining operations. Compost is increasingly being applied to agricultural and forest lands depleted of their organic matter. The most common use of compost today is probably in topsoil mixes used in the landscape industry. Compost is typically applied in three ways: to mulch or "top dress" planted areas; to amend soil prior to planting; and to amend potting mixes.

Mulching

Gardeners and landscapers use mulches and top dressings on the surface of the soil to suppress weeds, to keep plant roots cool and moist, to conserve water, to maintain a loose and porous surface, and to prevent soil from eroding or compacting. Compost serves all of these purposes and also gives plantings an attractive, natural appearance. Compost can be used to mulch around flower and vegetable plants, shrubs, trees, and ground covers.

To prepare any area for mulching, first clear away any grass or weeds that might grow up through the mulch. Make sure to remove the roots of any weedy plants that spread vegetatively. Different types of plants benefit from varying application rates and grades of mulch. Recommended uses of compost as mulch and top dressings are shown in the following chart.

Using Compost as Mulch

...ON FLOWER AND VEGETABLE BEDS:

Screen or pick through compost to remove large, woody materials. They are less attractive, and will compete for nitrogen if mixed into the soil.

Apply 1/2 to 1 inch of compost over the entire bed, or place in rings around each plant extended as far as the outermost leaves. Always keep mulches a few inches away from the base of the plant to prevent damage by pests and disease.

...ON LAWNS:

Use screened commercial compost, or sift homemade compost through a 1/2-inch or finer mesh. Mix with an equal amount of sand or sandy soil.

Spread compost/sand mix in 1/4- to 1/2-inch layers after thatching or coring, and before reseeding.

...ON TREES AND SHRUBS:

Remove sod from around trees and shrubs as far as branches spread. If this is impractical, remove sod a minimum 4-foot-diameter circle around plants.

Use coarse compost or material left after sifting. Remove only the largest branches and rocks.

...FOR EROSION CONTROL:

Spread coarse compost, or materials left after sifting, in 2- to 4-inch deep layers over entire planting area or in rings extending to the drip line.

Mulch exposed slopes or erosion prone areas with 2 to 4 inches of coarse compost.

Soil Amendment

Compost can be used to enrich garden soils before planting annuals, ground covers, shrubs, and trees. Many commercial topsoil mixes contain composted landscape trimmings or sewage sludge as a major component, along with sand, sandy soil removed from construction sites, peat moss, and ground bark. Amend soils by mixing compost or topsoil mixes thoroughly into the top 6 to 12 inches of existing soil. If a rich compost or topsoil mix is laid on top of the existing soil without being mixed, the interface where they meet can become a barrier to penetration by roots and water. In this condition, plantings often develop shallow roots and eventually blow over or suffer from lack of water and nutrients. The following is a list of recommended applications for different situations.

Potting and Seedling Mixes

Sifted compost can be combined with other materials to make a rich, loose potting soil for patio planters, house plants or starting seedlings in flats. Compost can be used to enrich purchased potting mixes or to make your own mixes. Plants growing in containers are entirely reliant on the water and nutrients that are provided in the potting mix. Compost is excellent for container growing mixes because it stores moisture effectively and provides a variety of nutrients not typically supplied in commercial fertilizers or soil-free potting mixes. However, because of the limits of the container, it is essential to amend compost-based potting mixes with a "complete"

fertilizer to provide an adequate supply of macronutrients (N-P-K). Some simple "recipes" for making your own compost mixes are shown below.

Using Compost as a Soil Amendment

...IN FLOWER AND VEGETABLE BEDS AND GROUND COVERS:

Dig or till base soil to a minimum 8- to 10- inch depth.

Mix 3 to 4 inches of compost through the entire depth. For poor soils, mix an additional 3 inches of compost into the top 3 inches of amended soil. In established gardens, mix 2 to 4 inches of compost into top 6 to 10 inches of soil each year before planting.

...ON LAWNS:

Till base soil to 6-inch depth.

Mix 4 inches of fine textured compost into the loosened base soil.

...AROUND TREES AND SHRUBS:

Dig or till base soil to a minimum 8- to 10-inch depth throughout planting area, or an area 2 to 5 times the width of the root ball of individual specimens.

Mix 3 to 4 inches of compost through the entire depth. For poor soils, mix an additional 3 inches of compost into the amended topsoil. Do not use compost at the bottom of individual planting holes or to fill the holes. Mulch the surface with wood chips or coarse compost.

Using Compost in Potting Mixes

...FOR STARTING AND GROWING SEEDLINGS IN FLATS OR SMALL CONTAINERS:

Sift compost through a 1/2-inch mesh.

Mix 2 parts sifted compost, 1 part coarse sand and 1 part Spagnum peat moss. Add 1/2 cup of lime for each bushel (8 gallons) of mix. Use liquid fertilizers when true leaves emerge.

...FOR GROWING TRANSPLANTS AND PLANTS IN LARGER CONTAINERS:

Sift compost through 1-inch mesh or remove larger particles by hand.

Mix 2 parts compost; 1 part ground bark, Perlite or pumice; 1 part coarse sand and 1 part loamy soil or peat moss. Add 1/2 cup of lime and 1/2 cup of 10-10-10 fertilizer for each bushel (8 gallons) of mix. (An organic fertilizer alternative can be made from 1/2 cup bloodmeal or cottonseed meal, 1 cup of rock phosphate, and 1/2 cup of kelp meal.)

Chapter Three

Home Composting of Organic Materials

With an understanding of the biological processes that transform organic materials and the value of finished compost, it is easy to see why people would want to compost organic materials at home. Home composting not only provides a free soil amendment, it also provides a means of recycling household organic waste.

Part of your role as a Master Composter is to help people decide which approaches are most appropriate for their unique situation. The decision depends on what materials are available, how much time and effort a person is willing to spend, the space available, costs, aesthetic considerations, and what options are available. To guide these decisions, you must be familiar with the entire range of home composting methods and the types of materials and maintenance styles best suited to each of these systems.

Home composting methods range from "no work" techniques that require maintenance once or twice a year, to active turning methods that are maintained weekly. Composting systems can be categorized by the type of materials they process: landscape trimmings or food wastes. The basic criteria considered when choosing a composting system are listed below.

Composting Criteria

MATERIALS: Types of organic materials to be composted.
COST: Amount of money required to buy or build a particular system.
LABOR: Amount of time and energy needed to maintain the compost system.
AESTHETICS: Types of materials and construction that are attractive and fit into a particular backyard. Also, how neatly the system organizes the compost.
EFFICIENCY: Amount of time and space required to make compost, and the desired quality and quantity of the finished product.
PEST CONTROL: How well pests are excluded.

WHAT CAN BE COMPOSTED...

Many of the common organic materials identified earlier are materials we generate at home and are candidates for home composting. These include landscape trimmings, kitchen scraps, sawdust, soiled paper and cardboard, hair, and natural fiber fabrics. However, just because a waste could be composted at home, does not mean that it should be. Some of these organic materials, including many yard clippings, are better managed by not producing them in the first place. Others, such as meat and other animal products or fatty foods, invite so many problems that we are better off putting them into the trash. Pet feces should not be composted. However, they can be safely buried in ornamental gardens if undisturbed for a couple of years. The types of materials considered appropriate for home composting are listed below.

ORGANIC MATERIALS ACCEPTABLE FOR HOME COMPOSTING

- **Grass clippings**
- **Yard Trimmings**: Old plants, wilted flowers, small prunings from shrubs and trees.
- **Leaves:** Deciduous leaves are ideal for composting. Evergreen leaves are slow to decompose, and may need to be shredded before composting.
- **Weeds:** Weeds make fine compost, if seed heads, rhizomes and other vegetative reproducing parts are kept out.
- **Sawdust:** Sawdust from unpainted, untreated wood without glues (i.e., no plywood) can be composted in worm bins or in landscape trimming piles in small amounts.
- **Plant-derived food scraps:** Vegetable and fruit waste, as well as coffee grounds and tea leaves, can be composted with landscape trimmings if buried one foot deep in finished compost in a properly prepared hot compost pile. Alternatively, they may be composted in special food waste composting systems.
- **Wood chips:** Wood chips are a product resulting from tree trimming. Most tree services will gladly give away wood chips.
- **Cardboard and Paper:** Soiled cardboard and paper are not acceptable for recycling, but they can be torn up and composted with landscape trimmings, or used under wood chip paths to suppress weeds.

WHAT SHOULD *NOT* BE COMPOSTED...

Everything that was once alive will compost, but not everything belongs in your compost pile. Following are some materials that should be avoided.

ORGANIC MATERIALS THAT SHOULD *NOT* BE COMPOSTED AT HOME	
• **Plants infected with a disease or a severe insect attack:** Insect eggs and disease spores can be preserved or the insects themselves could survive in most home compost piles (examples are apple scab, aphids, and tent caterpillars). These materials should be composted in large commercial systems which uniformly reach high, pasteurizing temperatures.	• **Ivy, and certain pernicious weeds:** Plants that spread by rhizomes or roots, such as bind weed, Morning Glory and crab grasses, may not be killed even in a well built hot pile in a home compost system. They can choke out other plants when compost is used in the garden. These plants should be composted in large commercial systems which uniformly reach high, pasteurizing temperatures.
• **Cat and dog manures:** Even though you find these in your yard, they are not yard trimmings. Pet wastes can contain pathogens harmful to people. These wastes should be buried in ornamental areas of the garden, or flushed down the toilet.	• **Weeds that have seeds on them:** Temperatures of over 140°F (60°C) are required to kill most weed seeds. It is extremely difficult to achieve these temperatures uniformly in a home composting system. Weeds with seeds on them should be sent to large commercial composting operations which uniformly reach high temperatures.
• **Evergreen leaves:** The leaves and needles of plants such as Holly, Pine and Juniper break down very slowly. Try composting small amounts of these mixed with other materials, or shred them for use as mulch. Large amounts of these leaves should be composted in large commercial systems which uniformly reach high temperatures and involve mechanical shredding processes.	• **Poisonous plants:** Keep poison ivy and other skin irritants out of the compost pile. Poisonous plants should be disposed of properly; i.e., landfilled. They should not be burned.

COMPOSTING METHODS

Composting can take place in open piles—simple holding units where the organic materials sit undisturbed for slow decomposition, or in turning bins that can produce finished compost in as little as a month. Compost bins are not essential for effective composting, a simple pile will work fine; but bins do help to organize materials for easier management, keep pests out of the compost, and make composting look neater. Following are brief descriptions of the most common types of home compost systems.

Holding Units are simply bins used to keep decomposing materials in an organized way while they break down (Figure 3.1). Using a holding unit may be the easiest way to compost. It requires no turning or other labor, except for placing the debris into the bin as it is generated.

Non-woody materials, such as grass clippings, crop trimmings, garden weeds, and leaves, work best in these systems. Decomposition can take from six months to two years. The process can be reduced to just a few months by chopping or shredding materials, mixing green and brown materials, and maintaining proper moisture.

Since materials are added continuously, they decompose in stages. Generally, the more finished compost is located inside and at the bottom of the pile, while partially decomposed materials are near the top. Once or twice a year, remove the finished compost and return the undecomposed materials to the holding bin.

Some examples of holding units include circles of snow fencing or stiff hardware cloth (not poultry wire), old wooden pallets lashed together, and stacked cinder blocks. There are also a variety of commercially available bins made from wood, molded plastic, or metal. Building plans for simple holding units are contained in Appendix B.

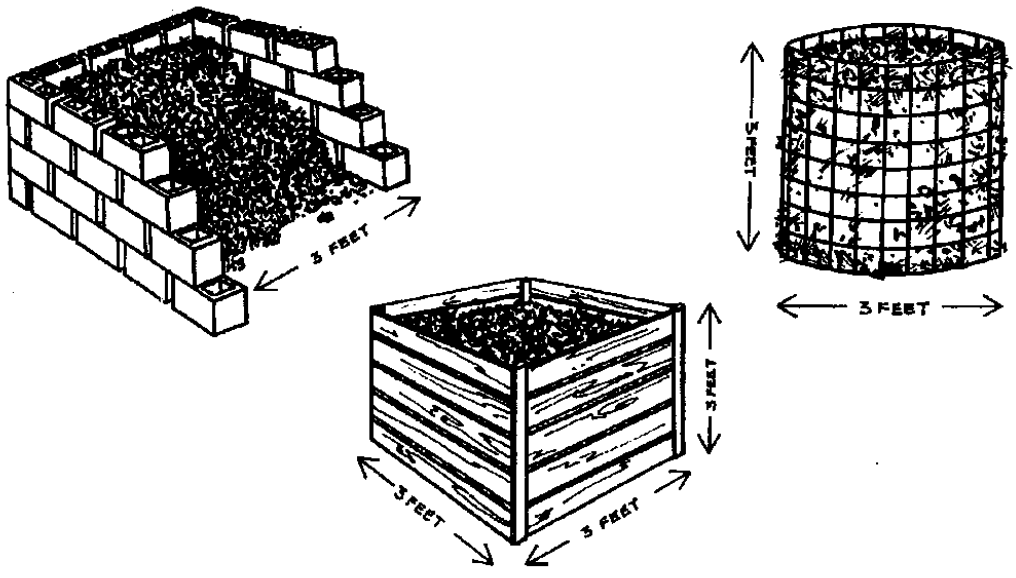


Figure 3.1 Examples of HoldingUnits

Turning Units are typically a series of bins used for building and turning hot, fast compost piles or to slowly accumulate debris in cool piles that are turned occasionally for aeration (Figure 3.2). Barrels or drums are also used as turning units, mounted either vertically or horizontally for easy turning. Turning units allow materials to be conveniently mixed for aeration on a regular basis. This speeds composting by providing bacteria with the air they need to break down materials. Given the proper mix and preparation of materials, turning piles will also generate the heat required to kill weed seeds, insect pests, and plant diseases.

Turning units can be expensive to buy or build, and hot composting requires substantial effort. However, the effort and expense is rewarded with high-quality compost produced in short periods of time. Building plans for simple turning units are contained in Appendix B.

Hot composting must be done in batches using enough material to fill a 3 ft. by 3 ft. by 3 ft. bin, or about two-thirds of a barrel composter. Materials should be chopped, moistened, layered, and mixed as described in Figure 3.6. Hot piles should be monitored and turned after temperatures peak and begin to fall.

Composting in rotating barrel units requires the same attention to balancing of carbon and nitrogen, chopping, and moisture control. If the materials are properly prepared and the barrel is rotated every 2 to 4 days, compost can be ready for curing in 2 to 3 weeks.

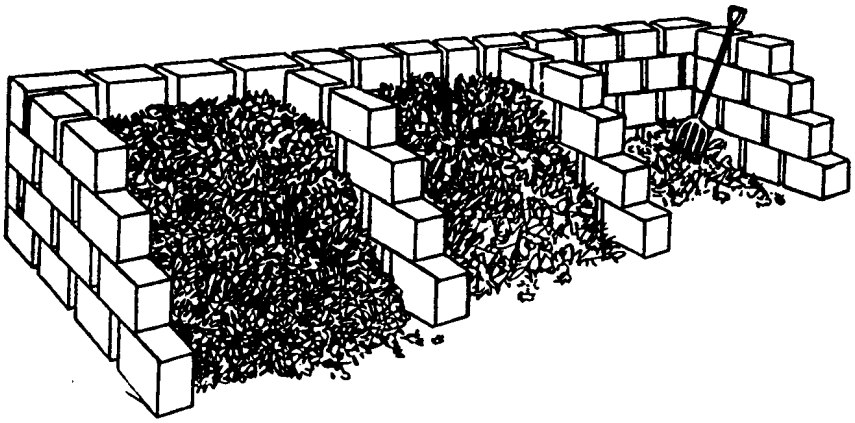


Figure 3.2 Turning Unit

Hot compost piles are the only effective way to compost food and yard trimmings together without pest problems. Unfortunately, many home compost piles, even when built carefully, do not attain the high temperatures needed to kill diseases and pests uniformly throughout the pile. Diseased or insect-infested plant materials are best composted in large commercial operations where high temperatures are uniformly produced throughout the compost pile.

TO BUILD A HOT COMPOST PILE:

1. Gather enough green and brown materials to make at least a 3 ft. by 3 ft. by 3 ft. pile (1 cubic yard) and to approximate a 30:1 carbon to nitrogen balance.
2. Shred or chop coarse and woody materials to increase their surface area. Semi-woody yard trimmings like corn stalks can be cut up with a pair of pruners, chopped with a machete or square point spade on a block of wood. Even some pounding with the back of a hatchet will create entry ways for decomposer organisms. A wide range of shredders and chippers are available for landscape trimmings, or a rotary lawn mower can be used to shred leaves on a hard surface such as a driveway.
3. Start building the pile with a 4- to 6-inch base of the coarser, brown wastes (small branches, corn stalks, straw) to help air circulate from below. Moisten each layer.
4. Add a 4- to 6-inch layer of nitrogen materials. If the greens are not very fresh, sprinkle a small amount of blood meal or cottonseed meal, high nitrogen fertilizer such as ammonium sulfate, vegetative food scraps, or poultry manure over this layer. Food wastes may make up a part of this layer. High-nitrogen materials such as fresh grass clippings or vegetative food wastes should be used in thinner layers. Moisten and mix the green and brown layers together, so bacteria can feed on both layers simultaneously.
5. Continue alternating and mixing layers of green and brown materials, adding water and extra nitrogen-rich materials as needed, until the bin is full.
6. Close the lid or cover the pile, and wait.
7. Monitor the temperature of the interior of the pile on a regular basis using a thermometer with a 6- to 12-inch-long probe. It should peak between 120° to 160° F (48-71° C) in 4 to 7 days.
8. When the temperature begins to decrease, turn the pile. Take materials from the outer edges and top of the pile and place them at the base and middle of the new pile; those from the middle should be on the outside edges and top of the new pile. If the materials are drying out, add water.
9. Continue monitoring the temperature in the pile.
10. About one week later, turn the pile again after the temperature of the pile peaks. After another week the compost should be ready for curing.

Composting Sod and Weeds

Weeds that spread through roots or rhizomes and sod stripped from a lawn require special covered compost piles. The roots of these plants will sprout and spread through compost piles unless light is completely excluded. Small volumes of these weeds can be composted in any system that effectively excludes light and prevents their spread into soil. A covered garbage can or extra thick black plastic bag can be used as a "weed holding pile." To compost large quantities of stripped sod, simply pile the fresh cut sod, roots up, in a square or rectangle up to 3 feet high. Make sure each layer is thoroughly wet, and cover the entire pile (including the sides) with black plastic or a tarp. Sod piles may take one to three years to completely decompose. Decomposition of sod piles can be shortened to as little as six months by sprinkling each layer with a high-nitrogen fertilizer, such as cottonseed meal or ammonium sulfate.

Do not put flowers and seed heads of any weeds into sod piles or any other home compost system. Weed seeds can only be killed by the high uniform temperatures of a large compost pile.

Composting Cat and Dog Wastes

The only acceptable ways to dispose of cat and dog feces are to flush them down the toilet or bury them in ornamental areas of the garden. Pet wastes should not be composted with food or yard trimmings. Dog and cat feces can carry pathogens that are dangerous to people, so they should be handled as little as possible. If you do bury these wastes, bury them as you would food scraps, where they are unlikely to be disturbed for at least two years.

Do not bury pet wastes within 100 feet of a domestic water well, or within 100 feet of a lake or stream. Burial is only recommended for small amounts of pet wastes. It is not a disposal option for commercial pet boarding, breeding operations, or experimental facilities.

Composting Food Scraps

Although non-fatty food scraps can be composted with landscape trimmings if they are buried deep with finished compost, or in properly maintained hot piles, it is difficult for many people to maintain the conditions required to do this effectively. Improperly composted food wastes can attract pests, create unpleasant odors, and can make the compost unhealthy to handle. If rats or loose dogs are already a problem in a neighborhood, it may be advisable to play it safe and use a composting system specifically designed for the safe composting of food scraps. The types of food scraps appropriate for home composting, and those that are not advisable for composting are listed on the following page.

Soil Incorporation is the simplest method for composting kitchen scraps. Dig a 1-foot-deep hole. Chop and mix the food wastes into the soil, then cover with at least 8 inches of additional soil. Depending on soil temperature, the supply of microorganisms in the soil and the content of the materials, decomposition will occur in one month to one year.

Food waste burial can be done randomly in fallow areas of the garden, or in an organized system. One system is to bury scraps in holes dug around the drip line of trees or shrubs. An English system, known as "pit and trench" composting, maintains a three-season rotation of soil incorporation and growing. The garden includes a trench in which to bury food wastes, a row for growing crops and a third "row" to use as a path.

In the next season, the fertile soil of the former compost trench is used to grow crops, the former crop row is left fallow and used as a path, and the compacted path is loosened and dug as a new trench. After a third season of rotation, the cycle starts over again. This form of composting keeps the garden perpetually fertile with a small organizational effort.

CAN BE COMPOSTED		NOT ADVISABLE TO COMPOST
Apples	Pears	Butter
Apple peels	Pineapples	Bones
Cabbage	Potatoes	Cheese
Carrots	Pumpkin shells	Chicken
Celery	Squash	Fish scraps
Coffee grounds/filters	Tea leaves/bags	Lard
Egg shells	Tomatoes	Mayonnaise
Grapefruit	Turnip leaves	Meat scraps
Lettuce		Peanut butter
Milk		Sour cream
Onion peels		Vegetable Oil
Orange peels		Yogurt

Food scrap digesters are enclosures designed to provide long-term food burial areas, without the need for constantly digging and covering new burial holes. Common types of food scrap digesters are cone or box shaped plastic units with a tight fitting, latching lid to exclude pests. Digesters are designed to fit over a large hole, which will accommodate several months' worth of food scraps from a typical family. Some digesters are attached to a mesh basket, which is buried in the hole to help keep out burrowing pests. There are a variety of food waste digesters available commercially from garden supply catalogs and at retail garden and hardware stores.

To use a food scrap digester, select a well-drained location in the garden, and dig a hole that is 2-3 feet deep, and wide enough to accommodate the unit selected. Bury any below ground parts of the bin and place the bin on top of the hole. To operate the digester simply open the lid, throw in food scraps, and secure the lid.

Some food scrap digesters are sold with an accelerator powder to help decompose food scraps. While the accelerator powder may assist the breakdown of food, it is not necessary. The only additive recommended for food waste digesters is small layers of soil or sawdust to suppress fly populations if they become a problem.

After approximately one year, most of the contents of the digester should be converted to dark, moist compost. To harvest the compost, remove the top of the digester and separate the top layer of undecomposed food scraps. If the compost is dark, moist and crumbly, it is ready to add to the garden. If the compost is wet, mix it with several shovels of soil, and let it sit for a few weeks before adding it to the garden. Alternatively, you can bury the wet compost in an empty spot in the garden to finish decomposing.

COMPOSTING IN SMALL SPACES

For many people, composting is believed to be a practice only performed by residents who live in rural areas, however, composting can be done almost anywhere, by anyone. Following are two methods of composting that can be kept on a small porch, garage, or inside your home. The first method covered is "vermicomposting," which uses worms to decompose organic wastes. This method is faster than most outdoor composts and can be easily concealed inside a home because of its small size. The second composting method is called "trash can compost." Since this compost bin is constructed out of a trash can, it is portable and if properly aerated, it is odor-free.

Vermicomposting

Vermicomposting is a method of composting that involves feeding kitchen scraps and other organic wastes to worms that are kept inside an aerated container (or worm bin). This particular compost system is referred to as vermicomposting because "vermi" is the Latin word for "worm." The advantage of using a vermicompost, opposed to an outdoor compost pile, is that a worm bin does not take up a large amount of space and can be kept inside your home. For those who live in apartments, condominiums, or do not have access to a backyard, composting with worms is one of the most convenient methods of composting. Vermicomposting is also a method of composting that can be used during the cold winter months.

How Does It Work?

The worms digest organic materials and leave worm manure called *castings*. These castings combined with other decomposed organic wastes (broken down by other decomposers such as bacteria and fungi) make up finished vermicompost. This earthy humus is perfect for adding to gardens, houseplants, shrubs, or other planting soil.

The species of worm used for vermicomposting is *Eisenia foetida* (a-se-na fa-ta-da) or Redworm. Redworms are most effective because they are able to digest two thirds of their weight in one day. At this rate, redworms can accommodate new organic waste on a daily basis.

Redworms are also the best choice for your worm bin because of their reproduction rate. Redworms under one year old will produce 6 to 9 baby worms every week. Depending on the conditions in your worm bin, the majority of these worms will survive and begin reproducing in 6 months.

Creating A Vermicompost System

To create your vermicompost system, you will need a bin, worms, bedding, and a handful of soil. Setting up a worm bin is inexpensive and takes little time.

Materials Needed:

Worms (Approximately 1 lb.)
Bin
Bedding
Soil

Purchasing Worms

If you are not fortunate enough to have a worm composting friend who can spare a few hundred worms, then you will need to purchase your worms from a worm farm. Redworms can be mail-ordered through garden magazines and other gardening and composting publications. These worms are usually sold by the pound. There are approximately 600 to 1000 worms per pound, depending on the size and maturity of the worms. The following are some companies that sell redworms.

Flowerfield Enterprises
10332 Shaver Road
Kalamazoo, MI 49002
(616) 327-0108
FAX: (616) 343-4505
e-mail: nancy@wormwoman.com

Gardener's Supply
128 Intervale Road
Burlington, VT 05401
(802) 863-1700
FAX: (800) 551-6712
e-mail: info@gardeners.com

Good Earth Organics
WNC Farmer's Market
570 Brevard Rd., Box 15
Ashville, NC 28806
(828) 232-0784

Rainbow Worm Farm
24700 County Rd. 95
Davis, CA 95616
(530) 758-9906
FAX (530) 756-0414
e-mail: rwf@afes.com
www: rainbow.worm.farm.com

Shakespere Acres
1032 Shakespere
N. Vancouver V7K1E8 BC Canada
(604) 988-6883
TEL/FAX: 604-987-9335
e-mail: cmorgray@axionet.com

The Worm Factory
Perth K7H3C5 ONT Canada
(613) 267-5540

Worm Depot
563 Avenue De Los Arboles #216
Thousand Oaks, CA 91360
(800) 854-1244
FAX: (818) 768-1642

Building A Worm Bin

While you are waiting for your mail-order worms or pleading with your worm friend to spare you a few worms, you can begin constructing a bin for your worms. A bin may be built out of wood, plastic, or any type of material that holes can be drilled into. The holes are important because air will need to circulate through the bin in order to discourage anaerobic conditions. These holes should be about 1/4 inch wide and placed on all four sides of the bin, as low to the bottom as possible. The holes placed on the bottom of the bin are necessary for air to circulate through the bottom of the compost. Holes can also be drilled into the top of your container for even more circulation. Surprisingly, if you keep plenty of fresh food scraps inside of your bin, the worms will rarely try to escape through these holes.

Sizing your bin will depend on the amount of food waste you will be placing in it. A square foot

of bin space is needed for every pound of food waste you plan to place in your bin per week. The depth of your bin should always be 8 to 12 inches deep no matter how long or wide the bin will be. Since redworms are surface eaters, a deeper bin will not accommodate more worms and organic wastes. In fact, if your bin is too deep and is filled with bedding and wastes that exceed 12 inches, the contents will most likely compress together and the proper amount of oxygen will not be able to flow through. A bin approximately 16" x 24" x 8" is a good size to begin vermicomposting with.

A square foot of bin space is needed for every pound of food waste you plan to place in your bin per week.

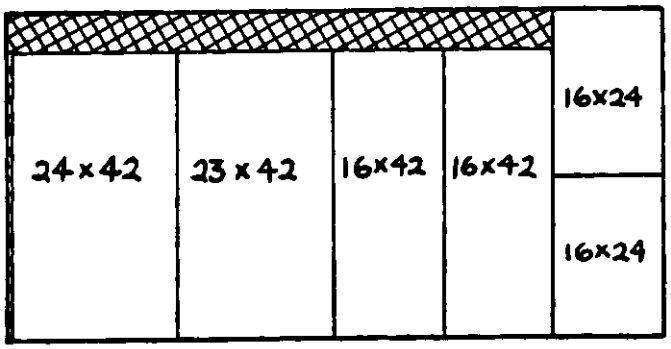
The following is a plan for constructing a bin out of wood. Keep in mind that an unfinished wooden bin will only last about three years, before it will start to decompose.

Materials:

1 4' x 8' sheet of 1/2 inch exterior plywood
1 12' of 2x4 lumber
1 16' 2x4 lumber
1/2 lb. of 16d galvanized nails
2 lbs. 6d galvanized nails
2 galvanized door hinges
Tape Measure
Saw
Hammer
Saw Horses
Long straight-edge
Screwdriver
Drill with 1/2 inch bit
Optional: 1 pint clear varnish or polyurethane
Optional: Paint brush

Directions:

1. Measure and cut the plywood as shown, so you have:
   1 24" x 42" (top)
   1 23" x 42" (bottom)
   2 16" x 42" (sides)
   2 16" x 24" (ends)



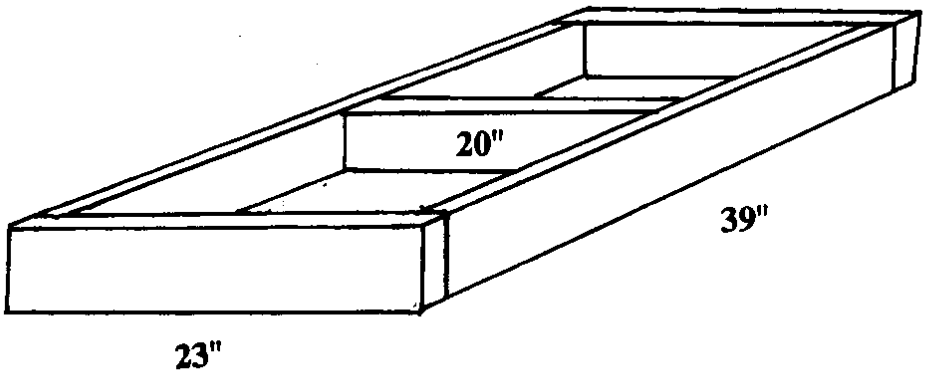
2. Cut the 12' 2x4 lumber into:
   2 39" pieces
   2 23" pieces
   1 20" piece

3. Lay the five pieces on edge on a flat surface to form a rectangle with the long pieces on the inside and the 20" piece centered parallel to the ends. Nail the pieces together with two 16d nails at each joint.

4. Nail the 23" x 42" piece of plywood onto the frame with 6d nails every 3 inches.

5. Cut the 16' 2x4 lumber into:
   4 12" pieces
   2 45" pieces
   2 20" pieces

6. Place a 12' flat against each short end of the 16" x 42" pieces of plywood and flush with the top and side edges. Nail the 2x4's in place with 6d nails.



7. Set the plywood sides up against the base frame so the bottom edges of the 2x4's rest on top of the base frame and the bottom edges of the plywood sides overlap the base frame. Nail the plywood sides to the base of the frame with 6d nails.

8. To complete the box, nail the 16" x 24" pieces of plywood onto the base and sides at each end.

9. To reinforce the box, make sure a nail is staggered at least every 3 inches wherever plywood and 2x4's meet.

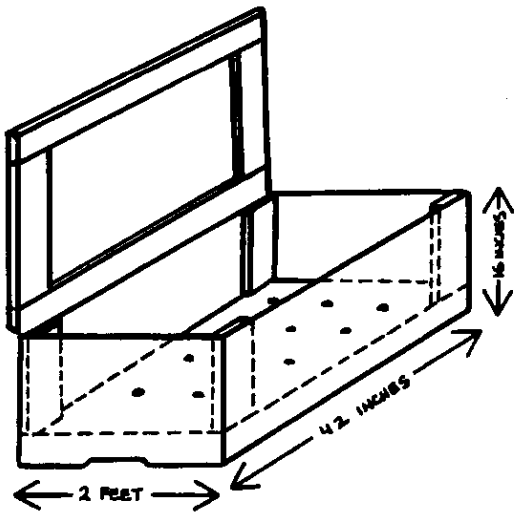
10. Drill 3 or 4 rows of 1/2 inch holes on all four sides of the box, 4 inches apart.

11. To build the frame for the lid, lay the two 45" and 20" pieces of 2x4's flat to form a rectangle, with the short pieces on the inside.

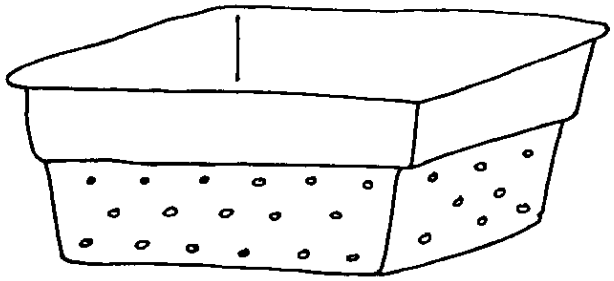
12. Lay the 24"x 42"piece of plywood on top of the lid frame so the plywood is 1 1/2 inches inside all the edges of the frame. Nail the plywood onto the frame with 6d nails.

13. Attach the hinges to the inside of the back of the box at each end (on the 2x4) and the corresponding undersides of the back edge of the lid frame, so the lid stands upright when opened.

14. Optional: Finish box with varnish or polyurethane. Coat twice with light sanding between coats.



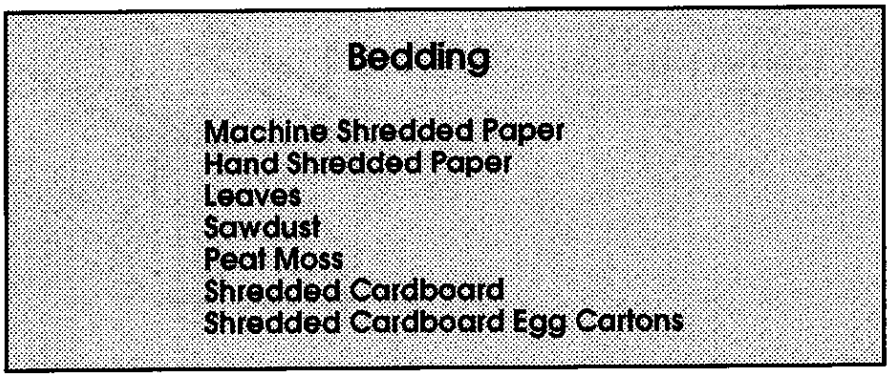
An alternative to building a wooden bin is a plastic container. Drill holes about every 2 to 3 inches on the sides of the container and your bin is ready to be filled with worms, bedding, and food scraps. Whichever bin you choose, it is important that it have a lid to keep the light out and minor odors in.



Bin Requirements

At least 12"x24"x8"
1/4" holes on all 4 sides; 2-3" apart
Lid

Bedding
A high carbon bedding such as shredded newspaper, sawdust, or leaves will give your vermicompost a bulky texture which will help circulate air through the bin. These high carbon materials will also discourage anaerobic conditions when they are mixed with high nitrogen organic wastes. The worms will consume this bedding along with the food wastes.



Fill the bin with about 8 inches of fluffy bedding and add a few cups of water while turning the bedding. Add enough water until the bedding is damp, like a wet sponge. Now the bin is ready for your worms. Place the redworms inside of the bin and add a handful of soil. The soil is added because it contains sand that will help the worms digest. Like a chicken, worms take food into their gizzard and churn it with grains of sand and then pass it through their digestive track.

The amount of bedding contained in your bin should be checked on a regular basis. Since you will be burying your scraps underneath the bedding, there should be plenty of bedding present in the bin. Because the worms digest the bedding along with the food wastes, you may need to add more bedding on a weekly or monthly basis.

Feeding Your Worms
Any food that humans eat can be fed to worms, but some foods are more suitable for indoor worm bins than others. Most people avoid meats, fats, and dairy products because they may attract pests. Large pieces of food scraps can be broken down into small pieces for faster decomposition.

When putting food in your worm bin, it will need to be buried underneath the bedding. In order to easily harvest the finished compost, it is best to bury the food scraps on one side of the bin. After 2 to 3 months, begin placing your scraps on the other side. When the worms are finished with the food on the first side, they will migrate over to the new side of the bin. After the worms have all moved to the new side, the finished compost on the first side can be taken out and replaced with new bedding. Alternating sides in your worm bin will minimize the amount of worms that are lost during compost harvesting.

The amount of food contained in the vermicompost should be monitored. If your worms do not have enough food to eat, they will not be healthy and productive. However, on the same note, try not to overload your worms with food, which is sometimes easy do when you first begin using your vermicompost system. Your worms will need some time to maintain a population suitable for the size of the bin and the amount of organic waste. Once a suitable worm population has been

established, you can add food every day, or you can leave the bin untended for a week or even up to a month.

Temperature
The temperature of your worm bin should be between 55 and 77°F (12-25°C). Unlike an outdoor compost pile, the temperature of the worm bin will depend on where it is located. For this reason, it is best to keep your bin inside. For example, it can be placed in a basement, utility room, patio, or any place where the temperature is 55 to 77°F (12-25°C). Some people keep their worm bins in their kitchen under a cutting board and simply scrape their kitchen scraps right into the bin after food preparation. If you keep your bin outdoors, avoid keeping it outside during a cold winter or hot summer. The worms will become very inactive or die at extreme temperatures.

Worm bins can be located in basements, utility rooms, kitchens, garages, on patios, or in closets.

Moisture
Since worms breathe through their skin, it is important that their skin stays moist, therefore, the contents of the bin should be damp but not soaked. If the contents are too wet, anaerobic conditions will set in because of a lack of air circulation. In addition, your worms will try to escape due to the amount of excess moisture, similar to worms living in nature that find their way to the ground's surface after a rain storm. A bin that is too moist may also attract fruit flies. If this is the case, place a piece of cardboard or several sheets of paper over the top of the vermicompost.

The contents of your bin should be kept as moist as a wrung-out sponge. Usually the moisture contained in the food scraps is enough to keep the bin damp, however, if it is too dry, add water while turning the bedding. If your bin is too wet, add dry bedding to absorb the excess water.

Keeping Your Worms Healthy
Once you have created your vermicompost system, you will need to monitor the worms and the contents of your worm bin to make sure the conditions are satisfactory for keeping your worms healthy. The most important conditions you must monitor are temperature, moisture, and the amount of bedding and organic waste.

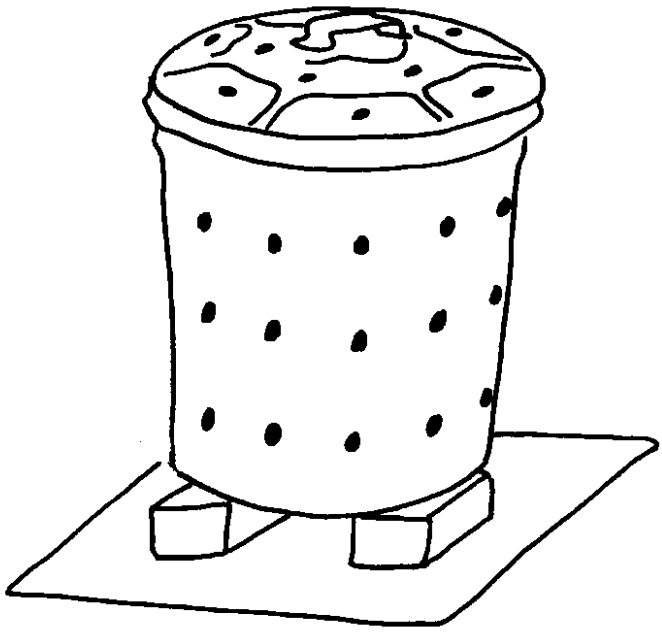
The most important conditions to monitor in a worm bin are: temperature, moisture, bedding, and organic waste.

Trash Can Composting

Composting in a trash can is another composting alternative for people who have limited space. The structure for this compost is much larger than a worm bin, however it is another method of indoor composting. The trash can compost breaks down organic matter by the same decomposition process as an outdoor compost pile. With the proper aeration, odor-free aerobic conditions will exist and the temperature will rise to over 100°F (37°C). The key to successfully constructing this compost is the aeration holes placed on the bottom of the compost structure. This vertical air flow will provide the air circulation needed to aerobically break down the organic materials.

Materials:

Trash Can (metal or plastic)
Drill and 1/2" drill bit
Bricks or Cement blocks
Tray
Optional: 6" Perforated Pipe



1. Drill at least three rows of holes, six inches apart, around the trash can (see diagram). Drill holes on the lid and the bottom of the can.

2. Place the cement blocks on top of the tray and the can on top of the cement blocks. The can is elevated to allow air to circulate through the bottom of the can. This vertical air flow is usually more efficient and supports aerobic decomposition within the can better than horizontal air circulation. For even more air circulation, a perforated pipe can be placed in the middle of the can. The holes can be covered with screening if fly activity is a concern.

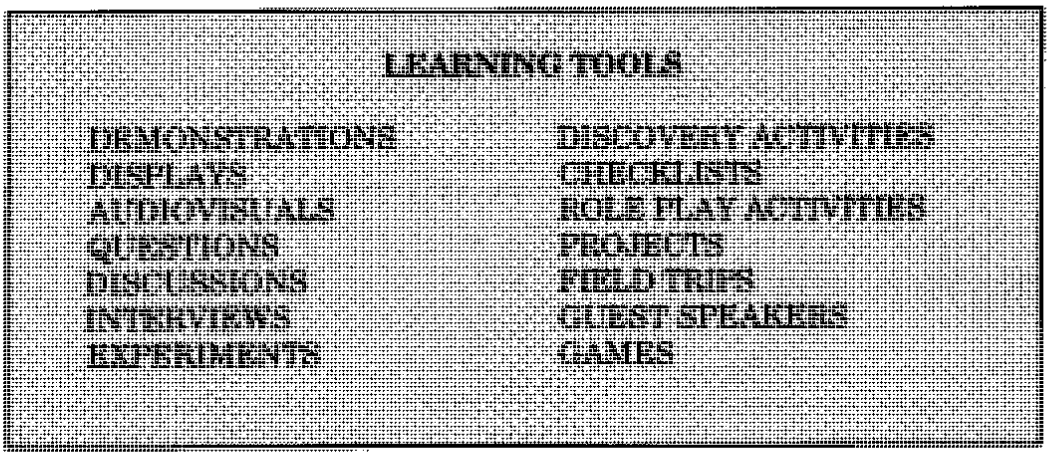
3. The can is now ready for organic wastes. Kitchen and yard wastes can be put in the can on a daily basis or stockpiled and filled all at once. When placing organic wastes in the can, it is important that the C:N ratio is met. About 1/3 high-nitrogen materials should be mixed with 2/3 high-carbon materials. These materials should either be mixed together or layered in your can. It is important to keep the layers loose and uncompacted to allow air to circulate freely. Be sure that there are not any high-nitrogen materials visible, these materials should be fully covered with high-carbon material. This will help keep pests away and odors to a minimum. If dripping is a problem, you can add more dry material—paper, sawdust, etc. Be sure to wipe up any spills.

4. The materials will take 3 to 6 months to turn into finished compost. When the compost is finished, the contents of the can be dumped out and used. Materials that have not completely decomposed can be placed back into the trash can composter.

Chapter Four

Educational Tools

This chapter will serve as a resource for you to refer to throughout your reign as "Master Composter." Many successful learning tools will be discussed, which you may use when instructing the public about the benefits of composting and how to start compost at home. The advantages of these tools will be explored and examples of each will be given. Some tools will be more appropriate for children, while others may be better suited for an adult compost workshop. Review all of the possibilities and decide which tools will best the needs of your audience.



It is important that you choose tools that demonstrate your topic constructively. For example, if you plan to teach your students about the Carbon:Nitrogen ratio, a combination of a video and a demonstration may be a more effective way to handle this topic than an interview or role play activity.

When designing your program, not only is it important to choose tools that effectively demonstrate your topic, it is also critical that you consider the audience you will be presenting to. Are they adults or children? Are they new composters or people who are already composting? To accommodate people of various backgrounds, it is most effective if the main topics of your presentation are introduced in more than one form. For example, lectures can be supplemented with videos, hands-on activities, slide presentations, or group activities. Combining techniques is worthwhile because concepts are reinforced when different methods are used to demonstrate the same idea. Remember to consider your audience and keep in mind that utilizing a combination of tools will strengthen your presentation.

DEMONSTRATIONS

Demonstrations are a great way to convey a particular point to a group. Demonstrations are most effective when they are kept relatively short and are presented with fascinating visual aids that catch your audience's interest while demonstrating an idea. It is very important that every one in the group is able to see and hear your demonstration, so be sure to check with those farthest away from you before you begin.

DISPLAYS

Compost displays can be set up at local fairs, special events, in malls, and in classrooms. Effective displays will catch the eye of a person walking by and demonstrate an idea through visuals. When designing a display, especially for children, include objects that can be picked up or touched. When others see that people are handling some compost tools, bags of compost, or other objects at your booth, they will be more likely to come over and check it out.

Compost Phases
(Exhibit of compost in various stages)

Collect compost in three or four stages of decomposition. Place each type of compost in a separate tub and label the different phases of compost with numbers. Have students observe the compost and encourage them to feel the texture of the different stages. With one glance, feel, and sniff, students will be able to see the evolution of organic waste into compost.

DEMONSTRATION SITES

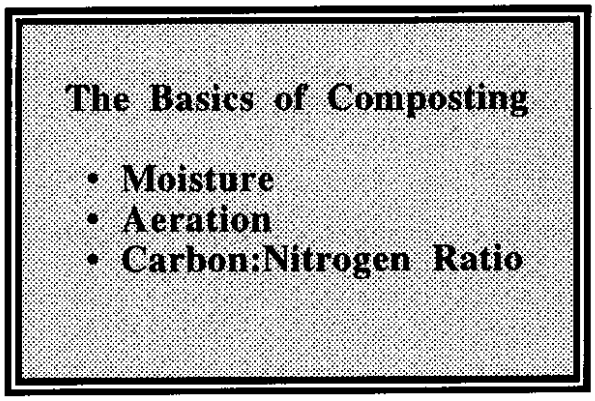
Compost demonstration sites are an important outreach tool and should be a component of any Master Composter Program. Demonstration sites are effective because they serve as an ongoing promotional piece and allow people who have never seen a compost pile to observe first-hand how the piles are constructed. These sites also provide a location for workshops and a source of sample compost. For those skeptical citizens who say "I'll believe it when I see it," demonstration sites are a perfect way of revealing the benefits of composting. In addition, building and maintaining a compost demonstration site is an excellent project for a Master Composter. Demonstration sites are covered in more detail in Chapter 5, *Workshops and Special Activities*.

For those skeptical citizens who say "I'll believe it when I see it," demonstration sites are a perfect way of revealing the benefits of composting.

AUDIOVISUALS

Videos are a productive way to break up your presentation. Videos can provide comic relief while demonstrating an important point, and most importantly, videos give you a break from speaking. Take advantage of the many informative composting videos that are available. See Appendix A for a list and description of composting videos.

Slide shows are also useful because slides can be used as a focus point for your students while you explain a particular concept. For example, if you are speaking about the basics of composting, a slide titled "The Basics of Composting" that lists "Moisture, Aeration, Carbon:Nitrogen Ratio" will indicate to your audience exactly what you are lecturing about at that particular time. If it is not possible for you to use a slide projector due to the location of your workshop, then an easel and poster board are an excellent alternative. Outline the concepts you will be introducing on different pieces of poster board and change the boards as you move through your lecture.



QUESTIONS

Ask your audience questions throughout your presentation. This is very important because students will gain more from a presentation if they feel involved and are given the opportunity to share their experiences. Ask your students if they already compost, how they compost, if they composted as a child, how they heard about the workshop, and any other questions you think may spark your students' interest. You just might learn something you never knew before! It may be beneficial to prepare a question for each topic of your presentation and open each subject with a question. This will no doubt stir up some interest and your students will be anxious to hear what you have to say on the subject. As well ask asking questions of your class, make sure you also encourage your audience to ask questions.

Your audience will feel more involved and will gain more from your presentation if given an opportunity to share experiences.

DISCUSSIONS

Open discussions provide a forum for members of an audience to ask questions. Discussions are one of the simplest learning tools, although one of the most valuable since students and teachers can learn from each other.

What's Garbage?

You can open up a discussion by asking the audience what happens to garbage once it's thrown away in the garbage cans at home or in school. Ask what we mean when we say "garbage?" Have members of the audience suggest things they believe are garbage and write them on the chalkboard.

Is garbage everything we throw away? Or can we reuse some of the things we throw away?

What happens to garbage after it gets picked up from your house? Where does the garbage truck take it? Does everybody's garbage go to the landfill? What will happen if the landfill is full?

Refer to the list of garbage items on the board and ask the audience which items could be used again for something else? Which items could be composted? Which items could be recycled? Which items could be replaced with reusable products? For example plastic wrap could be replaced with a reusable plastic container.

Adapted from "Composting Across the Curriculum--A Teacher's Guide to Composting"

INTERVIEWS

Interviewing others is a good way to learn about a variety of composting and waste management topics. Interviews can be conducted with family members, neighbors, friends, or experts within the community.

The Evolution Of Garbage

Have students interview a senior citizen (grandparent, neighbor, family friend). Give them the following questions. Students may also add their own questions.

1. Did you produce more or less garbage 40 years ago than you produce now?
2. What were your toys made of when you were a child?
3. What did you do with broken toys?
4. What did you take to school for lunch? How was it packaged?
5. What did you do with your garbage? Did a garbage truck come pick it up from your house or did your family take it away themselves?
6. What did you do with your food waste?
7. How were meat, milk, produce, and other foods packaged in the grocery store?
8. What did people use before there was plastic?

EXPERIMENTS

Experiments are an effective way to capture your students' interests, especially if they are children. Through experiments, students are able to form a hypothesis about what they believe will be the outcome of the activity and test that hypothesis. This is a very active method of learning because students' actions and decisions become part of the learning process. Following are some experiments that can be performed by school-aged students. Some are designed for a single sitting and others require follow-up activities and periodic observations. If you will be conducting experiments that require follow-up activities in a school classroom, it is beneficial if you are able to come back into the classroom on a weekly or monthly basis. For example, you can schedule the class two hours a week for four weeks. This schedule may have more of an impact on the students than a longer single session because the students will have to recall your previous presentation. This will help instill your composting and recycling suggestions.

If it is not possible to return to the class on a regular basis, you may set up a particular experiment and hand over the observation and conclusion portion of the activity to the teacher and he or she can continue the activity with the students. Another alternative for long-term experiments is to give the teacher all of the information and materials needed to set up and conduct the experiment.

Don't limit your educational programs for children just to classrooms. Master Composters are always welcome at area youth organizations such as Boy Scouts, Girl Scouts, and 4-H clubs, and other after-school groups.

***Composting In Nature** - One Session*
(Finding evidence of composting in nature)

Take students outside and have them find organic materials that are in the process of breaking down. For example, leaves decaying on a forest floor, chopped grass, or an out-of-season flower. When the students encounter evidence of degradation, ask them how they believe plant materials change into soil and explain the process of decomposition.

***Planting With Compost** - Multiple Sessions*
(Comparing plants grown in compost to those grown in soil)

During this experiment, students will plant seeds in regular soil and in a compost/soil mixture and compare the growth of each plant. Students can take part in planting their seeds and forming their own hypotheses. They will see first hand the benefits of using compost when they observe how much healthier the plants growing in the compost are.

Materials: Two plant containers per student (Styrofoam cups, yogurt cups, half pint milk containers, etc), 6 seeds per student (bean seeds, marigold seeds, or any other seeds), soil from school yard (not potting soil), and compost.

1. Have students fill one of their planters with soil and place 3 seeds, one inch under the soil.
2. Have students fill the other planter with a mixture of half soil and half compost and place 3 seeds, one inch under the mixture. It is better to let the students mix their own soil and compost so they can feel the difference in the texture of compost compared to regular soil.

Ask them how the texture is different and how this will help the plants grow. **Answer:** The mixture holds the soil together, holds more moisture, contains nutrients from the compost, and allows the plant's roots to penetrate the soil more easily due to the crumbly consistency.

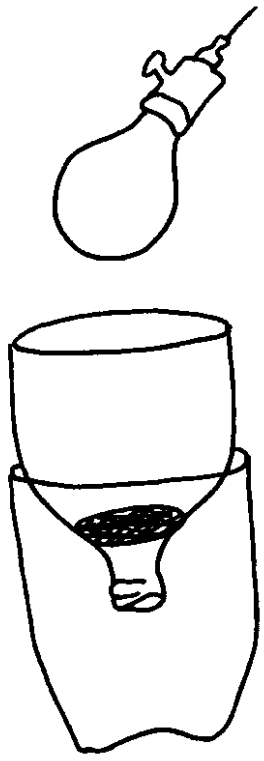
3. Add water to the planters and place in a sunny spot.
4. After one week observe the seedlings and compare the seedlings grown in soil to those grown in the compost mixture and record the results. Continue to observe the plants and record the results for as long as you feel is appropriate.

***Compost Critters In The Spot Light** - One Session*
(Separating decomposers from compost)

In this experiment, visible decomposing organisms such as sow bugs and ants are separated from a scoop of compost.

Materials: Glass jar, funnel, bright light (flashlight), wire mesh, and handful of fresh compost.

Note: A 2 or 3 liter soda bottle can be used instead of the glass jar and funnel (see diagram). Cut the soda bottle in half and place the top of the bottle upside down inside of the bottom portion of the bottle.



Place the funnel inside the neck of the glass jar and a piece of wire mesh over the hole to keep the compost from falling out of the funnel. Put the compost in the funnel and shine a light into the funnel. Leave the light over the compost for several hours or until you have extracted the number of decomposers you will need. The decomposing organisms will try to escape the light and make their way down the funnel and into the glass jar.

Note: If you would like to preserve the organisms, pour rubbing alcohol into the glass jar before performing the experiment.

After you have separated the decomposers from the compost, identify the decomposers using the Decomposer Identification Guide on the following page.

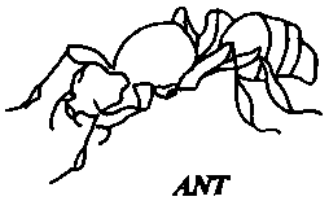
Decomposer Identification Guide

BEETLE MITE

GROUND BEETLE

SNAIL

CENTIPEDE



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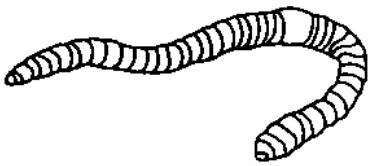
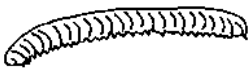


EARTHWORM

ROVE BEETLE

COLLEMBOLA



MILIPEDE

SOW BUG

FUNGI

BACTERIA

***Compost Critter Critique** - One Session*
(Observing decomposers)

In this observation activity, students will observe the organisms that were extracted in the "Compost Critters in the Spot Light" experiment or by picking out compost critters with a spoon from a sample of compost. Students will become wildlife biologists, investigating compost life.

Materials: One glass jar per student or pair of students, one type of compost critter per jar, and observation sheet.

Place one decomposing organism in each jar. Have students answer the following questions:

1. What are some of the most outstanding features of your organism?
2. How many legs does it have? Are the back legs different from the front legs?
3. How many eyes do you see? What do the eyes look like?
4. Do you see a mouth?
5. Do you see antennae? What do the antennae look like?
6. How does your organism move?
7. What colors is your organism?
8. What does your organism eat?

Have the students let their organisms go free in your compost pile. Explain to them that they need to live within the pile so they will be able to find the conditions they need and food to survive.

Adapted from "Project Wild, K-12 Activity Guide," "Grasshopper Gravity!" with permission from the Council for Environmental Education, Houston, Texas

The Banana Breakdown *- Multiple Sessions*
(Comparing the decomposition of a banana in different situations)

Students will be able to compare the breakdown of a banana in different conditions: water, soil, sunlight, with and without oxygen.

Materials: 5 one square inch pieces of banana peel, 5 small sealable containers such as baby food jars or ziplock bags, moist garden soil or compost, and plastic wrap.

1. Place one piece of banana peel in a jar filled with water and seal the lid.
2. Place one piece of banana peel in a jar filled with soil or compost, exposing a portion of the peel through the glass and seal the lid.
3. Place one piece of banana peel in an empty jar, seal the lid, and place in a sunny spot.
4. Place one piece of banana peel in an empty jar and seal the lid.
5. Cover the last piece of banana peel with plastic wrap, place in the jar and seal. This jar represents decomposition without air.
6. Place all of the jars except the one prepared for #3 in a dark place. After one week observe the jars without opening them. Has the color changed? Has the texture changed? What else do you observe? Record your observations.
7. After 2 weeks, observe the jars (opened or unopened) and record your results.
8. Ask the following questions: Did the peels change in the same way? Which changed the most? What conditions caused these peels to break down faster? Why? Did any of the banana peels stay exactly the same?

BANANA BREAKDOWN CHART

TRIAL	TIME	COLOR	TEXTURE	DESCRIPTION
WATER	WEEK 1			
	WEEK 2			
SOIL	WEEK 1			
	WEEK 2			
SUN	WEEK 1			
	WEEK 2			
AIR	WEEK 1			
	WEEK 2			
NO AIR	WEEK 1			
	WEEK 2			

Reprinted from "The Compost Learning Guide" with permission from the Missouri Department of Natural Resources

The Breakdown Marathon - *Multiple Sessions*
(Observing the decomposition rate of different organic materials)

Part I
During this experiment students will observe the decomposition of different organic materials in soil and find out which materials decompose faster or slower than others.

Materials: Sticks and labels for markers, soil or compost, and six different materials (such as a nail, nylon rope, a bone, plastic container, fruit and vegetable peelings, cotton sock, newspaper, or grass clippings).

1. Have students bury each item in a different hole (all of the holes must be the same depth). Mark each spot with a stick. These items can either be buried in soil or compost, inside or outside of the classroom.
2. Once a week have students dig up the items and record how fast and in what ways the items are decaying.
3. Make a graph charting the rate at which different objects decompose.
4. Ask the students what is in the ground causing the items to decompose? What characteristics of the materials make them break down faster or slower than other items?

If you are concerned about taking up too much time or space with this activity, here is a variation of the same experiment using a clay flower pot, aquarium, or other container:

1. Place a rock on the bottom of the flower pot if there is a hole.
2. Fill the pot 1/3 full with soil or compost.
3. Place pieces of trash and organic wastes in the pot. Make a list of the materials placed in the pot.
4. Fill the rest of the pot with soil or compost and add enough water to keep the contents moist. Cover with a plate or other covering and place in a warm place.
5. After 4 weeks place the contents of the flower pot on a piece of newspaper. Compare these materials with the materials on your list. Which materials have decomposed and which have not?

Part II

During this experiment students will observe the decomposition of different sized apple pieces in soil and learn that the more surface area that is exposed, the faster something will decompose.

Materials: Four apples of the same size (or other piece of fruit as long as the same size and type is used), soil or compost, sticks and labels.

1. Bury one piece of fruit whole in compost or soil and mark with a stick and label.
2. Cut a small section out of the second piece of fruit, bury in compost or soil and mark.
3. Cut the third piece of fruit into fourths, bury in compost or soil and mark.
4. Chop the fourth piece of fruit into fine pieces, bury in compost or soil and mark.
5. Dig up the fruit weekly and record how fast each piece of fruit is breaking down.

Younger students may fill in the description of the fruit each week and older students may record the percentage of decay each week.

FRUIT DECOMPOSITION CHART

	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8
Whole Fruit								
Punctured Skin								
Quartered								
Chopped								

Ask the students how the amount of surface area affects the rate of decomposition. What would break down faster, a 200 pound log or 200 pounds of broken sticks? Explain to the students that the more surface area that is exposed to the decomposers, the faster they will be able to break it down into soil.

Adapted from "Composting Across the Curriculum--A Teacher's Guide to Composting"

Two-Can Bioreactors *- Single or Multiple Sessions*
(Building an odorless indoor compost with two garbage cans)

Two-can composters consist of a 20-gallon garbage can containing organic wastes placed inside a 32-gallon garbage can. Although many classrooms have successfully composted with a single container, placing the can that holds wastes inside another container helps alleviate any odor and fly problems that may arise. The outside container can also be used to collect leachate.

Two-can units are designed to be used as small-scale indoor composting units for home composting, and as an educational tool in the classroom. A 20-gallon can holds only about 10% of the cubic meter volume commonly recommended for thermophilic composting. Thermophilic composting is possible in these smaller systems, but careful attention needs to be paid to C:N ratios, moisture content, and aeration requirements.

A system using a 10-gallon plastic garbage can inside a 20-gallon can may be substituted if space is a problem. The smaller system may operate at lower temperatures, thereby lengthening the time for decomposition. Or students may want to experiment with various aeration and insulation systems and mixtures of wastes to see if they can come up with a 10-gallon system that achieves temperatures as high as those in a larger system.

Materials: 32-gal. plastic garbage can, 20-gal. plastic garbage can, drill, brick, 6 pieces of nylon window screen (each about 2"x2"), dial thermometer with stem at least 24" long, peat moss or finished compost to make a 2" layer in outer can, compost ingredients including high-carbon materials such as wood chips and high-nitrogen materials such as food scraps (see Step 8, below), spigot (optional), duct tape (optional), insulation (optional).

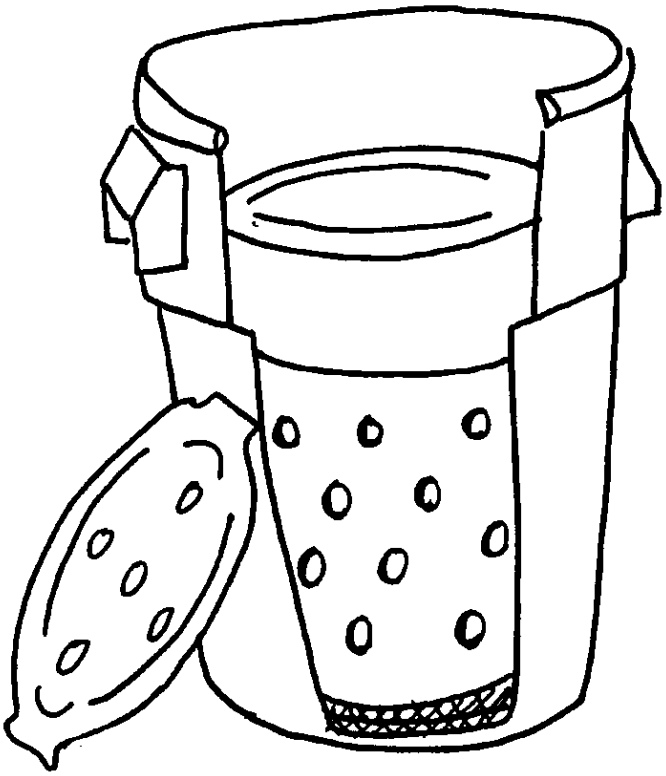
1. Using a drill, make 15 to 20 holes (approximately 1/2" in diameter) through the bottom of the 20-gal. Can.

2. Drill five 1/2" holes just below the rim of the larger garbage can, and cover them on the inside with pieces of nylon window screen.

3. Design and build a spigot at the bottom of the larger can for draining leachate. One way to do this is to fit a piece of pipe into a hole at the bottom edge of the outer can, sealing around the edges with waterproof tape or sealant. Close the outer end of the pipe with a tight-fitting cork or stopper that can be removed to drain the accumulated leachate, and cover the inner end with a piece of nylon screening to block the flow of solid particles.

4. Place a brick or some other object in the bottom of the 32-gal. can. This is to separate the two cans, leaving space for leachate to collect. (Students may want to measure the leachate and add it back into the compost.)

5. If you are composting in a cold area, you may want to attach insulation to the outer barrel and lid with duct tape, making sure not to block aeration holes.



6. To reduce potential odors, line the bottom of the outer can with several centimeters of absorbent material such as peat moss or finished compost. Periodically drain the leachate to avoid anaerobic conditions that may cause odors. The leachate can be poured back in the top if the compost appears to be drying out. Otherwise, dispose of it outside or down the drain, but do not use it for watering plants. (This leachate is not the "compost tea" prized by gardeners, and it could harm vegetation unless diluted. Compost tea is made by soaking mature compost, after decomposition is completed.)

7. Fill the reactor, starting with a 2-4" layer of "brown" material such as wood chips, finished compost, or twigs and branches. Loading can take place all at once (called "batch composting") or in periodic increments. With batch composting, you are more likely to achieve high temperatures quickly, but you will need to have all organic material ready to add at one time. If you are going to add layers of materials over a period of time rather than all at once, the material probably won't begin to get hot until the can is at least 1/3 full.

   Whether you fill the reactor all at once or in batches, remember to keep the ingredients loose and fluffy. Although they will become more compact during composting, never pack them down yourself because the air spaces are needed for maintaining aerobic conditions. Another important rule is to keep the mixture in the inner can covered at all times with a layer of high-carbon material such as finished compost, sawdust, straw, or wood shavings. This minimizes the chance of odor or insect problems.

8. To achieve thermophilic composting, you will need to provide the ingredients within the target ranges for moisture, carbon, and nitrogen. For moisture, the ideal mixture is 50-60% water by weight. Remember the rule of thumb that the ingredient mix should feel about as damp as a wrung-out sponge. For carbon and nitrogen, the mixture should contain approximately 30 times as much available carbon as nitrogen (or a C:N ratio of 30:1). Using a specified quantity of one ingredient, you can calculate how much of the other you will need to achieve this ratio. Or, you can simply make a mixture of high-carbon and high-nitrogen materials. Organic materials that are high in carbon include wood chips or shavings, shredded newspaper, paper egg cartons, and brown leaves. Those high in nitrogen include food scraps, green grass or yard trimmings, coffee grounds, and manure. (Do not use feces from cats or meat-eating animals because of the potential for spreading disease organisms.)

You are now ready to begin monitoring the composting process. The composting process should take 2-3 months after the can is filled. At the end of this period, you can either leave the compost in the can or transfer it into other containers or an outdoor pile for the curing phase.

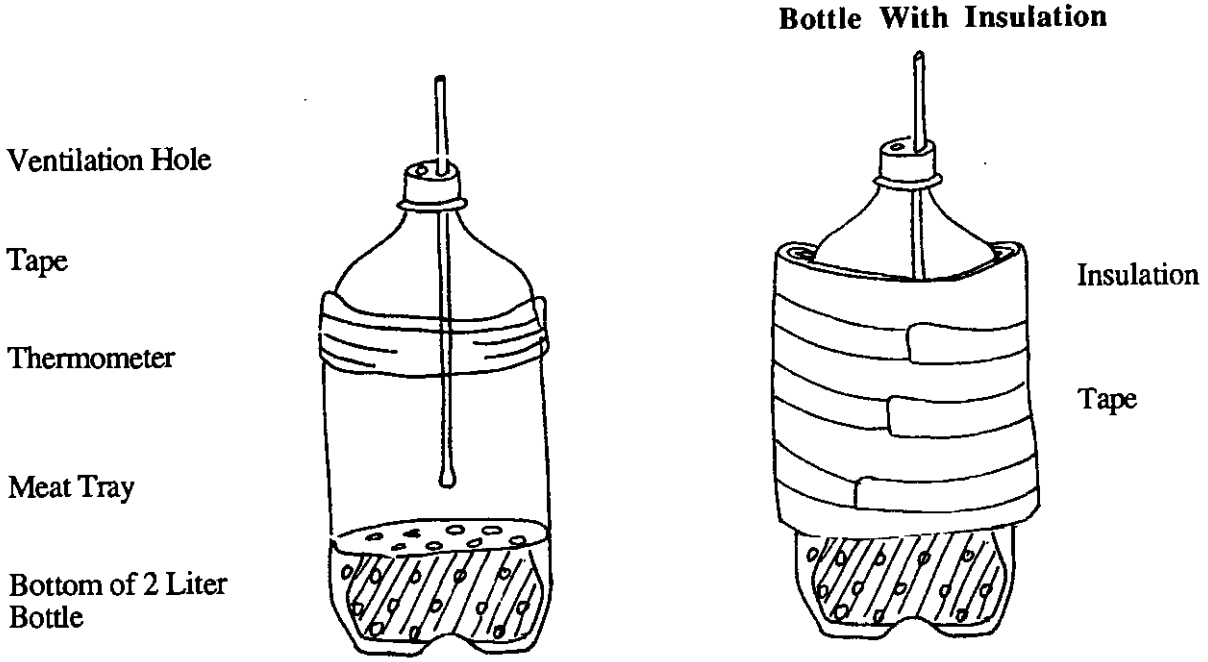
Adapted from "Composting in the Classroom, Scientific Inquiry for High School Students"

Soda Bottle Bioreactors *- Single or Multiple Sessions*
(Building an odorless indoor compost with two soda bottles)

Soda bottle bioreactors are designed to be used as tools for composting research rather than as a means to dispose of organic waste. They are small and inexpensive, enabling students to design and carry out individualized research projects comparing the effect of variables such as moisture content or nutrient ratios on compost temperatures.

Use the instructions below as a starting point. Challenge students to design their own soda bottle reactors and to monitor the temperatures that their reactors achieve.

Materials: Two 2-liter or 3-liter soda bottles, Styrofoam plate or tray, one smaller plastic container such as a margarine tub that fits inside the bottom of the soda bottle (optional--see Step 3), drill or nail for making holes, duct tape or clear packaging tape, utility knife or sharp-pointed scissors, insulation materials such as sheets of foam rubber or fiberglass, fine-meshed screen or fabric (such as a piece of nylon stocking) large enough to cover holes at top and bottom of soda bottle to keep flies out, dial thermometer with stem at least 8" long, chopped vegetable scraps such as lettuce leaves, carrot or potato peelings, and apple cores, or garden wastes such as weeds or grass clippings, bulking agent such as wood shavings or 1/2" square pieces of paper egg cartons, cardboard, or wood, hollow flexible tubing to provide ventilation out the top (optional--see Step 8).

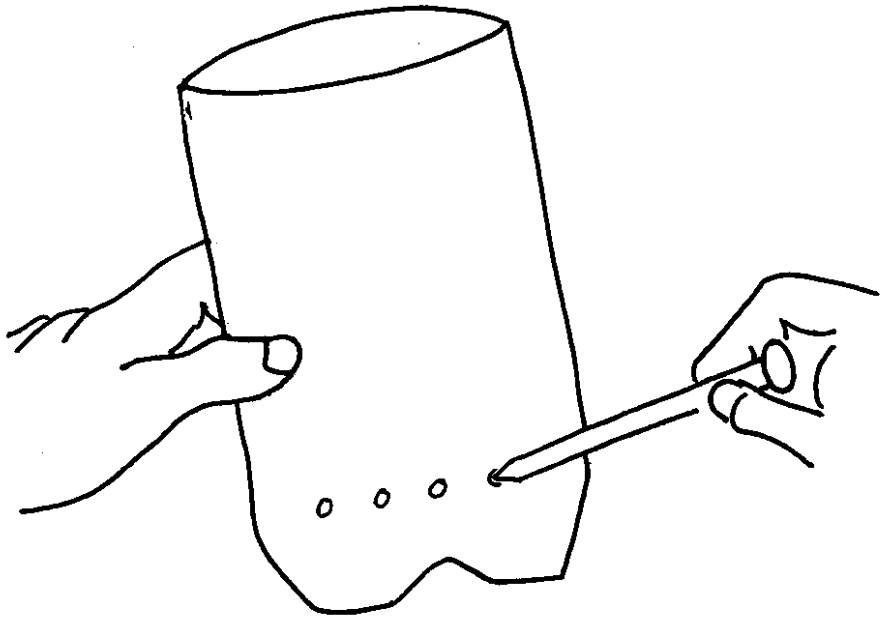


1. Using a utility knife or sharp-pointed scissors, cut the top off one soda bottle just below the shoulder and the other just above the shoulder. Using the larger pieces of the two bottles, you will now have a top from one that fits snugly over the bottom of the other.

2. The next step is to make a Styrofoam circle. Trace a circle the diameter of the soda bottle on a Styrofoam plate and cut it out, forming a piece that fits snugly inside the soda bottle. Use a nail to punch holes through the Styrofoam for aeration. The circle will form a tray to hold up the compost in the bioreactor. Beneath this tray, there will be air space for ventilation and leachate collection.

3. If your soda bottle is indented at the bottom, the indentations may provide sufficient support for the Styrofoam circle. Otherwise, you will need to fashion a support. One technique is to place a smaller plastic container upside down into the bottom of the soda bottle. Other possibilities include wiring or taping the tray in place.

4. Fit the Styrofoam circle into the soda bottle, roughly from the bottom. Below this tray, make air holes in the sides of the soda bottle. This can be done with a drill or by carefully heating a nail and using it to melt holes through the plastic. If you are using a plastic container to hold up the Styrofoam tray, you may need to drill holes through the container as well. The object is to make sure that air will be able to enter the bioreactor, diffuse through the compost, and exit through the holes or tubing at the top. Avoid making holes in the very bottom of the bottle unless you plan to use a pan underneath it to collect whatever leachate may be generated during composting.



5. Next, determine what you will compost. A variety of ingredients will work, but in general you will want a mixture that is 50-60% water by weight and has approximately 30 times as much available carbon as nitrogen (a C:N ratio of 30:1). You can estimate moisture by using the rule of thumb that the mixture should feel as damp as a wrung-out sponge, or you can calculate optimal mixtures using the procedures described in "Composting in the Classroom, Scientific Inquiry for High School Students," Chapter 3. (See bibliography.)

Similarly, mixtures that will achieve optimal C:N ratios can be either estimated or calculated. Materials that are high in carbon include wood chips or shavings, shredded newspaper, and brown leaves. High-nitrogen materials include food scraps, green grass or yard trimmings, and coffee grounds. By mixing materials from the high-carbon and high-nitrogen groups, you can achieve a successful mixture for thermophilic composting. Try to include more than just a couple of ingredients; mixtures containing a variety of materials are more likely than homogeneous ones to achieve hot temperatures in soda bottle bioreactors.

The particle size of compost materials needs to be smaller in soda bottle bioreactors than in larger composting systems. In soda bottles, composting will proceed best if the materials are no larger than 1/2-3/4" in size.

6. Loosely fill your bioreactor. Remember that you want air to be able to diffuse through the pores in the compost, so keep your mix light and fluffy and do not pack it down.

7. Put the top piece of the soda bottle on and seal it in place with tape.

8. Cover the top hole with a piece of screen or nylon stocking held in place with a rubber band. Alternatively, if you are worried about potential odors, you can ventilate your bioreactor by running rubber tubing out the top. In this case, drill a hole through the screw-on soda bottle lid, insert tubing through the hole, and lead the tubing either out the window or into a ventilation hood.

9. If you think flies may become a problem, cover all air holes with a piece of nylon stocking or other fine-meshed fabric.

10. Insulate the bioreactor, making sure not to block the ventilation holes. (Because soda bottle bioreactors are much smaller than the typical compost pile, they will work best if insulated to retain the heat that is generated during decomposition.) You can experiment with various types and amounts of insulation.

Now you are ready to watch the composting process at work! You can chart the progress of your compost by taking temperature readings. Insert a thermometer down into the compost through the top of the soda bottle. For the first few days, the temperature readings should be taken at least daily, preferably more often. In these small systems, it is possible that temperatures will reach their peak in less than 24 hours. To avoid missing a possible early peak, use a max/min thermometer or a continuously recording temperature sensor, or have the students measure the temperatures several hours after they add their wastes, and early the next morning.

Soda bottle reactors generally reach temperatures of 104-113°F (40-45°C), somewhat lower than temperatures achieved in larger composting systems. If conditions are not right, no noticeable heating will occur. Challenge your students to design systems that show temperature increases, and use their results as a starting point for a discussion of the various factors that affect microbial growth and decomposition (C:N ratios, moisture levels, air flow, size, and insulation). Because the bottles are so small, you may not end up with a product that looks as finished as the compost from larger piles or bioreactors. However, you should find that the volume shrinks by one-half to two-thirds and that the original materials are no longer recognizable. You can let the compost age in the soda bottles for several months, or transfer it to other containers or outdoor piles for curing.

Taken from "Composting in the Classroom, Scientific Inquiry for High School Students"

Experiments with Worms

Sizing Up Your Worm Bin *- Multiple Sessions*
(Determining how large a worm bin your classroom will need)

In this experiment students will collect their food scraps for three weeks to determine what size worm bin your classroom will need. This experiment is only necessary if you plan to put all of your food scraps in your worm bin every day. Redworms are surface eaters and prefer living in shallow containers. For this reason the square footage of the base of the container is more important than the volume, in determining the size of your worm bin. The standard measurement used when sizing a worm bin is: One square foot of surface area per pound of scraps per week.

Materials: Bucket with lid to collect food scraps and a scale.

1. Weigh the empty bucket and lid.
2. Collect food scraps for one week, weigh the bucket and food scraps and record the results, subtracting the weight of your bucket. Donate the scraps to someone with a compost pile.
3. Repeat this procedure for 2 more weeks and find the average weight of food scraps generated by your class in one week. For every pound of scraps, you will need a square foot in your worm bin. One large bin is not necessary, you may prefer to use several small bins.
4. Just for fun, determine how many square feet you would need to compost for the whole school. (Square footage for your class x number of classrooms in your school.)

One square foot of surface area for every pound of food scraps collected in one week.

Week 1 _____ lbs. of food scraps

Week 2 _____ lbs. of food scraps

Week 3 _____ lbs. of food scraps

_____ + _____ + _____ = _____ divided by 3 = _____ square feet
Week 1 Week 2 Week 3

Adapted from "Composting Across the Curriculum--A Teacher's Guide to Composting"

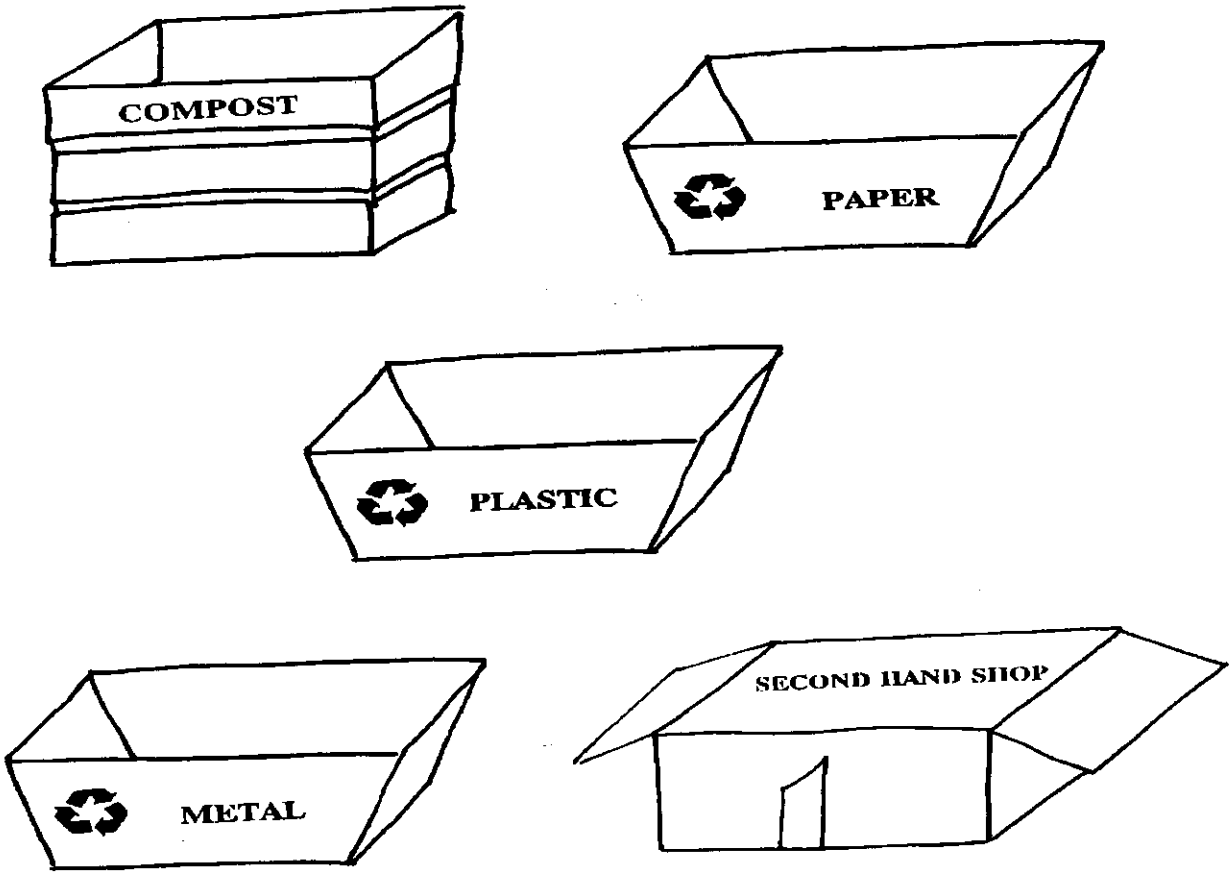
For additional reference materials and educational activities using worms, see bibliography.

What's In My Trash Can?
(Identifying the different materials in your trash can)

In this activity students will take items out of a previously prepared trash can and talk about the proper disposal of these items.

Materials: Clean garbage can and trash items such as glass bottles, plastic bottles, soda cans, cardboard, non-sticky food scraps, paper, paint, and batteries.

Have students pick trash items, one by one, out of the garbage can and talk about where they should go (recycled, composted, reused).



Taken from "Composting Across the Curriculum--A Teacher's Guide to Composting"

DISCOVERY ACTIVITIES

Discovery is a rewarding way of learning new things because students are able to explore, prod, and inspect to find out their own answers and draw their own conclusions. Children are very perceptive and one might be surprised to see what they may be able to identify on their own.

Exploring For Compost Creatures
(Finding and identifying compost organisms in sample compost)

This activity is extremely simple but will be one of your students' favorites. Students will prod and poke through a sample of compost and look for decomposing organisms such as sow bugs, millipedes, worms, and worm cocoons.

Materials: One tray per student or group of students (aluminum pie pan), one spoon per student, identification sheet, and compost (backyard compost will contain more sow bugs, millipedes, and beetles; worm compost will contain more worms and worm cocoons). Optional: observation containers and magnifying glasses.

Fill each tray with a few scoops of compost. After you have spoken to the class about the various organisms they will be looking for, give each student a spoon to poke with, a tray of compost, and the "Decomposers In The Spotlight Identification Guide." Let students examine their compost and when they find a living decomposing organism, have them carefully put it into an observation container so everyone can have a closer look at it.

CHECKLISTS

Checklists are a simple learning tool; however they are quite effective. While completing a checklist, students observe conditions carefully and decide whether the item should be checked or not. This is a skill that requires students to make decisions about anything from a condition in a compost pile to the presence of cocoons in a worm bin.

WORM BIN CHECK-UP

CHECK ANY OF THE FOLLOWING CONDITIONS YOU FIND IN YOUR WORM BIN

MOISTURE
Do you see...
- ❑ puddles of water
- ❑ liquid dripping from drain holes
- ❑ worms with glistening skin
- ❑ dry bedding
- ❑ casting and bedding stuck to worms
- ❑ ants in bin

DECOMPOSITION
How does it look?
- ❑ food still looks fresh
- ❑ food is black and slimy
- ❑ fuzzy mold on food
- ❑ bedding is disappearing
- ❑ castings are piling up
- ❑ only the fibrous food is left

REPRODUCTION
How many worms do you see?
- ❑ few red worms present
- ❑ few baby red worms
- ❑ worms joined together mating
- ❑ number of worm cocoons
- ❑ number of worms with a clitellum

AIR CIRCULATION
- ❑ bin smells rotten
- ❑ food and bedding are matted down in large clumps
- ❑ puddles in bin
- ❑ a few areas smell rotten
- ❑ spaces can be seen in between bedding
- ❑ bin smells fresh and earthy like the forest

OTHER DECOMPOSERS
- ❑ little white worms present
- ❑ slugs or snails present
- ❑ sow bugs present
- ❑ fruit flies present
- ❑ ants present
- ❑ mites present

Consult the Worm Bin Troubleshooting Guide for possible solutions to problem areas.

Adapted from "Composting Across the Curriculum--A Teacher's Guide to Composting"

WORM BIN TROUBLESHOOTING GUIDE

Bin too wet	Add more dry bedding Avoid foods with high water content
Bin too dry	Add water while turning bedding
Food/bedding matted together	Add more bedding and fluff to introduce air
Worms not eating food Food not decomposing	Too much food is being added at one time Break food into smaller pieces, especially hard woody materials
Bin smells	Add more bedding and turn Avoid naturally smelly foods such as broccoli and onions; avoid meat and dairy products which may turn rancid
Fruit flies	Cut food into smaller pieces and bury Keep bedding moist but not too wet Loosely cover bin with newspaper, cardboard, or screen Limit citrus fruits
Ants	Bury food under bedding; cover bin with screen; move to ant-proof location
Worms dying	Too much water; worms are drowning Too little water; worms drying out Limited food available—too many worms or not enough food Bin exposed to temperature extremes; ideal temperature should be between 55-77°F (12-25°C) Do not add alcohol, very spicy foods, or anything toxic

ROLE PLAY ACTIVITIES

Role play, oral presentations, and skits are always a fun way for students to demonstrate what they have learned. These types of activities are usually best saved for the conclusion of the unit on composting and give students an opportunity to bring together the many aspects of composting they have learned into one comprehensive presentation. Students may either speak to the class about the benefits of composting or work with other students to produce a composting TV commercial or any number of performances relating to composting.

My Compost Stinks, What Do I Do?

In this role play activity, students will be given a compost problem and their partners will diagnose the problem and tell them how to fix it. Students will learn compost troubleshooting techniques while they have fun acting out these scenarios with their classmates.

Give each pair of students the list of compost problems and the troubleshooting sheet. One student will look at the "Compost Problems" sheet and choose a problem to explain. The other student will use the "Compost Troubleshooting" sheet to determine the reason and solution to their partner's problem.

COMPOST PROBLEMS

Problem #1: "My pile is not heating up. I have been taking the temperature every day since I built my backyard compost pile two weeks ago but it has not gotten over 68˚F (20˚C). Isn't it suppose to be between 90 and 140˚ F (32-60˚C)?"

Problem #2: "The worms in my worm bin look unhealthy and are not eating the food that I have been putting in there. I keep my worms outside, is this bad for them?"

Problem #3: "Two nights ago I saw some animals around my compost pile when I brought out my food scraps from dinner. I think they were eating some of the food I put on the pile last week. What should I do?"

Problem #4: "My pile really smells. Why does it smell and what should I do?"

Problem #5: "My compost pile is not turning into compost fast enough. What can I do to make compost more quickly?"

COMPOST TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSES	SOLUTIONS
Rotten-Egg Odor	excess moisture (anaerobic conditions)	turn pile, or add dry material such as leaves, wood chips, or straw
Slow Decomposition	lack of moisture	add water
	lack of "green" material	add high nitrogen material
	lack of air in pile	turn pile
Low Pile Temperature	pile too small	make pile bigger or insulate sides
	insufficient moisture	add water while turning pile
	poor aeration	Turn pile
	lack of "green" material	mix in nitrogen sources such as grass clippings, food scraps, or manure
	cold weather	increase pile size, or insulate pile with an extra layer of material such as straw
High Pile Temperature--more than 140°F (60°C)	pile too large	reduce pile size
	insufficient ventilation	turn pile
Pests: rats raccoons, or insects	presence of meat scraps or fatty food waste food uncovered	remove meat and fatty foods from pile, or cover with a layer of soil or sawdust, or build an animal-proof compost bin, or turn pile to increase temperature

The Waste Predicament
(Town meeting convenes to solve the landfill crisis)

In this role play activity, students are divided into different interest groups and must decide how they believe the town should solve the waste stream problem. This activity will show students the various obstacles and opposing opinions real life interest groups hold regarding waste management. As students begin to understand the conflicting arguments, they will become more knowledgeable and be able to strengthen their own opinions. Inevitably, the need for composting will also surface during this activity.

The situation at hand: "Compost Cove, USA," like many communities, is anticipating a garbage crisis. At the current rate of generation, our present landfill will reach capacity in five to seven years. As you know, "Compost Cove" is located near the ocean, has a population of 30,000 people and is known for its natural beauty, clean air, and good schools. Our economy is dependent on a light industrial base, tourism, fishing, and commercial services. In the last ten years our population has doubled, putting an unexpected strain on our landfill and other community services. The town board must decide upon a waste management solution at this time.

1. Divide students into four groups and have one student from each group pick an interest group out of a hat. Interest groups: *Landfill managers and employees, town residents, environmental interest group, private waste haulers.* Give students the "situation at hand" as well as a garbage can waste stream chart, which will give them an idea of what type of waste is being generated.

   Ideas to consider...

LANDFILL MANAGERS AND EMPLOYEES

How will you be affected by...

- a decrease in garbage
- closure of local landfill
- home composting

TOWN RESIDENTS

How will you be affected by...

- an increase in landfill or incineration costs
- an increase in collection fees for transportation to a remote landfill
- a bag tag program (pay per garbage bag)

ENVIRONMENTAL INTEREST GROUP

How could you promote...

- recycling
- home composting
- waste reduction

PRIVATE GARBAGE HAULER

How will you be affected by...

- a decrease in the amount of garbage
- an increase in landfill or incineration costs
- curbside recycling

2. Let the students have 15 to 20 minutes to talk among themselves and come up with a waste management solution. Each group should choose a solution that is most advantageous to its interest category. Students will need to consider how the town could either reduce the amount of waste the residents produce and/or other possibilities of waste disposal. The solutions may have several components: ((1) education of the public, including backyard composting, (2) municipal composting, etc., (3) landfilling and/or incinerating.

3. After the students have had time to prepare their solution proposal, convene for a town meeting. The teacher or activity facilitator can pose as the mayor and conduct the meeting. A spokesperson from each interest group will come up to the podium and state the group's solution.

4. After all interest groups have shared their conclusions, students may vote for their favorite solution.

PROJECTS

Like role playing and oral presentations, composting projects are also an excellent way for students to incorporate what they have learned about composting into one final project that they can be proud of. Projects also give students the opportunity to work in groups and learn from each other. There are numerous assignments that will spark your students' imagination and teach them more about the subject of composting without them even realizing it.

Spreading The Word Of Compost
(Creating compost education and marketing tools to promote composting)

Here are four project ideas for your school-aged composters (7th through 12th grade). One project may be selected for the entire class or groups of students may have a choice between the four projects. Before assigning these projects, students should have a basic understanding of how to build a compost and why composting is important.

Project #1 - Compost Presentation

Have students develop a 20 minute composting workshop for fellow students, adults, or younger children. Have students begin by deciding what information is necessary to teach someone how to compost. (Example: Why Compost?, How to Compost, Troubleshooting.) Have students think about what type of visual aids they will need to create for their presentation. Students may need to conduct research, if they are not aware of the compost process, uses for compost, etc. Next, students will rehearse and then finally give their presentation to their classmates. They may want to video tape their performance, producing a mini-TV program about composting.

Project #2 - Compost Pamphlet

Have students develop a four page pamphlet that can be used to teach someone how to compost. Have students begin by brainstorming topics that should be included in the pamphlet. Students can gather other examples of brochures and pamphlets not associated with composting so they can get an idea of how they want their pamphlet to

look. Students will write out the text to be included and create and find pictures to go with this material. Students can also create a compost logo for their pamphlet. Next, students will create a rough draft of the pamphlet and then a final copy. Students can make a copy for the rest of the students in the classroom as well as distribute them in local grocery stores, garden centers, malls, etc.

Project #3 - Marketing Compost Products

Students will design a package and marketing slogan for one or more compost products. *Sample compost products: finished compost, worms, compost T-shirts, bumper stickers, compost bins.* First, have students decide what they would like to sell. Then students will brainstorm together what they believe are good selling points for their product. They will design a package for selling their product, which will involve decorating the outside with words, illustrations, and text that will help sell the product. Students may also create posters to advertise their product. For a final presentation, students can perform a two-minute commercial in front of the class about their product.

Project #4 - Publicizing A Compost Program

Students will create a publicity campaign for a compost workshop, compost product, or simply promote composting within the community. First, students will need to decide what type of compost program they will be publicizing. Then, they will brainstorm ways they can promote the program (TV, radio, newspaper, displays, etc.) and decide which ones will be the most effective. Students will choose four different methods of advertisement and create articles, press releases, visual aids, television and radio scripts, etc. For a final presentation, students may act out a television commercial, radio ad, or other advertisement.

Adapted from "Composting Across the Curriculum--A Teacher's Guide to Composting"

FIELD TRIPS

The knowledge and experience that can be gained from a field trip is extremely hard to recreate in a classroom situation. Excursions to compost demonstration sites, municipal compost sites, and public landfills will most likely make a considerable impact on your students. You may wish to prepare some type of presentation to be given while you are at your destination. A follow-up discussion back in the classroom is a great way to reinforce what the students have observed on their field trip.

GUEST SPEAKERS

Inviting a guest speaker to come into your class will provide an excellent opportunity for your students to learn about a specific compost topic as well as a chance for them to ask questions your speaker will be able to accurately answer. There a number of possible specialists you may invite to speak to your students.

Possible Guest Speakers

- Cooperative Extension Personnel
- Recycling Coordinator
- Municipal Compost Operator
- Person performing a unique method of composting
- Person who has organized community, school, campus composting
- Person who has organized composting at a special event (i.e., state fair)
- Farmers, especially organic farmers
- University Professor

GAMES

Games are perfect for releasing some of that energy your students have been building up since you began your composting spiel. If you are working with younger students especially, it is important to provide a balance of straight learning activities with some compost play. Even if your games are not directly related to composting, it's still a great way to break up your session.

Worms Made My Chocolate Milk Shake

In this game students will understand how worms are responsible for the health of the cow that provides milk for a chocolate milk shake. Students learn that cows would not have anything to eat if it were not for the worms who decompose dead grass and turn it into soil. New grass is able to grow using the sun, rain, and nutrients from the soil because the worms release these nutrients when they break down dead plants. The cow eats the new grass and produces milk for chocolate milk shakes.

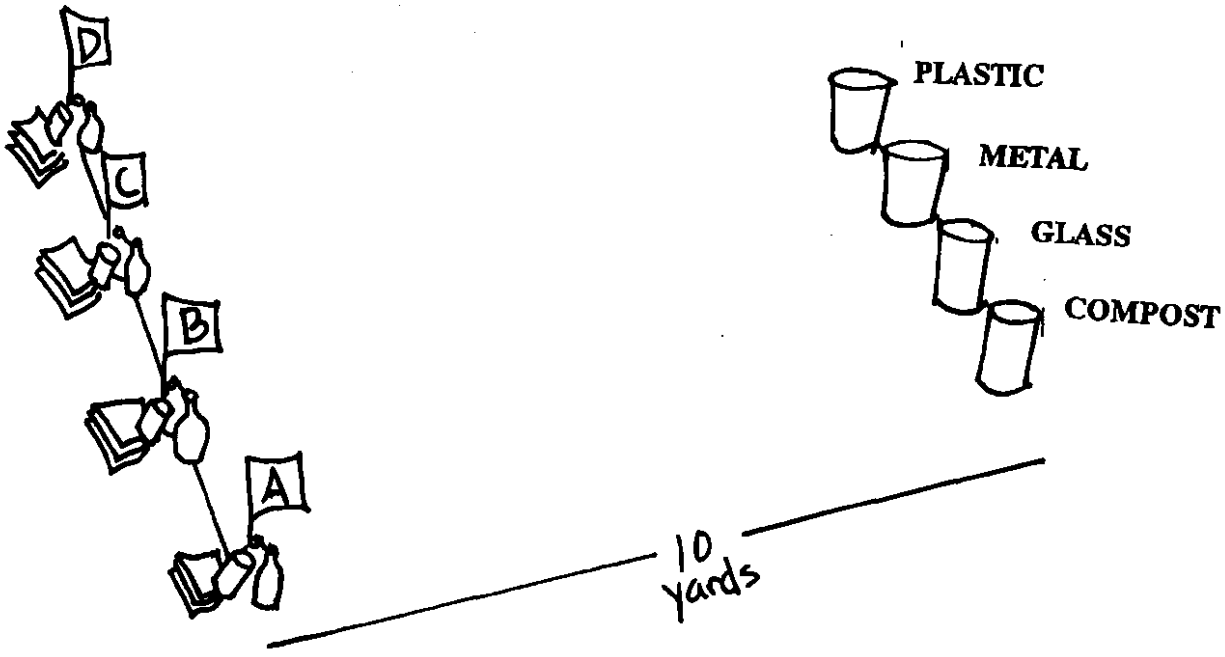
This can be demonstrated by having the students form a circle and naming some of the students "worms," "soil," "sunshine," "rain," "dead grass," "live grass," and "cows." Tell students that all of the worms are now extinct and have the "worms" sit down on the floor. Since the worms are not there to break down the dead grass into soil, have the "soil" sit down on the floor. The "dead grass," "rain," and "sunshine" are of no use because new plants will not grow without nutritious soil so these students can sit down along with the "live grass." Next tell the "cows" to sit down because without any grass to eat, they die of starvation. Now there aren't any cows to make milk for chocolate milk shakes.

Recycling Relay

Students will definitely release some of that built-up energy during this racing game. To play, you will need four large containers labeled "plastic," "metal," "paper," and "compost" which will be used as receptacles. First divide the class into four equal teams and give each player two recyclable items (plastic bottles, metal cans, plastic apple, newspaper). These items should be labeled "team A," "team B" etc. The receptacles should be placed about 10 yards from the students.

All four teams will stand behind a line and take turns with their teammates, running over to the recyclable receptacles with a recyclable item. Students need to put their recyclable item in the correct receptacle for it to count.

This is why it is best to label the recyclable items so you can determine if a team misplaced the recyclable item. Each player should make two runs. The next team member cannot leave his/her position until touching hands with the runner coming in, similar to a relay race. The team that sorts their recyclables first, wins the race.



Compost Critter, Guess Who?

During this game students will learn how to identify various decomposer organisms found in a compost pile. First, cut out a compost critter for each student from the "Decomposer Identification Guide." There will probably not be enough compost critters to go around, so the same critters can be assigned to more than one student. Tape one compost critter to each student's back, without the students seeing which decomposer organism they are. The students will ask their classmates yes and no questions about the critter on their back while they try to figure out which compost critter they are. It may be easier for the students to guess what they are if they are able to refer to a copy of the sheet of compost critters.

Compost Jeopardy

To play compost jeopardy, draw the following grid on a chalk board or large piece of paper. Students should be divided into two, three or four teams. This first team begins by choosing any section on the grid, for example "Wonderful Wigglers for 100 points". The game facilitator will then ask a 100 point question from the "Wonderful Wigglers" section. The team will get a chance to talk with each other and come up with their answer in less than a minute. If the team has the correct answer, they will receive the amount of points the particular question is worth. If the team has the incorrect answer then they will have the points subtracted from their score.

If the question was correctly answered, the question is excluded from the rest of the game and the spot an the grid is closed out (close out with a large "X"). If the question was incorrectly answered, it will be excluded from the rest of the game (unless all other questions have been used) and the grid space will not be closed out.

Teams continue to take turns answering questions until the entire grid is closed out or time has run out. The team with the most points is the winner.

Note: Some questions are multiple choice or True or False, while other questions require a short answer.

COMPOST JEOPARDY

COMPOST CRITTERS	SMELLY SOLUTIONS	WONDERFUL WIGGLERS	"BLACK GOLD"
50 points	50 points	50 points	50 points
100 points	100 points	100 points	100 points
150 points	150 points	150 points	150 points
200 points	200 points	200 points	200 points

COMPOST CRITTERS

For 50 points

1. Aerobic decomposers require which of the following to break down a compost pile?
   (a) rain
   (b) oxygen
   (c) sunlight
   Answer: B

2. As aerobic decomposers break down organic materials they release the following byproducts:
   (a) oxygen and heat
   (b) carbon and nitrogen
   (c) carbon dioxide and heat
   Answer: C

3. A compost pile usually raises to temperatures of:
   (a) 300-360^{0}F (148-182^{0}C)
   (b) 90-140^{0}F (32-60^{0}C)
   (c) 30-55^{0}F (-1-12^{0}C)
   Answer: B

4. Decomposers turn organic materials into compost, which can be used for
   (a) lawns
   (b) gardens
   (c) house plants
   (d) all of the above
   Answer: D

For 100 points

1. What kind of decomposer spreads by forming spores?
   (a) bacteria
   (b) fungi
   (c) sow bug
   Answer: B

2. What type of decomposer helps to give soil a loose and well-draining structure?
   Answer: Worm

3. Decomposers need carbon for a source of:
   (a) energy
   (b) heat
   (c) protein
   Answer: A

4. A food chain is
   (a) the kinds of food decomposers eat
   (b) the flow of energy from the producers to the decomposers
   (c) the four food groups
   Answer: B

For 150 points

1. What decomposer are we not able to see with our naked eye?
   (a) bacteria
   (b) fungi
   (c) millipede
   Answer: A

2. What type of decomposer rolls up into a ball and resembles a sow bug?
   (a) pill bug
   (b) millipede
   (c) ground beetle
   Answer: A

3. Decomposers need nitrogen for a source of
   (a) energy
   (b) heat
   (c) protein
   Answer: C

4. Where can decomposers be found?
   There are an unlimited number of answers to this question; some include: forest floor, under rocks, in a compost pile, and inside of a garbage can.

For 200 points

1. Name one type of arthropod decomposer--arthropod meaning an organism having jointed legs.

Possible answers: sow bug, ant, centipede, millipede, collembola, ground beetle, rove beetle or beetle mite

2. Name three decomposing organisms.
   Answers may include: sow bug, ant, centipede, beetle mite, ground beetle, collembola, and earthworm

3. Which of the following is a byproduct of anaerobic decomposition?
   (a) salt
   (b) methane gas
   (c) oxygen
   Answer: B

SMELLY SOLUTIONS

For 50 points

1. Should meat be put in your compost pile?
   Answer: Small amounts of meat, such as those found in casseroles or plate scrapings can be composted if the food is well covered. Large amounts of meat are not recommended because of the potential for odor problems, and possible animal attraction.

2. True or False: If your compost pile is not turned at least once a week, compost will not occur.
   Answer: False, compost will occur wherever there are dead organic materials, whether it is turned or not.

3. Which of the following materials will not decompose in your compost pile?
   (a) soda bottle
   (b) egg shell
   (c) coffee filter
   Answer: A

For 100 points

1. For the best results, what type of materials should be put in your compost?
   (a) high carbon materials (browns)
   (b) high nitrogen materials (greens)
   (c) a combination of carbon and nitrogen materials
   Answer: C

2. Which of the following foods are not recommended for your worm bin because they could cause an odor problem?
   (a) eggshells, tomatoes, and banana peels
   (b) meats, fatty foods, and cheese
   (c) grapefruit, bread, and cereal
   Answer: B

3. To help absorb any odors in your worm bin...
   (a) pour water on top
   (b) take out some of your worms
   (c) place a piece of cardboard or sheets of paper on top of the compost
   Answer: C

4. Your compost pile can become rodent proof by:
   (a) placing it on a cement slab so animals will not be able to borough underneath the pile
   (b) having holes no larger than 1/2 inch in your compost bin
   (c) not putting large amounts of meats, fatty foods, or cheese in your pile and covering all exposed food
   (d) all of the above
   Answer: D

For 150 points

1. What is the difference between aerobic and anaerobic decomposers?
   Answer: Aerobic decomposers use oxygen and anaerobic decomposers do not use oxygen. Anaerobic decomposition can also create an offensive smell; is slower, and makes more plant toxins.

2. For the best results, which combination is best for your compost pile? Remember, carbon = "browns" and nitrogen = "greens":
   (a) 1/3 high carbon materials and 2/3 high nitrogen materials
   (b) 1/2 high carbon materials and 1/2 high nitrogen materials
   (c) 2/3 high carbon materials and 1/3 high nitrogen materials
   Answer: C

3. Your compost pile may emit an odor if too many high nitrogen materials are placed in your pile because:
   (a) nitrogen has a small atomic weight
   (b) the high moisture content in nitrogen materials can lead anaerobic conditions
   (c) the high moisture content in nitrogen materials can lead to aerobic conditions
   Answer: B

4. If you pile has not warmed up, it may be because
   (a) your pile is too small and cannot retain its temperature
   (b) there are not enough high nitrogen materials in your pile
   (c) either a or b
   Answer: C

For 200 points

1. What may happen if your pile is too wet or compact and air is not able to get into the pile?
   Answer: Anaerobic decomposition will set in because there is no oxygen available for the aerobic decomposers.

2. When constructing a two can compost reactor, it is important to do which of the following to prevent odors?
   (a) drain or absorb excess water leaching out from the smaller can into the bigger can
   (b) keep the lid on tightly so oxygen will not seep inside of the can
   (c) pour at least one gallon of water in the bottom of the larger can
   Answer: A

3. Name one reason your compost pile may smell and what you can do to avoid this.
   Some possible answers: If large amounts of meat, oil or cheese are placed in your pile, your compost may smell--take these materials out and do not put any more in. If pile has been compressed or soaked with water, your compost may smell--turn pile and possibly add dry bulky materials, such as leaves or wood chips.

4. When constructing a soda bottle compost reactor, why are holes made in the soda bottle?
   Answer: So oxygen can get to the composting materials and smelly anaerobic decomposition will not occur.

WONDERFUL WIGGLERS

For 50 Points

1. What is another name for a worm compost?
   Answer: Vermicompost

2. True or False: Worms are sensitive to light and will try to seek shelter in a dark place if a light is shone on them.
   Answer: True

3. What type of worm is most commonly used for vermicomposting?
   Answer: The best worm for vermicomposting is the redworm, scientifically named the Eisenia foetida.

4. True or False: Setting up a worm bin is complicated.
   Answer: False--all you need is a bin, worms, bedding, a handful of soil, and some food scraps.

For 100 Points

1. What must a worm bin have in order for air to circulate through the bin?
   Answer: Aeration holes

2. What temperatures do worms feel most comfortable in?
   (a) 40 to 55°F (4-12°C)
   (b) 55 to 77°F (12-25°C)
   (c) 77 to 98°F (25-36°C)
   Answer: B

3. In addition to adequate oxygen and comfortable temperatures, what else is necessary to ensure a healthy environment for worms?
   Answer: Clean, loosely-packed bedding (moistened, shredded newspaper) provides moisture the worms need, and helps to keep air circulating through the bin.

4. Why should the amount of bedding in your worm bin be checked regularly?
   Answer: Because the worms digest the bedding along with the food wastes.

For 150 Points

1. What do worms like to eat?
   (a) most food scraps with the exception of large amounts of garlic, onions, meats, or pure dairy products
   (b) glass and metal products
   (c) plastic and rubber products
   Answer: A

2. How much do worms eat per day?
   (a) about two-thirds their total weight
   (b) almost double their weight
   (c) barely one fourth of their weight
   Answer: A

3. How big should a worm bin be?
   Answer: Sizing your bin will depend on the amount of food waste you will be placing in it. One square foot of surface area is needed for every pound of food waste you plan to place in your bin per week.

4. True or False: The deeper a worm bin the better.
   Answer: False--the depth of your bin should always be 8-12 inches deep no matter how long or wide the bin will be since redworms are surface eaters.

For 200 Points

1. What's a good size bin (length x width x height)?
   (a) 10" x 10" x 10"
   (b) 12" x 12" x 16"
   (c) 16" x 24" x 8"
   Answer: C

2. If your class produces three pounds of food scraps per week, how large should your worm bin be?
   (a) 3 square feet
   (b) 6 square feet
   (c) 9 square feet
   Answer: A

2. What are the most important conditions to monitor in a worm bin?
   Answer: Temperature, moisture, and the amount of bedding and organic waste.

4. True or False: Worms frequently escape the worm bin.
   Answer: False--if you provide the proper environment for the worms i.e., adequate amounts of air, moisture, and fresh food scraps, the worms will rarely try to escape.

"BLACK GOLD"

For 50 Points

1. What kinds of materials can be put in a compost pile?
   Answer: Organic, biodegradable

2. Compost is referred to as "Black Gold" because it is a black color and
   (a) was used in the 1800s for trading
   (b) was not discovered until the 1800s
   (c) is the most valuable soil amendment for your garden
   Answer: C

3. Compost enhances the soil and helps plants grow by:
   (a) adding nutrients to the soil
   (b) holding moisture
   (c) both a and b
   Answer: C

4. Composting is:
   (a) a form of recycling yard and kitchen wastes into a soil amendment
   (b) not a method of reducing the amount of trash we produce and send to the landfill
   (c) difficult and expensive
   Answer: A

For 100 Points

1. Name two uses for compost.
   Possible answers: garden, lawns, mulch, shrubs, trees, and house plants

2. Compost enhances the soil and helps plants grow by
   (a) adding oxygen to the soil
   (b) giving the soil a crumbly texture, which helps plant roots penetrate the soil more easily
   (c) allowing sunlight to reach underneath the soil
   Answer: B

3. Composting reduces the amount of waste we generate because
   (a) organic wastes are transformed into a soil amendment, instead of taken to the landfill
   (b) we are buying products will less packaging
   (c) we are taking our recyclable soda bottles to the deposit center
   Answer: A

For 150 Points

1. What does finished compost look like?
   Possible answers: brown color, like "dirt," like soil

2. When compost is finished it will be
   (a) green and smelly
   (b) brown and crumbly
   (c) neither a nor b
   Answer: B

3. True or False: If you do not have a backyard, then you cannot compost.
   Answer: False--many apartment and condominium dwellers compost with a worm bin or an indoor garbage can.

4. What does finished compost smell like?
   Possible answers: earthy, like "dirt," like soil

For 200 Points

1. Name one possible way to compost.
   Possible answers include: worm compost, heap outside, two-can compost, compost bin outside, tumbler

2. A compost pile in your backyard will take about how long to complete without turning?
   (a) 6 months
   (b) 1 year
   (c) 2 years
   Answer: B

3. What percentage of the average household's garbage is kitchen and yard waste?
   (a) 5 %
   (b) 10 %
   (c) 20 %
   Answer: C

Chapter Five

Workshops and Special Activities

You have completed your technical training and are now ready to share your expertise with your community. You may be interested in making a presentation in an elementary school classroom or organizing your own workshop for adults at a local park. In either case, it is important that you keep the message light and have fun with your students, especially if they are first time composters. Technical terms and strict guidelines may overwhelm some people and discourage them from composting because they may have the impression composting is too complicated and difficult for them to achieve. Composting is *EASY* and composters can put as much or as little energy into their compost as they choose.

Technical terms and strict guidelines may overwhelm some people and discourage them from composting because they may have the impression composting is too complicated and difficult for them to achieve.

Pulling together a presentation may seem overwhelming at first for a new Master Composter. What should I talk about? What activities should I conduct with my students? The activities covered in the previous chapter will help you formulate a base for your presentation and you can fill in the gaps with your own expertise.

Usually, a combination of hands-on activities and animated demonstrations will have the most impact on an audience. Your students will be more impressed if they are able to see the compost process rather than just hear about it. If you are speaking about a compost pile, take your students outside and break a pile open. Have the students take temperatures, look for decomposers, and examine compost at various stages. If you are explaining how worms break down food wastes, let them have their own worms to inspect, become acquainted with, and gain an appreciation for.

ADULT WORKSHOPS

The purpose of an adult workshop is to teach community residents how to compost kitchen and yard wastes at home. At the conclusion of the workshop, participants should have learned all of the essential information, including everything from setting up the compost unit to harvesting and using the finished compost.

Topics in your Adult Workshop should include: environmental benefits of composting; different methods of composting; building or purchasing a bin; materials that can and cannot be composted; maintaining a compost pile, and using the finished compost. The following sample outlines may also be helpful when developing your presentation.

Sample Adult Workshop (1 hour 30 minutes)

I. Introduction (5 min.)

Introduce yourself as a Master Composter.
Ask your audience if anyone is already composting.
Ask why they are interested in composting.

II. Composting Basics (5 min.)

Define Composting: Composting is the biological breakdown of organic matter into a rich humus. Using composting methods, the decomposition process can be accelerated.

Define Compost: Compost (or humus) is decomposed organic materials that have a soil-like texture with many valuable nutrients. Compost can be combined with existing soil for growing plants.

III. Environmental Benefits of Composting (5 min.)

Compost is a much needed resource. It is useful for the home gardener as a soil amendment, essential to the restoration of landscapes where topsoil has been removed or destroyed during construction or mining operations, and is increasingly being applied to agricultural and forest lands depleted of their organic matter.

In addition, by composting organic wastes, at least 20% of your garbage can be diverted from local landfills, reducing the waste stream.

IV. The Compost Process (10 min.)

Composting - How Does It Happen? Decomposing organisms break down organic matter, turning it into an earthy humus. See "Decomposers Identification Sheet," Chapter 4. As these organisms decompose the material, they leave the following byproducts:

- **Heat**: *pile can reach temperatures up to 160°F (71°C).*
- **Carbon Dioxide**: *a byproduct of the conversion of carbon and oxygen. Decomposers require carbon for energy.*
- **Water**
- **Compost**

How do decomposers get into the pile? *Some migrate from the soil; others are already present in the yard and food wastes.*

NOTE: Different types of decomposers are able to break down different plant forms, therefore, which decomposers are present in your pile depends on what materials you have put in the pile.

V. Compost Factors (20 min.)

Compost Factors are the conditions that can be altered to enhance the decomposition process. They include:

- **Surface Area/Particle Size**: The more surface area, the more "available" material the decomposers have to break down. The materials do not necessarily have to be cut up for decomposition to occur, although this will quicken the process. For example leaves can be cut up with a lawn mower before they are put in the compost pile.

- **Temperature:** Ideal temperature 90 -140° F (32-60°C).

  What happens if...

  The pile is too hot? *Certain decomposers will die.*
  Solution: *Turn the pile to let the heat escape or decrease the size of the pile if it is too large. (One cubic yard is an ideal pile size.)*

  The pile is too cold? *Decomposers are not active.*
  Solution: *Insulate the pile or make the pile larger if it is too small. The pile can be insulated with leaves, hay bales, paper, etc.*

  How do you identify the temperature? *Temperature probe.*

NOTE: High temperatures are good because they kill weed seeds and plant diseases. High temperatures also speed up the compost process. In the best situation, the pile should reach 140°F (60° C) during the first week.

- **Oxygen/Aeration** - Ideal oxygen content 5%
  What happens if ...

  There is insufficient oxygen? *As the pile gets heavier and compacts, air will not be able to circulate through the pile. Aerobic decomposers will not be active and anaerobic decomposers will take over. The pile may emit:*
  - *Methane and hydrogen sulfide, which has an offensive odor*
  - *Phytotoxic acids and alcohols that are toxic to growing plants*

  Solution: *Turn the pile to circulate air through the pile and/or mix bulk materials with fine materials to create aeration holes throughout the pile. Aeration pipes and poles can also be inserted into the center of the pile.*

To turn the pile: Break the pile open and bring the inside materials to the outside and vice versa.

How to identify: *Check for heaviness and the smell of the pile.*

- **Carbon:Nitrogen Ratio** - Ideal ratio 30:1
  The ideal carbon to nitrogen ratio is 30:1; or approximately 2/3 high carbon materials and 1/3 high nitrogen materials. It will take a certain amount of experimentation with different quantities of high carbon and high nitrogen materials to determine which produces the quickest compost.

High Carbon Materials

Material	C:N
Foliage (leaves)	30-80:1
Corn Stalks	60:1
Straw	40-100:1
Bark	100-130:1
Paper	150-200:1
Wood Chips and Saw Dust	100-500:1

High Nitrogen Materials

Material	C:N
Vegetable Wastes	12-20:1
Coffee Grounds	20:1
Grass Clippings	12-25:1
Cow Manure	20:1
Horse Manure	25:1
Horse Manure with Litter	30-60:1
Poultry Manure (fresh)	10:1
Poultry Manure with Litter	13-18:1
Pig Manure	5-7:1

FOR EXAMPLE: Ideal Carbon to Nitrogen Ratio = 30:1

2 parts leaves	(50:1)	100:2
1 part vegetable scraps	(12:1)	+ 12:1
		112:3 = 37:1

What happens if...

There is too much carbon? *Decomposers are not as active because they need more nitrogen to work. Decomposers use nitrogen as their protein source.*
Solution: *Add high nitrogen materials such as fresh grass clippings or food scraps.*

There is too much nitrogen? *Aerobic decomposers will work too fast, using all of the available oxygen and anaerobic decomposers will take over causing the pile to smell.*
Solution: *Turn to add more air or add high carbon materials such as dried leaves, paper, or straw.*

How to identify: *Check for odors.*

- **Moisture** - Ideal moisture content 50%

What happens if...

The pile is too dry? *The decomposers will become dormant.*
Solution: *Turn pile and add water.*

The pile is too wet? *Not enough air will circulate through the pile and decomposition will become anaerobic.*

Solution: *Turn the pile to increase evaporation and add dry materials.*

How to identify: *Squeeze a handful of the compost; a drop or two of liquid should fall.*

VI. What Can and Cannot Be Composted (10 min.)

All organic wastes ***can*** be composted. However, large amounts of meat, cheese, or fatty products are not recommended for the backyard compost pile because they can attract pests. Nor should weed seeds, rhizomes, or plants infected with disease or insects be composted.

Glass, metal and plastic ***cannot*** be composted, however, paper and untreated wood can be.

Dog and cat manure ***should not*** be composted because they may contain human parasites or diseased organisms.

VII. Methods of Composting (15 min.)

The choice of compost method will depend on:

- available space
- time
- materials to be composted.

Holding Unit (6 months to a year depending on compost factors)
This is a "passive" method of composting. Wastes are thrown into a bin and left alone; there is no turning required. It is important that the kitchen wastes are buried within the pile to avoid pests. Holding units can be built with:

- wire fencing
- wood
- snow fencing
- concrete blocks
- hay bails.

Three Bin Holding Unit
Each bin will hold compost in different stages of decomposition. Fresh organic wastes will be held in the first unit. After a month or so this compost can be shifted into the next bin, where it will stay for another month or so and then be shifted into the last bin. As the compost is shifted from one bin to the next, the materials are aerated, which helps accelerate decomposition.

Turning Unit (2 months or less)
Turning units are simply holding units that can be opened up to allow the compost to be turned with a pitch fork or other turning tool. A pole can also be inserted into the middle of the pile and turned occasionally to allow air to circulate through the pile.

Incorporation (1 month to 1 year depending on the ground temperature and type of organic waste)

1. Dig a hole in the ground and fill with food and soil.
2. Cover with at least 8 inches of soil.

Worm Composting/Vermicomposting (3 to 6 months)
This method of composting is ideal for someone who does not have a large area to work with. To start a worm compost, you will need a bin approximately 16" x 24" x 8" (see chapter 3) with holes for aeration. Fill the bin with damp bedding such as leaves, shredded paper, or straw. Add approximately 1 pound (600-1000) redworms and food scraps. The bin should kept in an area with temperatures between 55-77°F (12-25°C). A basement is an ideal place to keep a worm bin. As the worms digest the food waste, they leave "castings," a quality soil amendment rich in minerals and nutrients.

Mulching

Mulching is another form of composting. Lawn clippings, pine needles, chipped branches, bark chips, and sawdust can be placed on pathways and gardens, and under trees, etc. Mulching helps to:

- stop weed growth
- prevent erosion
- insulate underlying soil
- hold moisture.

Garden mulching: Do not use woody mulch because it will not break down quickly. Lawn clippings, pine needles, and leaves are good garden mulches and they should be spread about one-inch thick.

VIII. Using Compost (10 min.)

Deciding When Compost Is Ready

Screening

When compost is harvested, it can be screened to get a finer compost material. Compost is great for gardens, lawns houseplants, or any other plant growth because it:

- improves soil structure and helps roots penetrate better
- holds moisture better than regular soil
- holds soil together giving it a crumbly texture
- attracts earthworms.

Applying Compost

The best time to apply compost to your garden is when the soil is prepared for planting seeds or plants. Compost can be applied to shrubs, houseplants, and lawns at any time during the year.

IX. Building A Compost Pile (10 min.)

Give each participant a bag of organic waste (high nitrogen and high carbon materials). Have each person take a turn layering the waste in the compost pile, alternating between high nitrogen and high carbon materials. Make sure the high nitrogen materials are completely covered with high carbon materials.

YOUTH PROGRAMS

When you begin designing your youth compost program, you will need to decide where you will conduct your presentation. You may want to work with children in the school classroom, outside at a local park during a special school excursion, or anywhere or anytime you feel is appropriate.

Possible Presentation Sites for Youth Composting Programs

- School Classroom
- Conservation Field Days
- Kids' Compost Workshop
- Cub Scouts/Girl Scouts
- 4-H Cubs
- Field trips
- Local Nature Center
- Community Fairs
- Farmers' Markets

Sample Youth Presentation (15-30 minutes)

Worm Fun!

This presentation is appropriate for elementary school students and can be given in 15 to 30 minutes.

Materials: Worm bin with worms and cocoons, one tray per four or five students, spoons, easel and large writing tablet or dry eraser board.

1. Begin by introducing yourself and explain that you will be talking about worms.

2. Explain the difference between earthworms and redworms. Earth worms live deeper under the soil than redworms. Earthworms can live in colder temperatures and do not require as much food as redworms do. Redworms are surface eaters and live within the first eight inches of the soil. You may want to share with your students, the scientific name for the redworm: Eisenia foetida, pronounced A-si-na Fa-ta-da.

3. Ask the students what worms do to help us. **Answer**: They make the soil better for growing plants.

4. Ask the students how the worms make the soil better for growing plants. **Answer**: Worms eat dead plants and transform them into soil by digesting organic matter and leaving worm castings. The castings contain nutrients plants need to grow and stay healthy. Worms also

plow tunnels in the soil, which allow air and water to get down to the plants' roots. You may pass around a sample of worm compost and ask the students what they think it looks and smells like. They will probably tell you that it has an earthy smell.

5. Explain to the students that we can build a home for worms and can keep it in our basement, porch, or classroom. Show the students the closed worm bin. Point out the approximate size of the bin and tell them how they could make the same type of container.

6. Ask the students what they think should be put inside of the bin to make a good home for the worms. **Answer**: Bedding (leaves, newspaper, or straw), and food.

7. Ask the students how many worms they think need to be put into the bin. **Answer**: About 1000 if we put one-half pound of food in the bin per day.

8. Explain to the students that this is called a "Vermicompost," *vermi* meaning *worm* in Latin.

9. Ask the students what they think needs to be done to keep the worms healthy.
   a. Moisture - The bin must not be too wet so the worms will be able to breath. Ask them why after a heavy rain they find worms above ground and on the sidewalks. **Answer**: It has become too wet for them underground. The bin should not be too dry either because the worms need to be moist.
   b. Temperature - Worms are most comfortable between 55-77°F (12-25°C)--the same temperatures we like! Worm bins can be kept in the basement, utility room, enclosed porch, classroom, etc.
   c. Light - Worms need to be kept out of the light. Your worm bin should be kept in a dark place or have a lid.
   d. Aeration - Your worm bin should have plenty of holes to allow air to flow through the bin.
   e. Food - Don't forget to feed your worms. Tell the students that worms will eat any type of food that we eat, especially fruits and vegetables. Ask the students what kinds of food they think worms like to eat. Explain to students that they should not put meats, cheese, or fatty foods into their worm bin because it may smell and, worms don't like them very much. You may add that worms eat almost as much as they weigh in one day. Worms will also eat food faster if it is cut up into smaller pieces.

10. Divide students into small groups and pass out a tray of worm compost with a spoon for each student. Have the students look for adult worms, baby worms, worm cocoons, and other compost critters. Warn students not to cut the worms in half. They may believe both ends will survive; however, the end with the head will generate a new tail and the tail end will die. Ask students to figure out which end is the worm's head by watching which direction it moves.

11. At some point show students the inside of your worm bin and explain that at one time the material that looks like "dirt" was once newspaper (or other bedding), and food scraps.

WORKSHOPS FOR TEACHERS

If your goal is to bring composting into the classroom, then one way to achieve this is to work with school teachers directly. The following information can be used to conduct a workshop specifically designed for teachers of any grade level. You should allow for 3-4 hours to conduct the workshop, however this will depend on how many activities you plan to present.

During the training session it is important that you convey how composting can relate to several subjects they may already be teaching such as science, math, and language arts. Hands-on activities are also an important component of a teacher's composting workshop. Successful compost experiments and exciting activities that involve discovering and observing compost critters will win over any teacher with the slightest interest in composting. In addition, compost education resources should be made available for the teachers to browse through, as well as a list indicating where to obtain these materials. Most importantly, teachers should leave with the impression that composting is fun and easy!

Workshop Materials

- Name tags
- Icebreaker activity materials
- Compost reactor materials
- Videos, slides, etc.
- Worm bin materials
- Evaluation forms

Sample Teacher's Workshop Outline (3 hours 30 minutes)

I. Introduction (25 min.)

A. Personal and Organizational Introduction
B. What is Composting?
   1. Compost basics: A natural way of breaking down organic matter
   2. A way to reduce waste going to the landfill
C. Why in the classroom?
   1. Composting stretches across many curriculum areas
   2. There are many hands-on activities designed for use in the classroom

II. Icebreaker Activity (20 min.)

Compost Critter, Guess Who?

III. Compost Reactor Activities (50 min.)
A. Soda Bottle compost Reactor (30 min.)
B. Two Can Compost Reactor (20 min.)

BREAK (15 min.)

IV. Worm Composting Activities (70 min.)
A. Getting Acquainted - worm observation
B. Setting up a worm bin

V. Closing (30 min.)

Workshop Notes:

I. Introduction

What is composting:
- biological breakdown of organic matter
- with human intervention we can accelerate this process
- compost uses
  - gardens
  - lawns
  - mulching trees shrubs
  - house plants
- compost as a soil amendment
  - improves soil structure
  - holds moisture
  - holds soil together
  - attracts earthworms
- composting to reduce the waste stream
  - since yard and kitchen waste make up about 30% of the waste stream, we are significantly reducing the waste stream by composting these materials

Methods of composting:
"Who already composts in the classroom or at home?"
"What method are you using?"
- holding unit
- tumbler
- heaps
- incorporation
- worm composting

Backyard composting factors:
particle size
temperature/size of pile
aeration
carbon:nitrogen ration (2/3 high carbon, 1/3 high nitrogen)
moisture

Why compost in the classroom?
- overview of the compost activities I will demonstrate today

- composting can be incorporated into many different subject areas

Science: observing the decomposition process/ discovery of decomposing organisms/ the food chain

Environment: recycling by composting/"put back into the earth what we have taken out"

Math: graphing/measuring/word problems "how much Waste would a town defer from a landfill if half of the town composted"/calculating the size of a worm bin

Language Arts: essays "How a Worm Moves," oral presentations "How to Compost," role play "My Compost Smells, What do I Do?"

II. Icebreaker Activity
Compost Critter, Guess Who?

III. Compost Reactor Activities
- Soda Bottle Compost Reactor
- Two Can Compost Reactor

IV. Worm Composting Activities
- Getting Acquainted
- Setting up a worm bin

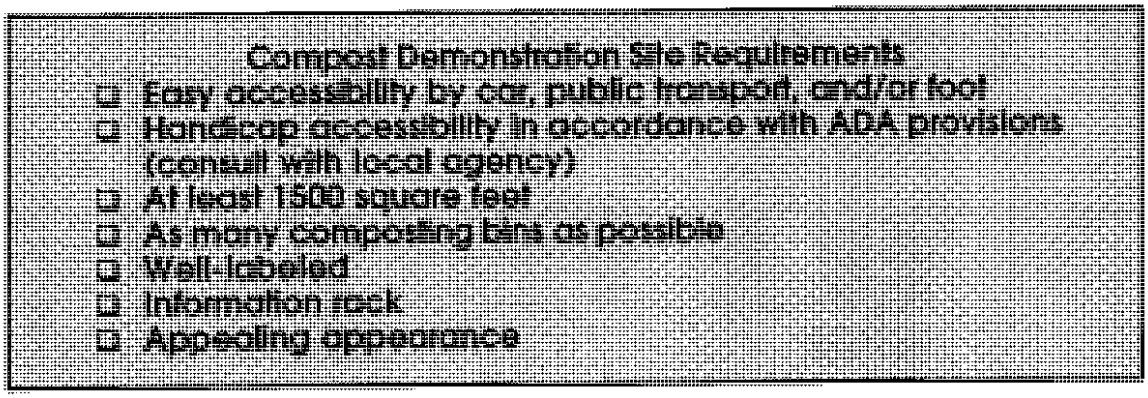
V. Closing
- Pass around any of the resources you have that might be useful to the teachers and briefly describe each book or video
- Have teachers fill out an evaluation form

SPECIAL OUTREACH ACTIVITIES

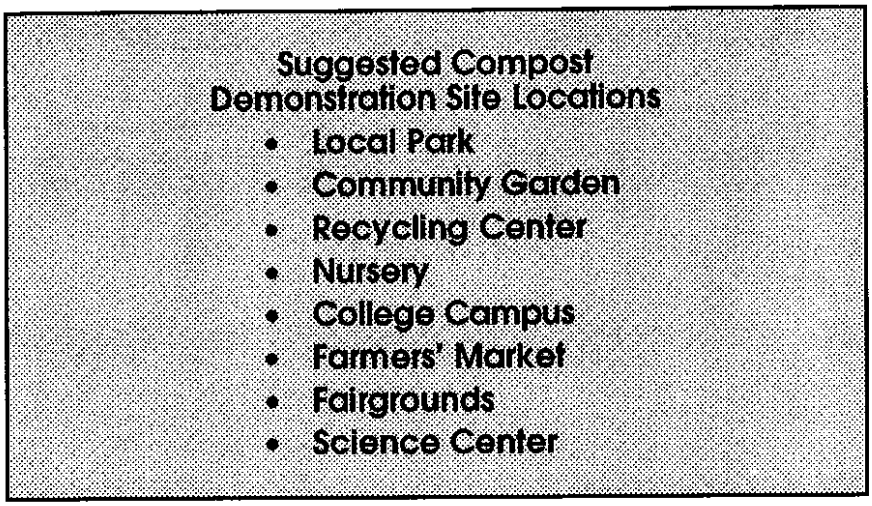
Demonstration Sites

As previously mentioned, compost demonstration sites are an important outreach tool for the Master Composter. Demonstration sites not only serve as promotional tools, they can also double as locations for community composting workshops.

"Location, location, location!" When deciding upon a site for your compost demonstration site, location is critical. Your site should be situated in a place where there is a heavy flow of traffic, such as a park or local fairgrounds. The site should have vehicle and public transportation accessibility and should comply with Americans with Disabilities Act provisions, if applicable. It is also very important that the site is of adequate size and displays as many different bins as possible.

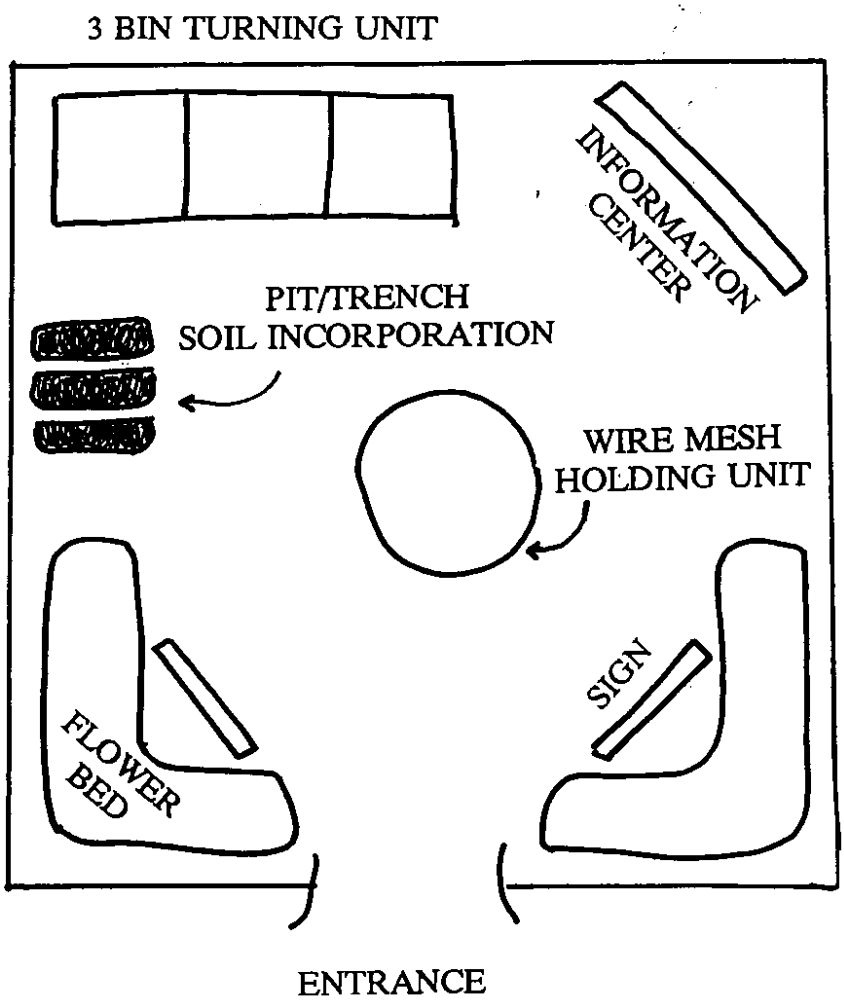


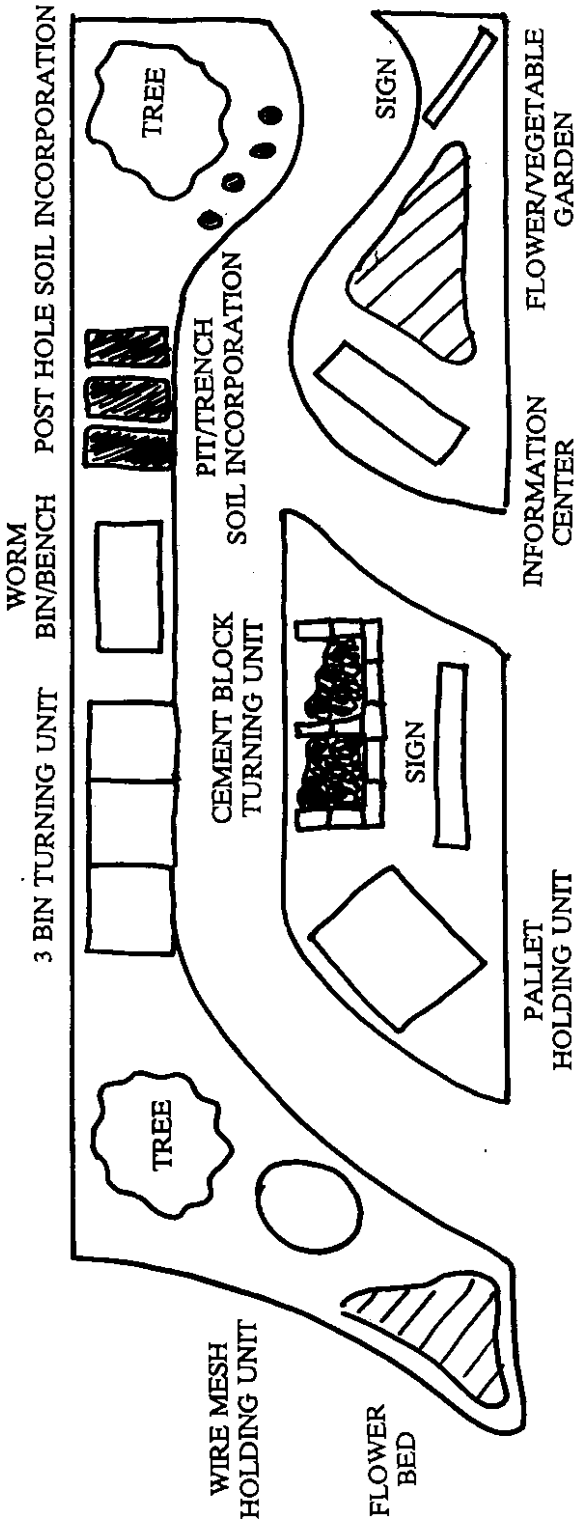
Depending upon your organization's needs, you will have additional criteria. For example, if you plan on conducting workshops at the demonstration site that require an indoor facility, your site will need to be located near a building where you will be able to hold classroom sessions. Demonstration sites can also be constructed near a business or organization that will agree to compost wastes regularly, such as a college dining hall.



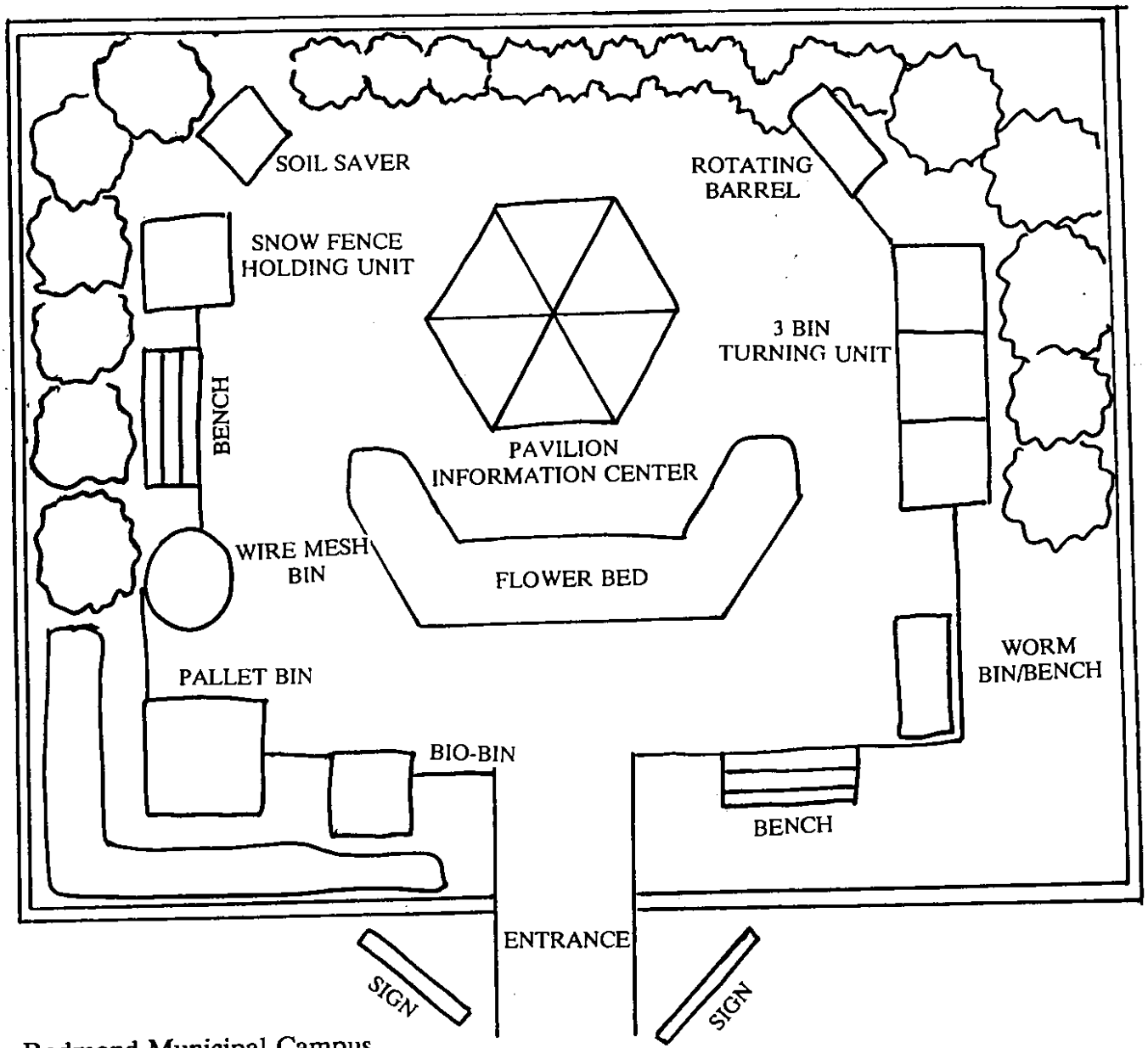
It is also worthwhile if the site is well-landscaped because the beauty of the site will attract more people. You may want to mulch the pathways and plant flowers and shrubs. Leave adequate space between the bins and mount recognizable signs that will draw people over to the site. Information about composting should also be made available on site. The following pages show some sample layouts for effective demonstration sites.

Sample Compost Demonstration Sites





Washington State University
Puyallup Research Station
Puyallup, Washington



Redmond Municipal Campus
Kings County, Washington

MAINTAINING YOUR COMPOST DEMONSTRATION SITE

Keep your compost demonstration site well maintained! Not many people will be too enthusiastic about visiting a site that looks overgrown and neglected. A work schedule can be prepared for the Master Composters to coordinate the maintenance of the site.

DEMONSTRATION SITE WORK CHECKLIST

- ☐ Put down new mulch
- ☐ Remove weeds
- ☐ Tend to plants and other landscaping
- ☐ Turn compost
- ☐ Add compost to bins
- ☐ Check for moisture
- ☐ Refill brochures
- ☐ Check for broken signs, fencing, compost bins

Master Composters should staff the demonstration sites occasionally in order to answer questions. It is also a good idea to staff the site during special events. Master Composters may also staff the site during the weekend for two or three hours to answer questions and provide composting advice. A sign on who to call for more information should also be prominently displayed.

PROMOTING COMMUNITY COMPOSTING

The following descriptions of **Festival Composting** and **Compost Theater** are examples of some innovative outreach activities to promote composting within a community.

Festival Composting

A festival composting project was conducted in Tompkins County, New York by John Sullivan, a Master Composter of Cornell Cooperative Extension, with the aid of the Tompkins County Solid Waste Division and supporting volunteers. The Grassroots Festival of Music and Dance in Trumansburg, NY attracts 10,000 people over a four-day period and one of the festival's most difficult challenges and highest expense is dealing with the waste generated during the event each year. Eight dumpsters are normally filled by the end of the event and festival organizers supported the idea of composting pre-consumer food waste produced by the food vendors.

Supplies - The supplies needed to carry out this project included five composting bins (one for every three vendors), eighteen 5-gallon buckets (three per vendor), paint, a "Compost" stencil, "Compost Community Project" signs, and composting information. Two of the compost bins were made out of welded wire, which kept the costs down. All of the buckets were spray painted green and stenciled with the project name, and that they were being used by Master Composters to avoid losing the buckets.

Composting Site - The compost bins needed to be located near the vendors, as well as sources of water and high carbon materials. It was also important that the bins were situated in a place where they would be visible to the festival goers in order for people to be aware of the project. Mr. Sullivan and his team decided to put the compost bins near the horse stalls since they used the horse bedding for a high carbon source and this location fit all of the other criteria. Unfortunately, after the festival, the composts would need to be taken off of the property and left to decompose at another location.

PROJECT COMPONENTS

- **Supplies**
- **Composting Site**
- **Composting Volunteers**
- **Vendor Participation**
- **Compost Education**
- **Checklist**

Composting Volunteers - Four volunteers were recruited to implement the compost project, however, next year they plan to recruit at least seven. Each volunteer worked two 5-hour shifts and received a free pass to the festival, which was worth approximately $20.00. It was important that the volunteers were capable of lifting at least 40 pounds and were trained how to properly layer the organic materials inside of the compost bins.

Vendor Participation - The composting volunteers approached the vendors, for the first time, the morning the festival opened. The composting project was briefly explained to the vendors and the volunteers asked if they would be willing to participate. More than half of the vendors agreed to compost their pre-consumer food wastes. Each participating vendor was given two buckets and told to put any of their food scraps in the bucket except meat, or fatty or oily food products. Volunteers continued to take the full buckets from the vendors and relaced them with empty buckets throughout the duration of the festival. At night, the vendors were left with a bucket and lid to collect their food scraps for the following morning.

Compost Education - Not only did the project coordinators wish to work with the vendors to reduce the amount of waste, they were also interested in educating the people at the festival about composting. Visible signs were placed on the festival grounds publicizing the composting project, and composting brochures were also available.

Checklist – John Sullivan has put together the following checklist to use when organizing a special event in your community.

Special Events Composting Checklist

1 year – 6 months before event:

- ❑ Contact Event Committee or organizers to assess interest in composting. Acquaint yourself with local tip fees so you can mention savings. Contact landowner for permission, if different than organizers.

- ❑ Based on event parameters, generate a rough estimate of compostable food scrap waste:
  - How many food vendors?
  - Is there a hospitality kitchen or area?
  - Pre- or post-consumer?

6 months-1 month before event

- ❑ Determine possible budget needs:
  - Bin costs
  - Brown material/bulking agent
  - Collection system, containers and/or carts

1 month-1 week before event:

- ❑ Choose composting site:
  - Relatively close to vendor area
  - Water supply nearby
  - As flat as possible
  - Prominent visibility

- ❑ Recruit project staff:
  - Volunteers, working in exchange for ticket to event
  - Able to lift 50 pounds
  - Training in compost layering techniques

- ❑ Contact vendors, let them know about composting project, cultivate involvement in the process.

1 week before event:

- ❑ Set up site:
  - Bins
  - Brown material/bulking agent
  - Containers, cart(s)
  - Educational materials, brochures, handouts, etc.

- ❑ Hold staff orientation at event site, to familiarize volunteers with the layout and composting techniques.

- ❑ Create signs for vendors, to let customers and compost collectors know about the composting project, and who to contact for more information.

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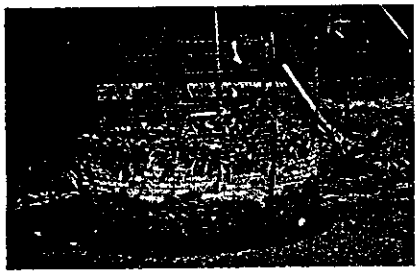

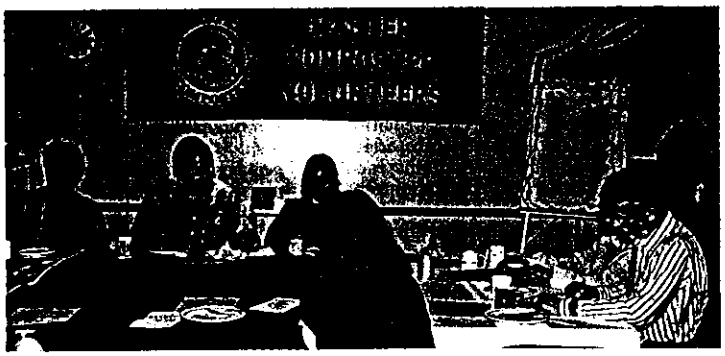

A wire bin filled with preconsumer vegetable trimmings from a delicatessen and five kinds of carbon materials sits in a parking lot to demonstrate the "Lasagna Method" of composting (above). Master Compasters and others wait for more graduates to arrive at a graduation party for the volunteers of the Class of 1997 (above, right).

CREATIVE OUTREACH

PROMOTING COMMUNITY COMPOSTING

Master Composter program develops ways to promote composting — even for residents without yards. The next challenge is convincing small businesses to compost their food residuals.

Dave Block

VEET DEHA earned her Master Composter diploma with the Cornell Cooperative Extension of Tompkins County (Ithaca), New York in its inaugural class of 1991. The program was one of many patterned according to the Seattle Master Composting model after awareness of shrinking landfill capacity was raised by the plight of the Mobro garbage barge, which in 1987 traveled six months and over 6,000 miles before finally being able to unload its cargo. "Garbage was on people's minds," notes Deha, who now oversees the program, which she estimates was responsible for diverting about 500 tons of materials in 1996. The focus began with home composting and has broadened to educate entire neighborhoods. Now Deha's ambition is to get small businesses to compost food residuals.

The Master Composter program is funded by the county's solid waste management division, and costs about 25 cents/resident. It received a flood of interest when landfill disposal of yard trimmings was banned in the early 1990s. "There was a lot of media attention," says Deha. "We had huge classes back then." Participants can buy subsidized home composters, 500 of which the county has sold to residents since 1994. Master Composters receive classroom and practical compost training on topics such as waste stream analysis, compost science, bins and systems, layer composting, vermicomposting and ecology.. Forty hours of training culminate in a compost fair on Earth Day. In return, students provide volunteer service and an independent outreach project.

COMPOST THEATER

The outreach component is where the extension's Master Composter program really has found its niche, says Deha. One example is Compost Theater, which debuted in 1996. Created by Master Composter Lisa Fernandez, the play takes 15 to 20 minutes, encouraging audience participation and teaching facts about composting. The first act presents refutations of what Deha calls the five major myths that keep people from composting: 1) Composting produces foul odors; 2) It attracts bugs and rats; 3) There is no time to do it; 4) It requires land; and 5) There's too much end product. The second act shows how to set up and maintain a compost bin.

The common thread in the outreach programs is converting people who think they can't compost. Deha says her approach to the residential audience reflects Cornell Cooperative Extension's original home composting brochure. "The feeling was that you shouldn't have to have a backyard to do it," she explains. "The phrase (backyard composting) itself sounds awfully elitist; the majority of people don't have their own backyard. That homeowner audience is fine —

A teaching site at the local Cayuga Nature Center provides information about home composting.

they're usually doing something — but we're really targeting people who think they can't compost, people who live in apartments or rent a place where the landlord doesn't want smelly food laying around."

The main strategy for that audience is promoting worm bins. "While most people don't have a backyard, everybody has a home," Deha says. She borrows from the instruction in Mary Appelhof's seminal work on vermiculture, *Worms Eat My Garbage*. This year, a stocked worm bin was offered for the first five students to register for two vermicomposting classes offered in February to the general public. Instruction is usually offered at the beginning of the year and around election day, when the slogan is "Vote for real worms." Humor helps bring in volunteers, says Deha, rather than preaching about saving the world, particularly since the city collects yard trimmings at the curb and composts them.

GETTING RESIDENTS TOGETHER

In 1994, approval was given to work on group projects, and Deha started by targeting residential developments and cooperatives. She knew that having group "experts" run operations was not the way to go. "Unless care is shared, it's not sustainable," she notes. "The average life of an unshared group composting project is 18 months. Sharing takes the weight off one or two people; eventually, those people get burned out or move away ... Our theme this year is sustainable composting. We no longer tell people to put it in a pile and nature will do it. Let's set up systems that don't depend on one person, where everyone who's part of generating food at least understands the process."

One of the successful projects is at a community of graduate students and their families, where a well-maintained compost bin stands next to a road with a sign declaring it "The Soil Factory." About 15 households each take a two-week shift. They check daily on the need for adding wood chips, covering up visible food and removing contaminants. In exchange for that labor, the residents bring their organics to the bin and have use of the end product. Groups are encouraged to post a chart prominently that lists the care schedule for participants, who also take their turn answering questions from others interested in what they're doing.

One challenge to group projects is illegal dumping, which has risen since the county instituted a pay-as-you-throw garbage system in the early 1990s. To discourage outsiders from dumping organics into the composting containers, groups post signs identifying ownership. "You need a sign indicating who's taking care of it," says Deha. "If not, there's no accountability and it turns into a dump, with name calling and neighborhood disputes. We're slower now to encourage a group to start a composting project, and quicker to say 'make a plan.'" If a group of students is composting, for example, the bin should be locked or removed over summer break.

COMMERCIAL DIVERSION

An audit of county businesses showed that even after recycling, 30 percent of the trash headed for the landfill could be composted is another 40 percent are materials that could be recycled. About a half-dozen local businesses compost their residuals, including a salon that is using hair to fertilize a tomato plant. None, however, have made the leap to including postconsumer food or significant volumes of preconsumer food. "Food is a very delicate issue," says Deha, noting that some places would never consid-

The common thread in the outreach programs is converting people who think they can't compost.

COMPOSTING IN GROUPS

THE CORNELL Cooperative Extension of Tompkins County has gleaned ten steps to group composting success from local Master Composters' experiences with communities, cooperatives, schools, businesses, etc.:

1. Enlist support from fellow enthusiasts in the group — teachers, housemates, etc.; groundskeeper, kitchen crew, physical plant manager, et al; house manager, principal, property manager, superintendent or landlord. Solicit their ideas for how it might work best — don't be discouraged by naysayers!
2. Walk around possible sites. Look for a site that is level, well drained, convenient to all participants (closer to the source than the end use), accessible on all sides, shaded and out of the wind. It should be visible — it will be too beautiful to hide — and still fit into the design of its surroundings.
3. Figure out what type of residuals and how much. If it's only kitchen prep, then figure about two pounds/person/week. If it's all household organics, including paper, then estimate up to five pounds/person/week. For garden materials, you can double that figure. To be safe, figure about one cubic yard of bin space for every five people.
4. Decide who will be the compost caretaker. Will the care be from one person (less sustainable) or rotated? Ideally, all the generators should rotate caretaking monthly.
5. Choose a composting system — either a holding unit where the material is simply layered, or a unit where the material is turned from one section to another.
6. Plan out the flow of compostables. How will the material get from the source to the bin? How will the buckets be washed? What kind of carbon material? Leaves? Sawdust?
7. Let everyone know what is happening — students, housemates, custodians, fellow residents, teachers, etc. — so that people feel a sense of ownership. There will be less contamination and fewer problems. Schedule an information session, if appropriate.
8. Contact a builder and schedule a delivery of wood chips for mulching and bulking.
9. Schedule a work party to prepare the site. Prune back branches, clear brush, sheet compost with wet newspaper and wood chips to keep weeds down, edge neatly to define the area. Create an attractive, low maintenance area that invites visitation.
10. Schedule a grand opening with refreshments. Congratulate yourselves on a good start.

After three months and 25 hours of labor, there was a 50 percent volume reduction, very little contamination, no problems with vectors and no complaints other than the loss of parking space.

er having food anywhere other than on plates or in the trash. "But if it's in a wire bin, it should be okay." She is shooting for a popular restaurant to compost its food and become a model that would stimulate other commercial projects. She envisions a particular establishment developing a cookbook with one section for pot leftovers and a second part describing a recipe for composting what can't be eaten.

There's less margin for error with businesses, however, since complaints mean lost profits. To address that sensitive situation, the Tompkins County Master Composters developed a "Lasagna Method" for on-site composting that is inexpensive, easy to use and maintain, space-efficient and flexible. Welded wire bins are set up about four feet high and four to five feet in diameter. Food is completely covered by several inches of carbon material like dried leaves, wood chips, sawdust or shredded paper so that none ever shows; successive layers of the two materials can be added. The center of the pile is made a bit lower than the sides to make a saucer shape.

A pair of these bins can accept 30 pounds/week of feedstock. The city makes the method even more convenient by providing wood chips for those who need them. "Food with a decent carbon layer is gone in about 10 days," says Deha. "You don't see any cooked food." Items like peanut and egg shells are exceptions. In a few months, the bottom layer of material is usable compost. Everything is accomplished in a small space that calls little attention to itself. "I don't know any business that can afford the space for a pile of wood chips," notes Deha. "They don't want that look. Most customers don't know about the wire containers; they think they're storing leaves."

The Lasagna Method was tested in a pilot project conducted on 70 feet of property at a bagel store last year. Feedstocks were 199 pounds (six days' worth) of vegetable prep scraps from a store, 372 pounds (six days' worth) of dough, cornmeal, coffee grounds and egg shells from a bakery, and 350 pounds of assorted carbon material. Two wire bins were used. After three months and 25 hours of planning time, there was a 50 percent volume reduction, very little contamination, no problems with vectors and no complaints other than the loss of parking space. The bin with the dough stayed over 100° for almost three months. When the contents were turned and relayered at a new location, both bins heated up again immediately to over 140°.

Other composting projects are going strong at locations like schools, a food pantry, a nature center and a farmers' market. But a few operations had to be stopped "because you can't just dump food on a pile of leaves," says Deha. "Some people want nature to do it all. Any food that can be seen is not composting."

SHOWING OFF

Every year, the Cooperative Extension holds a Compost Fair and Open House on Earth Day with 40,000 square feet of activities and exhibits, including children's art made with things that don't belong in the compost heap, vermicomposting displays and stations staffed by Master Composters with themes like composting in small spaces and how to keep kitchen buckets for vegetable scraps smelling sweet.

Despite great progress and ambitious goals, Deha is never sure from year to year whether funding for her outreach programs will be renewed. She would like to develop independent funding for more solid footing. That would relieve the pressure of justifying programs on an economic basis and allow for more emphasis on education. "I'd like to be not so tied to the numbers of how much was diverted, how much was saved," she says. "Looking at it positively, though, that's helped us tighten our outreach — being able to tell businesses how mucb they can reduce disposal costs."

For more information about Master Composters or Compost Theater, contact Lisa Fernandez at (607) 272-3055. ■

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Appendix A

Cornell Waste Management Institute – Educational Composting Resources

Most of the following resources are now available for free downloading at: http://cwmi.css.cornell.edu

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GENERAL COMPOSTING INFORMATION

Cornell Composting at: http://~~www.cals.cornell.edu/dept/compost/~~ compost.css.cornell.edu/Composting_homepage.html A web site providing access to a variety of composting educational materials and programs developed at Cornell University including an engineering-based analysis of composting systems, a series of slides and graphics, and a list of resources and contacts.

CWMI Web Site: http://~~www.cfe.cornell.edu/wmi/~~ cwmi.css.cornell.edu Check out the CWMI web site for additional resources on composting and youth education.

FOR HOME COMPOSTERS

Master Composter Program Implementation Guide and Resource Manual. (1998) This manual is divided into two sections. The first, the "Master Composter Program Implementation Guide," is designed for staff developing and implementing a Master Composter Program within a community. It covers the responsibilities of a Master Composter Program Coordinator, recruiting and training volunteers; and presents examples for community outreach and education programs. The second section, "Master Composter Resource Manual," is aimed at the Master Composter volunteer. This section describes the Master Composter Program teaches the science of composting, illustrates methods for composting at home, including vermicomposting, and contains educational and outreach activities that can be conducted by Master Composters. Available from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. Cost: $12. Also available as a package with our new 15-minute video, "Compost: Truth or Consequences," described below, both for $30.

COMPOST Truth or Consequences. (1998) This 15-minute video is designed for people who would like to take the mystery out of home composting, and teaches the science behind the solutions. Using a quiz show format to present common questions, the video shows home composters learning how to provide the right conditions for composting without problems. Produced by Photosynthesis Productions, Inc. and the Cornell Waste Management Institute. Available from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. Cost: $25.

Composting to Reduce the Waste Stream by N. Dickson, T. Richard, and R. Kozlowski. (1991). A guide to small-scale composting methods, building bins, and educating the public (1991). Available from the Northeast Regional Agricultural Engineering Service (NRAES), 152 Riley-Robb Hall, Ithaca, NY 14853. Cost: $8.

Yard Waste Composting/Composting as a Waste Management Strategy, New Directions—New Questions. (1990). Fact Sheet and Viewpoint #2—Includes what percentage of solid waste is yard waste. Describes composting methods. Available from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. Cost: $3.

FOR SCHOOLS AND YOUTH

Composting in the Classroom: Scientific Inquiry for High School Students by N.M. Trautmann and M.E. Krasny. (1997). Publication on how to use composting as a focus for science exploration and investigation by high school classes. Includes composting indoors in simple bioreactors and worm bins. Describes the science of composting, techniques for monitoring the compost process, and ideas for original student research. Can be ordered from any bookstore, or contact: Kendall/Hunt Publishing Co., PO Box 539, Dubuque, IA 52004. 1-800-223-0810. Cost: $24.95.

Composting in Schools. (1996). A special section of our composting web site for teachers and students using composting in the classroom. Access it at the CWMI web site: http://www.cfe.cornell.edu/compost/schools.html.

It's Gotten Rotten. (1996). Award-winning video on composting science designed to be used at the high school level. It focuses primarily on the invertebrates and microorganisms that live in compost and shows methods of classroom use of compost for scientific investigations. 20 min. Available from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. Teachers' Guide Included. Cost: $25.

Composting: Wastes to Resources. (1990). A guide for those who want to educate youth about composting. The packet includes an instructional guide, two posters, and eleven designs for compost systems. Available from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. Cost: $8.

Do You Know Where Your Garbage Is? (1992). Video for youth which presents options for what we can do with the garbage we can't reduce, reuse, or compost. Two animated characters help us explore the more controversial issues of composting, incinerating, and landfilling and how they can be part of a community's waste management plan. Informative for all ages. 12 min. Available from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. Cost: $22.

Trash Goes to School. (1991). More than sixty popular activities in solid waste education selected by educators as the best from many national curricula are broken into four grade levels: K-3, 4-6, 7-8, and 9-12. Educators and recycling coordinators can use this formatted text to prepare a program that uses waste management to teach diverse skills from language and science to art. It covers waste reduction, recycling, composting, incineration, landfilling, and the environment. Computer file format allows exercises to be customized with local facts. Available in MS Word 6 format on PC or Mac disk from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. Cost: $24.

What about Waste? (1990). Workbook for youth educators including group activities introduces facts about solid waste to youth so that they will be able to identify what can be reduced, reused, recycled, and composted. Available from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. Cost: $3.

Woodsy's Resource Goldmine. (1989). Portrays trash as a resource instead of something to throw away. Includes information on solid waste management, plans for saving energy, and suggestions for children to help reduce, reuse, and recycle waste. 52 slides, cassette and 8 min script. Available from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. Cost: $41.

FOR BUSINESSES AND INSTITUTIONS

Compost..because a rind is a terrible thing to waste! (1996).

Food scrap composting for businesses and institutions (1996). Provides detailed guidance for large institutions (i.e. universities, hospitals, prisons, adult homes) and businesses (i.e., grocery stores, businesses with food service) to help them implement food scrap composting through source separation of scraps and composting either on-site or collection for composting elsewhere. The 65-page manual includes "how to" information and works sheets and describes the experiences and cost savings realized in 9 case studies. A 30-minute video shows how source separation and composting are done at different businesses and institutions. A 7-minute video describes the benefits of food scrap composting, and can help promote the concept to decision-makers in businesses and institutions. Available from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. Cost: Manual - $22.50; Manual & one Video - $30; Manual & both Videos - $35; 7 min. Video - $20; 30 min. Video - $22.50

On-Farm Composting Handbook. (1992). This comprehensive handbook presents a thorough overview of farm-scale composting and explains how to produce, use, and market compost. Available from the Northeast Regional Agricultural Engineering Service (NRAES), 152 Riley-Robb Hall, Ithaca, NY 14853. Cost: $20.

FOR MUNICIPALITIES

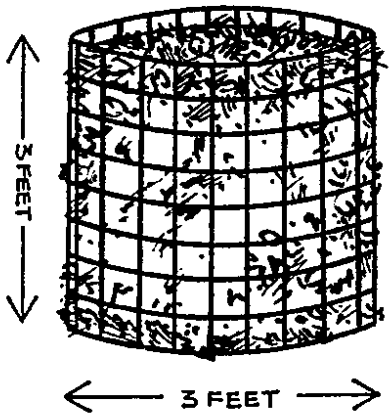
MSW Composting Fact Sheet Series. (1992). A large fraction of municipal solid waste is organic matter which can be composted. This series of fact sheets, based on extensive literature reviews, summarizes the processes and major issues of composting mixed municipal wastes. Titles include: #1 Municipal Solid Waste Composting: Physical Processing; #2 Municipal Solid Waste Composting: Biological Processing; #3 Strategies for Separating Contaminants from Municipal Solid Waste Compost; #4 Potential Effects of Heavy Metals in Municipal Solid Waste Composts on Plants & the Environment; #5 Municipal Solid Waste Composting: Issues in Risk Assessment and Management/Worker Health & Safety; #6 Municipal Solid Waste Composting: Issues in Policy & Regulation, and #7 Key Aspects of Compost Quality Assurance. Available from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. Sold as a set of seven only. Cost: $7.

Recycling Yard Waste: A Tour of Community Programs. (1991). This video tour shows four community composting and chipping programs. It is designed to help other communities explore the options available, and covers types of recyclable yard trimmings, and equipment and space needed to obtain yields from both low and high intensity management sites. Available from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. 35 min. Cost: $25.

Turning Over An Old Leaf: Municipal Yard Waste Composting, The 20% Solution. (1992). A video designed to help local officials and citizens understand how recycling yard waste through composting and chipping helps the environment and saves money. Available from the Cornell University Resource Center, 7 Business & Technology Park, Ithaca, NY 14850. 7 min. Cost: $22.

Wire Mesh Bin

A wire mesh bin is inexpensive and easy to build out of either galvanized chicken wire or hardware cloth. (Nongalvanized chicken wire can also be used but will not last very long.) Posts provide more stability for a chicken wire bin, but make the bin difficult to move. A wire mesh bin made without posts is easy to lift, allowing you to get at the compost that is already "done" at the bottom of the pile while the top of the pile is still cooking.



What You Need

Materials

- 12 1/2 feet of 36-inch-wide 1-inch galvanized chicken wire or 1/2-inch hardware cloth
- heavy wire for ties
- 3 or 4 4-foot wooden or metal posts (for chicken wire bin)

Tools

- heavy-duty wire or tin snips
- pliers
- hammer (for chicken wire bin)
- metal file (for hardware cloth bin)
- work gloves

Building a Wire Mesh Bin

If using chicken wire:

1. Fold back 3 to 4 inches of wire at each end of the cut piece to provide a strong, clean edge that won't poke or snag and which will be easy to latch.
2. Stand the wire in a circle and set it in place for the compost pile.
3. Cut the heavy wire into lengths for ties. Attach the ends of the chicken wire together with the wire ties, using pliers.
4. Space wood or metal posts around the inside of the chicken wire circle. Holding the posts tightly against the wire, pound them firmly into the ground to provide support.

If using hardware cloth:

1. Trim the ends of the hardware cloth so the wires are flush with a cross wire to get rid of edges that could poke or scratch hands. Lightly file each wire along the cut edge to ensure safe handling when opening and closing the bin.
2. Bend the hardware cloth into a circle, and stand it in place for the compost pile.
3. Cut the heavy wire into lengths for ties. Attach the ends of the hardware cloth together with the wire ties, using pliers.

Adding Wastes

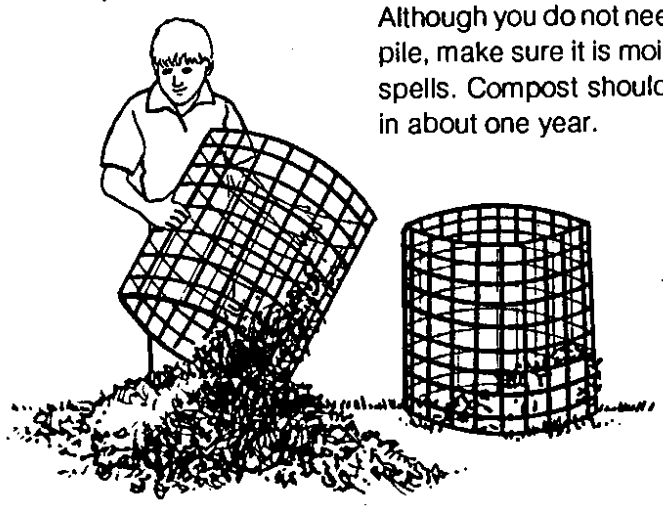
Add wastes as they become available. Nonwood materials such as grass clippings and garden weeds work best. You can speed up the process by chopping or shredding the wastes.

Maintaining Your Compost Pile

As you keep adding wastes to the wire mesh bin, the material at the bottom will become compost sooner than the material at the top. If you want to use the compost at the bottom of the pile, you can remove the wire holding unit and place it next to the pile. Then, use a pitchfork to move the compost back into the moved holding unit, adding the material from the top of the pile first. Continue until you have replaced all the compost. Now the compost at the top of the bin is ready to use.

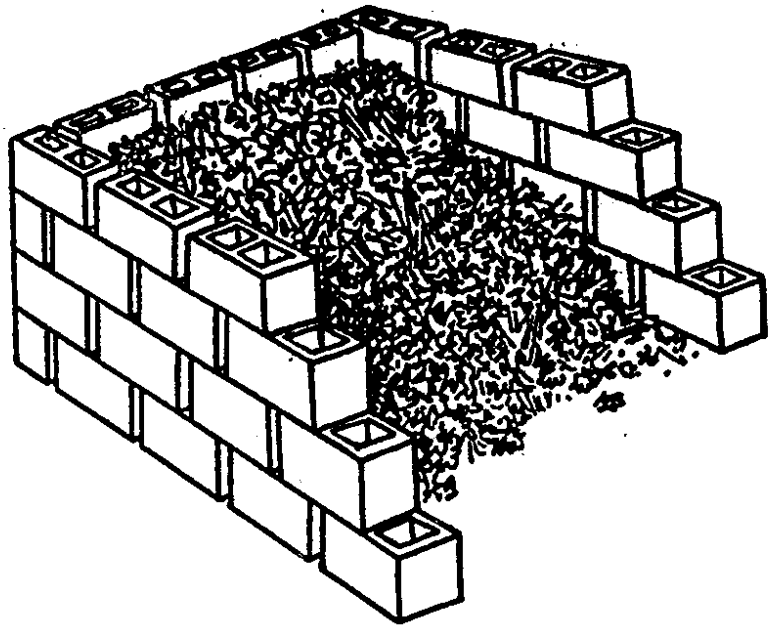
You also can scoop finished compost from the bottom of the pile by lifting one side of the unit.

Although you do not need to turn this pile, make sure it is moist during dry spells. Compost should be finished in about one year.



Cinder Block Bin

A cinder block bin is sturdy, durable, and easily accessible. If you have to buy the cinder blocks, it is slightly more expensive to build than the wire mesh or snow fence bins.



What You Need

- about 46 cinder blocks for the first bin
- optional: about 32 blocks for a second bin
- work gloves

Building a Cinder Block Bin

1. Place 5 cinder blocks in a row along the ground at your composting site, leaving about 1/2 inch between each block to let in air.
2. Place 4 cinder blocks in another row along the ground perpendicular to and at one end of the first row, forming a square corner; leave about 1/2 inch between each block.
3. In the same way, place 4 cinder blocks at the opposite end of the first row to form a three-sided enclosure.
4. Add a second layer of blocks, staggering them to increase stability and leaving about 1/2 inch between each block. There should be a layer of 4 cinder blocks on each of the three walls of the enclosure.
5. Add a third layer of blocks, again staggering them to increase stability, with 5 blocks across the back of the enclosure and 3 on each side.
6. The last and top layer should have 4 blocks across the back and 3 on each side.
7. Optional: If you wish to decrease your composting time, build a second bin next to the first so the wastes in one can mature while you add wastes to the other. Use one side wall of the first bin so you only need to build two additional walls.

Adding Wastes

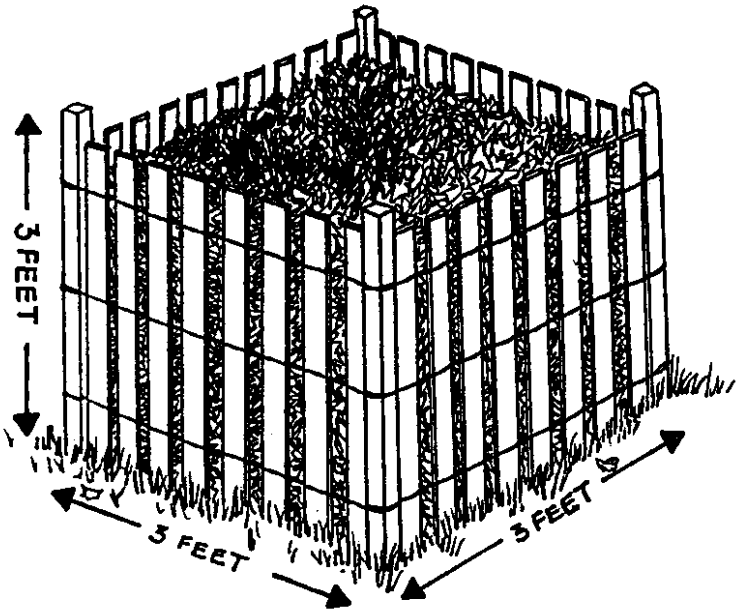
Add wastes as they become available. Nonwood materials such as grass clippings and garden weeds work best. You can speed up the process by chopping or shredding the wastes. If you have two units, when the first unit is full let the compost mature and add wastes to the second unit.

Maintaining Your Compost Pile

Although you do not need to turn this pile, make sure that it is moist during dry spells. Compost should be ready in about one year or more.

Snow Fence Bin

A snow fence bin is simple to make. It works best with four posts pounded into the ground for support.



What You Need

Materials

- 4 wooden or metal posts, at least as tall as the snow fence
- heavy wire for ties
- 12 1/2 feet of snow fencing, at least 3 feet tall

Tools

- heavy-duty wire or tin snips
- pliers
- sledge hammer
- work gloves

Building a Snow Fence Bin

1. Choose a 3-foot-square site for your compost bin, and pound the four wooden or metal posts into the ground 3 feet apart, at the corners of the square.
2. Cut the heavy wire into lengths for ties. Attach the snow fence to the outside of the posts with the wire ties, using pliers.
3. Attach the ends of the snow fence together in the same way, forming a 3-foot-square enclosure.

Adding Wastes

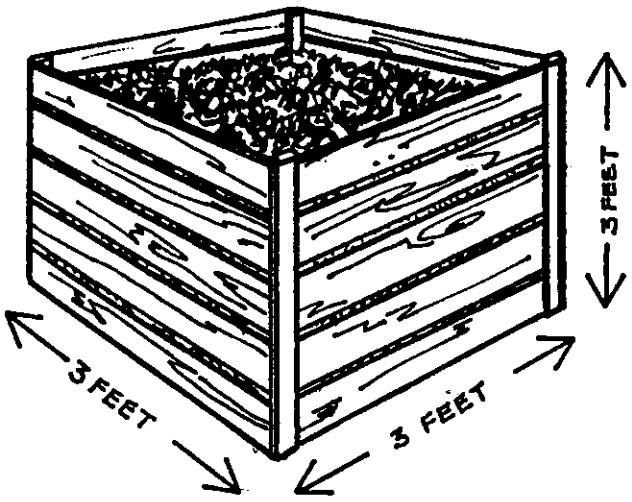
Add wastes as they become available. Nonwood materials such as grass clippings and garden weeds work best. You can speed up the process by chopping or shredding the wastes.

Maintaining Your Compost Pile

Although you do not need to turn this pile, make sure that it is moist during dry spells. Compost should be ready in about one year. Simply remove the fencing and the compost is ready to use.

Wooden Box Bin

A wooden box bin can be built inexpensively using wooden pallets. Or you can use lumber to make a nicer looking bin. The costs will vary, depending on whether you use pallets or new lumber. Used pallets are often available from manufacturers and landfills.



What You Need

Materials

- 4 wooden pallets (5 pallets if you want a bottom in the container), sized to make a four-sided container at least 3 feet x 3 feet x 3 feet
- nails
- wire ties

or

- 1 12-foot length of 2 x 4 lumber
- 5 12-foot lengths of lumber, 6 X 3/4
- nails

Tools

- saw
- sledge hammer
- work gloves

Building a Wooden Box Bin

If using wooden pallets:

1. Nail or wire four pallets together to make a four-sided container at least 3 feet x 3 feet x 3 feet. The container is ready to use.
2. A fifth pallet can be used as a base to allow more air to get into the pile and to increase the stability of the bin.

If using lumber:

1. Saw the 12-foot length of 2 x 4 lumber into four pieces, each 3 feet long, to be used as corner posts.
2. Choose a 3-foot-square site for your compost bin, and pound the four posts into the ground 3 feet apart, at the corners of the square.
3. Saw each of the five 12-foot boards into four 3-foot pieces. Allowing five boards to a side and starting at the bottom, nail the boards to the posts to make a four-sided container. Leave 1/2 inch between the boards to allow air to get into the pile.
4. If you wish to decrease your composting time, build a second holding unit so the wastes in one can mature while you add wastes to the other.

Adding Wastes

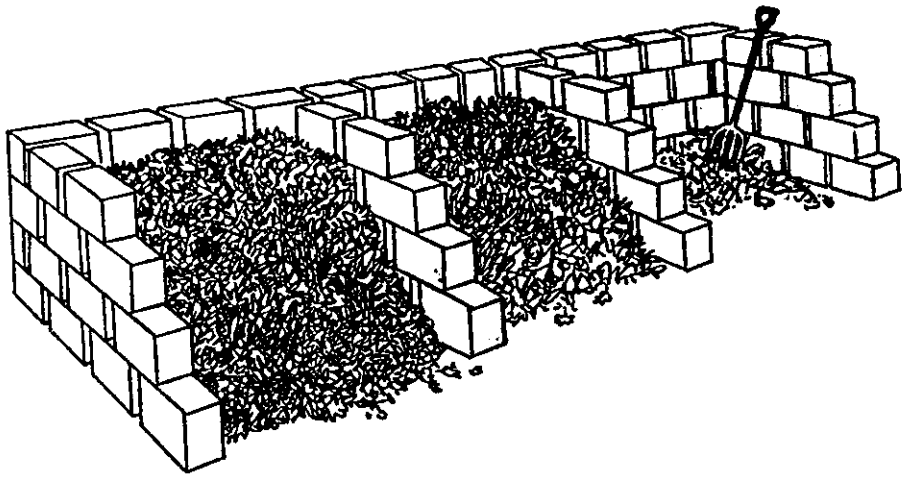
Add wastes as they become available. Nonwood materials such as grass clippings and garden weeds work best. You can speed up the process by chopping or shredding the wastes. If you have two units, when the first unit is full let the compost mature and add wastes to the second unit.

Maintaining Your Compost Pile

Although you do not need to turn this pile, make sure that it is moist during dry spells. Compost should be ready in about one year.

Cinder Block Turning Unit

A cinder block turning unit looks like three cinder block holding units in a row. It is sturdy, and if you can find used cinder blocks, it is inexpensive to build.



What You Need

- about 98 cinder blocks
- work gloves

Building a Cinder Block Turning Unit

1. Place 12 cinder blocks in a row along the ground at your composting site, leaving about 1/2 inch between each block to let in air.
2. Place 4 cinder blocks in another row along the ground perpendicular to and at one end of the first row, forming a square corner; leave about 1/2 inch between each block.
3. In the same way, place 4 cinder blocks at the opposite end of the first row to form a three-sided enclosure.
4. Place two more rows—4 cinder blocks each—along the ground, parallel to the ends and evenly spaced within the enclosure. This divides the enclosure into three separate bins.
5. Add a second layer of blocks, staggering them to increase stability and leaving about 1/2 inch between each block. There should be a layer of 13 cinder blocks across the back and 3 cinder blocks on the sides of each bin.
6. Add a third layer of blocks, again staggering them to increase stability, with 12 blocks across the back of the enclosure and 3 on each side.
7. The last and top layer should have 13 blocks across the back and 2 on each side.

Adding Wastes

Do not add wastes as they become available with this system. Collect enough wastes to fill one of the three bins at one time. You can collect woody as well as nonwood wastes. Add thin layers of different kinds of organic materials or mix the wastes together.

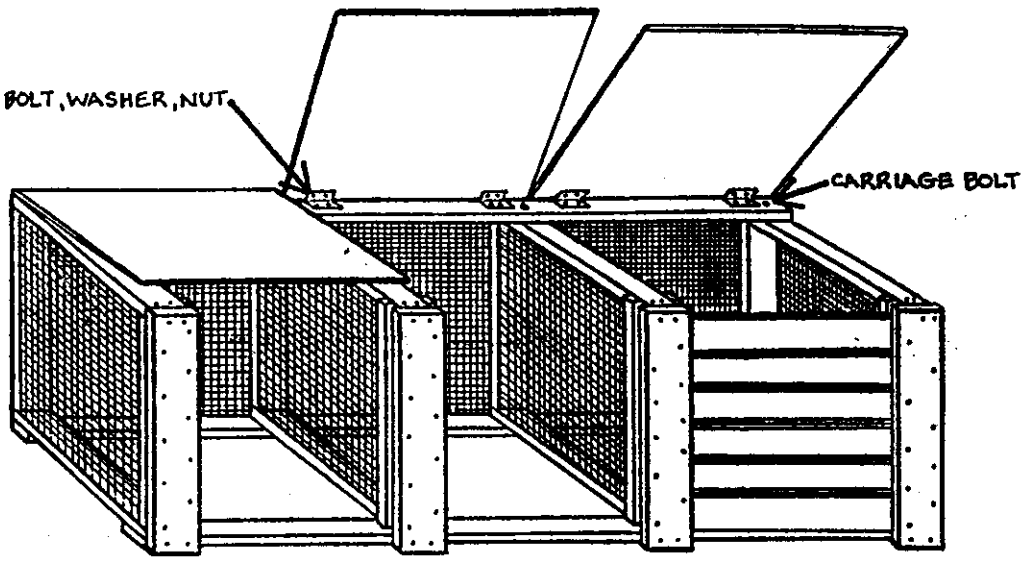
Before adding new wastes to an empty bin, collect enough to fill the entire bin.

Maintaining Your Compost Pile

Take the temperature of your pile every day. After a few days, the temperature should reach between 130° and 140°F (54° to 60°C). If your pile gets very hot, turn it before the temperature gets above 155°F (68°C). In a few days, the temperature will start to drop. When the temperature starts going down, turn your compost pile into the next bin with a pitchfork. The temperature of your compost pile will increase again and then, in about four to seven days, start to drop. Turn your compost pile into the third bin. Continue to take the temperature and turn the compost pile until the compost is ready. The compost should be ready in about one or two months.

Wood and Wire Three-Bin Turning Unit

A wood and wire three-bin turning unit can be used to compost large amounts of yard, garden, and kitchen wastes in a short time. Although relatively expensive to build, it is sturdy, attractive, and should last a long time. Construction requires basic carpentry skills and tools.



What You Need

Materials

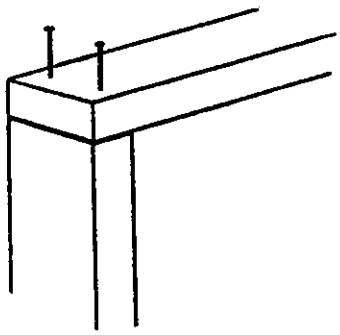
- 4 12-foot (or 8 6-foot) lengths of pressure-treated 2 x 4 lumber
- 2 10-foot lengths of pressure-treated 2 x 4 lumber
- 1 10-foot length of construction grade 2 x 4 lumber
- 1 16-foot length of 2 x 6 lumber
- 6 8-foot lengths of 1 x 6 lumber
- 1 4-x-8-foot sheet of 1/2-inch exterior plywood
- 1 4-x-4-foot sheet of 1/2-inch exterior plywood
- 22 feet of 36-inch-wide 1/2-inch hardware cloth
- 2 pounds of 16d galvanized nails
- 250 poultry wire staples (or a power stapler with 1-inch galvanized staples)
- 12 1/2-inch carriage bolts 4 inches long
- 12 washers and 12 nuts for the bolts
- 6 3-inch zinc-plated hinges
- 24 washers and 24 nuts for the hinges
- 1 quart wood preservative or stain

Tools

- tape measure
- hand saw or circular power saw
- hammer
- tin snips
- carpenter's square
- optional: power stapler with 1-inch galvanized staples
- drill with 1/2-inch bit
- screwdriver
- 3/4-inch socket or open-ended wrench
- pencil
- safety glasses
- ear protection
- dust mask
- work gloves

Building a Wood and Wire Three-Bin System

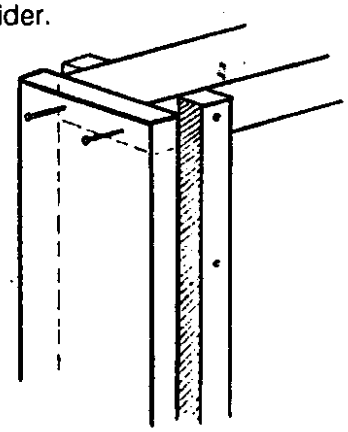
1. Cut two 31 1/2-inch and two 36-inch pieces from a 12-foot length of pressure-treated 2 x 4 lumber. Butt joint and nail the four pieces into a 35-inch x 36-inch "square." Repeat, building three more frames with the remaining 12-foot lengths of 2 x 4 lumber.



2. Cut four 37-inch lengths of hardware cloth. Fold back the edges of the wire 1 inch. Stretch the pieces of hardware cloth across each frame. Make sure the corners of each frame are square and then staple the screen tightly into place every 4 inches around the edge. The wood and wire frames will be dividers in your composter.

continued on next page

3. Set two dividers on end 9 feet apart and parallel to one another. Position the other two dividers so they are parallel to and evenly spaced between the end dividers. The 36-inch edges should be on the ground. Measure the position of the centers of the two inside dividers along each 9-foot edge.
4. Cut a 9-foot piece from each 10-foot length of pressure-treated 2 x 4 lumber. Place the two treated boards across the tops of the dividers so each is flush against the outer edges. Measure and mark on the 9-foot boards the center of each inside divider.
5. Line up the marks, and through each junction of board and divider, drill a 1/2-inch hole centered 1 inch in from the edge. Secure the boards with carriage bolts, but do not tighten them yet. Turn the unit so the treated boards are on the bottom.
6. Cut one 9-foot piece from the 10-foot length of construction grade 2 x 4 lumber. Attach the board to the back of the top by repeating the process used to attach the base boards. Using the carpenter's square or measuring between opposing corners, make sure the bin is square. Tighten all the bolts securely.
7. Fasten a 9-foot length of hardware cloth to the back side of the bin with staples every 4 inches around the frame.
8. Cut four 36-inch-long pieces from the 16-foot length of 2 x 6 lumber for front runners (Save the remaining 4-foot length.) Rip cut two of these boards to two 4 3/4-inch-wide strips. (Save the two remaining strips.)
9. Nail the 4 3/4-inch-wide strips to the front of the outside dividers and baseboard so they are flush on the top and the outside edges. Center the two remaining 6-inch-wide boards on the front of the inside dividers flush with the top edge and nail securely.
10. Cut the remaining 4-foot length of 2 x 6 lumber into a 34-inch-long piece and then rip cut this piece into four equal strips. Trim the two strips saved from step 8 to 34 inches. Nail each 34-inch strip to the insides of the dividers so they are parallel to and 1 inch away from the boards attached to the front. This creates a 1-inch vertical slot on the inside of each divider.



11. Cut the 6 8-foot lengths of 1 x 6 lumber into 18 slats, each 31 1/4 inches long. Insert the horizontal slats, 6 per bin, between the dividers into the vertical slots.
12. Cut the 4-x-8-foot sheet of exterior plywood into two 3-x-3-foot pieces. Cut the 4-x-4-foot sheet of exterior plywood into one 3-x-3-foot piece. Center each 3-x-3-foot piece on one of the three bins and attach each to the back top board with two hinges.
13. Stain all untreated wood.

Adding Wastes

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