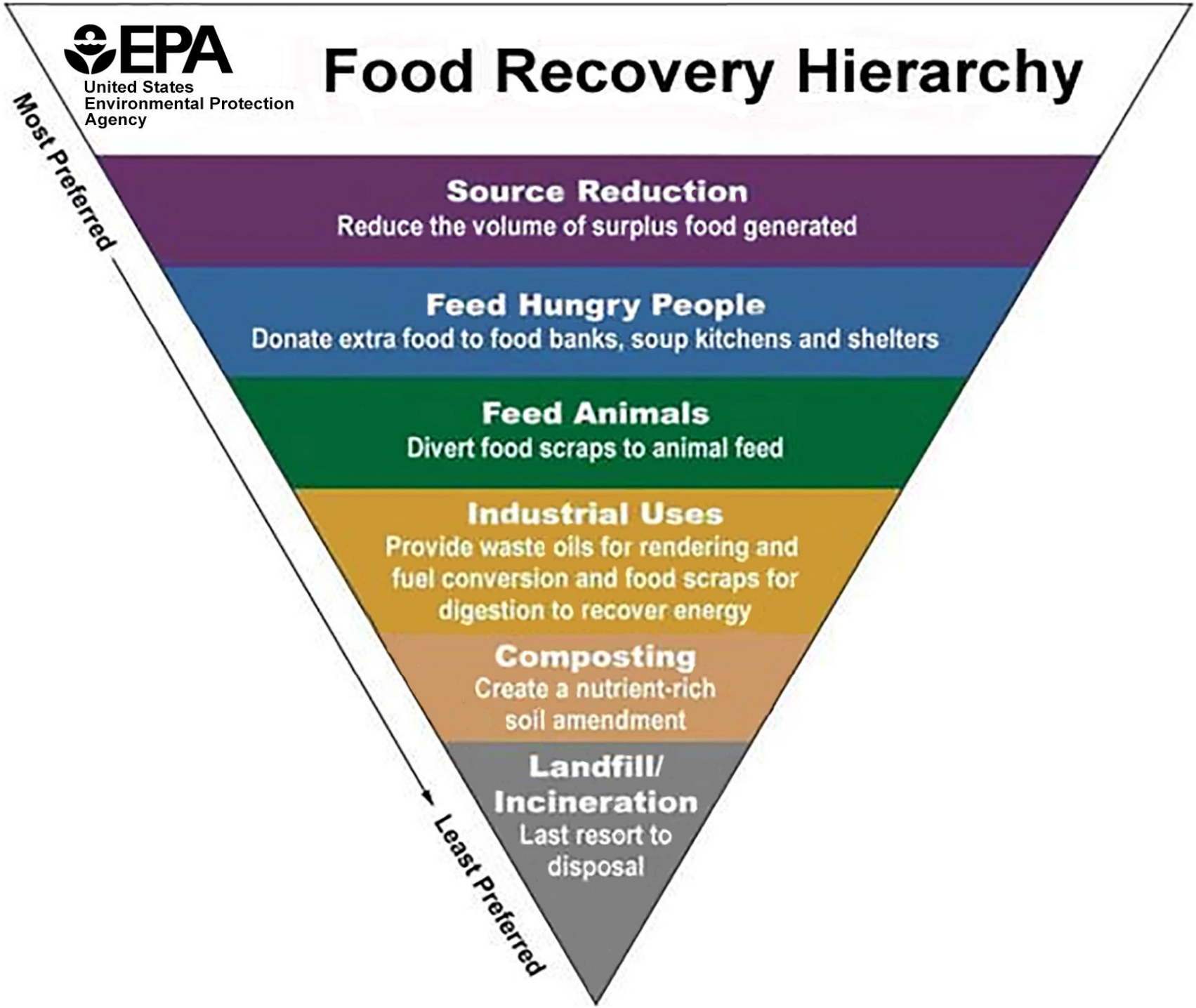
BEYOND THE BASICS

FOOD SCRAP & ORGANICS COMPOSTING

Athena Lee Bradley
Northeast Recycling Council
www.NERC.org


EPA
United States
Environmental Protection
Agency
Food Recovery Hierarchy
Most Preferred
Least Preferred
Source Reduction
Reduce the volume of surplus food generated
Feed Hungry People
Donate extra food to food banks, soup kitchens and shelters
Feed Animals
Divert food scraps to animal feed
Industrial Uses
Provide waste oils for rendering and fuel conversion and food scraps for digestion to recover energy
Composting
Create a nutrient-rich soil amendment
Landfill/ Incineration
Last resort to disposal

or•gan•ics

1. Of, relating to, or derived from living organisms: organic matter
2. Yard & landscape trimmings—leaves, grass, tree & brush
3. Agricultural & land-clearing/forestry debris
4. Manures & biosolids
5. Food scraps & food processing residues
6. Non-recyclable/soiled paper—napkins, paper towels, pizza boxes & other paper products
7. Items manufactured from organics—"certified compostable" bags, plates, cups, bowls, other serviceware

Percentage of Organics in MSW

- Largest component of MSW
  - ✓ 56%
  - ✓ Yard trimmings are recycled at 57%
  - ✓ Less than 6% of food scraps are recovered
- 30-40% of food is wasted in the U.S.
  - ✓ 62.5 Million Tons annually

Benefits of the Hierarchy

- Reduced disposal needs & costs
- Reduced greenhouse gas emissions
- Food recovery helps those in need
- Composting stimulates the local economy
  - ✓ Creates local jobs & business development
- Composting provides valuable soil amendment
- Anaerobic digestion generates energy
  - ✓ Utilizing locally generated resources

Food Scrap Collection

Step 1: Arrange for Processing

- Off-site composting or AD
  - ✓ Commercial compost operation
  - ✓ Farm operation
  - ✓ Community composting
- Onsite composting
- How to finance?

Step 2: Arrange for Hauling

- Processor may provide hauling
- Ask current hauler(s)
- Other trash/recycling haulers
- Dedicated food scrap hauler
  - ✓ Agri-Cycle
- Municipal hauling

Step 3: Collection System

- Staffed site is best
  - ✓ Monitor materials, helps reduce contamination
  - ✓ Controlled access
  - ✓ Answer resident questions about acceptable materials

Collection System, cont.

- Placement of collection containers
  - ✓ Transfer station
  - ✓ Public works yard
  - ✓ Landfill or recycling center
  - ✓ Other location(s) in a community (e.g., retail center)

Collection System, cont.

Private contractors

- Typically provide rental containers
- Transportation to a processing site

Municipal/Public

- Existing containers; used containers
- Existing municipal vehicles & equipment

Containers

- Food scraps only
  - ✓ 32-65 gallon carts on wheels
  - ✓ Dumpsters – 2- yard
    - Aeration system?
- Mixed yard waste/food scraps
  - ✓ 30-40 cubic yard roll-off dumpsters
- Storage of sawdust

Regulations

- Can collect meat & dairy
  - ✓ IF collection ONLY
- If TS has standard permit
  - ✓ Check with DES to see if a modification is needed
- Permit By Notice
  - ✓ Notify DES
  - ✓ Update Operating Plan

Regulations, cont.

- Actively managed
  - ✓ BMPs for facility
- No less than once per week pickup
  - ✓ Recommended
- Cover daily with sawdust
- Fully enclosed containers

Quality begins with the Generator

Promotion

- Simple, concisely worded fliers
  - ✓ Distribute at start of the collection program; periodically
- Signage at the point of collection
  - ✓ Hauler usually labels carts
  - ✓ Banner
- Website & social media

Collection Containers

Certified Compostable Liners

Kitchen Collection Buckets

Issues to Address

- Keeping bears & other critters out
- Odor control
  - ✓ Completely cover scraps with a thin layer of sawdust
  - ✓ Lock & secure bins at night
  - ✓ Empty at least weekly

Transfer Station Collection

Bear-resistant Containers

COMPOSTING

Science of Composting

Composting

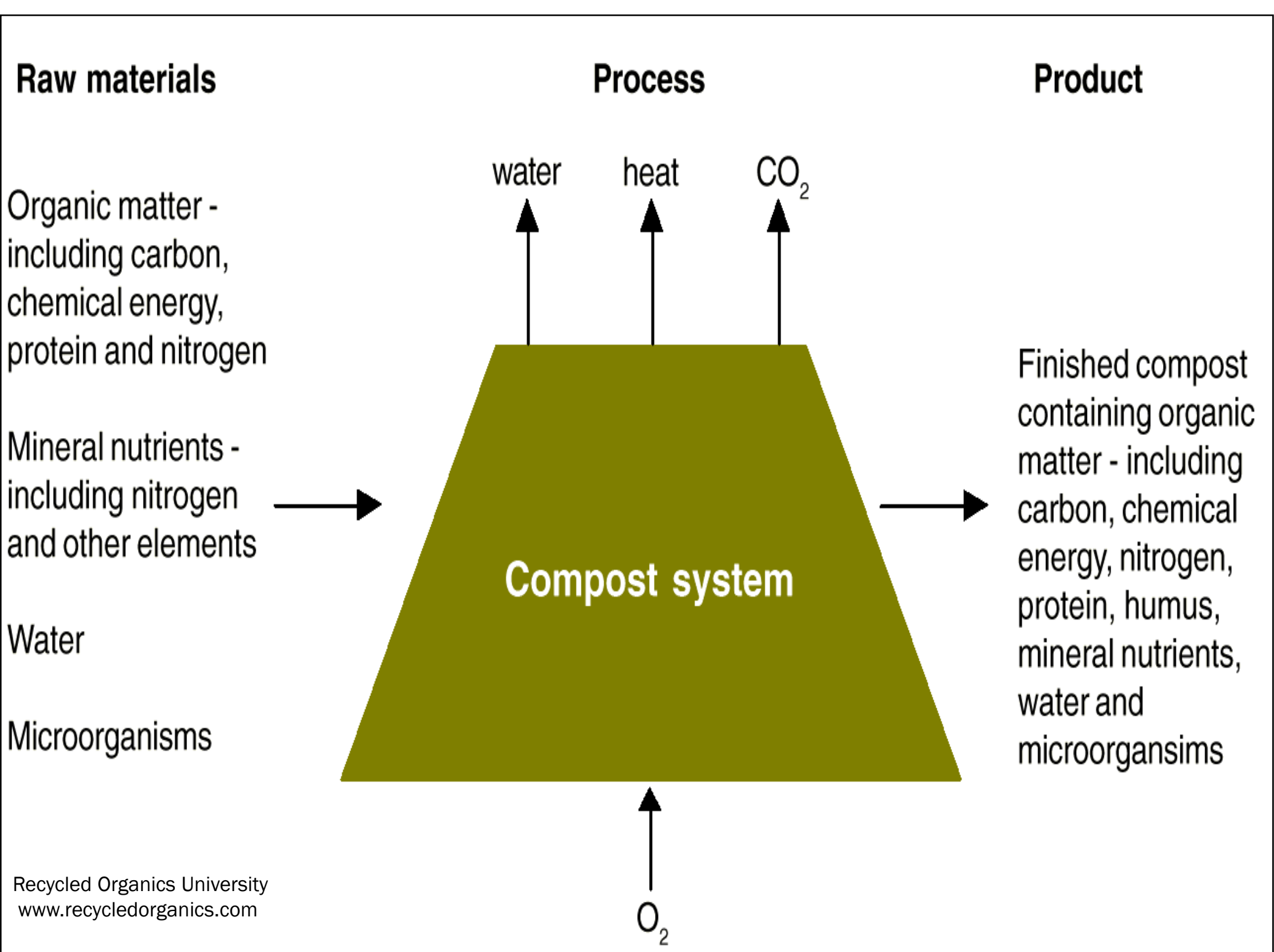
- Controlled, aerobic biological process
- Results in the decomposition of organic materials
- Macroorganisms & Microorganisms
  - ✓ Digest organic residues for food and energy
  - ✓ Speeds up the decomposition process
- Primary end-products—carbon dioxide, water, & compost

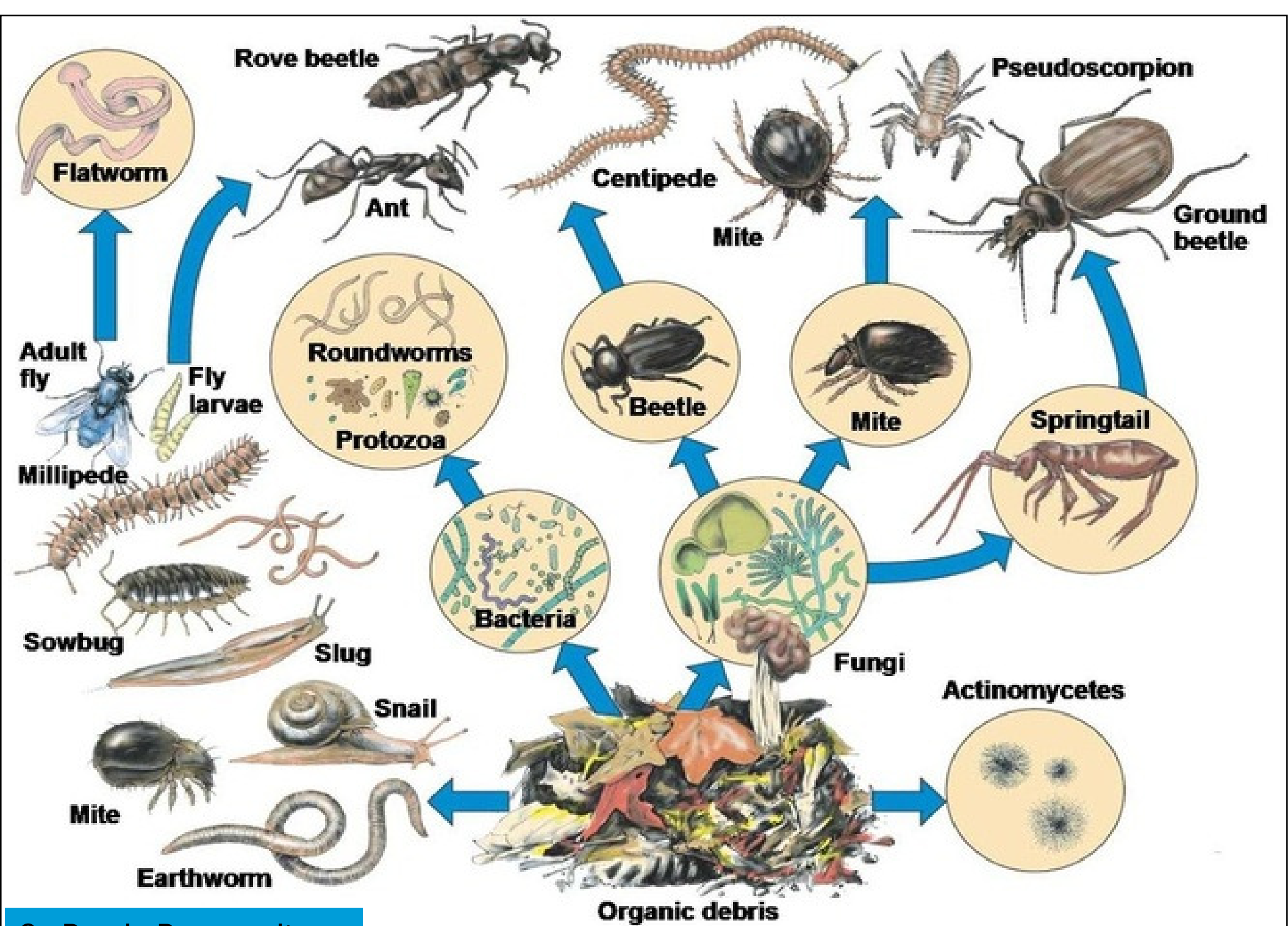
What is Compost?

- Stable, soil/humus-like material
- Rich in organic matter & organisms
- Free of unpleasant odors
- Easy to handle
- Can be stored for long periods
- Valuable soil & potting media amendment

Benefits of Compost on Soil

- Improves Physical Properties: Increases water retention; improves soil aeration and structural stability; resistance to water and wind erosion; root penetration; soil temperature stabilization.
- Enhances Chemical Properties: Increases macro- and micronutrient content; availability of beneficial minerals; pH stability; converts nutrients to a more stable form, reducing fertilizer requirements.
- Improves Biological Properties: Increases the activity of beneficial micro-organisms; promotes root development; can increase agricultural crop yields; suppresses certain plant diseases; acts as biofilter, bonding heavy metals.


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

Elements of Composting

- 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
  - ✓ Preferred 50–60%
  - ✓ Like a damp sponge

Elements of Composting, cont.

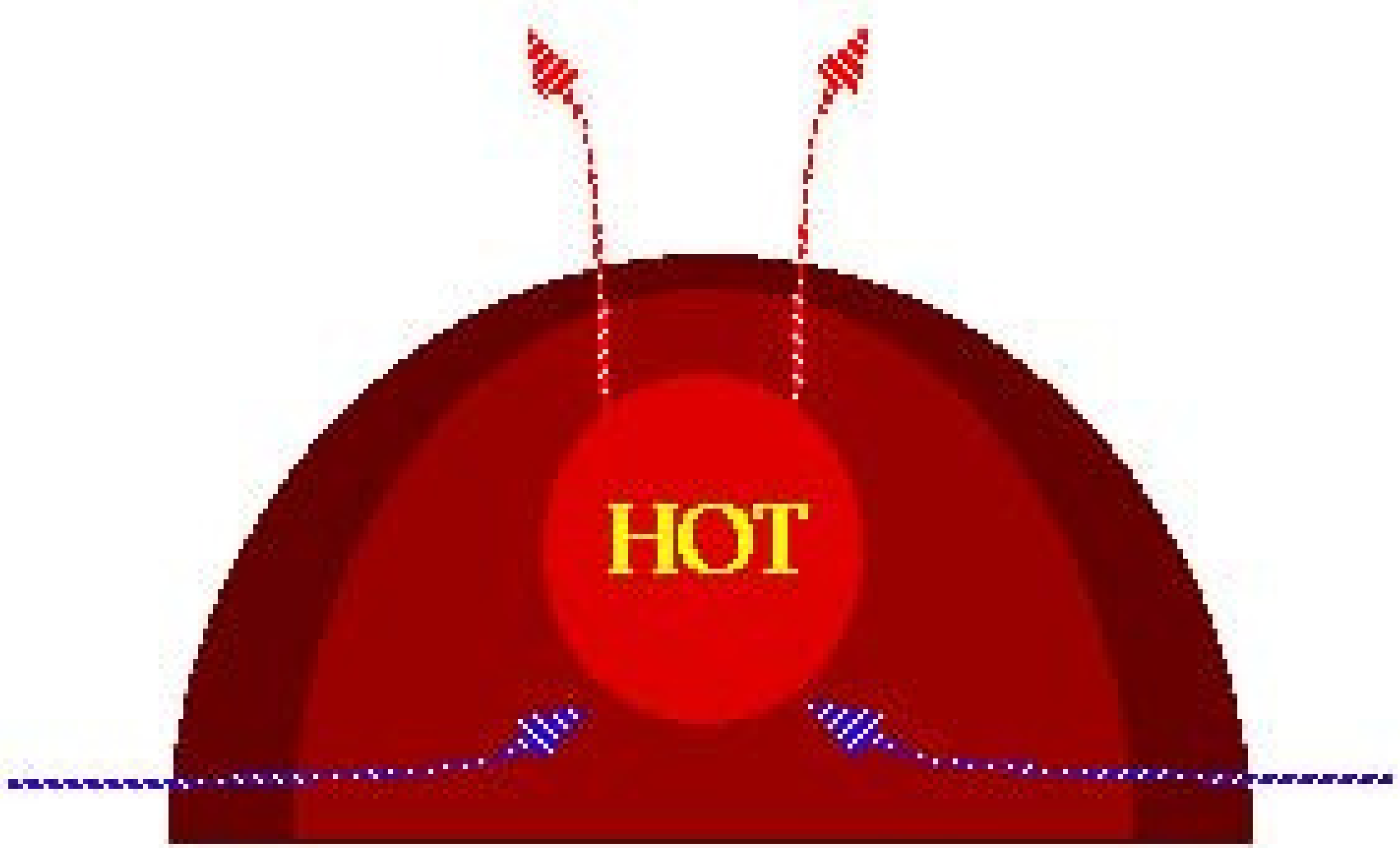
- Optimum pH range - 5.5 to 8
  - ✓ Preferred 6.5 – 8.0
- Temperature – 120° - 160°F.
  - ✓*Process to Further Reduce Pathogens*
  - ✓131°F for 3-15 days (*f* of system)

Elements of Composting, cont.

- Bulk density < 1000 lbs. per cubic yard
- Porosity, structure, texture - particle size, shape & consistency influence aeration
  - ✓ Adjust with bulking agents
  - ✓ Compost recipe
  - ✓ Grinding or mixing

Elements of Composting, cont.

- Particle size 3-13 mm
  - ✓ Smaller particles
  - ✓ More surface area upon which the microorganisms can feed
  - ✓ Helps to speed up the decomposition process
  - ✓ Improves porosity (air flow)
  - ✓ A more homogeneous compost mixture
  - ✓ Mowing, grinding, chipping, or shredding



Natural Air Circulation in a Compost Windrow

Cornell University

COMPOSTING

Feedstocks & Recipe Development

Feedstocks

- What feedstock(s) do you have available?
- Characteristics?
  - ✓ Nutrient content
  - ✓ C:N ratio
  - ✓ Moisture content
  - ✓ Particle size
  - ✓ Bulk density- how easy the material is to mix & handle
  - ✓ pH
  - ✓ Potential for odors – food scraps, grass clippings
  - ✓ Contamination

Recipe Basics

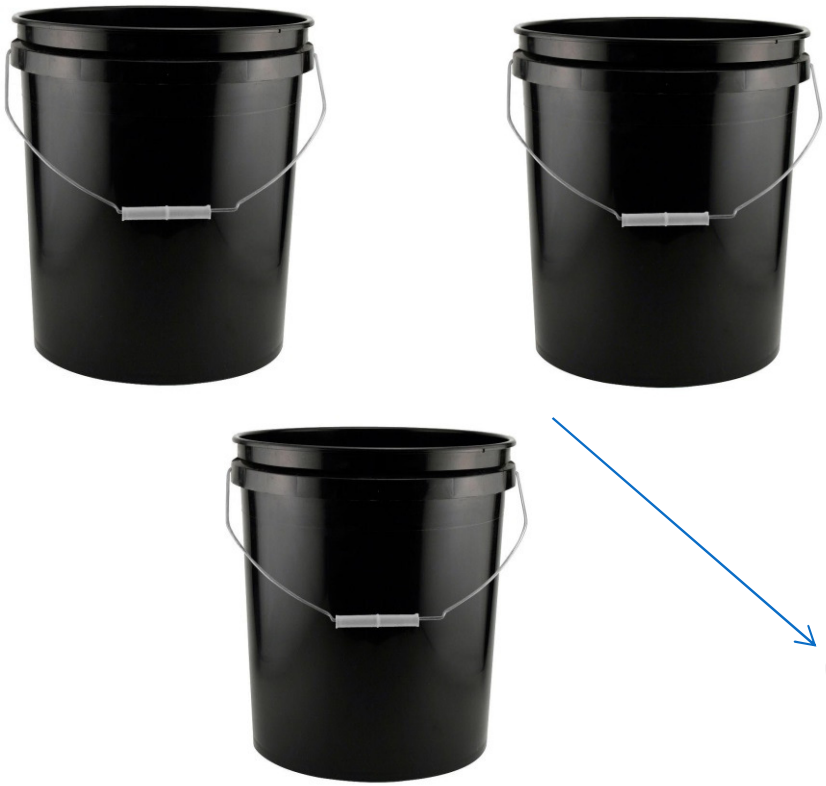
- "Green" materials (Nitrogen)
  - ✓ Food scraps, grass clippings, manure
- "Brown" materials (Carbon)—
  - ✓ Manure w/animal bedding, paper, dry leaves, wood shavings, brush
- Bulking agents – wood shavings, chips
  - ✓ Provide porosity
  - ✓ Pile stabilization
  - ✓ Aids air flow

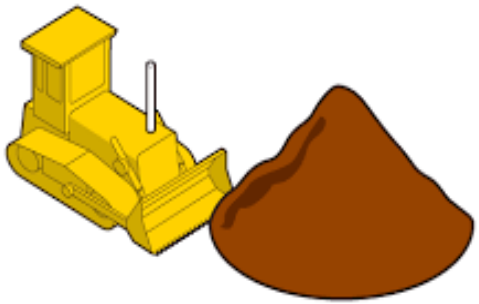
Recipe Basics, cont.

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

High Carbon
3 volumes

High Nitrogen
1 volume





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	
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.

Getting the Right Mix

- Green Mountain Technologies
  - ✓ http://compostingtechnology.com/resources/compost-calculator/
- Compost Mix Calculator
  - ✓ http://www.klickitatcounty.org/solidwaste/fileshtml/organics/compostCalcAbout.htm
- Highfields Recipe & Pad Size Calculation Worksheets
  - ✓ www.highfieldscomposting.org

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

COMPOSTING

Compost Methods & Systems

Determine the Right System

- What's the feedstock
  - ✓Availability & handling issues
  - ✓Tip fees
- Annual processing needs & capacity
- Financial plan
  - ✓Capital for equipment, labor, storage, feedstocks, marketing, etc.
- Determine the end-use for the finished product
- View as many real-life situations as you can

Windrow Composting
Low-to-Intermediate Technology, Costs, & Labor

Windrows

Windrows Basics

- Land for the operation
- Minimum staffing
- Front loader, backhoe, manure spreader, or windrow turner
  - ✓ Mix materials, form & turn windrows

Windrows Basics, cont.

- Access to water
- Monitor temperatures
  - ✓ PFRP - 131°F for 15 days, turning 5 times
- Cover –Chips, tarp, GORE™

Windrows BMPs

- 10’ – 16’ wide by 3’ – 8’ high
- Keep windrow piles as straight & uniform as possible
- Blend materials without compacting them
- Check & adjust moisture level
  - ✓ Add water or dry bulking agent

Windrows BMPs, cont.

- Move materials from surface to center of windrow and vice versa
  - ✓ When turning with a frontend loader, lift material, let it cascade down to maximize aeration & porosity
  - ✓ Re-shape the windrow for consistent dimensions & smooth sides
- If building more than one windrow, leave sufficient space between them for drainage & to allow for turning
  - ✓ Track when windrows were formed

Windrows BMPs, cont.

- Monitor temperatures daily during the active compost phases & after turning
  - ✓Take measurements at various depths & at least every 75 feet along the windrow
  - ✓ Always turn and aerate a pile or windrow if temperatures reach above 160°F

Windrows BMPs, cont.

- Moisture management is important
  - ✓ If is too dry, add water when turning & rebuilding the windrow
    - Start by watering the outside of the pile before mixing materials into the center
    - Shape the windrow to increase rain infiltration
  - ✓ If the windrow is too wet
    - Turn it to release excess water vapor or mix more dry carbon material into the pile

Windrows BMPs, cont.

- Once the active composting phase for PFRP is met, turn materials weekly or as needed until ready for curing
- Windrows typically reduce 60% in volume during active composting
  - ✓ Two windrows can then be combined into one to free up space
- Curing time can range from 30 to 60 days

Seacoast Farms

ALWAYS SOMETHING FARM

TAM Organics

Martin's Farm

Windham Solid Waste Management District

WSWMD - Specifics

- 20 member towns
- 497 tons SSO processed in 2016
- Screened to 3/8 inch
  - ✓ Compost product & compost/soil mix product
- Cash positive operation
  - ✓ Tipping fee $65/ton
  - ✓ Compost sells $20/cy

Town of Skowhegan

Screening Compost

Mark King, ME DEP

Aerated Static System Moderate Technology, Costs & Labor

Aerated Static Systems

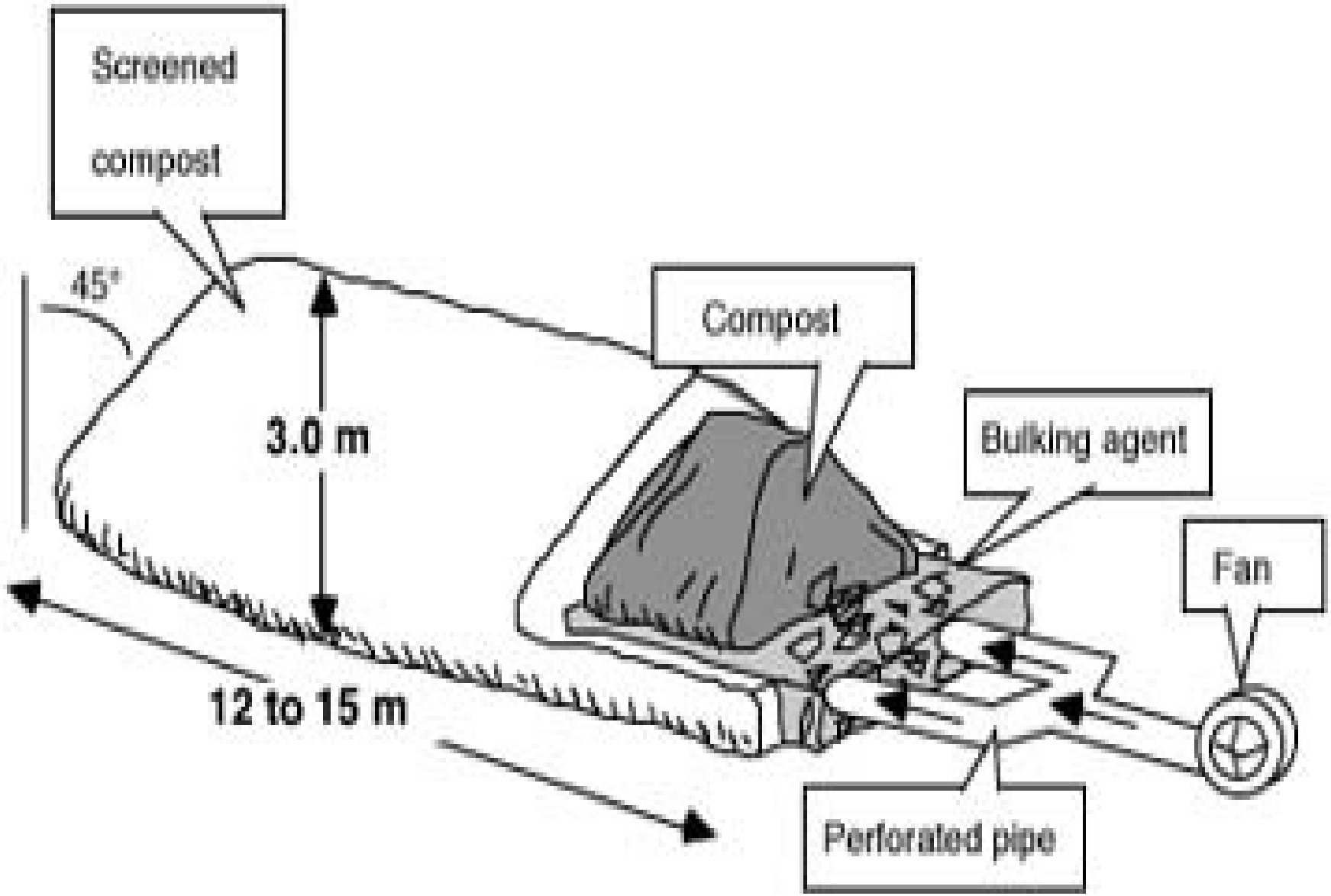
- Forced air compost system
  - ✓ Compost pile is built on top
- Perforated pipe (10-inch diameter) is connected to a blower system
- Create homogeneous mixture prior to forming pile
- Cover with a layer of peat, wood chips, or finished compost
  - ✓ Insulation & odor control

ASP, cont.

- Speeds up the composting process by ensuring proper air flow
- Initial moderate capital costs & operating costs
  - ✓ Purchase & installation of pipes and blowers
  - ✓ Utilities & ongoing maintenance
  - ✓ Less daily labor
  - ✓ Portable aeration equipment can be installed for $15,000 or less
    - Suitable for a 10,000 TPY compost facility

ASP Best Management Practices

- Homogenous “haystack” type pile 4’ – 6’ high
  - ✓ No more than 6’ high and 12’ wide to ensure sufficient air movement
- Start with a higher initial moisture content
- Include a bulking agent or carbon source with higher percent of larger particles to promote greater aeration


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

ASP BMPs, cont.

- Use a porous, well-aged capping layer
  - ✓ Wood chips or finished compost
- Sufficient space should be available for additional piles
  - ✓ Depending on the volume of organics
- Place a layer of woodchips over aeration pipes to help protect the pipes & assist in air flow through the pile

ASP BMPs, cont.

- In 2-10 weeks of composting, material can be turned into another aerated system or windrowed to finish the compost process
  - ✓ Up to 6 months to produce compost ready for curing

Aerated Static Windrow

O2Compost

Protecting The Pipes

Photo Cr.: Green Mountain Technologies/Compost Design Services

Cedar Grove Composting
Seattle, WA region
Gore Cover systems
Aerated static piles

Photo Cr.: Bruce Fulford

Green Mountain Compost

Green Mountain Compost

GMC - Specifics

- Equipment: Front loader, vertical auger mixer, ASP system, star
- Food scraps processed: 4026 traditional food scraps (+ ~770 tons pre-consumer food residuals)
- Tipping fee: $45/ton
- Sells: Compost for $40.50; Blended average ($59 retail)/cy

Onondaga County Resource Recovery Agency

Sheds

Bays

3-Bin System

Photo Cr.: George McDonald, Maine DEP

In-Vessel

Community Composting

CR: David Hurd,
GrowNYC

Equipment

- Pre-processing equipment:
  - ✓ Mixer, manure spreader, tub grinder, horizontal grinder
- A frontend loader
  - ✓ 500 – 5,000 cubic yards/year or less
- Windrow turner
- Post-processing equipment: trammel screen

Front-End Loader vs. Turner

- Front-end loader works well for small scale operations (<500-2,500 yd^3/yr)
  - ✓>2,500 yd^3/yr, loader tends to be time intensive
- Turner physically agitates ingredients & can accomplish task in half the time
- Turner requires a tractor to run, therefore additional cost

OCCRA EQUIPMENT

- 2 front-end loaders
- 2 skid loaders
- 1 compact excavator
- 1 vertical mixer on truck chassis
- 1 slow speed shredder
- 1 high speed grinder
- 1 trommel screen (2 – drums, ½” and ¼”)
- 1 portable compost bagger

Front Loader

Tractor with bucket

Windrow Turner

Mixer

Auger

Screening

Screener

Photo Cr.: Mark King

Covers

- Types
  - ✓Impermeable
  - ✓Microporous Membrane
  - ✓Spun or open weave fabrics
- Can help control moisture levels
- Reduces temperature variability
- Helps control odors

COMPOSTING

Facility Development & Management

Successful Composting Requires

- A solid plan of action
- Available land
- Appropriate equipment
- Proper training and management
- Community support

Planning a Compost Operation

- Estimate the volume expected
- Needs assessment: determine available space, staffing, & equipment
  - ✓ And, additional land/operating space, staffing, & equipment required
- Capital & operating requirements necessary for start-up, as well as ongoing expenses

Planning, cont.

- Know your regulations/permit requirements
  - ✓ Consult state agencies
- Feasibility of the operation
- Public involvement

Funding Options

- Tip Fees
  - ✓ Residents
  - ✓ Landscapers & other small commercial generators
  - ✓ Keep fees lower than solid waste tip fees
- Sales of compost product
  - ✓ Mulch – grind brush, wood, pallets
  - ✓ Compost – quality product can be sold to offset costs

Cost Control

- Sharing equipment & labor
- Using available public land
- Used equipment
- Calculating avoided disposal costs
- Reduced soil & fertilizer purchase costs through use of compost

Financing

- Capital & operating requirements will vary
  - ✓ Needs for smaller scale operations will be minimal, if existing land & equipment are available for use
- Site preparation & drainage requirements can potentially be conducted in house, depending on the requirements
  - ✓ If equipment is needed & more extensive site preparation required, financing professionals should be consulted

Siting Parameters

- Check with state & local regulatory agencies prior to siting
- “Set-backs” or distances from waterways & structures may vary depending on the materials & volume to be composted

General Guidance

- From 100’ – 500’ from wells and potable water sources
- Adequate distance from wetlands, surface water bodies (streams, ponds), and flood plains
  - ✓Recommended at 200’
- Minimally 200’ away from residences & 50’ from property lines

General Guidance

- A low water table to reduce flooding risk on the site
- A high soil percolation rate, but not excessively permeable soils in order to avoid standing water.
- Gently sloped surface (1-3% grade)

Land Requirement

The amount of land required for the composting site depends on the volume and type of material accepted, the composting system, and the amount of time required for the process to complete.

- Typically 2 - 20 acres is adequate for most small operations

Site Plan

- Material receiving area
- Mixing area
- Active composting area
- Curing area

Mixing Area

- Storage of carbon & bulking materials should be near mixing area
- Mixing & chipping/shredding can be done in or near the material receiving area
- Dump food scraps onto a bed of bulking materials to absorb liquid
- Cover & mix food scraps immediately upon dumping

Mixing Area

Photo Cr.: BioCycle

Mixing Area

Photo Cr.: Bob Spenser, WCSWMD

Mixing Area

Grow Compost

Mixing Area Under Cover

Mixer

Siting Specifics

- Site
- Materials flow
- Leachate & storm water management
- Equipment & personnel list
  - ✓Qualifications and/or training

Siting Specifics, cont.

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

Site

- Year-round accessibility
  - ✓ Prepare for vehicle access
  - ✓ Space for future expansion
- Access to a water source is necessary
- Gate & a perimeter fence
- Control access to site
  - ✓ Prevent illegal dumping

Site, cont.

- Signage
  - ✓ Control incoming traffic
  - ✓ Restrict public access to areas where equipment will be operating
- Area to store finished compost
  - ✓ Accessible to the public

Site, cont.

- Plan site so that customers see the end product…not the receiving & mixing area
- Set up the site so that the oldest finished product can be moved first
- Material movement is in as linear a fashion as site constraints allow
  - ✓ Nothing should move more than twice in its same physical condition

Site, cont.

- 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

Site, cont.

- A “buffer zone” will alleviate nuisance issues
  - ✓ Noise, blowing material, dust, potential traffic concerns, & odor
  - ✓ Use shrubbery or fencing to block view

Compost Pad

- Firm & stable surface to support heavy equipment under varying weather conditions
  - ✓ Compacted soil is adequate
  - ✓ Native soil with moderate permeability is best

Compost Pad, cont.

- Hard packed or cement mixing area
  - ✓ Recommended if affordable
  - ✓ Limit mud problems
  - ✓ Good foundation for equipment

Compost Pad, cont.

- 6 inches of compacted, graded sand or gravel should be installed if soil conditions are not sufficient for drainage
  - ✓ Small diameter dark gravel is recommended
  - ✓ Gravel can become mixed in with the composting materials

Drainage/Buffer

- A grassy or vegetated filter/buffer
  - ✓ Relatively low cost drainage field
- Rain gardens & marsh areas
  - ✓ Work for smaller sites
- Check with state/local agencies to determine if drainage system is adequate

Drainage/Buffer, cont.

- Site grading to divert surface runoff from the up-slope side of piles
- Trenching to capture or divert leachate
- Install piping around larger piles or windrows or where seepage is an issue
- Capture wastewater and divert it to the filer area, drainage pond, or holding tank
  - ✓Reuse water

Grow Compost – Grassy Buffer

Grow Compost – Grassy Buffer

Crushed Glass Drainage Filter

Image Cr. Mark King

Drainage Pond

Great...

Okay


Not good…

Controlling Odors

Photo Cr.: BioCycle

Biofiltration

Photo Cr.: Bruce Fulford

Good Neighbor Strategy

- ✓Know your neighbors & keep them happy
- ✓Give them compost!
- ✓Respond appropriately & quickly to complaints

COMPOSTING

Regulations

Food Waste Composting

Tara Mae Albert
SWOT Coordinator

Is a Permit Required?

No permit to compost:

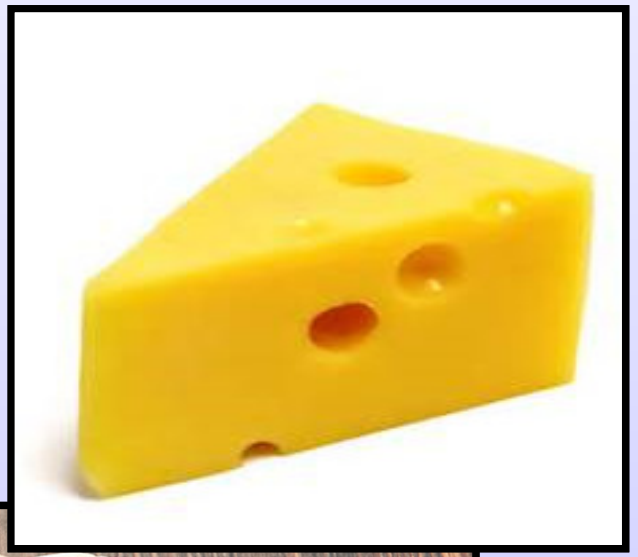
- only leaf and yard waste, manure, and approved bulking agents

- food at the site of generation (homes, schools, farms)

Is a Permit Required?

Yes, when food scraps:

- are from ***off-site***
- include ***meat/dairy***



Is a Permit Required?

No extra permit to compost food waste at Transfer Stations that already hold a Permit-by Notification (PbN)

- **Up to 20% of compost operations**
- **No meat or dairy**
- **Update Operating Plan**
- **Notify NHDES**

What's the Deal with Meat/Dairy?

Odors & Pests

Quick Check
Is a Permit Required?

	No permit needed	Permit-by-Notification	Standard Permit
Yard Waste	X	-	-
Food Scraps			
• On-site	X	-	-
• From off-site	-	X (< 30 TPD)	X (> 30 TPD)
• Meat & Dairy	-	-	X

Food Composting Rules

PAPERWORK!

- Written Operating Plan
- Annual Reporting to NHDES

Food Composting Rules for PbN Holders

- Do not allow food to remain uncovered > 2 hrs.
- Blend food into pile within 24 hours.
- Keep under aerobic conditions.
- Stabilize compost prior to distribution.


SOMETHING
NEW
IS ON
ITS WAY...

Questions?


ONE DOES NOT
SIMPLY START A COMPOST PILE BY
THROWING FRUIT IN THE CORNER OF A YARD

COMPOSTING

Process Management & Quality Control

Key Tips for Success

- Location
- Precondition materials
- Bulking agents
- Mix ratios
- Monitor loads
- Drop & cover
- PFRP

Process Management

- Know the compost process
- Essential equipment: loader, screen, thermometer
- Cover
- Keep records

Best Management Practices (BMPs)

- Produce compost in shortest time possible with:
  - ✓ Minimum odors
  - ✓ Minimum environmental impacts
  - ✓ Minimum process-related problems

BMPs

- Efficient Materials Movement
  - ✓ Nothing should move more than twice in its same physical condition
  - ✓ Move in as linear a fashion as site constraints allow
  - ✓ Timing production

Process to Further Pathogen Reduction

- Turned Windrow: 15 consecutive days with temperatures ≥131°F (55°C) with 5 turnings
- Aerated Static Pile: 3 days with temperatures ≥131°F (insulated pile)
- In-vessel: 3 days with temperatures ≥131°F

Staffing

- For most small community operations one or two employees will be sufficient
  - ✓ Staff may be shared
    - If operation is co-located with a transfer station or other facility
  - ✓ One person should have the role of compost operator or manager
  - ✓ All employees should understand & know all aspects of the operation
    - How to deal effectively with issues that arise

Duties

- Monitoring materials as they come into the operation
- Ensuring BMPs
- Monitoring & maintaining records

Employee Training

- Basic understanding of the compost process
- Know how to monitor & record temperatures & assess moisture levels
- Be familiar with general troubleshooting guidelines to manage issues as they arise
- Equipment operators must be trained & properly certified

Monitoring Equipment

- Long-stem, non-mercury compost thermometer at least 2’ -3’ long
- Moisture meters & oxygen probes
- Windsock
  - ✓ Monitor wind direction
- Safety equipment: hard hats; steel-toe boots; safety vests; dust masks; eye/hearing protection

Thermometer

Observing, monitoring, and record keeping should be the foundation for decisions and activities at the compost operation, whether it's turning the materials and adding water because temperatures are below 120°F and moisture content is low or adding carbon or bulking agents because the materials are too wet.


BE ONE WITH
THE PILE

Monitoring the Process

- *Daily Observation*
  - ✓ Are the windrows or piles steaming?
  - ✓ Are materials looking different
    - Is decomposition occurring
    - Materials starting to slowing look like soil?
    - Is the pile uniformly composting?
  - ✓ Are strong odors present?

Monitoring the Process

- Are there persistent puddles of leachate or water?
- *Compost feel*
  - ✓Does the squeeze test indicate that there is moisture in the material
  - ✓Does it feel like a damp sponge so that when a handful is squeezed, it sticks together & hand is moist

Monitoring the Process

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

Monitoring the Process

- *Daily temperature monitoring*
  - ✓ Is the temperature rising appropriately for rapid compost?
  - ✓ Does the temperature rise to at least 131°F in windrows
  - ✓ Maintain for PFRP

Monitoring the Process

- Once the temperature goes below 120°F materials should be turned until temperatures no longer rise
- Materials should also be turned if temperatures rise above 140°F
- Depending on the materials, system, & compost management, the active composting phase will last 6 – 10 weeks

Log Book

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

Ready for Curing

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

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 is stable
  - ✓ 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

Curing Piles

Curing Piles

Quality Assurance

- Observe, monitor, sample, analyze, test
- *Keep accurate compost records*
  - ✓ Track feedstock sources, materials, problems
  - ✓ Track lot numbers, problems
  - ✓ Track turning frequency, temperature
  - ✓ Odor issues
- Train your staff

Product Quality Certification

- Seal of Testing Assurance ("STA"/USCC)
- Woods End
- Rodale Quality Seal
- Soil Foodweb
- Organics/"Approved" for use

US Composting Council
Seal of Testing Assurance

- University Testing
- Other

Why Test? Why Certification?

- Standardization of products, practices, & applications
- Helps to improve customer confidence in the compost product and its utilization

Compost Test

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

Bioassay Testing

WWW.NERC.ORG

COMPOSTING

Finished Product End Use

Screener

Brattle grow Compost

Windham Solid Waste Management District's
All Purpose Compost

Call to order 802-257-0272

ORGANIC COMPOST SOIL CONDITIONER

LeafGro®

100% ORGANIC

The beauty of your garden starts below the surface!

SOIL CONDITIONER

HIGH HUMUS CONTENT

MARYLAND ENVIRONMENTAL SERVICE

1.5 CUBIC FEET

US Composting Council
Seal of Testing Assurance

ORGANIC COMPOST SOIL CONDITIONER

LeafGro GOLD®

OCCRA


All-Purpose
COMPOST
(Screened to 1/2")


COMPOST
US Composting Council
Seal of Testing Assurance
Be Good to Your Soil!
Enrich your soil and grow healthier, better plants.
This compost:
• Retains moisture so you can water less.
• Introduces vital nutrients to your garden.
• Protects our environment by reducing the need for chemical fertilizers and pesticides.
• Is ideal for gardens, flowers, vegetables, lawns, shrubs and trees.
• Is ready to use or can be mixed with existing soils.
An ideal soil amendment for all of your landscaping needs.
1 cu. ft.
(~40lbs.)
ALL NATURAL
Made in CNY
Save the world a little each day.
See how at
OCCRA.org

Bagger

COMPOST MARKETS

- Erosion Control/Reclamation
- Agricultural applications
- Topsoil
- Nurseries/Silviculture
- Sod production
- Turf grass
- Public Works
- Construction sites
- Landfill cover
- Marginal soils

- Direct marketing
- Retail sales
- Landscapers and Lawn Care Companies
- Golf Courses
- Greenhouses
- Rainwater filters
- Roof top gardens
- Compost socks
- Biofiltering

Major Factors Affecting Compost Demand and Sales

- Compost quality
- Product consistency
- Product availability (meeting demand)
- Economics of transportation
- Economics & challenges associated with compost application
- Industry standards & specifications

Grow Ulster Green Compost

- $30 Per Ton
  - ✓ Sold In BULK Only
- Screened To 3/8 Inch Minus
- Certified By USCC

COMPOSTING

Other Food Scrap Diversion Options

On-Farm Composting

- Provides opportunity to divert organics
  - ✓ Without public investment in space, equipment, & staffing
  - ✓ Farm operations may have more flexibility in permitting requirements
- Helps farms diversify their operation
  - ✓ Manufacturing a valued added product
  - ✓ Soil amendment for farm fields
  - ✓ Sold to bring in additional revenues

Private Sector Composting

- Partnerships to promote resident & commercial customers
  - ✓ Reduced tipping fees
  - ✓ Flexibility in accepting loads (resident drop-off)
- Economies of scale—multiple community, county or solid waste district jurisdictions—more economically appealing for larger scale private composting operations
- May profit from locating in rural, agricultural areas & servicing more populated area

Private Sector Cont.

- Publicly owned & Privately operated
  - ✓ Typically land would be public
  - ✓ Equipment & staffing private
    - Landfill, MRF
  - ✓ Private haulers to provide collection services

Opportunities and Action

- Explore potential with private-sector businesses or farms
- Promote to & train residents
- Find haulers
- Promote compost product sales

Quasar Food Scrap AD Facility Collinwood, Ohio

Photo Cr.: Bob Spenser, WSWMD

Harvest Power

Photo Cr.: Wayne Davis, Harvest Power

Vanguard Renewables Anaerobic Digester

Power Generation

COMPOSTING WORKSHOP: SUCCESSFUL MUNICIPAL AND INSTITUTIONAL DESIGN

AUGUST 9 -10, 2017 (WED-THURS)

DAY 1: BASICS OF COMPOSTING WITH HANDS-ON EXERCISES

DAY 2: MORE HANDS-ON AND SITE VISIT TO FARM COMPOST

ALWAYS SOMETHING FARM, 407 ROUTE 10, CROYDON

Presenters:
Mark Hutchinson, Extension Professor, Instructor at the Maine Composting School
Athena Bradley, Northeast Recycling Council
Tara Albert, NH Department of Environmental Services

NERC Can Help

We're experts in

- Waste reduction & recycling
- Recycling program design & implementation
- Organics management
- Green procurement
- C&D reuse & recycling
- Electronics recycling
- School reuse, recycling & composting
- Textile recycling programs
- Multi-stakeholder dialogues & negotiations
- & More!

Fee for service program makes NERC's sustainable materials management expertise available at a reasonable price with outstanding results

Athena Lee Bradley

athena@nerc.org
802.254.3636

www.nerc.org

Composting at Winnacunnet High School

Caroline Anastasia and Grace Cushing

What is Composting?

"Composting is a natural process that turns organic material into a dark rich substance"

The Idea Behind it All

Mr. Magnusson's 8th Grade Science

Class - vermiculture

St. Paul's Advanced Studies

Program

WHS Senior Seminar

Essential Questions

- Is composting a reality at Winnacunnet High School?
- If so, how can it be implemented?
- What else can be done to make WHS a more sustainable campus?
- What laws or regulations would we have to comply with in order to make composting a reality at Winnacunnet?

The Original Plan

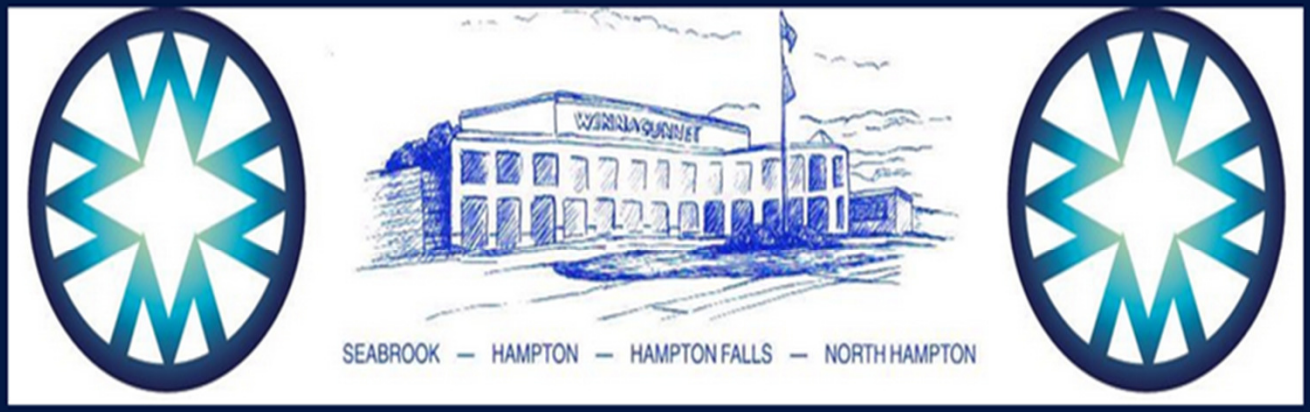
- On-site composting
- Only fruit and vegetable scraps and paper products

Refined Plan

Mr. Fox Composting Video

Grant

Friends of Winnacunnet Foundation



Mission

The primary focus of the Friends of Winnacunnet Foundation is to provide supplemental funding to enhance a program of excellence in education at WHS.

Since the Friends of Winnacunnet Foundation formed in 2005 as a non-profit to benefit innovative learning initiatives at WHS, it has raised over $100,000 toward an endowment and dispersed over $36,000 in grants. Grants are awarded in the fall/winter and spring. The deadlines for grants are determined during the first meeting of the school year. To apply for a grant, please fill out the above application and send it to llibbey@winnacunnet.org.

Below are the details of grants awarded...

Fall 2014:

- Grace Cushing/Caroline Anastasia: *School-wide Composting Project*, $2,200.
- Diana Weidenbacker, Decisions Program: *Disc Golf (Frisbee golf), $3,099.* Similar to golf, the object of disc golf is to complete each hole in as few throws–or strokes–as possible. Instead of using golf clubs and a golf ball, disc golfers use a flying golf disc to traverse the hole. Each hole starts with a teeing area and is completed once the disc lands in the "hole", which is a disc-catching target.

Grant

Ten question application with three letters of support from our principal William McGowan, facilities director Karl Ingoldsby, and science teacher John Croteau.

1. What are the specific goals and objectives of the project?

We plan to implement a composting program within Winnacunnet High School to increase student and faculty awareness of sustainability as well as present students with the opportunity to be directly and actively involved with sustainability in their personal community.

4. How many students, staff and teachers will be involved in the project?

Part of Mr. Fox's school program is to hold a school-wide assembly to educate all students and staff on what composting is and how to do it. This would educate each student in the school on the Composting Project, and therefore give all Winnacunnet students and faculty the opportunity to participate. The kitchen staff would be especially involved, since they would oversee the disposal process in the dining hall. We have spoken several times to Ryan Costigan, the food service director, and he is willing to help us in any way possible to make this project successful.

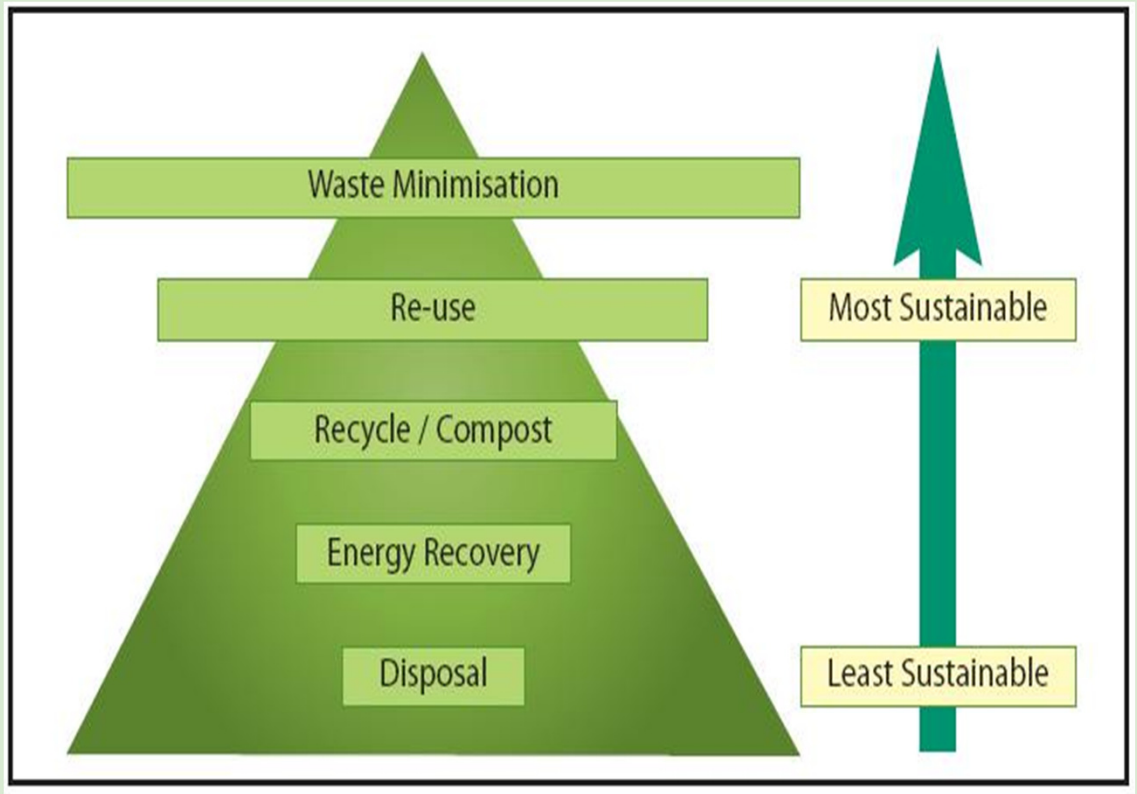
7. Itemized Budget

For this grant, we are requesting $2,200. Of that, $1,680 would go towards paying Mr. Fox's Composting Company for weekly pick ups from the beginning of December until the end of the school year in June. It is estimated that Winnacunnet High School will require five sixty-four gallon toter compost bins to be picked up weekly. At $12 per toter for the twenty-seven week trial period we propose, this will cost $1,680. $320 will then go to purchasing compostable liners for the trash cans, and the remaining $200 will go towards the vermiculture kits.

Before and After

Waste Deferred

14,000 pounds (7 tons) in 14 weeks
3-5 64 gallon toters/week



Costs

Mr. Fox Composting:
$12/64 gallon toter
Total: $1,277.10
$182.44/ton

Compostable Bags:

- Clean-O-Rama
- $468.84
  - Anticipated only $320 needed

Clean-O-Rama

Costs

Winnacunnet Trash Pick Up with G. Mello:

- Pay $375 for each trash dumpster
- The school pays for the number of times the trash is picked up, not the weight
- It costs $495/month to recycle at WHS ($170/month for the dumpsters and $325/month for the many, smaller green containers)

Costs

Hampton Transfer Station Rate:
$78.00/ton + $300.00 hauling fee

Publication

School newspaper
Hampton Union newspaper article
2015 EcoMaine Eco-Excellence Award
2015 Aquarion Environmental Champion Award

ecomaine
the future of regional waste systems

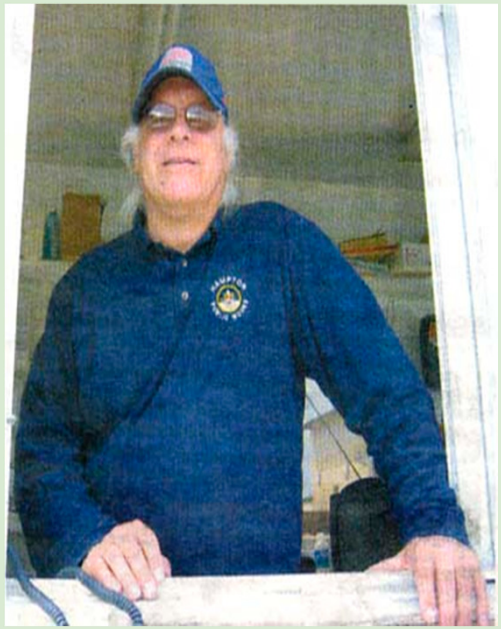
Thanks To...

Karl Ingoldsby
WHS Facilities Director

John Croteau
WHS Biology Teacher

Ryan Costigan
WHS Food Service Director

Rian Bedard
Mr. Fox Composting



Mark Richardson
Hampton Transfer Station Coordinator

Linda Libbey
Vice President, Friends of
Winnacunnet Foundation