

# UF/IFAS Extension

## The Journey to Sustainability Begins with Education





# **Contemplative Food Gardening: “SOIL FOOD” (COMPOST & EARTHWORMS)**

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# OUTLINE

- **Overview & Goals of Contemplative Food Gardening Presentation Series**
- **Short Review of Contemplative Food Gardens**
- **Compost**
  - **History of compost**
  - **Composting procedures**
  - **Compost applications**

# Contemplative Food Gardening Series Titles

- Introduction
- Feed Your Head (Edible Landscaping & Design)
- Growing Food When People & Place Matter  
(FL Climate, Crops and Soils)
- Ancient Traditions (Companion Planting and  
Biodynamic Agriculture)
- Sacred Community (Attracting Beneficials)
- Soil Food (Compost & Earthworms) ←
- Back to the Future (Contemplative Design &  
Container Gardening)

# Goals for Talks on Contemplative Food Gardening

- Food for your freshest nutrition
- Food for thought
- Food for community benefits
- **Food for your soul**



# Approach of Talks on Contemplative Food Gardening

- Integrate the concepts of contemplative gardens and edible landscaping, using organic food gardening practices
- Provide background information on the science and principles from agroecology for successful organic food gardening
- Offer an opportunity to participate in the setup of a contemplative food garden at Warm Mineral Springs Spa
- Provide additional educational resources

# Review: What is Edible Landscaping?



The thoughtful arrangement of edible plants in the landscape into a unified, functional biological whole to maximize their aesthetic appeal and food production.

**Treating Edibles as Ornamentals**

# Review:

## What Is Organic Food Gardening?



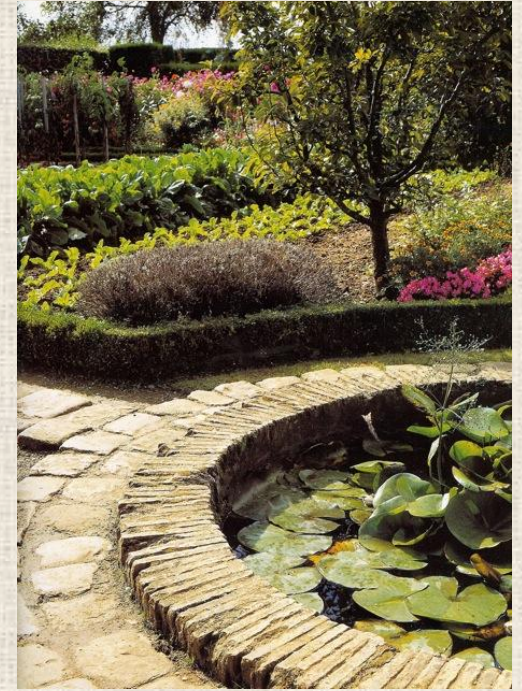
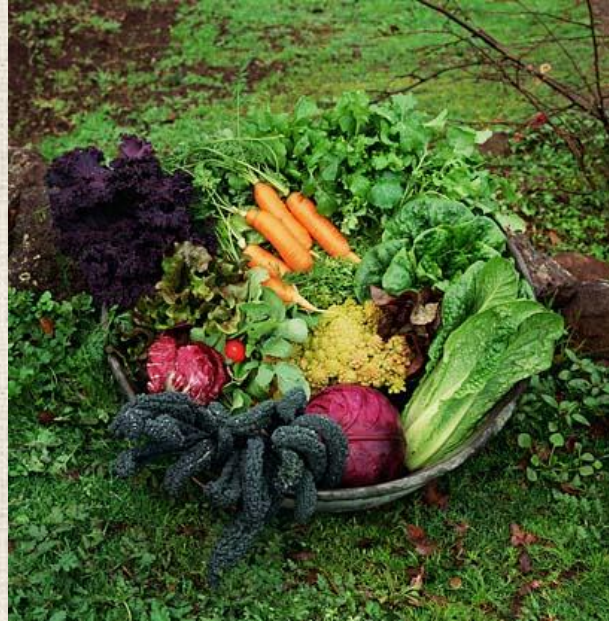


# Review:Organic Food Gardening

- It's a science and art
- Incorporates the entire landscape design and environment, e.g., to improve and maximize the garden soil's structure, life & health
- Maximizes the production and health of developing food plants without using synthetic commercial fertilizers, pesticides, or fungicides

David Knauft, Horticulture Department, Univ. of GA

[www.caes.uga.edu/extension/clarke/anr/documents/Organicgardening.pdf](http://www.caes.uga.edu/extension/clarke/anr/documents/Organicgardening.pdf)



## **Review: Contemplative Food Gardening**

Gardening outside the rows...creatively for personal inspiration and growth, as well as physical nourishment and growth

# Contemplative Gardening Approach

- ❖ Discover your inward garden to grow your outward garden
- ❖ Your inward garden lies in your imagination, memory, character, & dreams
- ❖ Your outward garden lies upon your land – a private landscape for wandering, for dancing, for daydreaming

J.M. Messervy  
Landscape Architect



# Organic Food Gardening Approach

- ❖ Practices from traditions of organic farming
- ❖ Practices from science of agroecology
  - applies ecological concepts & principles to the design & management of sustainable food production
  - provides a framework based on the scientific study of the ecology of natural systems.

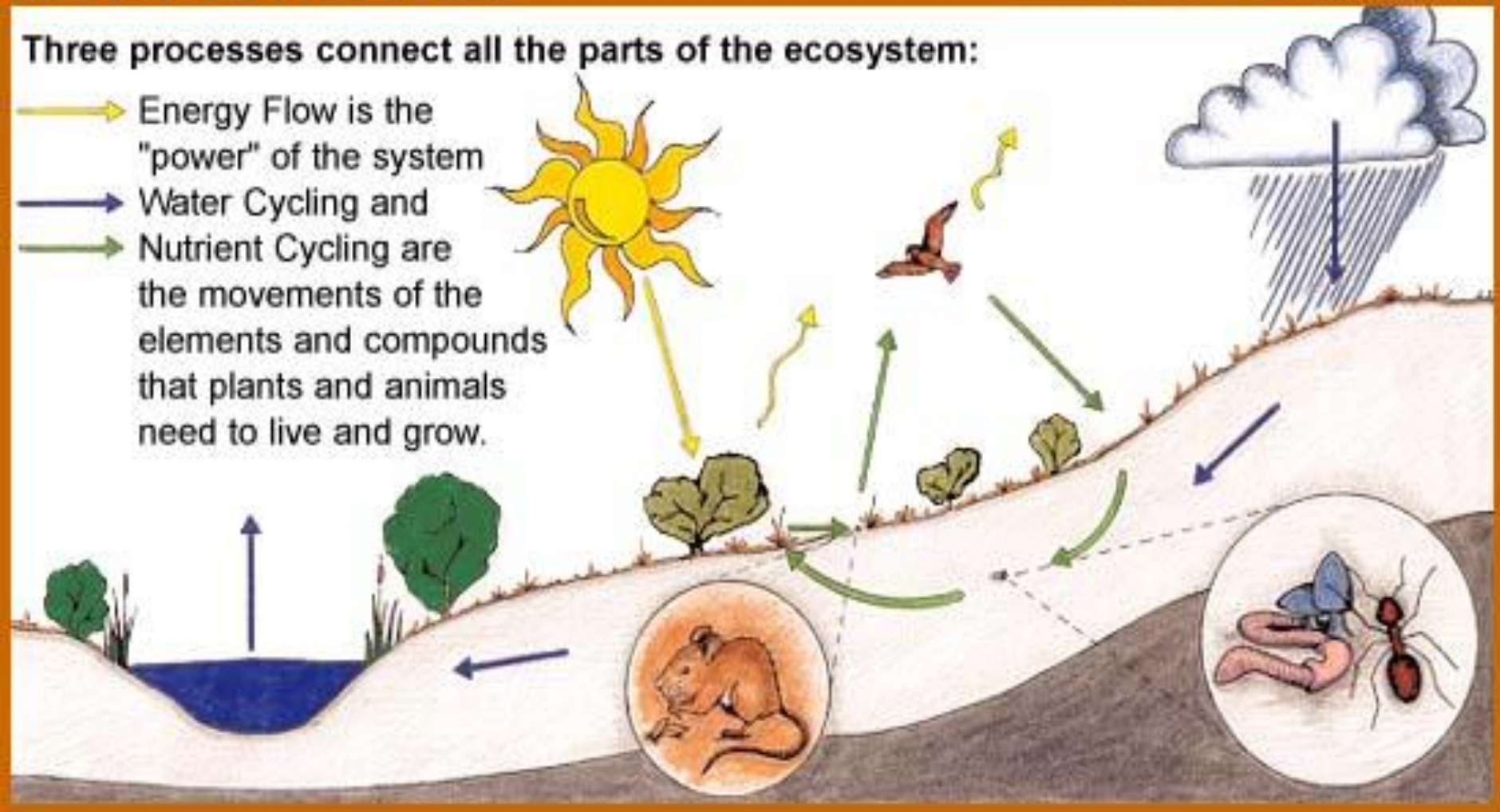
# Ecosystem Model from Nature

## ECOSYSTEM PROCESSES

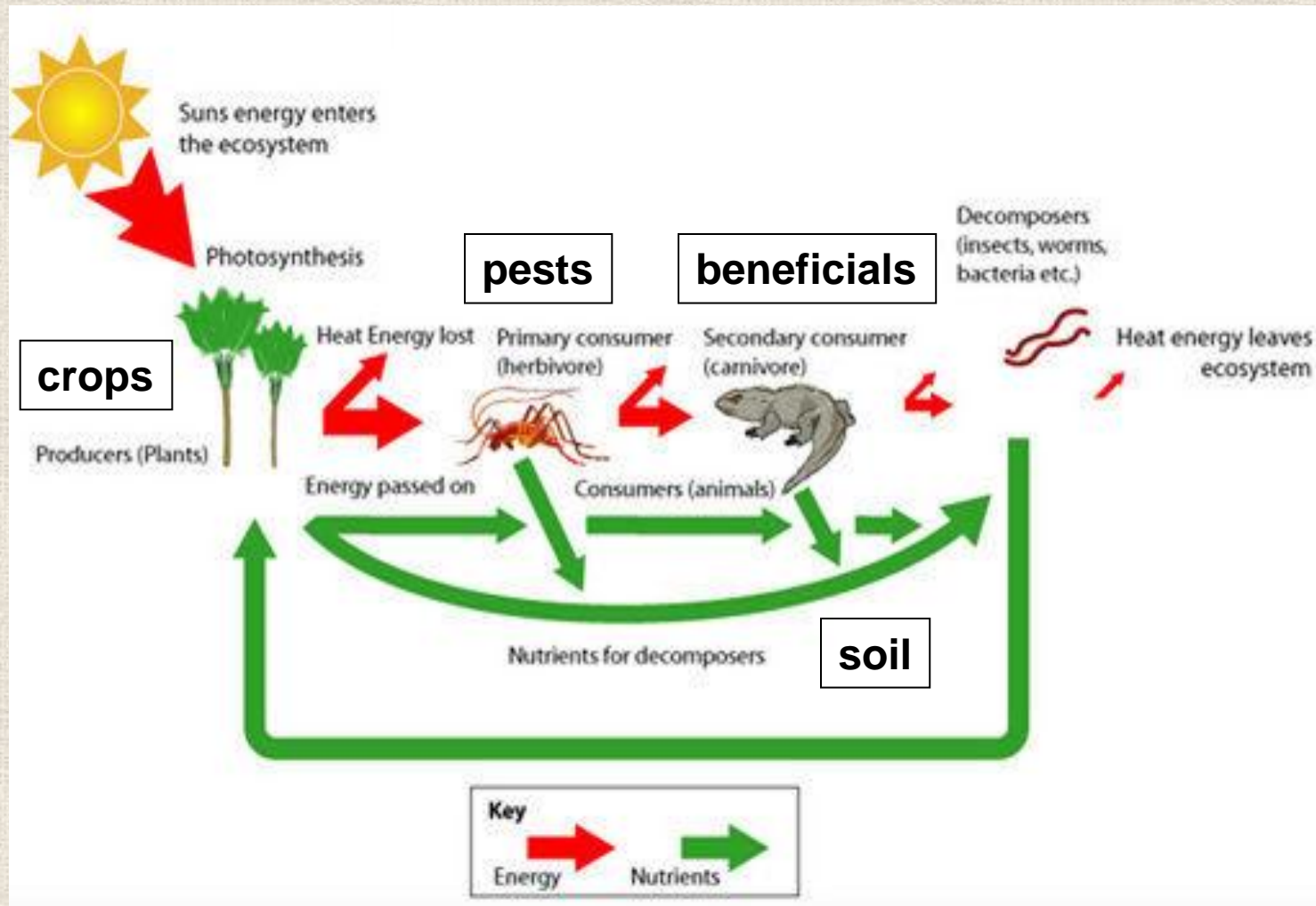
ILLUSTRATION: NICOLE BRAND

Three processes connect all the parts of the ecosystem:

- Energy Flow is the "power" of the system
- Water Cycling and
- Nutrient Cycling are the movements of the elements and compounds that plants and animals need to live and grow.



# Food Garden Ecosystem Model



- Garden agroecosystems have functional properties & subsystems from **biodiversity management**

# Food For Your Soul

## ❖ Walt Whitman, one of America's Great Poets, "Behold This Compost" (1855)

- A celebratory poem in his seminal book 'Leaves of Grass'

- His words speak of the nurturing quality of compost as a transformative element supporting the cycle of life



# Food For Your Soul

## “Behold This Compost”

“Something startles me where I thought I was safest,  
I withdraw from the still woods I loved . . .

How can you be alive you growths of spring?

How can you furnish health you blood of herbs, roots, orchards, grain?

Are they not continually putting distemper'd corpses within you?

Is not every continent work'd over and over with sour dead?

Where have you disposed of their carcasses? . . .

**Behold this compost! behold it well!**

Perhaps every mite has once form'd part of a sick person--yet behold!

The grass of spring covers the prairies,

The bean bursts noiselessly through the mould in the garden,

The delicate spear of the onion pierces upward, . . .

What chemistry! . . .”



# Cultural Expressions Through History of 'Soil As The Nurturing Part of Nature'

- “Soil Is The Mother Of All Things” . . .  
Chinese proverb
- “Mother Earth” . . .  
similar expressions in many cultures

• Bierman, OSU; <http://www.ag.ohio-state.edu/~prec/soil/slides/>

- “Feed the soil, not the plants” . . .  
organic farming adage

[http://newfarm.rodaleinstitute.org/columns/research\\_paul/2005/1105/feedsoil.shtml](http://newfarm.rodaleinstitute.org/columns/research_paul/2005/1105/feedsoil.shtml)

# What is **Compost**?

- Composting is the application of a natural way of degrading organic material into humus and minerals
- It's a natural microbiological process that returns plant nutrients to the soil which feeds the plants, as well as adding beneficial microorganisms to the soil

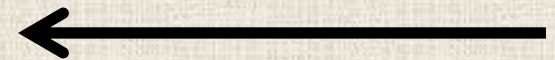


# Why Should We Make Compost?

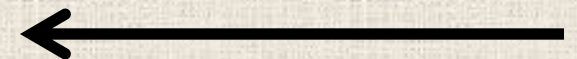
- Compost is an excellent soil additive that increases the productivity and workability of soil.
- It is also inexpensive and solves the problem of disposing of plant, kitchen wastes and other waste products.

# Composting

- Art & science of producing stable organic matter soil amendment by:
  - mixing organic materials properly
  - monitoring resultant biological activity
- **Types**
  - aerobic
  - anaerobic
  - sheet
  - worm (vermicomposting)



Today's Topics



# History of Composting

- ❖ Compost is a word of Latin origin coming from the word “compositus” (to compose, or put together), “com” – together plus “ponere” – to place.
- ❖ In this case placing together different substances that decompose (or fall apart), to produce a newly composed substance composed of rotted organic materials called “humus” (from Latin meaning “earth, soil”).

# History of Composting

- ❖ Agriculture in the oldest historical civilizations have traditions based on the benefits of different forms of composting.
- ❖ For example, the 1911 book “Farmers of 40 Centuries” by F.H. King documented the traditional agricultural practices of China, Japan and Korea, including composting techniques, that had sustained high densities of human populations for millennia.

# History of Composting

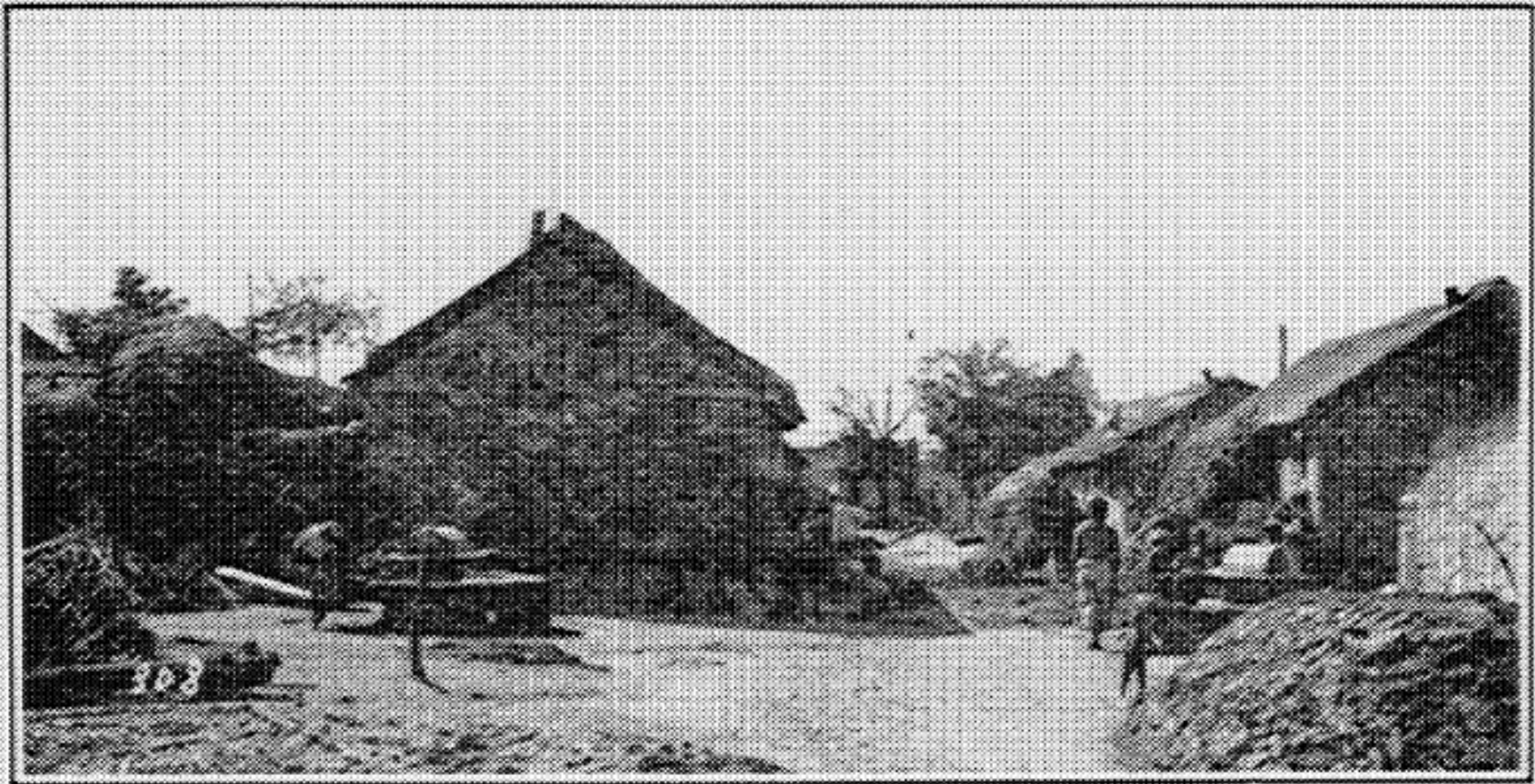


Fig. 30—Village in Shantung Province, China. Donkey grinding grain. Small compost stack in foreground, at right.

# History of Composting

- ❖ The earliest writings known today of the use of compost were written on clay tablets from the Akkadian Empire in ancient Mesopotamia (2334 BC–2154 BC) that mentions the return of manures to the soil.
- ❖ There is evidence that Romans, Greeks and the Tribes of Israel knew about the use and value of compost for crop production.



# History of Composting



- India's 'Goddess of the Garbage'
  - For centuries traditions in India have revered the link between soil fertility and organic amendments.
  - For example, the farmers of the Hassan District perform annual rituals for the filth and dirt collected by their family in a thippe (a dump yard for cow dung and other organic waste), which is located at the back of the house.
  - Over a period of time, this garbage decomposes into natural fertilizer called thippe gobbara.
  - The thippe is revered as the goddess Thippamma and rituals performed because she makes possible a bountiful yield.

# History of Composting

- ❖ The Bible and Talmud both contain numerous references to the use of rotted manure straw, and organic references to compost are contained in tenth and twelfth century Arab writings, in medieval Church texts, and in Renaissance literature.
- ❖ Notable writers such as William Shakespeare, Sir Francis Bacon, Sir Walter Raleigh all mentioned the use of compost.

# History of Composting

Marcus Cato (Cato the Elder) 234 – 149 BC describes composting in his Book *De Agri Cultura*, one of the oldest surviving latin texts. Of his composting instructions he suggests they be “written in gold in every farmhouse”.

"I appreciate that there are certain kinds of farms on which it is impossible to keep either live stock or birds, yet even in such places it is a lazy farmer who lacks manure: for he can collect leaves, rubbish from the hedge rows, and droppings from the high ways: without giving offence, and indeed earning gratitude, he can cut ferns from his neighbour's land: and all these things he can mingle with the sweepings of the courtyard: he can dig a pit, like that we have counselled for the protection of stable manure, and there mix together ashes, sewage, and straw, and indeed every waste thing which is swept up on the place. But it is wise to bury a piece of oak wood in the midst of this compost, for that will prevent venomous snakes from lurking in it. This will suffice for a farm without live stock."



# History of Composting



Native Americans buried fish, either alone or with wood ash or “muck”.

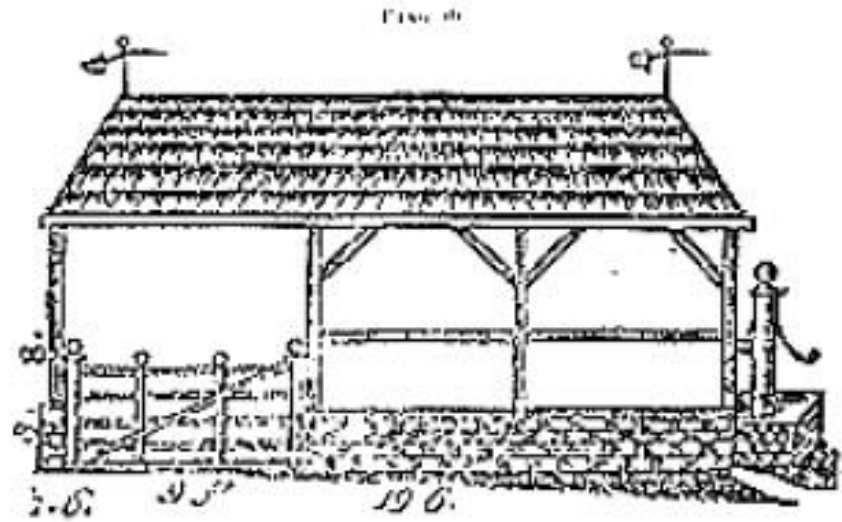
Colonial settlers learned this practice from the native Americans. Many New England farmers made compost as a recipe of 10 parts muck to 1 part fish, periodically turning their compost heaps until the fish disintegrated (except the bones).

# History of Composting



George Washington built a "Dung Repository" for composting animal manure.

*"Unless some practice prevails, my fields will be growing worse every year, until the crops will not defray the expense of the culture of them."*



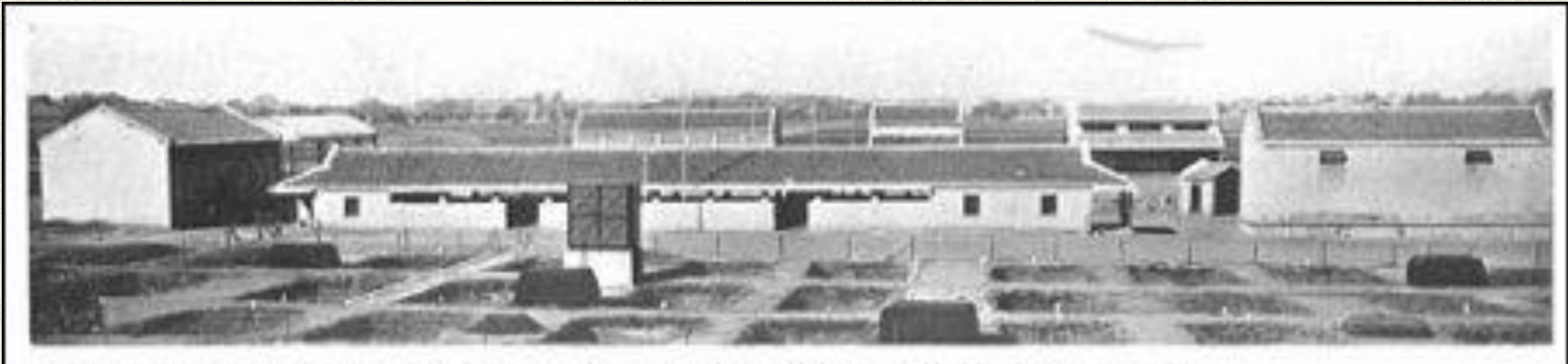
# History of Composting

- Sir Albert Howard, “An Agriculture Testament” (1943)
  - Introduced the Indore Compost Making Process
  - He was a British agronomist based in India from 1905 to 1939. He was committed to developing farming methods that the average Indian farmer would be able to afford and to use.
  - Promoted his ideas worldwide and set foundation of organic gardening/farming



# Sir Albert Howard

300 acre govt. farm site of aerobic composting research



The Compost Factory at Indore - from Agricultural Wastes 1931



Building Monsoon Heaps - from Waste Products of Agriculture 1931

Compost pits used for dry season. Heaps were designed due to flooding of compost pits in monsoon season

# History of Composting

- Composting was modernized beginning in the 1920s in Europe as a tool for organic farming.
- The early advocates most cited for promoting composting within farming is for the German-speaking world Rudolf Steiner, founder of a farming method called biodynamics



Compost pile made according to biodynamic method and with biodynamic preparations



# History of Composting

- J.I Rodale, “Complete Book of Composting” (1960)
  - Father of US organic gardening/farming
  - He carried Sir Howard’s work further and introduced American gardeners to the value of composting for improving soil quality.
  - He established a farming research center in Pennsylvania and the monthly *Organic Gardening* magazine.

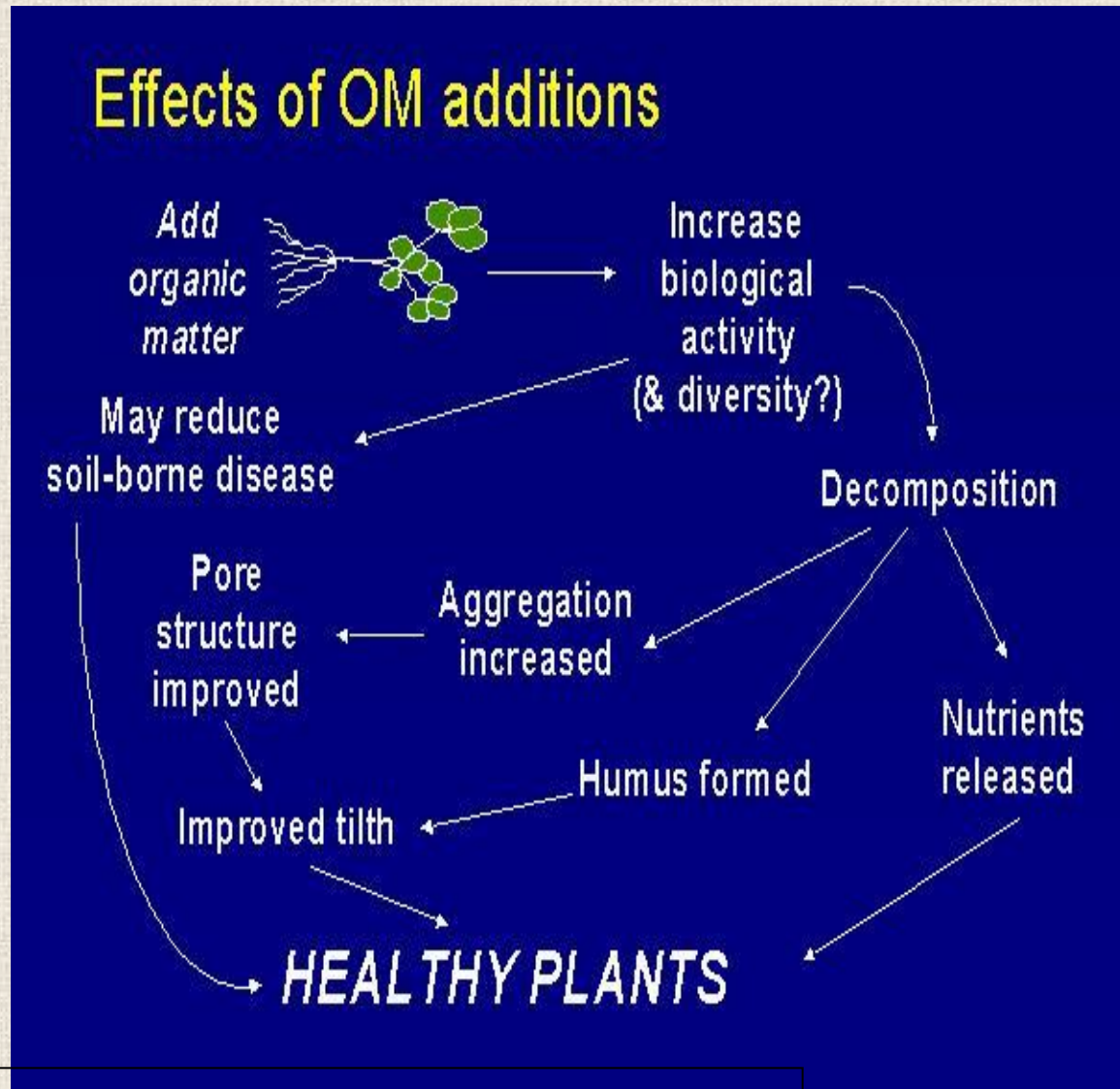


# Contemplations from the History of Composting

- It's the art & science of producing stable organic matter soil amendment by:
  - mixing organic materials properly
  - monitoring resultant biological activity
- Procedures for making beneficial and mature compost are based on the model of soil organic matter

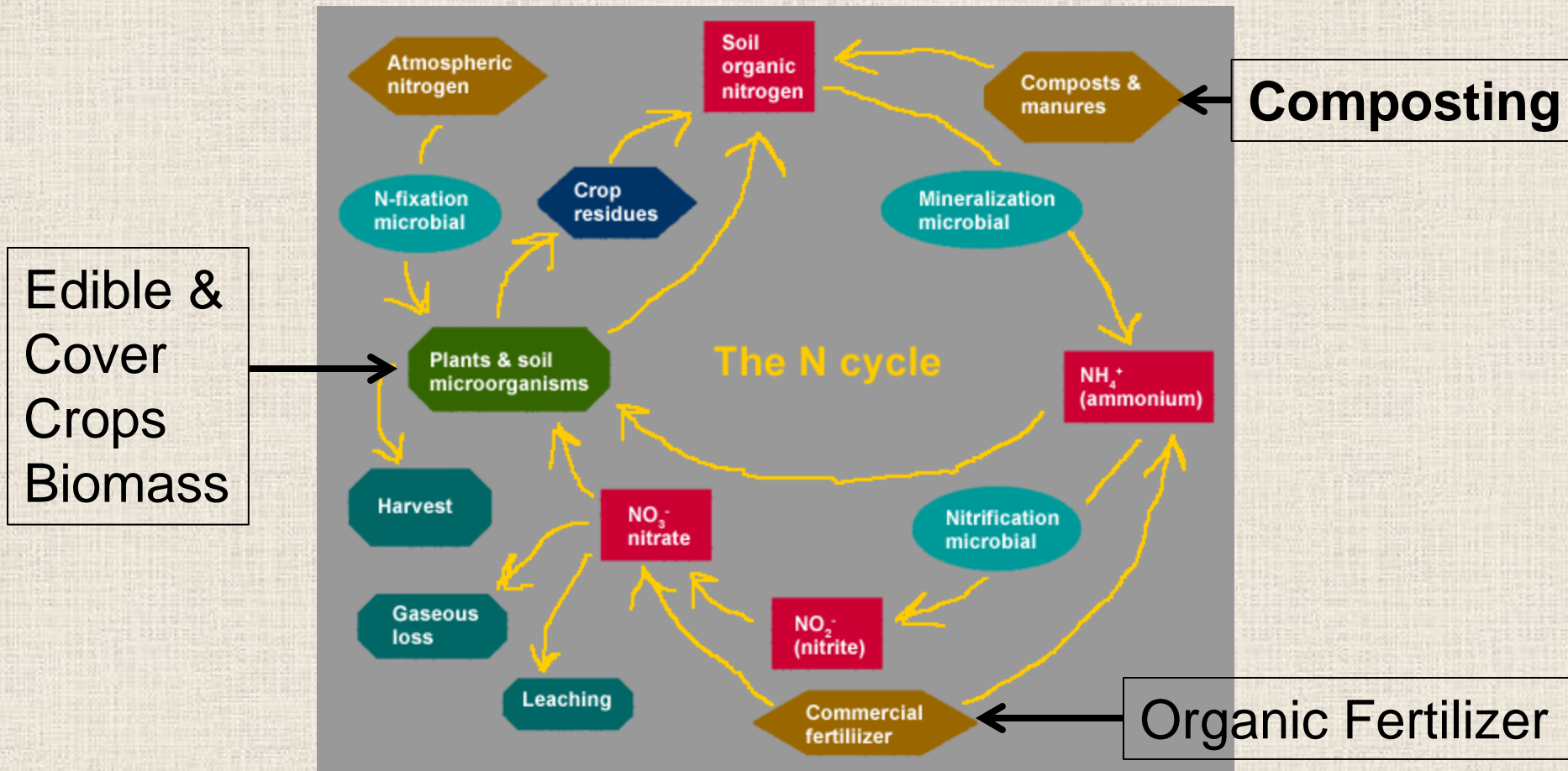
# Soil Organic Matter Model

- Organic matter additions' impact on soil ecology and plant nutrition
- Rapid multiplication of beneficial bacteria, fungi, and actinomycetes
- Addition of dark mixture usually referred to as *humus* - a stable organic compound



# Agroecosystem Nutrient Cycling

## \*Nitrogen Example\*

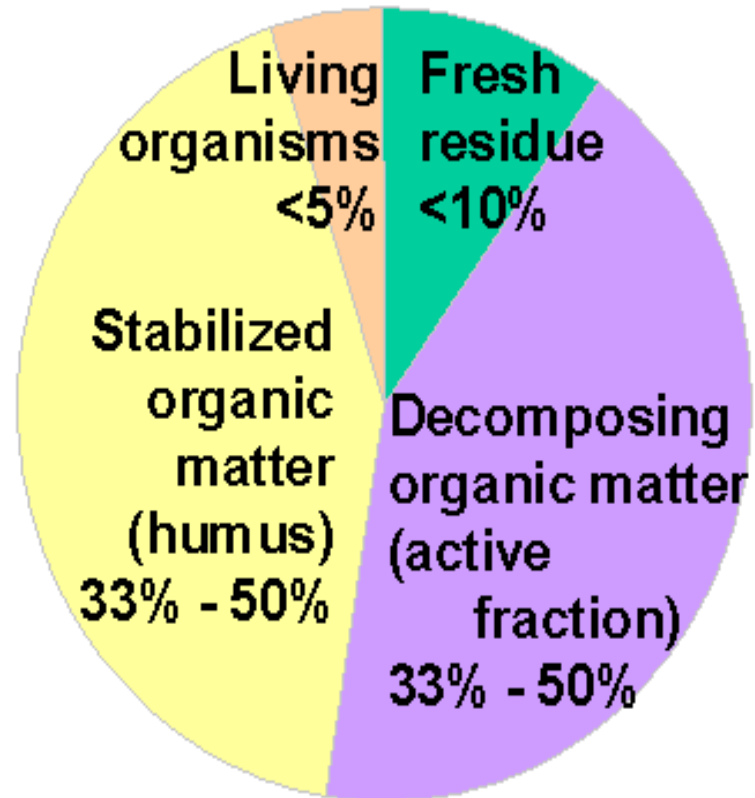


❖ Composting is part of the management of all soil nutrients necessary for healthy plant growth

# Soil Organic Matter Model

- **Composition**

- all living organisms (microorganisms, earthworms, etc)
- **fresh residues (old plant roots, crop residues, recently added manures)**
- Active decomposing OM provides plant nutrients
- **Humus = significant component**

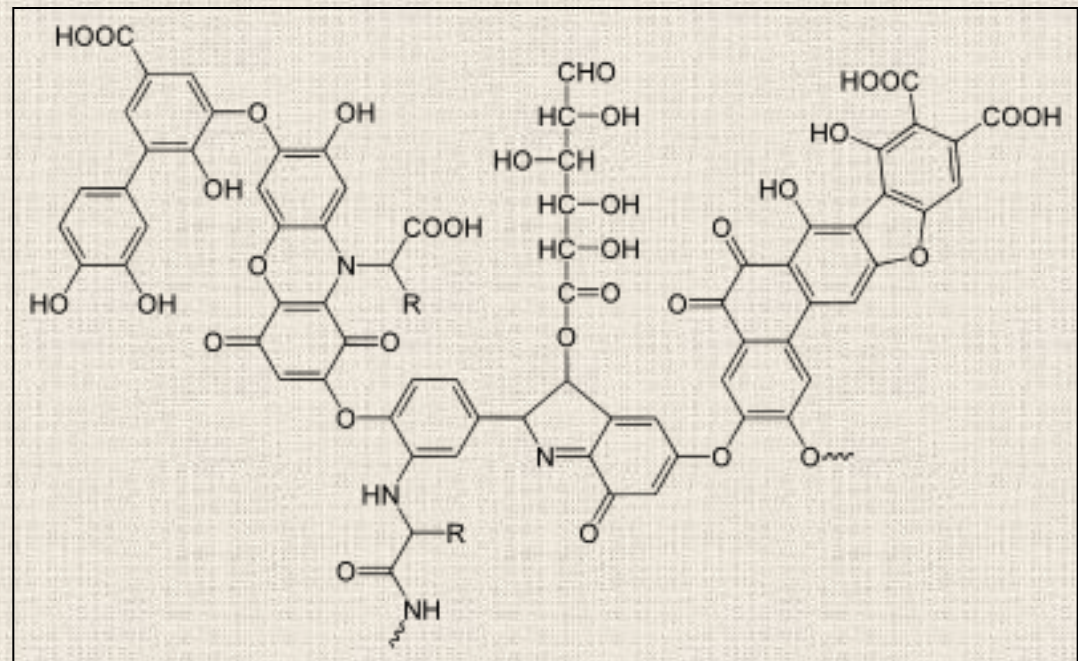
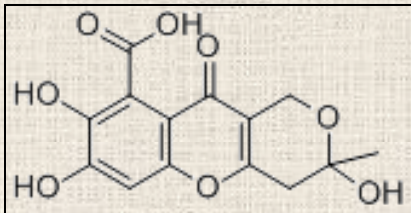


# What is Humus ?

✓ a mixture of compounds and complex life chemicals of plant, animal, or microbial origin that are resistant to decomposition and include:

## Humic Acids

### Fulvic Acids



# Function of Humus

- increases water holding capacity
- sticks together & helps establish and maintain a strong crumb structure & aids infiltration
- provides some nutrients (N & P) as it is slowly decayed by microbial activity at the rate of 2.5% per year
- buffers pH changes
- creates good soil "Tilth"
- holds nutrients by increasing cation & anion exchange capacity, and chelating capacity

Humus =  
High

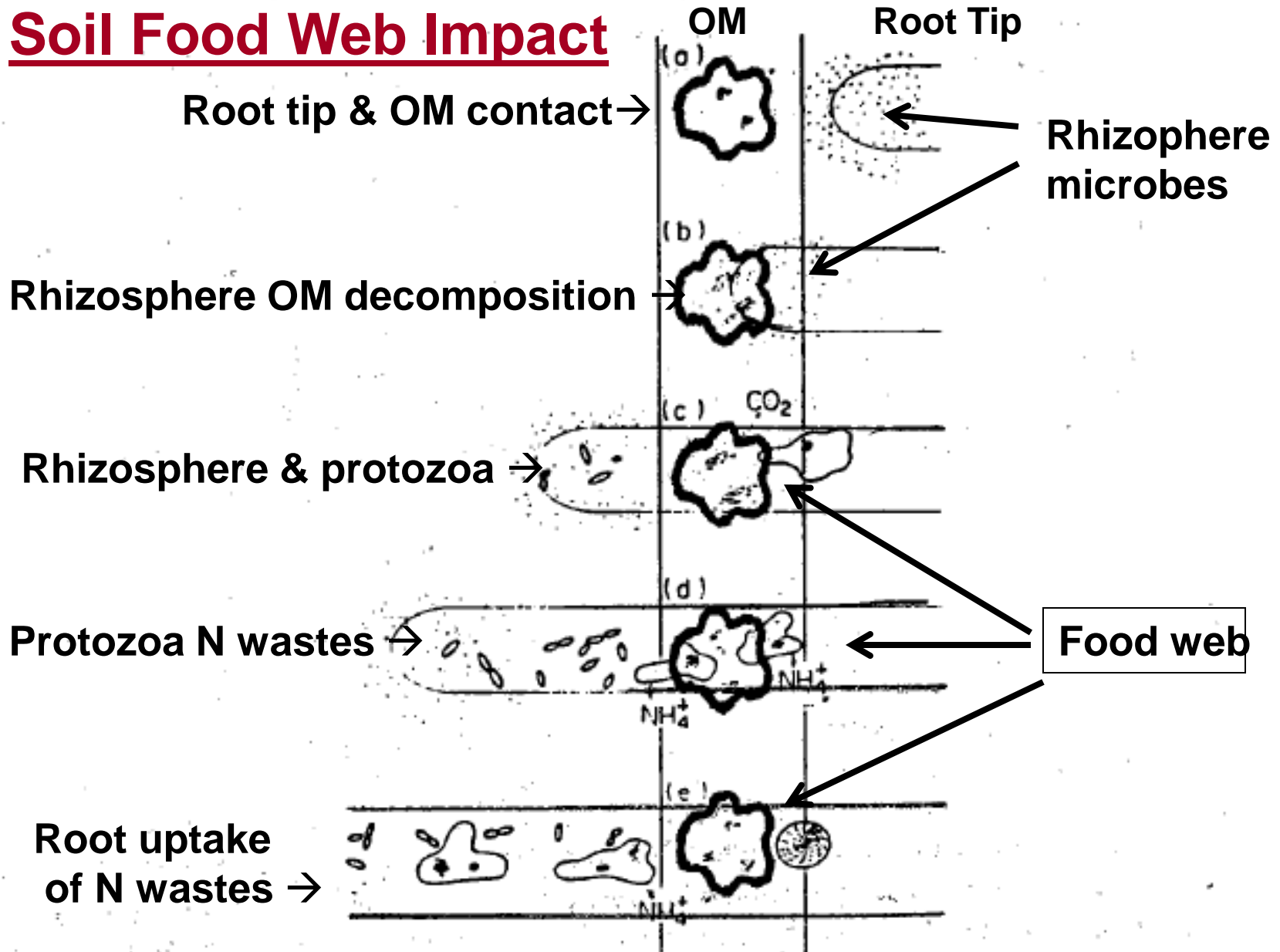
Medium

Low



# Model of Decomposing Organic Matter

## Soil Food Web Impact

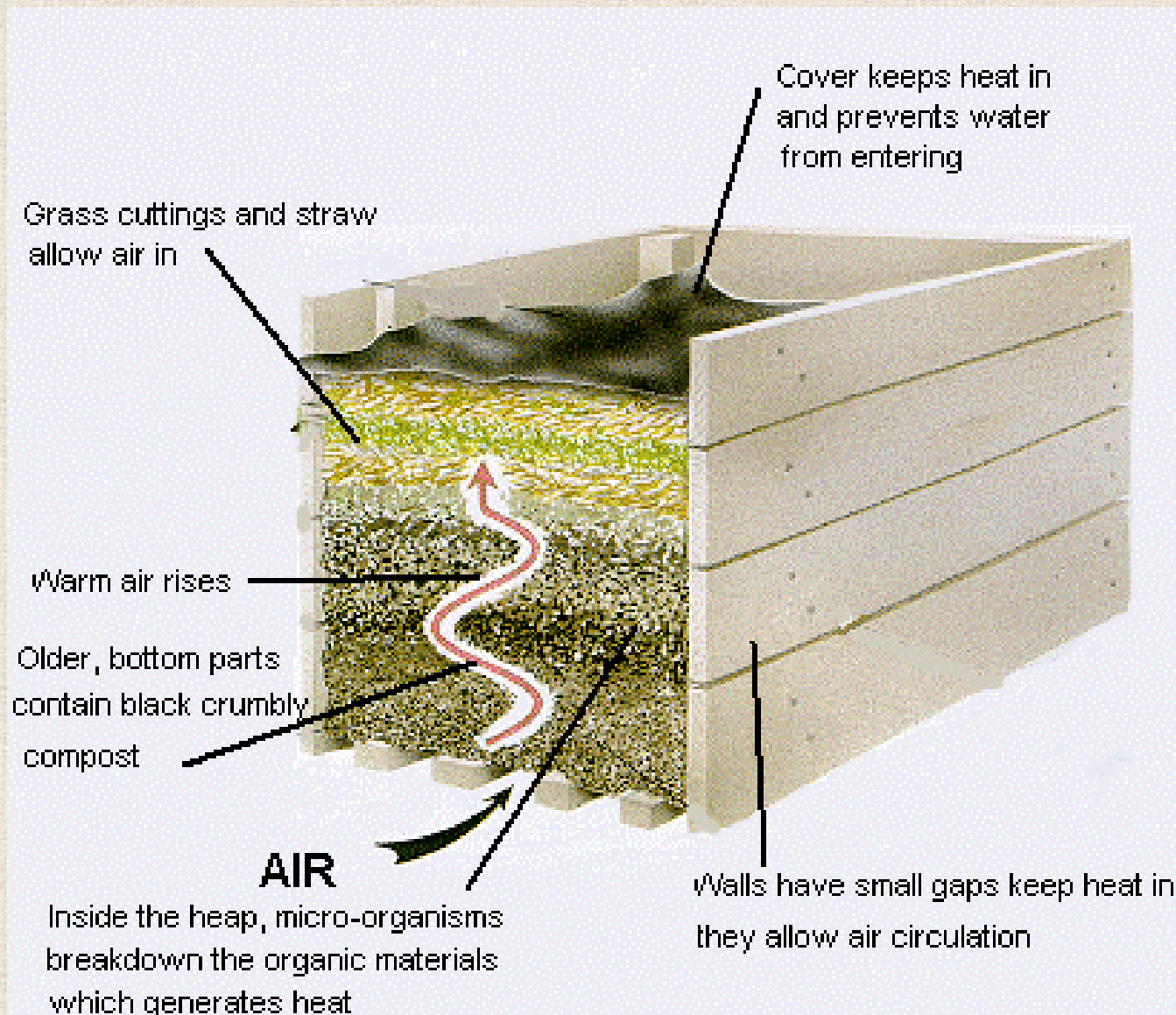




# Compost Use Soil Benefits

- Adds nutrients in a controlled release and chelated form
- Adds humus and organic matter
- Adds biological inoculum
  - Microbes
  - Micro fauna
  - Earthworms (via eggs)

# Aerobic Composting Basics



# Aerobic Composting Basics

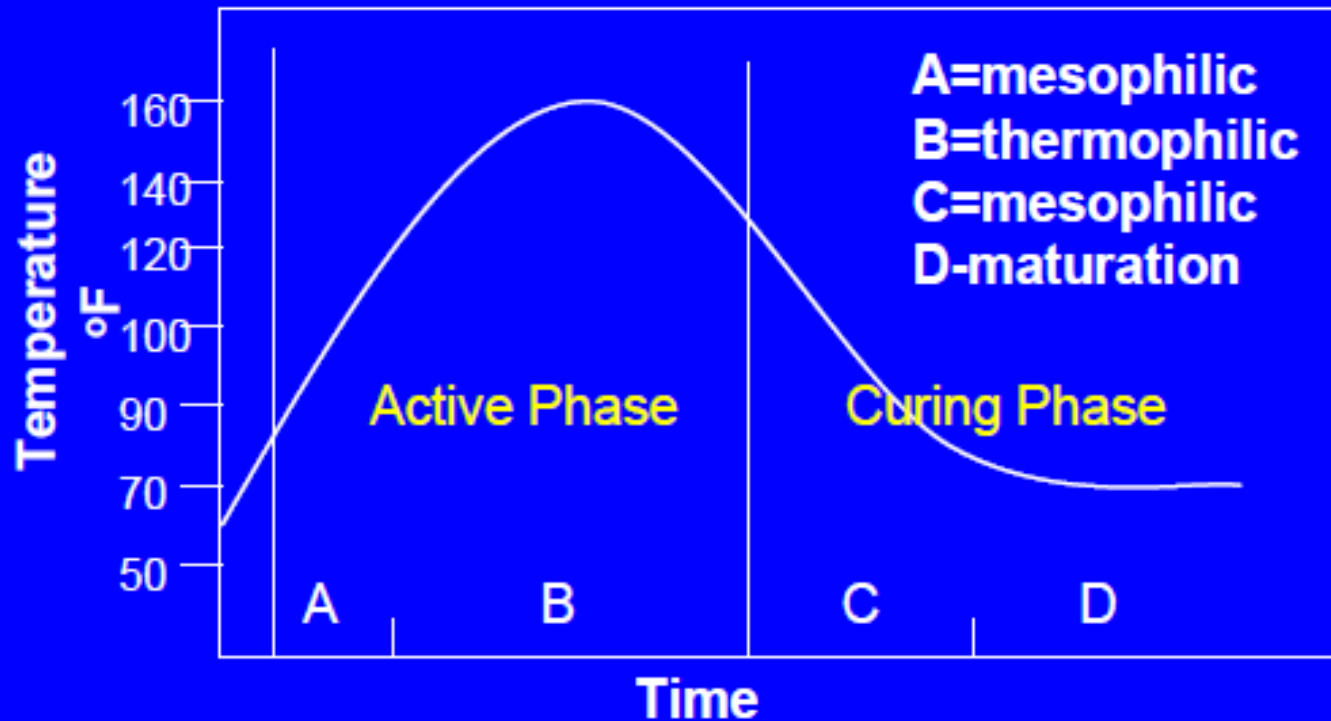
## How Is Compost Produced?

Combination of microbial processes at work

1. **Decomposition:** breakdown of plant and animal remains into stable organic materials
2. **Humification:** conversion of organic matter into humus (resistant to microbial attack)
3. **Immobilization:** microbial tie up of inorganic molecules into their own cells.
4. **Mineralization:** microbial release of inorganic ions (nutrients like nitrate, ammonium, phosphate)

# Aerobic Composting Basics

## Simplified Temperature Changes in an Aerobic Compost Pile



# Aerobic Composting Basics

## Phases of Aerobic Composting

- **Mesophilic phase:** moderate temps., lasts for a few days
- **Thermophilic phase,** high temps., lasts from a few days to several weeks
- **Curing and maturation phase,** moderate to ambient temps., lasts 1-2 months.

# Aerobic Composting Ecology

## Succession of microbial communities during composting

- Mesophilic bacteria break down soluble, readily degradable compounds (sugars, starches)
- Thermophilic bacteria break down proteins, fats, cellulose, hemicellulose
- Fungi and actinomycetes (filamentous bacteria) important during curing phase in attacking most resistant compounds

# Aerobic Composting Ecology

## **Mesofauna (the “teeth and tongue”)**

- Snails, slugs, mites, sow bugs, worms, springtails, ants, centipedes, millipedes, nematodes, beetles
- They do most of initial mechanical break down of organic materials into smaller particles

# Aerobic Composting Basics

## Why cure?

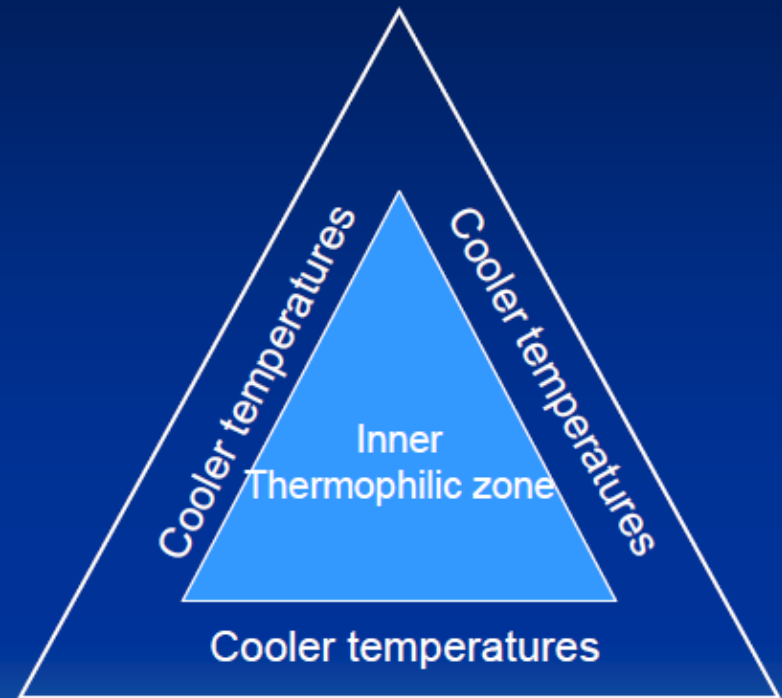
- Assures highest quality product
- pH shifts to neutral
- Soil MO's re-colonize compost, impart disease suppressing qualities to compost
- If too much C left, use of this compost as a soil amendment may cause a temporary N deficiency, just the opposite of what you want!
- Makes compost optimum for plant growth



# Aerobic Composting Basics

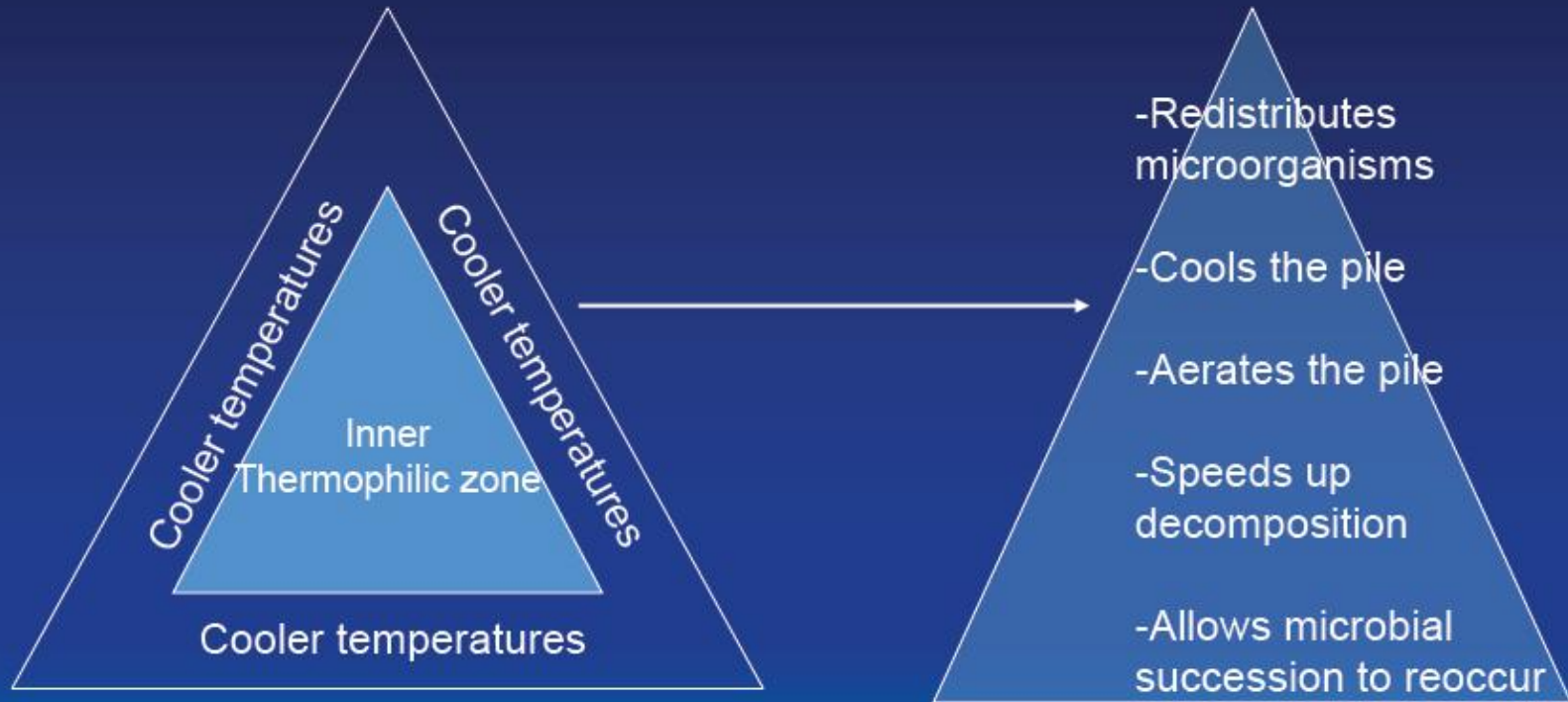
## Zonation of temperatures

- Internal temperatures can be as high as 70 or 80° C
- Center of pile is dominated by the most heat-tolerant bacteria (eg., *Bacillus*)
- Edges of pile support diverse populations of thermophilic bacteria, actinomycetes and fungi



# Aerobic Composting Basics

## Importance of turning the pile



# Compost Pile Trouble Shooting

If the pile or bin develops A strong odor from insufficient oxygen

- Turn the pile or bin
- Pile is damp, but won't heat - insufficient nitrogen
  - Add fertilizer, urea or grass clipping
- Pile is dry and not composting - insufficient water
  - Form pile so center is lowest to collect rainwater or
  - add water.
- Ammonia smell - too much nitrogen
  - Add sawdust of other high carbon material and turn pile

# Composting Online Resource

- **Organic materials**
  - carbon:nitrogen ratio = 30:1
  - less than 2-3 inches particle size
  - moisture (40-60 %)
- **Pile building and management**
  - layers
  - aeration
  - volume (3'x3'x3-6')
- **Monitoring**
  - temperature rise (minimum 131° F for 3 days)
- **Management**
  - mixing/turning
  - finishing/curing
  - screening
  - maturity tests

Florida's Online  
Composting Center



<http://compostinfo.com/>

# Compost Maturity Testing

## Homogeneous, Fine-particle Humus-like Material

- This is the final product that you are aiming for at the end of a successful composting process.



# Compost Maturity

- Assure that your compost is mature
  - Maturity = low microbial activity = fully composted
  - This will avoid ammonia burn in your plants
  - Nitrogen in your garden soil will not be immobilized by unfinished compost and 'rob' your plants of nutrients
  - Pathogens (E .coli/Salmonella) are destroyed during a well managed composting process
- Test your compost!!! And your soil!!!
  - This will help you determine how much compost your soil needs. More is not always better!

# Compost Maturity Testing

## When is my compost done?

- After heating cycles stop
- After curing
- Check for homogenous, fine-particled humus-like appearance
- Earthy smell
- Maturity tests: Solvita test (becoming recognized by highway departments), and others, experience!
  - [www.woodsend.org](http://www.woodsend.org)

# Compost Maturity Test Examples

- ✓ Sniff test
- ✓ Bag test
- ✓ Germination tests
  - ✓ with extracts of compost
  - ✓ in compost
- ✓ Plant growth in compost
- ✓ Solvita test kit



# Compost Maturity Testing

## The Sniff Test

- Get a sample from the compost pile by hand or in an open container
- Check for foul odors. They indicate anaerobic or airless decomposition is occurring, creating chemicals which can be toxic to plants
- As a rule, foul smelling compost should not be used.



# Compost Maturity Testing

## The Bag Test

- Used to determine if the compost is ready to be cured or stored for its final stage of stabilization
- Take a small sample of compost from the inside of the pile, wet it thoroughly, and seal the sample in a plastic bag
- Store the closed bag for about a week at room temperature.
- If when you open the bag the compost has a pleasant, earthy odor, rather than a foul odor, it is stable enough to be cured. If not, the composting process should be continued.

# Simple Compost Maturity Testing

## The Germination Test

-Unfinished compost has phytotoxic compounds (toxic to plants) which inhibit seed germination, especially with highly sensitive cress and bean seeds.

-Test cress seed germination in a starting flat with a shallow layer of compost and planting a predetermined number of seeds. (germination in 2-3 days)

-Test bean germination in several 4 inch pots with compost, planting 3 to 4 seeds in each pot (germination in 5-7 days)



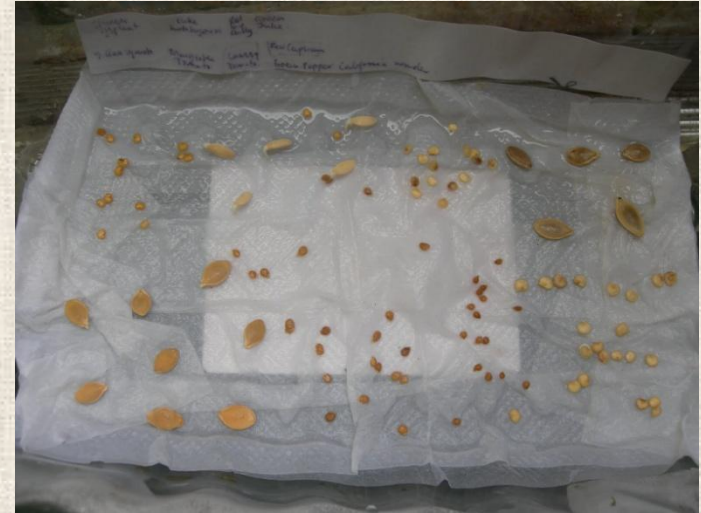
# Simple Compost Maturity Testing

## The Germination Test (cont.)

-At the same time, count out the same number of seeds and germinate these in damp paper towels.

-Compare both the germination speed and the number of seeds that germinate in towels with the number that germinate in compost treatment

-If the plants are not healthy, the compost is not mature and needs to continue composting or curing, the final stage of stabilizing compost.



# Solvita Test for Compost Maturity

- Test based on monitoring both  $\text{CO}_2$  respiration &  $\text{NH}_3$  volatilization
- High rates of emissions indicate actively degrading compost
- Tests results together give a compost maturity index



<http://solvita.com/compost-information>

# Vermicompost

- ❖ Not really a form of composting – in fact, earthworms are likely to die if true composting, a heat-producing process, occurs.
- ❖ Similar to composting, management is critical –e.g., moisture,pH, and aerobic conditions in the growing medium must be maintained to ensure healthy, growing worm populations
- ❖ Many different materials can be used as feedstock for the worms.
- ❖ Produces **earthworm castings** which contain a highly active biological mixture of bacteria, enzymes, remnants of plant matter and animal manure, as well as earthworm cocoons (while damp). The castings are rich in water-soluble plant nutrients, and contain more than 50% more humus than what is normally found in topsoil.

# Vermicompost

## Vermicomposting - Process

1. Add a layer of shredded newspaper to the bottom of the composter.
2. Add some native soil.
3. Add worms.
4. Add food.
5. Add more shredded newspaper.
6. Keep cool and dark.



Things to remember: No eggs, dairy, meat or bread and use acidic scraps sparingly. Chop up large scraps. Worms need slightly moist soil but too moist and they will evacuate.

# Comparison of Vermicomposting to Composting

- Organic Matter – common to both
- Temperature
  - Compost bin = 130-160° F; 6-8 months
  - Worm bin = 59-70° F; year-round
- Air circulation
  - Compost bin = vents + turning
  - Worm bin = vents + worm churn





# Comparison of Vermicomposting to Composting

- Moisture
  - Compost bin = rain, hose, organic matter
  - Worm bin = foodstock
- Time
  - Compost bin = few months; depends on weather
  - Worm bin = few months
- Microorganisms
  - Compost bin = bacteria + fungi + some worms
  - Worm bin = worm mass + bacteria + fungi, etc.



# More Comparisons

	Composting	Vermicomposting
Space limitations	★	★
No outdoor space available	—	★
Large quantity of waste to compost	★	—
Limited time to spend	★	★
Pathogen control	★	★ ★
<i>Ewww!</i> factor	★	—
Ecologically responsible	★ ★ ★	★ ★ ★

# Worm Bin Examples



Instructions for homemade version and operation at:

<http://www.watershedactivities.com/projects/winter/wormbin.html>

# Earthworm Nutrition

- In vermicomposting worms eat the microbes that feed on the decaying food, not the food itself.
- Food won't attract them until it starts to spoil.
- Consider pre-composting food
- Once acclimated, earthworms consume half their weight –or more- daily



*Worms with vegetable scraps and paper bedding.  
Photo by Amy Weishuhn.*

# Earthworm Castings Benefits

- ❖ The humus in the worm castings extracts toxins and harmful fungi and bacteria from the soil. Worm Castings therefore have the ability to fight off plant diseases.
- ❖ The worm castings have the ability to fix heavy metals in organic waste. This prevents plants from absorbing more of these chemical compounds than they need. These compounds can then be released later when the plants need them.
- ❖ Worm Castings act as a barrier to help plants grow in soil where the pH levels are too high or too low. They prevent extreme pH levels from making it impossible for plants to absorb nutrients from the soil.

# Earthworm Castings Benefits

- ❖ The humic acid content stimulates plant growth, even in very low concentrations. Humic acid also stimulates the development of beneficial micro-flora populations in the soil.
- ❖ Earthworm castings increase the ability of soil to retain water. The worm castings form aggregates, which are mineral clusters that combine in such a way that they can withstand water erosion and compaction, and also increase water retention.
- ❖ Earthworm castings increase the nitrogen levels in a state that the plant can easily use. Organic plant wastes usually have a carbon-nitrogen ratio of more than 20 to 1. Because of this ratio, the nitrogen is unavailable to plants, and the soil around the organic waste becomes acidic.

# Vermicompost

- Earthworms are either earthmovers or composters.
  - Earthmovers tend to be solitary species which tunnel through the earth
  - Composters live en masse in organic matter on the soil surface
- Recommended composter worm is *Eisenia fetida* or red worms



# Compost Management Strategy:

## \*Applications\*

- Volume recommendations
  - Refer to EDIS vegetable gardening and specific vegetable publications
    - For example, general guideline of 1 lb/sq ft
  - Incorporate into soil at least 3 weeks before planting
  - Sidedress to prevent and respond to nutrient deficiencies, e.g., with longer season crops



# Commercial Composts Examples

- Commercial Examples



Organic Brands  
w/ only organic ingredients



Non-Organic Brands  
w/ chemical fertilizer  
supplements

# Compost Management Strategy:

## \*Mulching\*

❖ Benefits of mulches as surface covers to soils amended with compost include:

- Decreased compost oxidation loss
  - ✓ With greater soil moisture conservation via improved water infiltration & reduced evaporation
  - ✓ With maintenance of stable soil temperature
- Optimized crop uptake of compost nutrients
  - ✓ With improved weed management
- Decreased soil erosion
  - ✓ With greater soil surface protection from rainfall physical impacts

## Sources of Mulch

- Newspaper/ wheat straw
- Pine straw
- Hardwood mulch
- Chopped leaves
- Plastic
- Cover crops



❖ Loose materials as hay/straw, dry grass, clippings, leaves work best.

# Compost Management Strategy: \*Compost Tea\*

## What is Compost Tea?

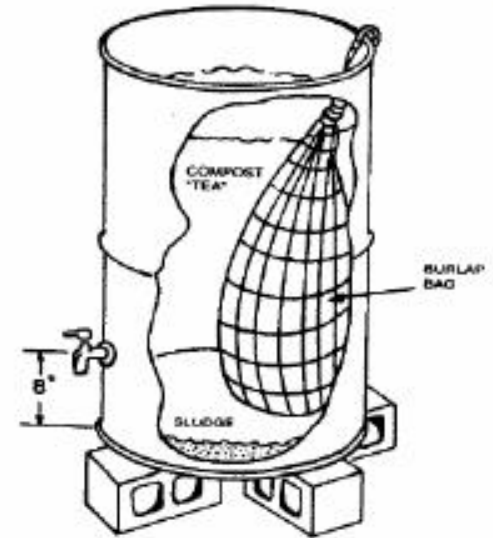
- The liquid portion of compost soaked (“steeped”) in water

≡ Non-aerated

- 1 part compost, 3-10 parts water
- Occasional stirring
- 1-3 weeks

‘Tea’ = Aerated

- 1 part compost, 10-50 parts water
- Air injection or constant circulation for 6-24 hours
- Often made with additives (molasses, yeast extract, algal powder, kelp) to increase microbial biomass



# Gardening Applications

## Compost tea uses

- Foliar fertilizer
- Disease suppression
  - Foliar
  - Soil-borne
- Residue decomposition
- Enhanced soil biology
- Pest suppression



Steve Wright, Pennsylvania vineyard. Rodale Institute Photo.

# Compost Tea Use Safety

## NOP Compost Tea Task Force Recommendations

- Compost extract: Compost held in *potable* water for < 1 hr
- Compost tea: Compost held in water for > 1 hr
  - Aerated
    - 1 part compost, 10-50 parts water
    - Air injection or constant circulation for 12-24 hours
    - Often used additives (molasses, yeast extract, algal powder) to increase microbial biomass
  - Non-aerated
    - 1 part compost, 3-10 parts water
    - Occasional stirring
    - 1-3 weeks

Additives increase microbial biomass (both good and bad)

# Compost Tea Safety

## NOP Compost Tea Task Force Recommendations (April, 2004)

- Use drinkable water
- Sanitize equipment before use
- Use NOP-compliant compost (*both plant and manure-based composts*)
- No restriction:
  - Compost tea without additives
  - Compost extract (steeped for < 1 hr)
  - Compost tea with additives IF production system (compost + additives + equipment) makes tea that meets EPA water quality guidelines for E. coli and enterococci in two pre-tests
- 90/120 day pre-harvest restriction:
  - Untested compost tea with additives
  - Soil applications of raw manure extract/tea or compost leachate
- Prohibited:
  - Foliar applications of raw manure extract/tea or compost leachate
  - Use of compost teas for edible sprout production

# Contemplation on Compost

- When anger is born in us, we can be aware that anger is an energy in us, and we can accept that energy in order to transform it into another kind of energy.
- When we have a compost bin filled with organic material that is decomposing and smelly, we know that we can transform the waste into beautiful flowers...
- We need the insight and non-dual vision of the organic gardener with respect to our anger. We need not be afraid of it or reject it.



# Contemplation on Compost

- We know that anger can be a kind of compost, and that it is within its power to give birth to something beautiful. We need anger the way an organic gardener needs compost.
- If we know how to accept our anger, we already have some peace and joy. Gradually we can transform anger completely into peace, love and understanding.



Thich Nhat Hanh,  
Vietnamese Buddhist monk

# Summary

- Contemplative food gardening benefits from careful attention given to the holistic practice and integration of composting
- Compost nurtures soil ecosystems and food crop production
- Composting demonstrates the capacity of the cycle of life for regeneration in the contemplative food garden

# Online Resources

- **Bomford, M. Compost Tea.**  
<http://organic.kysu.edu/CompostTea.pdf>
- **Clemson Cooperative Extension: Mulch**  
[http://www.clemson.edu/extension/hgic/plants/other/compost\\_mulch/hgic1604.html](http://www.clemson.edu/extension/hgic/plants/other/compost_mulch/hgic1604.html)
- **Copperbrand, L. The Biology of Composting.**  
<http://www.wastenot-organics.wisc.edu/05composting/presentations/biologyofcompostpile.pdf>
- **Cornell Univ. Cooperative Extension**
  - **Composting. Compost Trouble Shooting**  
<http://compost.css.cornell.edu/trouble.html>
  - **Vermicompost: A Living Soil Amendment**  
<http://cwmi.css.cornell.edu/vermicompost.htm>
- **Elliot, A. Backyard Composting.**  
[http://www.fcgov.com/recycling/pdf/composting\\_fest08\\_02\\_composting.pdf](http://www.fcgov.com/recycling/pdf/composting_fest08_02_composting.pdf)

# Online Resources

- Florida's Online Composting Center - <http://compostinfo.com/>
- King, F.H.
  - Farmers of 40 Centuries  
[http://journeytoforever.org/farm\\_library/King\\_Farmersof40Centuries.pdf](http://journeytoforever.org/farm_library/King_Farmersof40Centuries.pdf)
  - Soil Management  
[http://journeytoforever.org/farm\\_library/King\\_SoilManagement.pdf](http://journeytoforever.org/farm_library/King_SoilManagement.pdf)
- Messervy, J.N. The Magic Land  
[http://www.oneyearofwritingandhealing.com/a\\_healing\\_library/the-magic-land-by-julie-m.html](http://www.oneyearofwritingandhealing.com/a_healing_library/the-magic-land-by-julie-m.html)
- SARE. Building Soils for Better Crops  
<http://www.sare.org/Learning-Center/Books/Building-Soils-for-Better-Crops-3rd-Edition>
- Stromberger, M. Composting Organisms, CSU  
<http://www.extsoilcrop.colostate.edu/Soils/powerpoint/compost/CompostingOrganisms.pdf>

# Online Resources

- UF/IFAS Extension. EDIS Publications
  - Organic Vegetable Gardening -  
<http://edis.ifas.ufl.edu/pdf/vh/vh01900.pdf>
  - Producing Garden Vegetables with Organic Soil Amendments  
<http://edis.ifas.ufl.edu/mg323>
  - Soils & Fertilizers for Master Gardeners: Soil Organic Matter & Organic Amendments - <http://edis.ifas.ufl.edu/mg454>