COMMUNITY FOOD SCRAP COMPOSTING

Brought to you by:

Northeast Recycling Council

Compost Association of Vermont

Vermont Community Garden Network

Community Composting

- Often volunteer run; some operated by nonprofit organizations or farms
- Produces compost for local use
- Promotes community connections
- Provides an essential role in the evolution of food scrap diversion
- Range of sizes - 10 sq. ft. – 20,000 sq. ft.

Vermont Regulations

- Exemptions:
  - ✓ < 100 yds^3/year feedstocks
  - ✓ < 1000 yds^3/year food processing residuals on farms
  - ✓ < 3000 yds^3/year leaf and yard debris
- Larger amounts: small, medium and large operations

FEED STOCK COLLECTION

What's your goal?

How much volume can your site handle?

OR•GAN•ICS

Rwaste
Rescue
Reduction
food Composting
scraps

Acceptable Materials

- Vegetable food scraps, peels
- Fruit food scraps, peels
- Nuts & nut shells
- Dairy, cheese
- Coffee grounds/filters & tea bags
- Leaves, garden trimmings
- Napkins, paper towels
- Sawdust
- Livestock bedding/manure
- Straw

Food Scraps Sourcing

- Community gardeners
- Schools
- Businesses
- Nonprofits
- Churches
- Community

- Start collecting small volumes & grow it!
- Year-round, consistent supply of feedstocks!

Carbon Sourcing

- Wood workers, town, utility crews, landscapers – sawdust, chips
- Neighborhood, landscapers – leaves
- Farmers – livestock bedding

- Year-round, consistent supply of feedstocks!
- 2-3 times volume than food scraps
- Keep Dry

Onsite Collection Containers

- Food scraps
  - ✓ 5 gallon buckets
  - ✓ Tubs
  - ✓ 5-20 gallon cans or carts
- Sawdust storage

Kitchen Collection Buckets

Compostable Liners

Community Garden Collection

Ludlow

Community Garden Collection

Elm Street

School & Business Collection

Home & Office Collection

Image Cr. StopWaste.org

Images Cr.: BioCycle.net

Image Cr.: Elements Mountain Compost

COLLECTION MONITORING

- Set designated days & times for food scrap collection/drop off
  - ✓ Match collection/drop-off with compost pile building
- Educate participants about feedstocks
  - ✓ Onsite orientation & clear signage

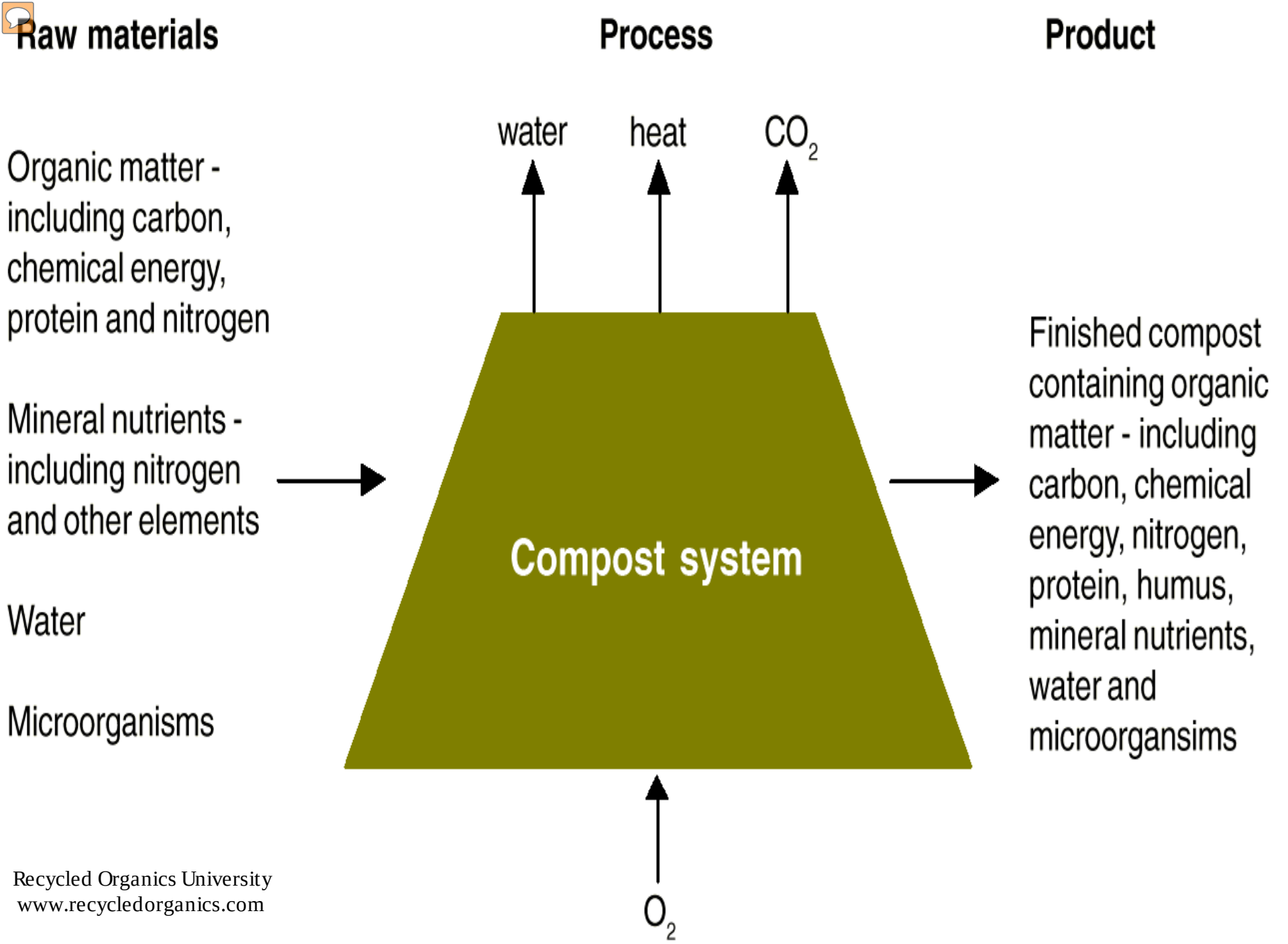
Science of Composting

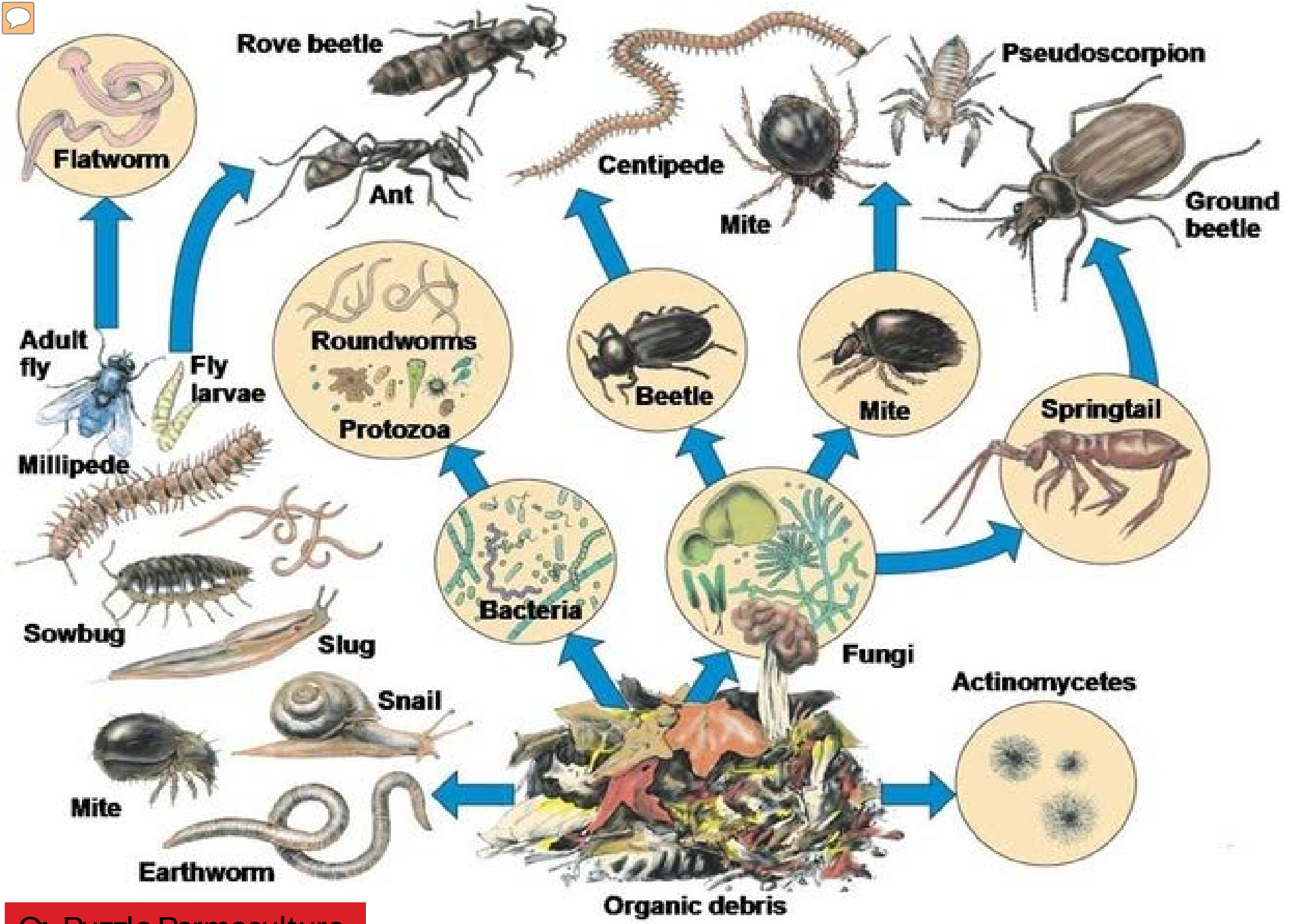
What is Compost?

Compost is a value-added product. Composting converts residue material into an easy-to-handle, humus-like product, rich in organic matter & organisms.

Composting

- Controlled, aerobic biological process
  - ✓ Results in the decomposition of organics
- Decomposers: Micro & Macroorganisms
  - ✓ Digest organic residues for food & energy
  - ✓ Speed up the process by creating heat


Raw materials
Process
Product
water
heat
CO_2
Organic matter - including carbon, chemical energy, protein and nitrogen
Mineral nutrients - including nitrogen and other elements
Water
Microorganisms
Compost system
Finished compost containing organic matter - including carbon, chemical energy, nitrogen, protein, humus, mineral nutrients, water and microorgansims
O_2



Cr. Puzzle Permaculture

Healthy biological activity is essential to successful composting—setting up the right environment and conditions is fundamental to the process

Composting Science Basics

- **Aeration**
  - ✓ Oxygen concentrations: 10-14+%.
- **Carbon to Nitrogen (C:N) Ratio**
  - ✓ 20:1 – 60:1
  - ✓ Preferred 30:1-50:1
- **Moisture**: 40 to 65 percent
  - ✓ Like a damp sponge

Science, cont.

- **Optimum pH range**
  - ✓ 5.5 to 8
- **Temperature** – 90°-150°F (32°-66°C)
  - ✓ *Process to Further Reduce Pathogens*
  - ✓ **131°F for 3-15 days (*f* of system)**

Basic Recipe

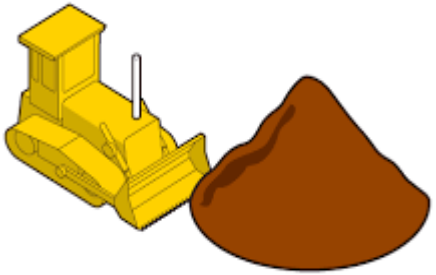
- **2-3 Parts Carbon - "Brown" materials**
  - Woody, dry materials: wood shavings, leaves, soiled/shredded paper, straw, animal bedding
  - Bulky materials, including branches should be chopped or shredded
- **1 Part Nitrogen - "Green" materials**
  - Fresh, "wet" materials, such as kitchen scraps, grass clippings, garden trimmings (no weeds), manures
- **Keep it small!**
  - ✓ Mowing, grinding, chipping, or shredding

???

Does your site have enough of the right mix?

High Carbon 2-3 volumes

High Nitrogen 1 volume



Recipe, Cont.

- **A little soil, finished compost, or horse manure**
- **Moisture**
  - ✓ Just a little, like a damp sponge
  - ✓ Leave lid or cover off during rain
  - ✓ Required to keep microorganisms alive & active

Recipe Tips for Jora/Tumblers

- Start with equal parts C to N or 2 parts C to 1 part N
- Adjust to speed decomposition
  - ✓ Temperature
  - ✓ Moisture level
  - ✓ Active decomposition

Recipe Tips for Bins/Piles

- Carbon – keep with the 30:1 C:N
- Bulking agents – wood shavings, chips
  - ✓ Provide porosity
  - ✓ Pile stabilization
  - ✓ Aid air flow

Sample Carbon and Nitrogen Ratios of Various Organics

Carbon Sources	Carbon:Nitrogen Ratio
Yard wastes	50 - 90:1
Straw/hay	50 - 80:1
Wood chips/sawdust	250 - 500:1
Nitrogen Sources	**Carbon:Nitrogen Ratio**
Vegetable scraps	10 – 30:1
Fruit scraps	10 – 30:1
Grass & garden gleanings	10 – 20:1
Chicken manure	10 – 25:1
Cow manure	20 – 30:1
Horse manure	25 – 30:1

Adapted from Robert Rynk, "*On-Farm Composting Handbook*," Natural Resource, Agriculture, and Engineering Service, 1992.

General TIPS

- Mix ingredients together to create a better balance— homogeneous mix
- Adding food scraps
  - ✓ No more than 20%, more okay in tumblers/Jora
  - ✓ Balance C:N ratio, moisture, bulk density
- Observation, temperature, look & feel of compost, trial & error

Quality Begins With The Generator

Image Cr.: Permies.com

Image Cr.: David Hurd

BE ONE WITH YOUR COMPOST

Hot Compost

- Temperature should rise to at least 90-120° F
  - ✓ 130°F for PFRP
  - ✓ Turn/rotate materials to achieve heat
    - ➢ 1-2 times per week, as needed

"Hot" Compost Method

- Enclosed containers
  - ✓ Insulate in winter
  - ✓ Use larger containers or tumblers
- Covered piles – insulate
- Proper "mix" of feedstocks

COMPOST SYSTEMS & OPERATIONS

System Considerations

What's Right for your Site?

Photos: upper left: Bakersfield Elementary Middle School, Bakersfield, VT; lower left: Red Hook Community Farm, Brooklyn, NY (photo credit NYC Master Composter Manual, DSNY); upper right: Charlotte Central School, Charlotte, VT; lower left: La Plaza Cultural, Manhattan, NY

System Considerations: Materials

Photos: upper left: La Plaza Cultural, Manhattan, NY; upper right: Cornwall School, Cornwall, VT; lower right: Thetford Elementary School, Thetford, VT

Assess Volume of Materials:

Community need

People power

Site capacity

Permit limits > 100cy/yr. feedstock

Resources available

Home Composting

Image Cr.: Central Vermont Solid Waste District

Tumblers

Compost Bins

Aerobin & Jora

3-BIN SYSTEM

Photo Cr.: George McDonald, Maine DEP

Four Bin System

Windrows

Images Cr.: David Hurd, GrowNYC

In-Vessel

The Dirt Factory community composting facility in University City
Image Cr.: PlanPhily

Aerated Static Piles

Black Dirt Farm

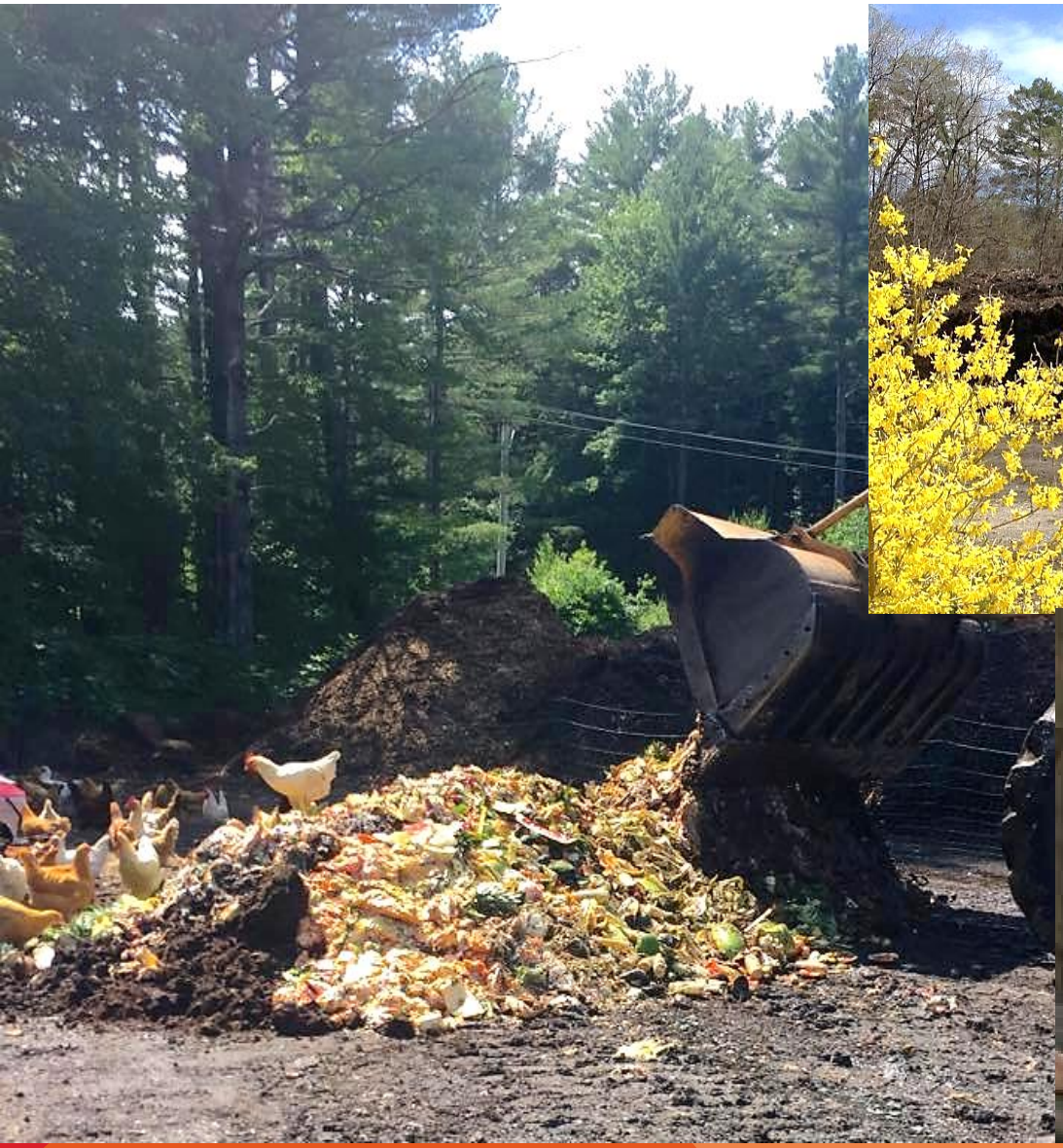
Devine Gardens

Brattle grow Compost

Windham Solid Waste Management District's
All Purpose Compost

Call to order 802-257-0272

Grow Compost Vermont



Green Mountain Compost

Onondaga County Resource Recovery Agency

Tipping fee: $34/ton vs. $84/ton MSW

Costs & Inputs to Build System

Materials, Equipment, Supplies, Tools

Bins, Screener

- ✓ Purchased Bins, Tumblers
- ✓ Tools to assemble or build
- ✓ Wood
- ✓ Screws, bolts, nails, etc.
- ✓ Hardware cloth
- ✓ Screening material

Supplies

- Gloves
  - ✓ Rubber for handling food scraps
  - ✓ Gardening for turning
- Tarps
- Signage &fliers
- Scissors (cut bags)
- Water-proof box for logs

Equipment/Tools

- Chopping & Shredding
  - ✓ Trowels for tumblers
  - ✓ Hatchet
  - ✓ Garden edger or spade shovel
  - ✓ Pruners
  - ✓ Mulch mower




Equipment/Tools

- Turning & Material Moving Tools
  - ✓ Pitch fork
  - ✓ Shovel
  - ✓ Bobcat/tractor
- Thermometer
  - ✓ For hot composting

Tool Storage

Elm Street

Community Compost Site Design

Going with the flow…

Site Plan

- ✓ Composting method
- ✓ Safety & fire emergency plan
  - ✓ Security & vandalism concerns
- ✓ Monitoring techniques & record keeping
- ✓ Provisions for controlling odors
- ✓ Contingency plan

Site Layout

- Material receiving & mixing area
  - ✓ Food scrap drop-off
  - ✓ Carbon storage
- Active composting area
  - ✓ Maybe same as mixing area
- Curing
- Finished compost

Image Cr.: NYC Master Composter Manual DSNY

Ludlow

Material Receiving/Mixing

- Intake: Sealable bins for collection
  - ✓ Always cover food scraps with sawdust
  - ✓ Carbon storage – covered, enclosed
- Monitor for contaminants
- Log weight or volume

Ludlow Community Compost Site

Jora/Tumbler

3-Bin System

Signage

Food scrap collection bins & carbon storage

Elm St. Community Compost Site

Signage


Food Scraps you can add to the compost bin:
Fruit & vegetable scraps (remove PLU stickers!)
Egg shells
Dirty unbleached paper napkins & towels
Coffee grounds & un-bleached coffee filters
Leftover vegetarian meals
Do NOT add these to the bin:
Meat & fish
Grease
Diseased plants
Plastic bags, metal, fruit stickers, glass
Bones
Dairy products
Greasy food

Signage


KITCHEN
WASTE
Put food scraps into the plastic buckets in bin.
BIN 2

Carbon Storage

Image Cr.: Philadelphia Orchard Project

Image Cr.: Cedar Circle Farm

Fort Community Compost Site

Receiving/Mixing

- Feedstock Preparation
  - ✓ Size reduction: chop, shred
  - ✓ Mix: homogenous blend
- Blend proper C:N ratios
- Add moisture, if needed

Image Cr.: Dreamkeeper Garden

Filling the Tumblers

Mixing in the Tumblers

Mixing Food Scraps in Bins

Food Land Opportunity - Chicago

Nola Greens – New Orleans

Mixing into Windrows

Active Composting

- Fill tumblers, bins or add to piles
- Keep record of filling date for each system
  - ✓ Fill one tumbler or bin completely prior to moving to next
  - ✓ Incorporate fully into pile/windrow

Active Composting

- Monitor: temperature, moisture
- Rotate tumblers/turn compost to meet PFRP
  - ✓ Add water, as necessary
- Troubleshoot

Turning Active Compost

Hands in Heart Community Garden

The Dirt Factory Community Composting Facility In University City

Ready for Curing

- Ingredients are digested & bacterial activity declines
- Compost pile heats up very little
  - ✓ Even after turning or aerating the pile
- Compost has a uniform, crumbly appearance, earthy smell

Curing

- Store in bin or pile
- Turn occasionally
- Keep moist

Image Cr.: Rodale

Chapel Hill Community Compost

Image Cr.: Chapel Hill Spring Garden Tour

Harvesting & Screening

- Remove finished compost from curing area
- Screen/sift
- Send sample for testing
- Cover until ready for use
  - ✓ Signage – “finished compost”

Finished Compost - Screening

Image Cr.: University of Florida/IFAS Extension Sarasota County

Image Cr.: EcoCity Farms

Site

- Year-round accessibility
- Access to a water source is necessary
- Shrubbery, fencing, or cover to block wind
  - ✓ Insulation for winter
- Sit bins/piles on ground, grass or vegetated area
  - Tumblers can be mounted

Site

- Buffer, swale, or filter around/behind piles
  - ✓Capture leachate
- Shady/partial sun is best
- Access to a water source

Set-Backs

Best Management Practices

- 3 feet from side lot lines
- 10 feet from the front & back lot lines
- Adequate distance from water sources & water bodies

BMPS

- Operated so as to minimize odors, prevent run-off, & not harbor rodents & pests
- Screened from view from public & adjacent neighbors using plants, trellis, or fencing

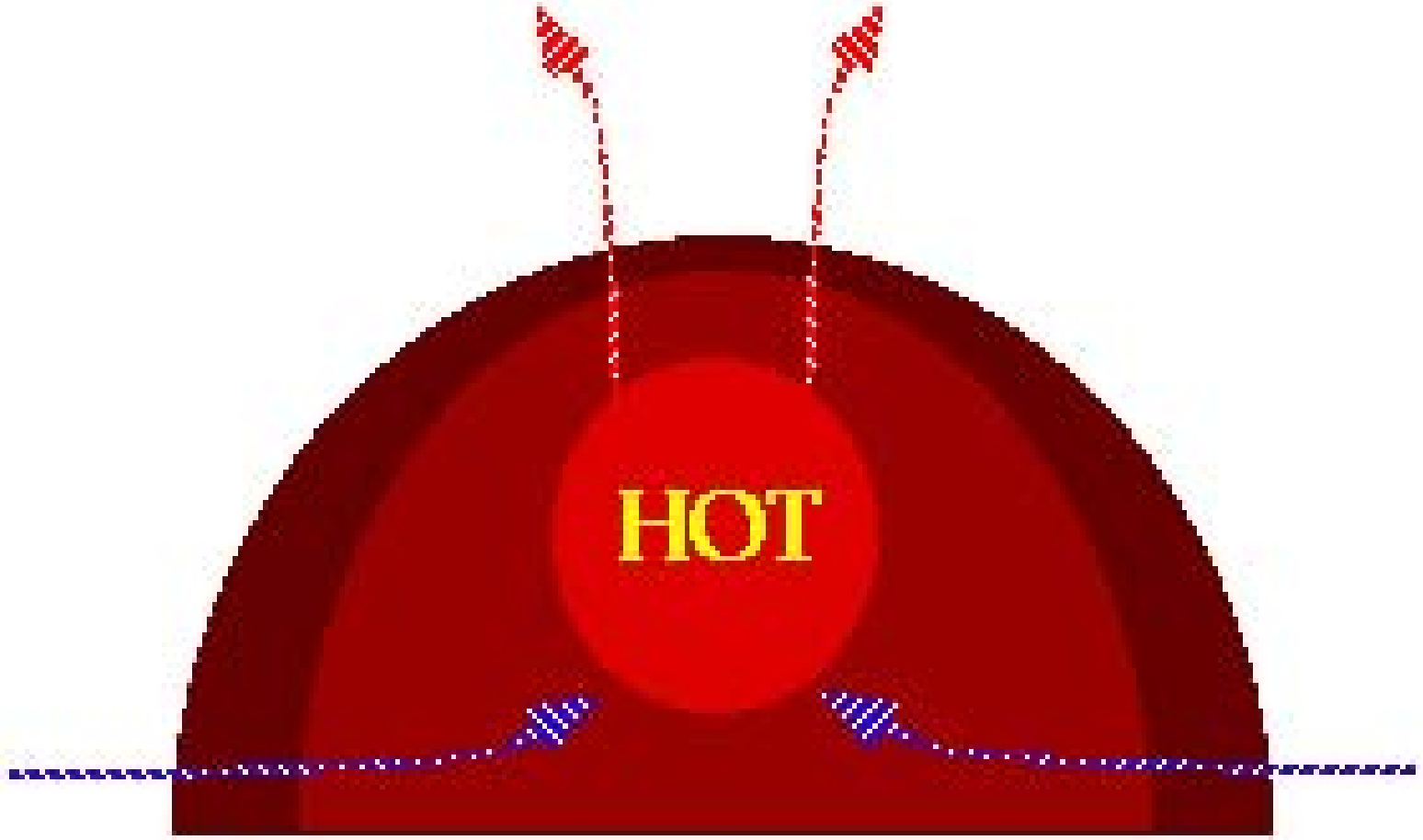
BMPs

- A neat site appearance is important
  - ✓ Don’t let weeds grow on finished product
  - ✓ Deal effectively with leachate or ponding
  - ✓ Consider the view from the road

PROCESS MANAGEMENT & MONITORING

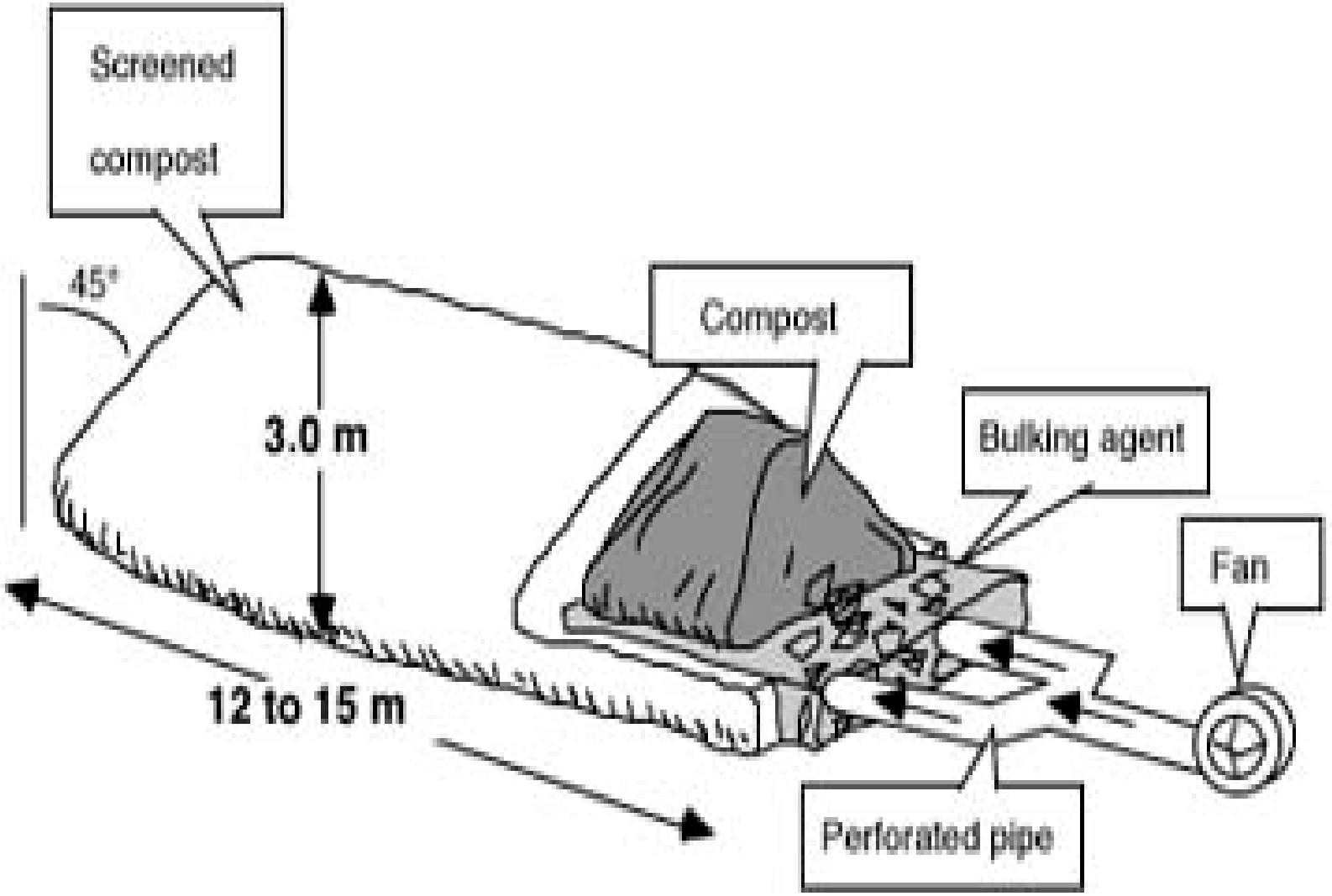
Aeration Techniques

- Tumblers: Close lid & rotate
- Piles, bins: Lift materials with forklift
  - ✓ Move materials from outside to inside
  - ✓ Or, place materials on perforated pipes or pipe through middle



Natural Air Circulation in a Compost Windrow

Image Cr.: Cornell University


Screened
compost
45°
3.0 m
12 to 15 m
Compost
Bulking agent
Fan
Perforated pipe

Tractor with Bucket

Monitoring the Process

- *Observation*
  - ✓ Are the bins or piles steaming?
  - ✓ Are materials looking different?
    - ✓ Is decomposition occurring?
    - ✓ Materials looking like soil?
    - ✓ Is the pile uniformly composting?

Monitoring the Process, cont.

- *Compost feel*
  - ✓ Does the squeeze test indicate that there is moisture in the material
  - ✓ Does it feels like a damp sponge & stick together?
  - ✓ Is the material too wet/slimy?

Monitoring the Process, cont.

- *Oxygen*—Smell is the best measure of properly aerated composting
- Unpleasant odor – indicative of anaerobic conditions
  - ✓ Pile needs to be turned

Monitoring the Process, cont.

- *Temperature monitoring*
  - ✓ Is the temperature rising appropriately for rapid compost?
  - ✓ Does the temperature rise to 90°F
  - ✓ Maintain for PFRP (131°F…ideal)

Winter Preparations

Dual-Chamber System

Image Cr.: Eartheasy.com

Insulated Bins

Image Cr. Pinterest

Insulated Bins, cont.

Image Cr.: Pinterest

Image Crs.: Maine Organic Farmers & Gardeners Assoc.

Curing

- Necessary part of the compost process
  - ✓ Should be cured for a minimum of 45 days
  - ✓ Ensures compost is completely done & ready for use
- Cured compost becomes stable & mature
  - ✓ Ammonia nitrogen converts to nitrate nitrogen
  - ✓ Large woody particles continue to break down
- Compost ingredients not recognizable
  - ✓ Wood chips may not entirely decompose & will require screening

Quality Assurance

- Observe, monitor, sample, analyze, test
- *Keep accurate compost records*
  - ✓ Track feedstock sources & materials
  - ✓ Track turning frequency, temperature
  - ✓ Track compost phases (Active, Curing)
  - ✓ Odor issues & other problems
- Train the Team!

LOG BOOK

Date	Time	Composter Name(s)	Moisture Rating	Odor Rating	Temp 1	Temp 2	Turned (Y/N)	Other Actions Taken

LOG BOOK

Compost Monitoring Log										
Pile Identification: Pile Location:										Date Pile Built:
Feedstocks and Mix Proportions:										
Date	Pile Temperature					Air Temp	MC	Odor	Visual	Notes (management, weather, vectors):
	1	2	3	4	5					
	1'/3'	1'/3'	1'/3'	1'/3'	1'/3'					

Compost Testing

- Maturity
- At a minimum—analyze the basic nutrient content—nitrogen, phosphorous, & potassium (N:P:K:)
- Bioassay testing

Your Compost Product is Ready to Use!

TROUBLESHOOTING

Tips

- Adequate amount of carbon
- **Always** cover food scraps with carbon & soil
  - Sawdust is best
- Cover with lime to deter fruit flies & vermin (rodents, bears)

Tips

- Line bottoms of compost bins with wire mesh
  - ✓To detour vermin
- Use vinegar to wash collection containers

If Critters Become An Issue

- Use Jora, Tumblers for full decomposition
- Eliminate any meat, sauces, cheese
- Discontinue adding food scraps, especially in early spring
- Build an enclosure around the compost area

Bins within Fencing

Who You Gonna Call?

- VCGN
- CAV
- NERC
- UVM Extension Master Composters
- Solid Waste Management Districts

Exercise: My compost stinks…

- Locate where the odors are coming from (collection area, active compost)
- Determine the cause (based on location, moisture, etc.)
- Take action

Special Appreciation

- CVSWMD for use of their facilities
- High Meadows Fund, the Grassroots Fund, participating Vermont Solid Waste Districts
- USDA Rural Utilities Program, which provided partial funding.

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QUESTIONS?