



# **Raising Microbes—The Secret to Your Own “Living Soil”**

**(7 Jun 25)**

# HUGE Topic!!!

- [www.Libertytracefarm.com](http://www.Libertytracefarm.com)
- References “Books and Resources” Tab
- Slides “Living Soil” Tab
- Links Last Year’s Presentations (2024)
  - (Beginner & Advanced)

# Objectives

- Brief Background
- Importance of Microbes in Soil
- How to Raise Your Own Microbes

"More than a terrific movie — it's an important movie."

—Owen Gleiberman, *Entertainment Weekly*

YOU'LL NEVER LOOK AT DINNER  
THE SAME WAY AGAIN



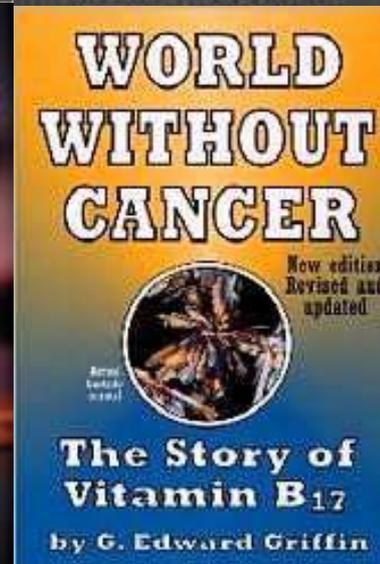
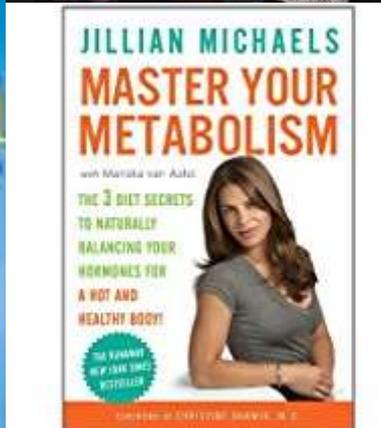
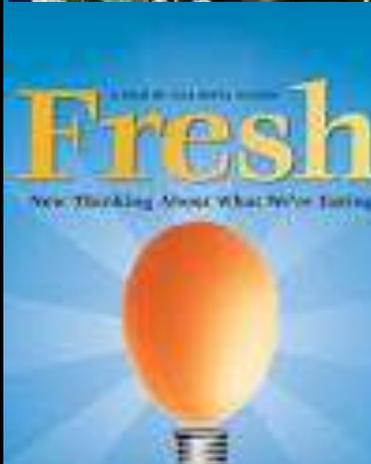
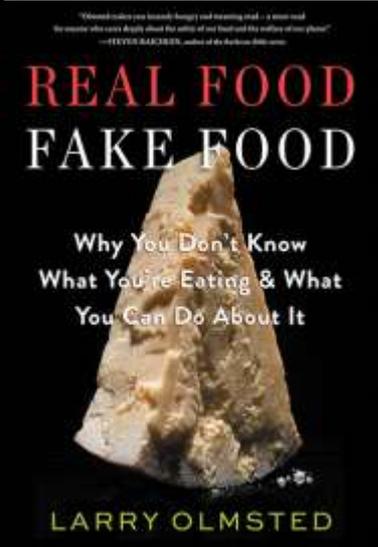
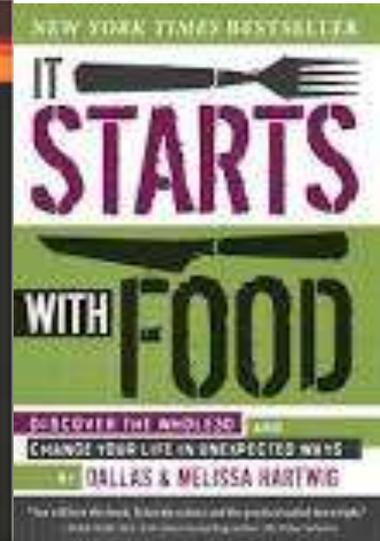
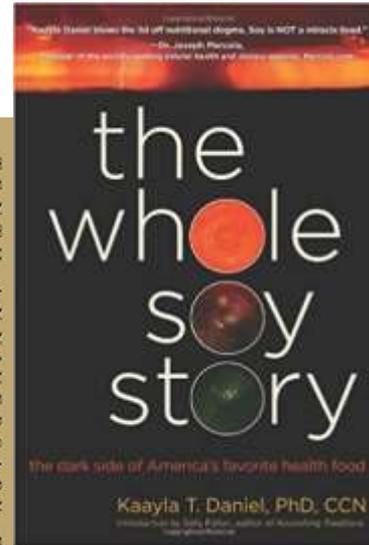
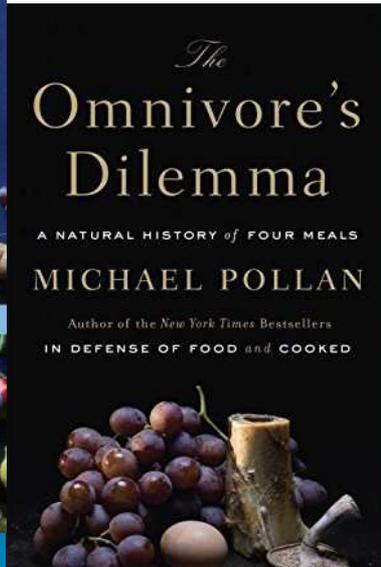
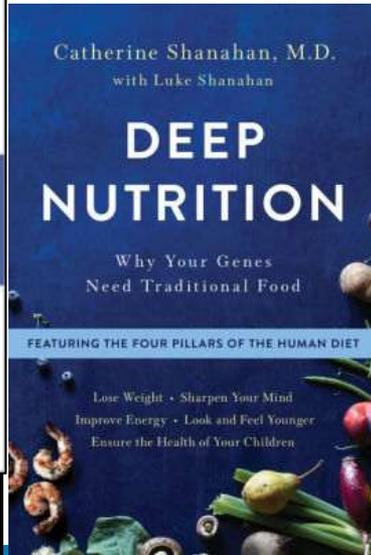
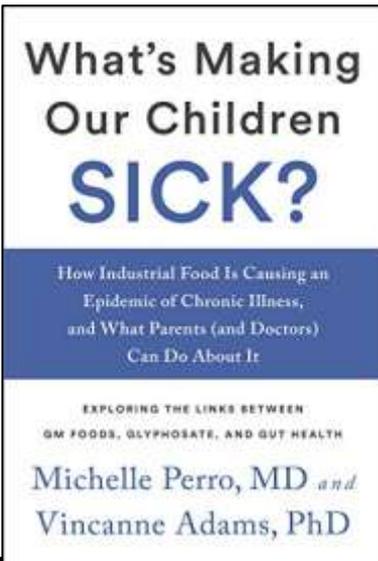
# FOOD, INC.

A ROBERT KENNER FILM

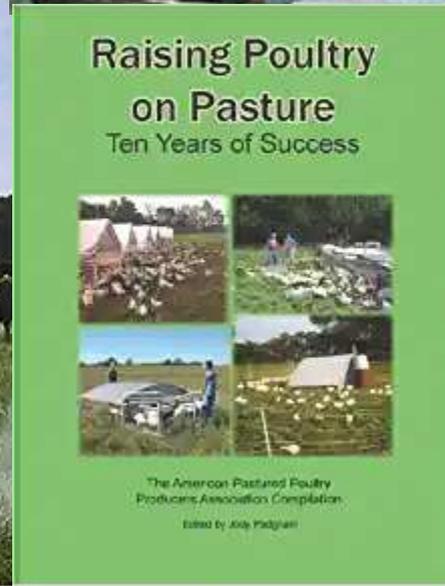
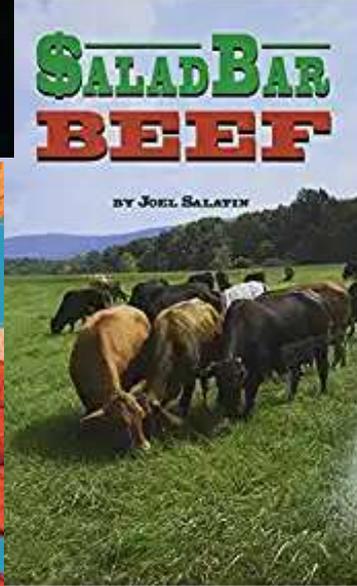
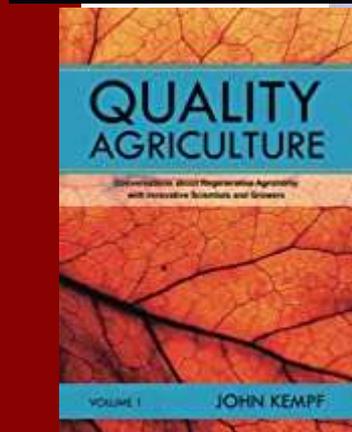
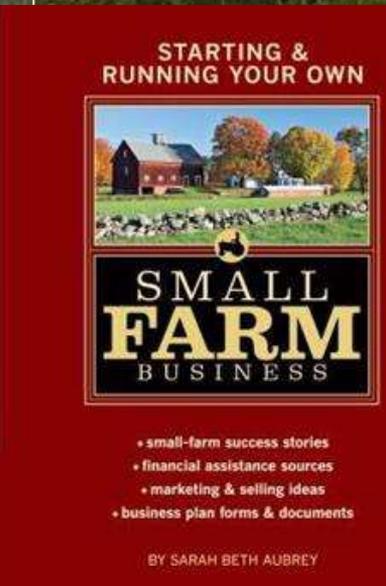
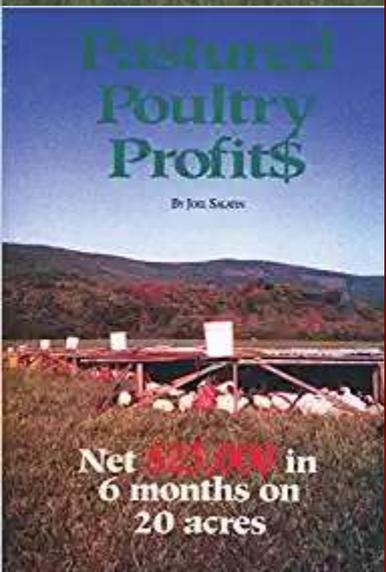
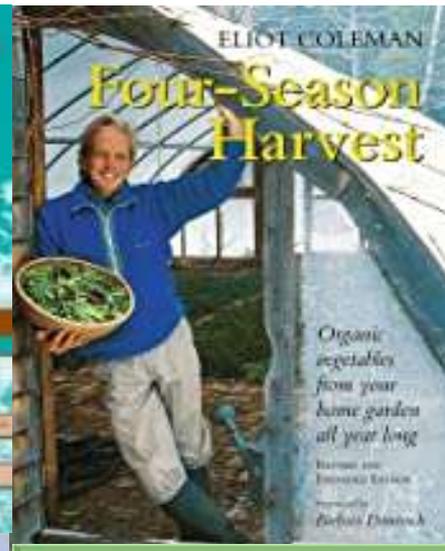
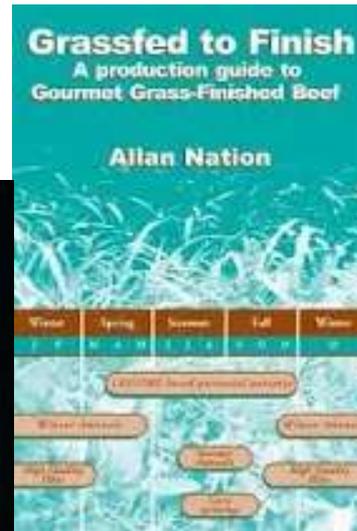
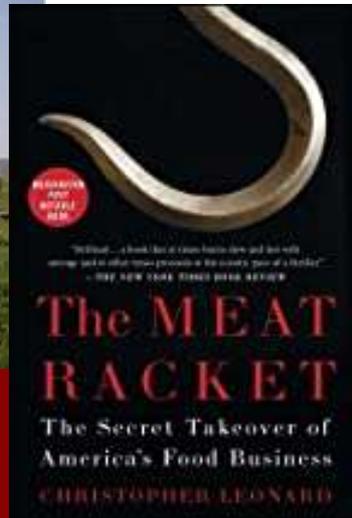
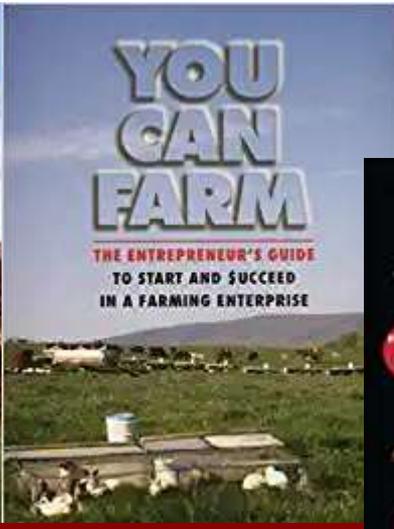
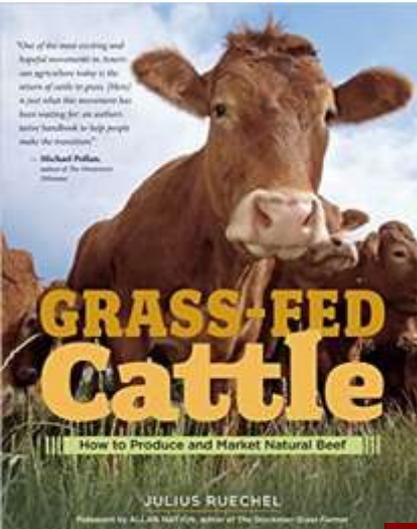
MANUELA VICIOMI, WITNESS MEDIA, AND RIVER ROAD ENTERTAINMENT PRESENT A FILM BY ROBERT KENNER "FOOD, INC." WITH DAVID ABLEN, KEVIN ROBERTS,  
AND RICHARD PRANCE. MUSIC BY ERIC SCHLOSSER. VISUALS BY RICHARD PRANCE. EDITOR MELISSA ROBERTO. EXECUTIVE PRODUCERS JUDITH WILLIAM KUNZ AND JUDITH SCHOTER. JEFF SWILL, DANIE WEVERMANN  
PRODUCED BY RICHARD PRANCE. WRITTEN AND DIRECTED BY ROBERT KENNER. [www.foodincmovie.com](http://www.foodincmovie.com) [www.magnolia.com](http://www.magnolia.com) [www.fox.com](http://www.fox.com)



# 2008 and Every Day Since...



# Let's Start a Farm!





# Health/Nutrition Coach



Search icon | Sign In | [JOIN FOR FREE](#)

[1-to-1 Coaching](#) | [Certifications](#) | [Resources and Articles](#)

## Precision Nutrition is the home of the world's top nutrition coaches.

Transforming lives and certifying professionals since 2005.



The New York Times

THE HUFFINGTON POST

Women's Health.



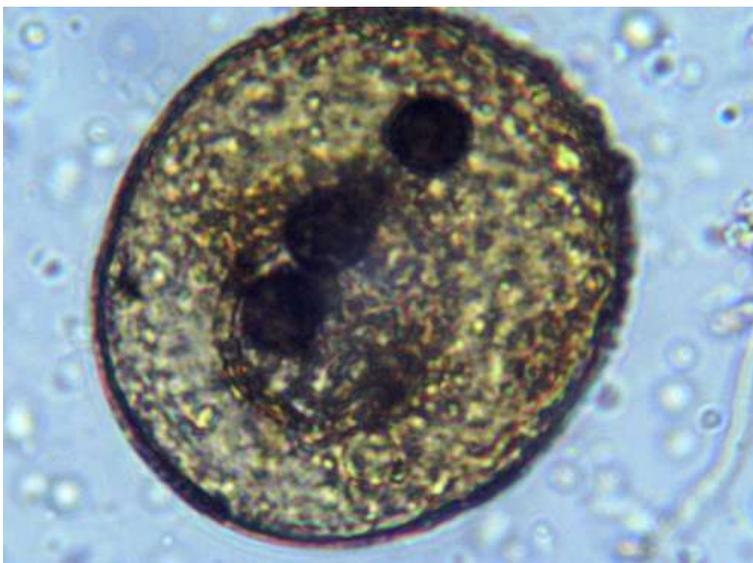
TIME





# Dr. Elaine Ingham (PhD in 1981)

- Soilfoodweb School
  - Fundamental Courses
  - Certified Lab-Tech
  - Consultant Training Program
    - **Microbiome**
    - Make **biological** amendments
    - Microscopy
    - Turn dirt to soil



- Korean Natural Farming—Chris Trump
  - 2000 years of Korean/Japanese farming
- **Biology is most important ingredient**

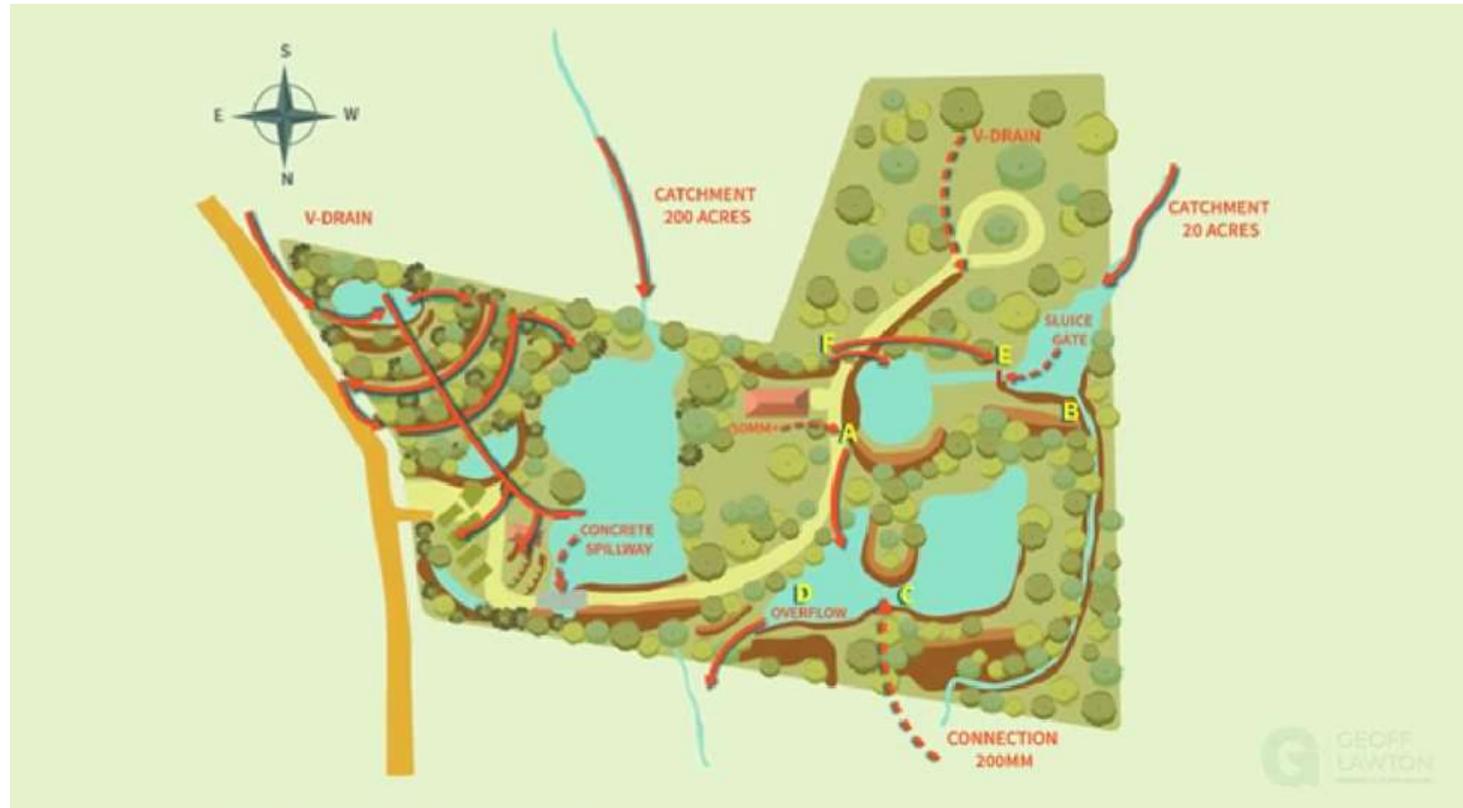


# THE HARMONICS AND GEOMETRY OF BOUNDARIES

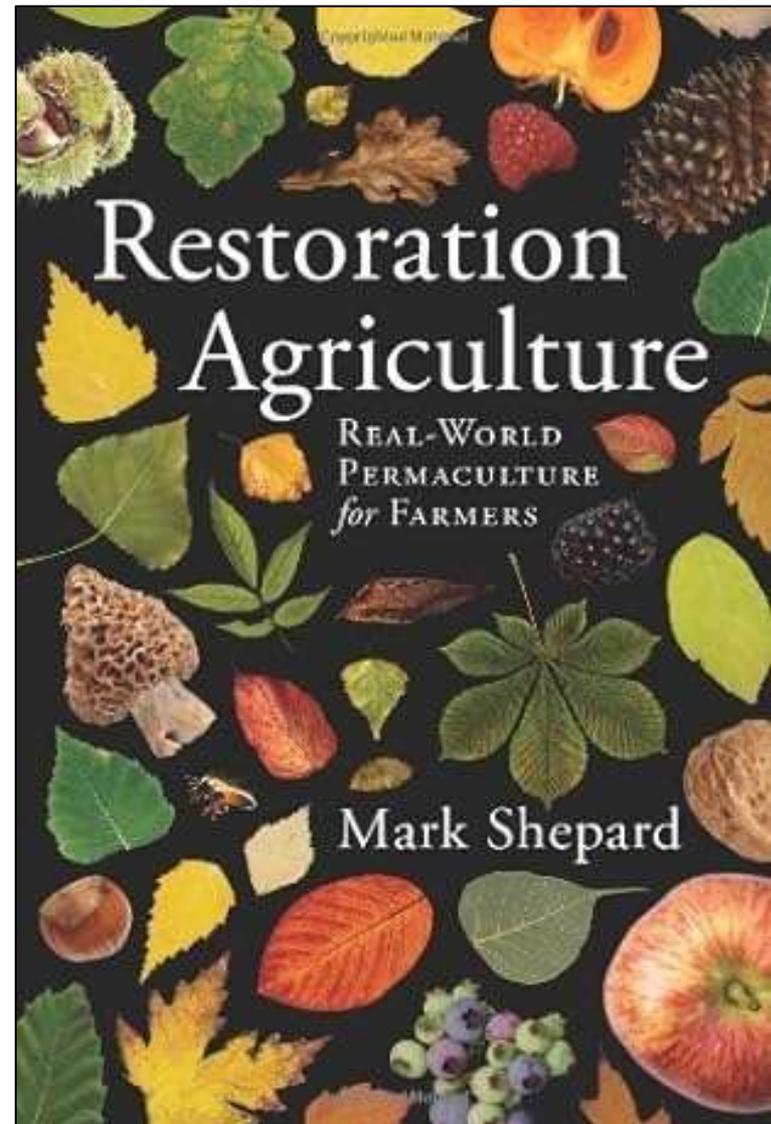
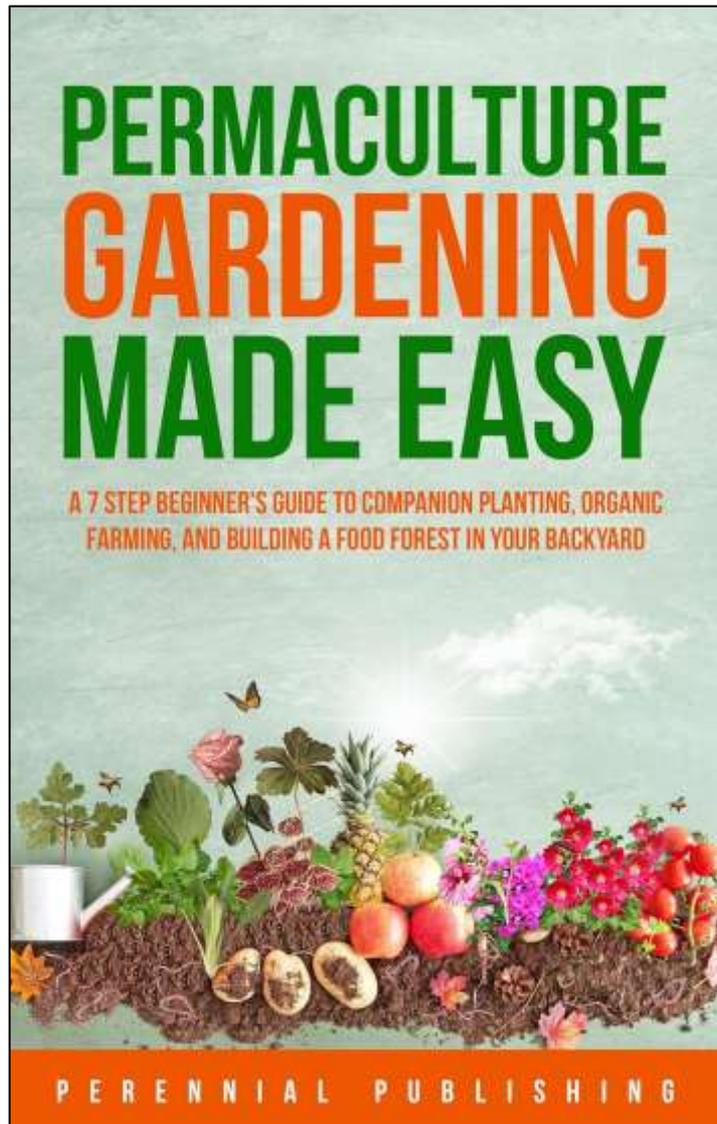


## Geoff Lawton's

## Permaculture Design Certification

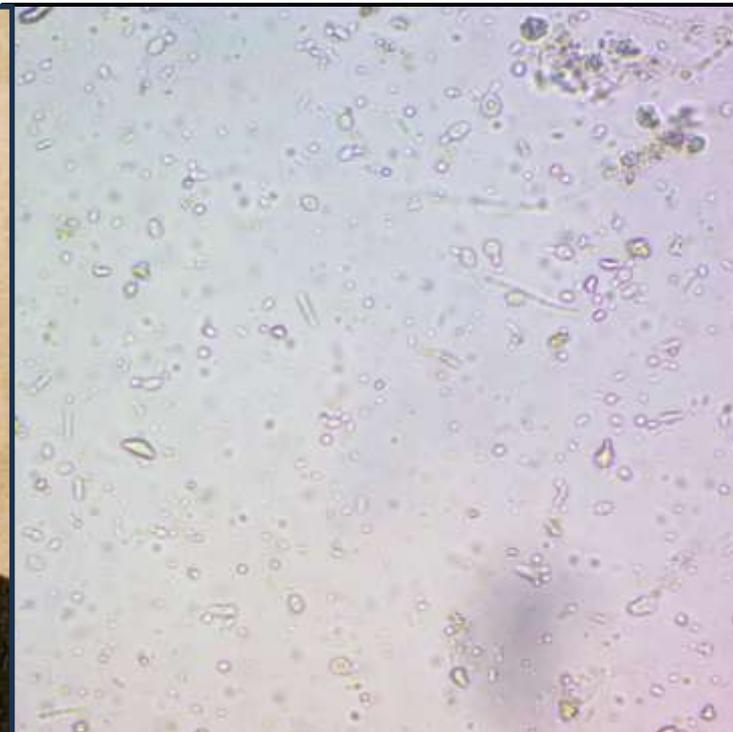
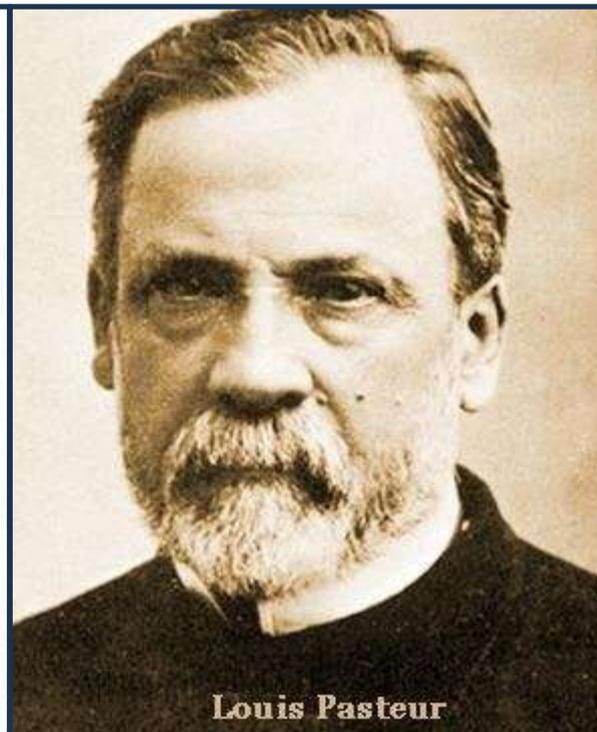
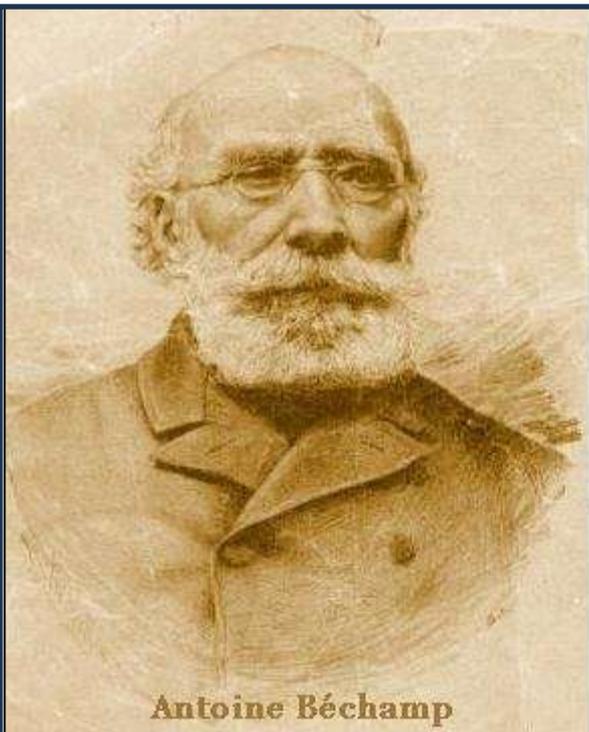


# Permaculture for the Homesteader



# Hmmm—"Germs"

- Dr Louis Pasteur—"Germ Theory"

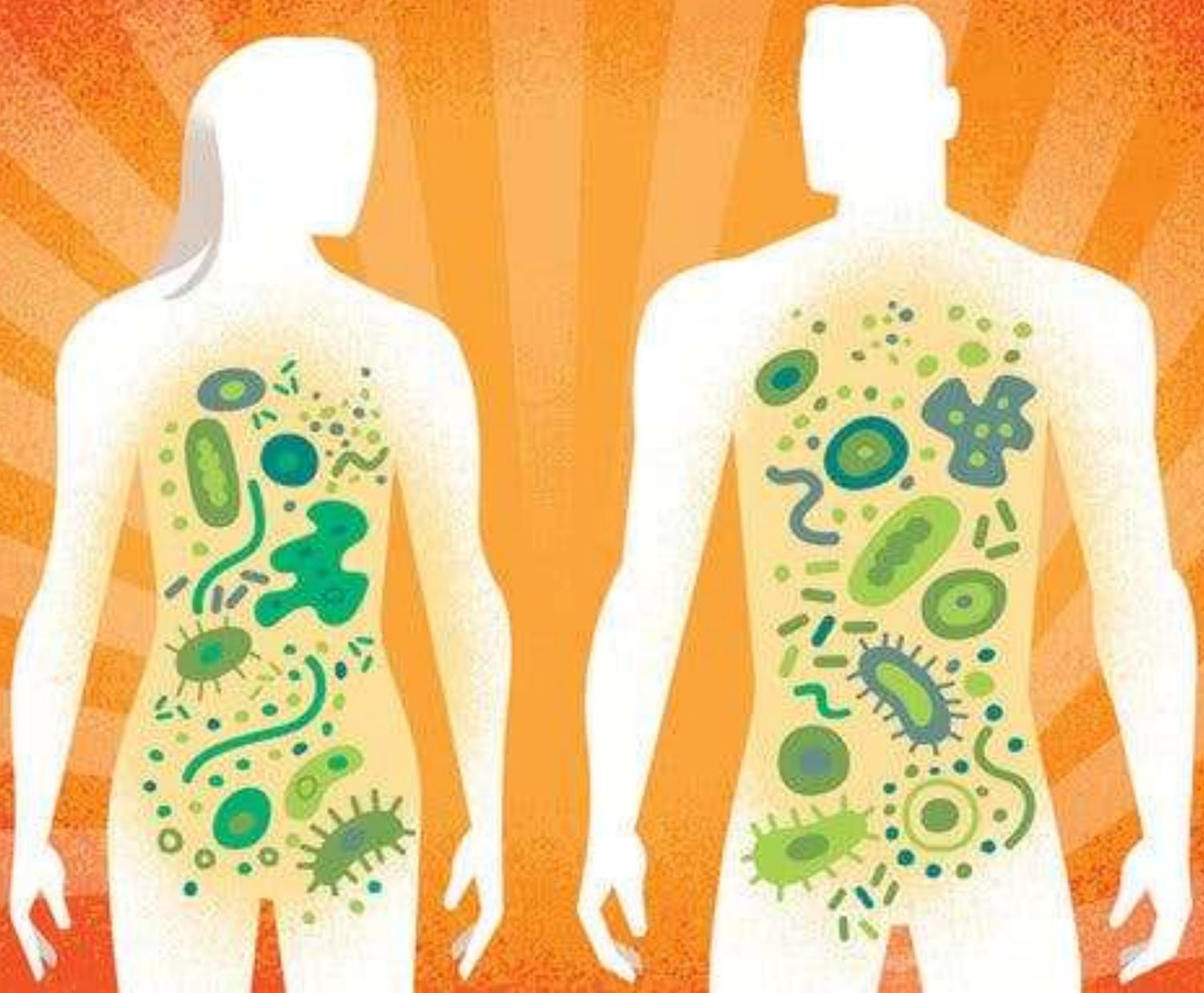






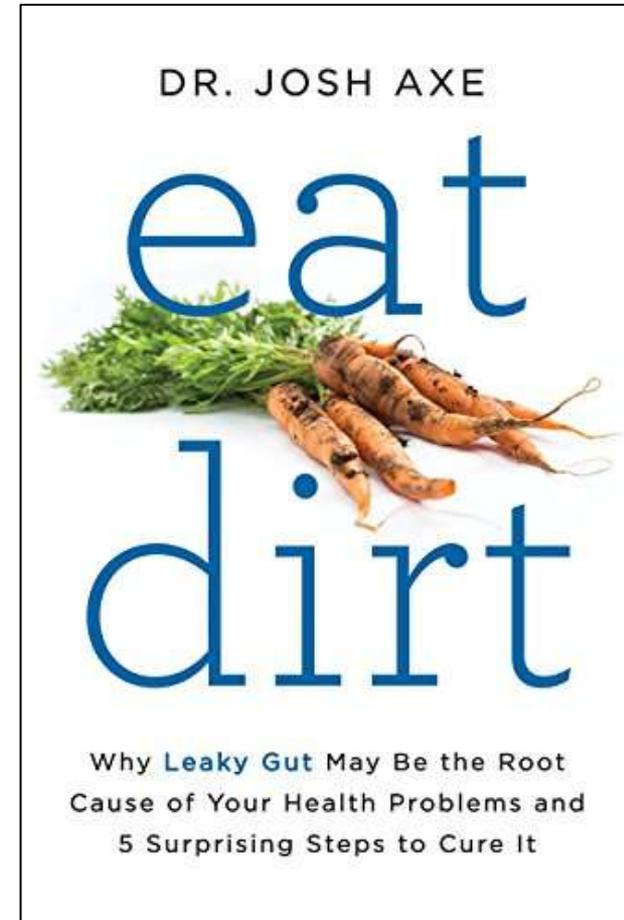
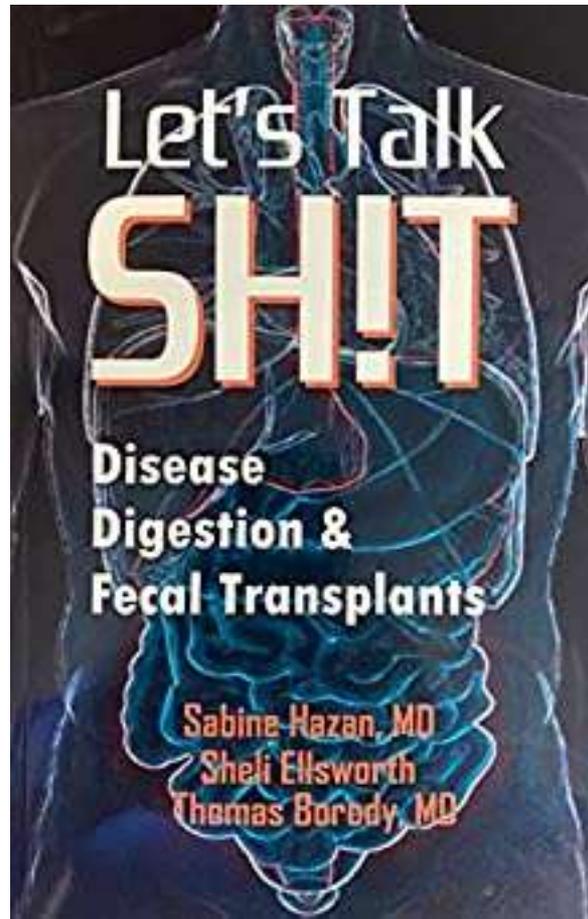
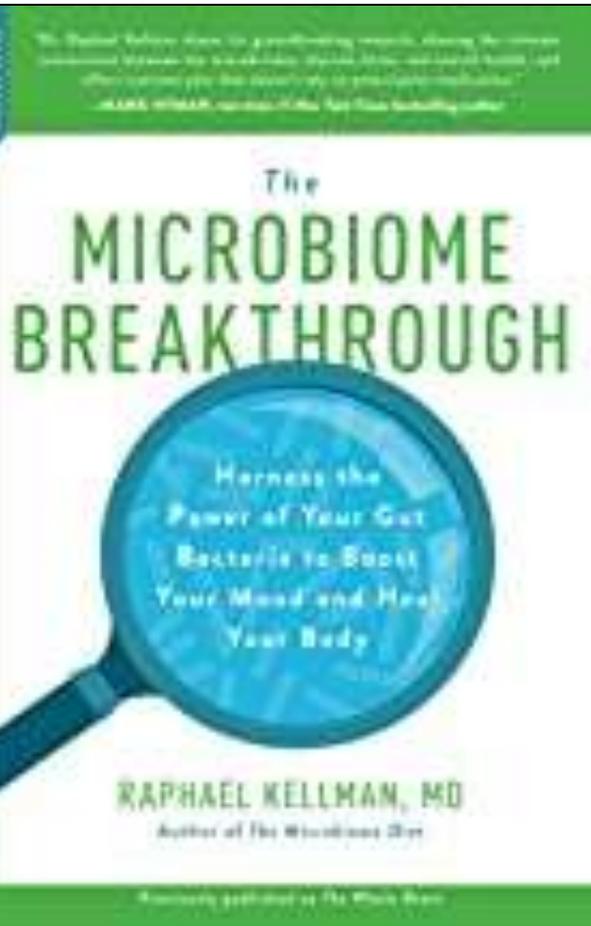


# We're Products of Biology!



# 2016 Human Microbiome

- Very Small Life—can't see with naked eye
- 10X more critters living in/on you than human cells



# Biology

## Plants have Microbiome Too!!

- Caretakers of the plants
  - Live on and inside
  - Recycle nutrients (dead plants/animals)
  - Harvest minerals from sand, silt, clay
  - Make Vitamins & Enzymes plant can't
  - Create humus
  - Diversity keeps all “in check”
- Inject Nutrient Density at bottom of food chain

# Nutrient Density

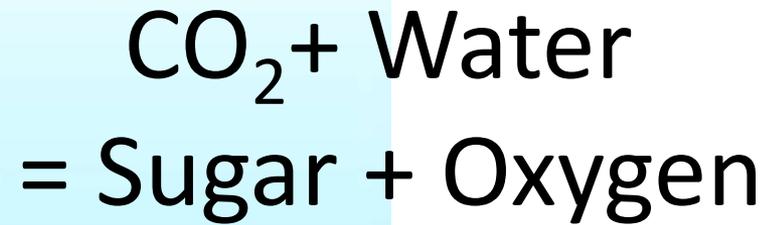
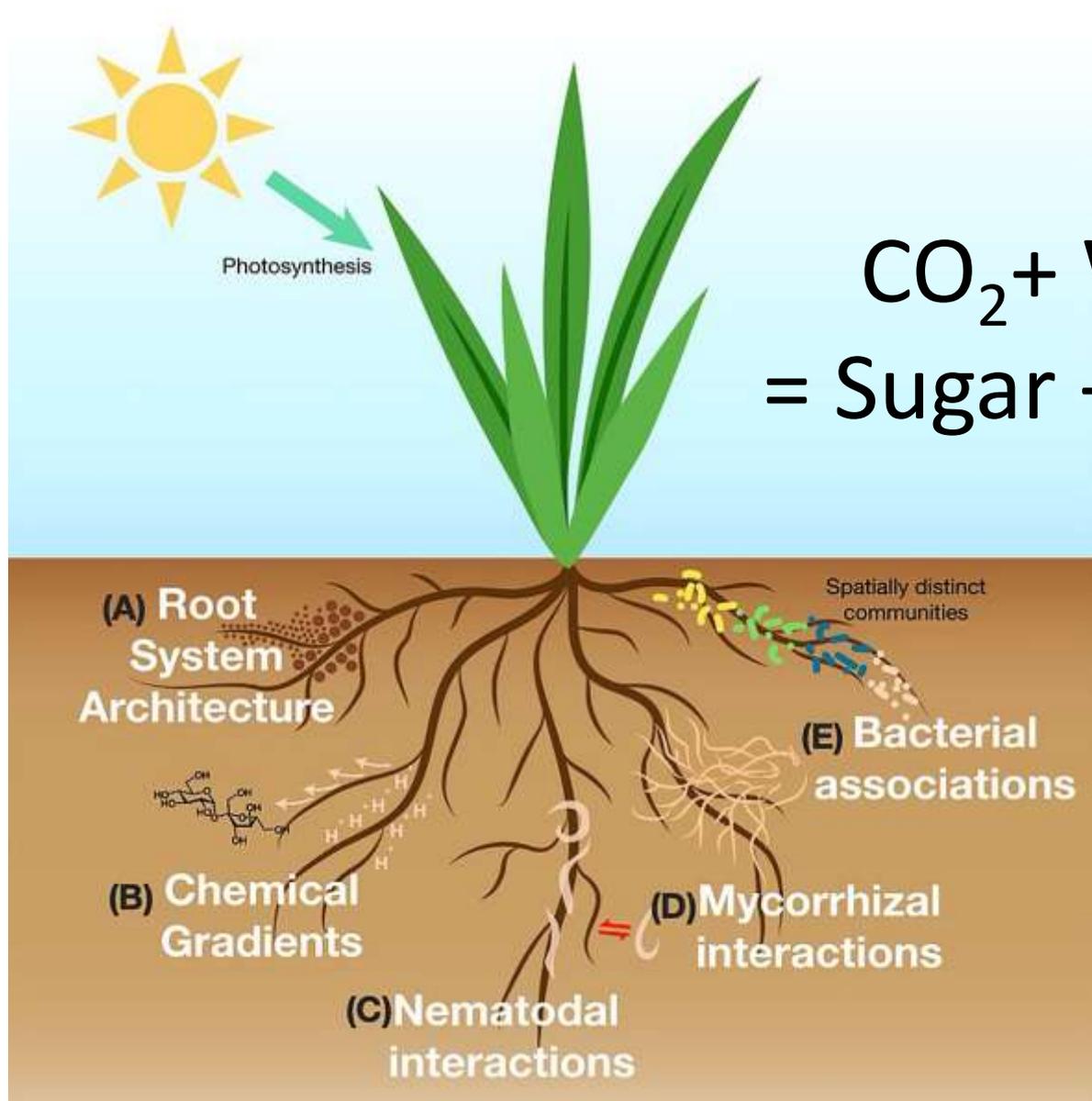




Photo Source: Soil Science Society of America

# Periodic Table of the Elements

Name Number → **H** ← Symbol  
 Name → **Hydrogen** ← Atomic Weight

Rows of matter states of gases: ■ ■ ■ ■ ■ ■ ■  
 Solid Liquid Gas

Subcategory in the metal-nonmetal-metalloid band (color of background):  
■ Alkali metal ■ Alkaline earth metal ■ Metalloid ■ Nonmetal  
■ Lanthanide ■ Actinide ■ Pnictogen (semimetal) ■ Noble gas  
■ Transition metal ■ Post-transition metal ■ Unknown chemical properties

1 <b>H</b> Hydrogen																	18 <b>He</b> Helium
3 <b>Li</b> Lithium	4 <b>Be</b> Beryllium											5 <b>B</b> Boron	6 <b>C</b> Carbon	7 <b>N</b> Nitrogen	8 <b>O</b> Oxygen	9 <b>F</b> Fluorine	10 <b>Ne</b> Neon
11 <b>Na</b> Sodium	12 <b>Mg</b> Magnesium											13 <b>Al</b> Aluminum	14 <b>Si</b> Silicon	15 <b>P</b> Phosphorus	16 <b>S</b> Sulfur	17 <b>Cl</b> Chlorine	18 <b>Ar</b> Argon
19 <b>K</b> Potassium	20 <b>Ca</b> Calcium	21 <b>Sc</b> Scandium	22 <b>Ti</b> Titanium	23 <b>V</b> Vanadium	24 <b>Cr</b> Chromium	25 <b>Mn</b> Manganese	26 <b>Fe</b> Iron	27 <b>Co</b> Cobalt	28 <b>Ni</b> Nickel	29 <b>Cu</b> Copper	30 <b>Zn</b> Zinc	31 <b>Ga</b> Gallium	32 <b>Ge</b> Germanium	33 <b>As</b> Arsenic	34 <b>Se</b> Selenium	35 <b>Br</b> Bromine	36 <b>Kr</b> Krypton
37 <b>Rb</b> Rubidium	38 <b>Sr</b> Strontium	39 <b>Y</b> Yttrium	40 <b>Zr</b> Zirconium	41 <b>Nb</b> Niobium	42 <b>Mo</b> Molybdenum	43 <b>Tc</b> Technetium	44 <b>Ru</b> Ruthenium	45 <b>Rh</b> Rhodium	46 <b>Pd</b> Palladium	47 <b>Ag</b> Silver	48 <b>Cd</b> Cadmium	49 <b>In</b> Indium	50 <b>Sn</b> Tin	51 <b>Sb</b> Antimony	52 <b>Te</b> Tellurium	53 <b>I</b> Iodine	54 <b>Xe</b> Xenon
55 <b>Cs</b> Cesium	56 <b>Ba</b> Barium	71 <b>Hf</b> Hafnium	72 <b>Ta</b> Tantalum	73 <b>W</b> Tungsten	74 <b>Re</b> Rhenium	75 <b>Os</b> Osmium	76 <b>Ir</b> Iridium	77 <b>Pt</b> Platinum	78 <b>Au</b> Gold	79 <b>Hg</b> Mercury	81 <b>Tl</b> Thallium	82 <b>Pb</b> Lead	83 <b>Bi</b> Bismuth	84 <b>Po</b> Polonium	85 <b>At</b> Astatine	86 <b>Rn</b> Radon	
87 <b>Fr</b> Francium	88 <b>Ra</b> Radium	103 <b>Rf</b> Rutherfordium	104 <b>Db</b> Dubnium	105 <b>Sg</b> Seaborgium	106 <b>Bh</b> Bohrium	107 <b>Hs</b> Hassium	108 <b>Mt</b> Meitnerium	109 <b>Ds</b> Darmstadtium	110 <b>Rg</b> Roentgenium	111 <b>Cn</b> Copernicium	112 <b>Nh</b> Nihonium	113 <b>Fl</b> Flerovium	114 <b>Mc</b> Moscovium	115 <b>Lv</b> Livermorium	116 <b>Ts</b> Tennessine	118 <b>Og</b> Oganesson	

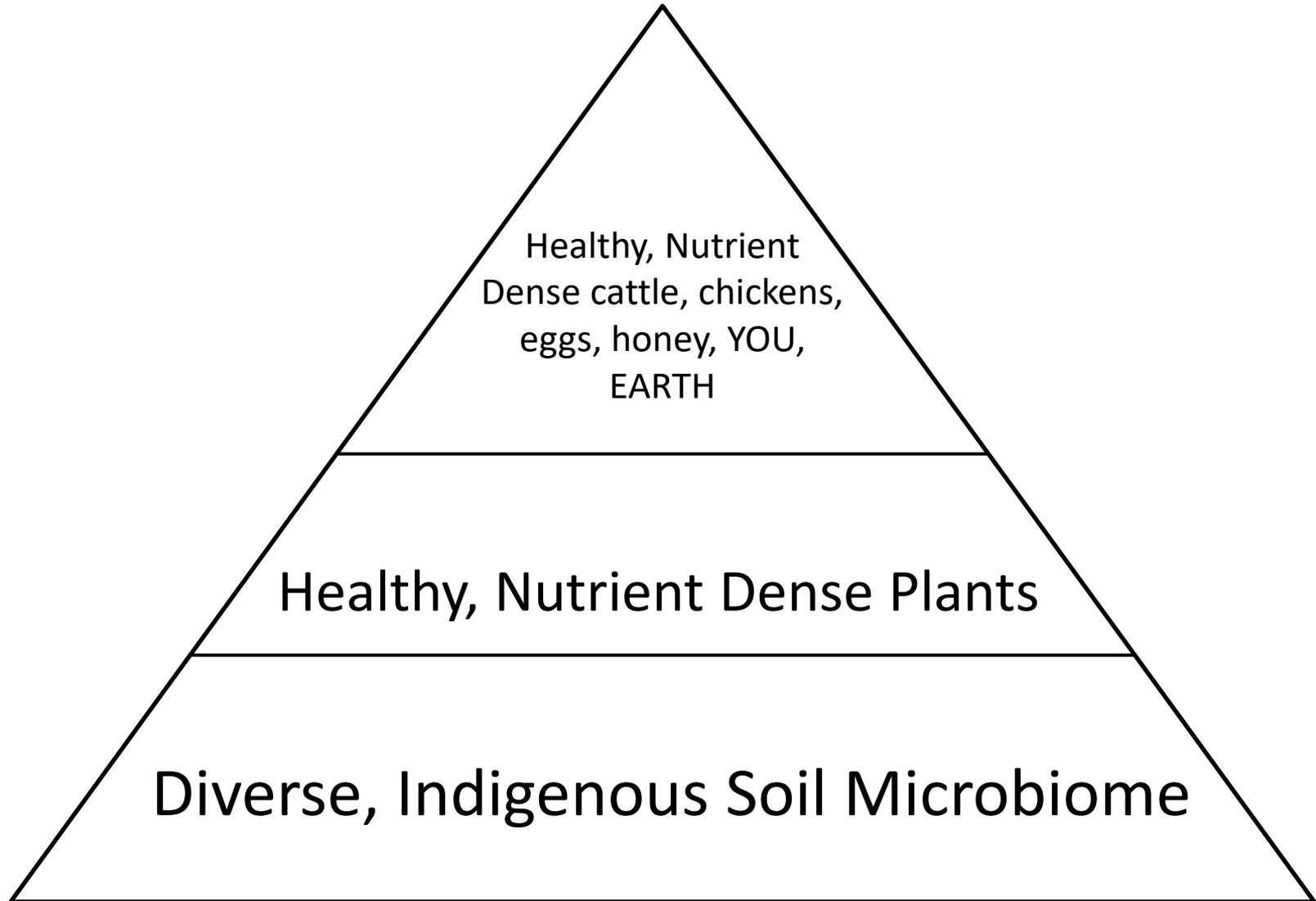
57 <b>La</b> Lanthanum	58 <b>Ce</b> Cerium	59 <b>Pr</b> Praseodymium	60 <b>Nd</b> Neodymium	61 <b>Pm</b> Promethium	62 <b>Sm</b> Samarium	63 <b>Eu</b> Europium	64 <b>Gd</b> Gadolinium	65 <b>Tb</b> Terbium	66 <b>Dy</b> Dysprosium	67 <b>Ho</b> Holmium	68 <b>Er</b> Erbium	69 <b>Tm</b> Thulium	70 <b>Yb</b> Ytterbium	71 <b>Lu</b> Lutetium
89 <b>Ac</b> Actinium	90 <b>Th</b> Thorium	91 <b>Pa</b> Protactinium	92 <b>U</b> Uranium	93 <b>Np</b> Neptunium	94 <b>Pu</b> Plutonium	95 <b>Am</b> Americium	96 <b>Cm</b> Curium	97 <b>Bk</b> Berkelium	98 <b>Cf</b> Californium	99 <b>Es</b> Einsteinium	100 <b>Fm</b> Fermium	101 <b>Md</b> Mendelevium	102 <b>No</b> Nobelium	103 <b>Lr</b> Lawrencium

# Soil vs Dirt

- Dirt—physical rocks, sand, silt & clay
- Soil—living skin of the planet
  - Handful of healthy soil has more critters in it than people on planet earth
  - Not just there for the “hell of it”



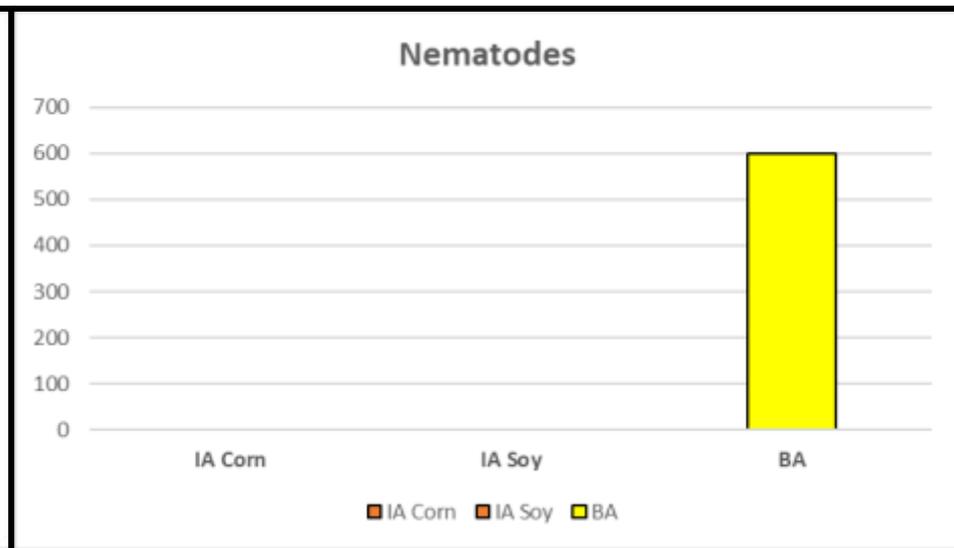
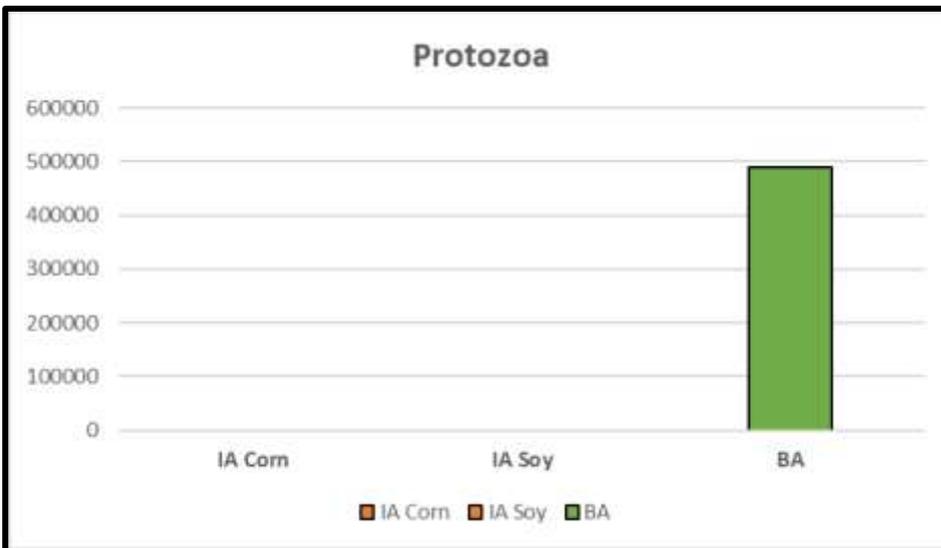
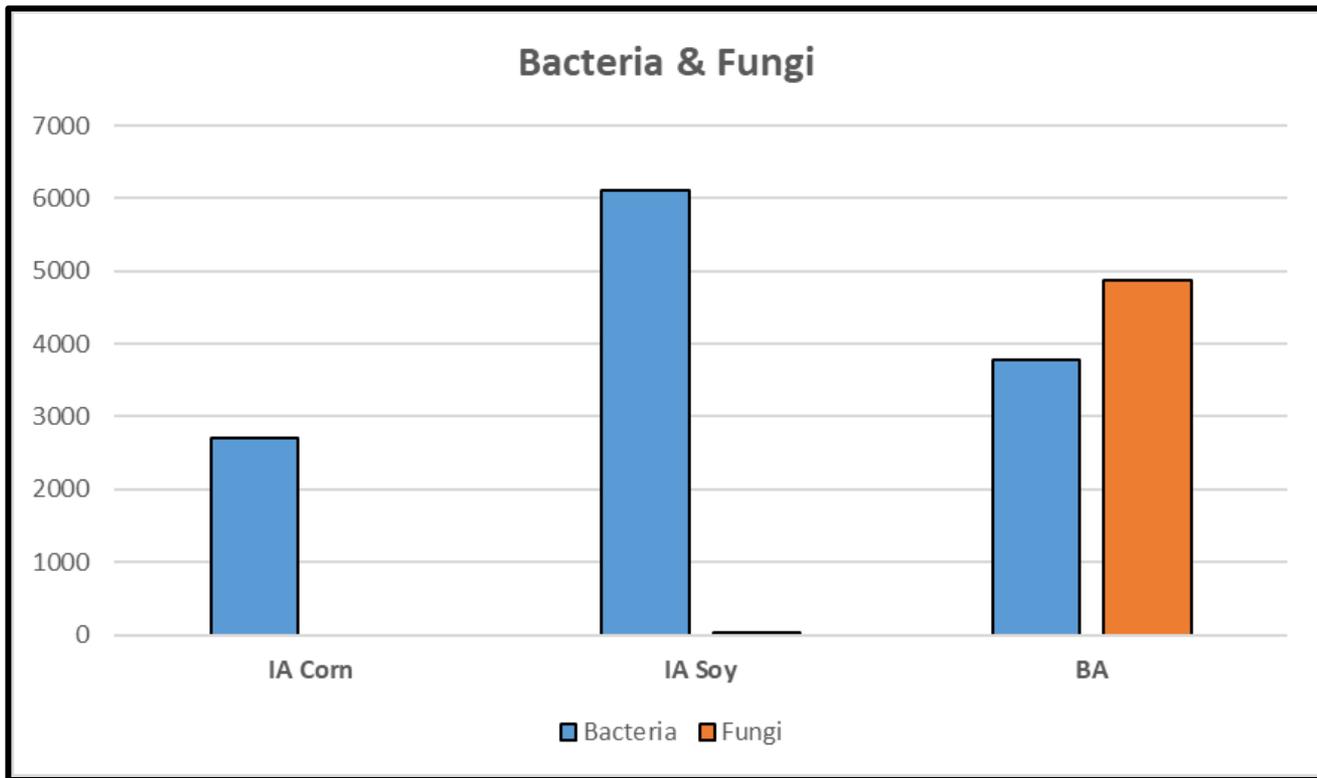
# The Foundation--Microbiome



# But, Dirt's Taking Over

- Modern agriculture focused on “chemistry”
- What kills biology?
  - Excessive Tillage
  - Chemical Fertilizers (N, P, K)
  - “icides”...Herbicides & Insecticides







# Wild Turkeys

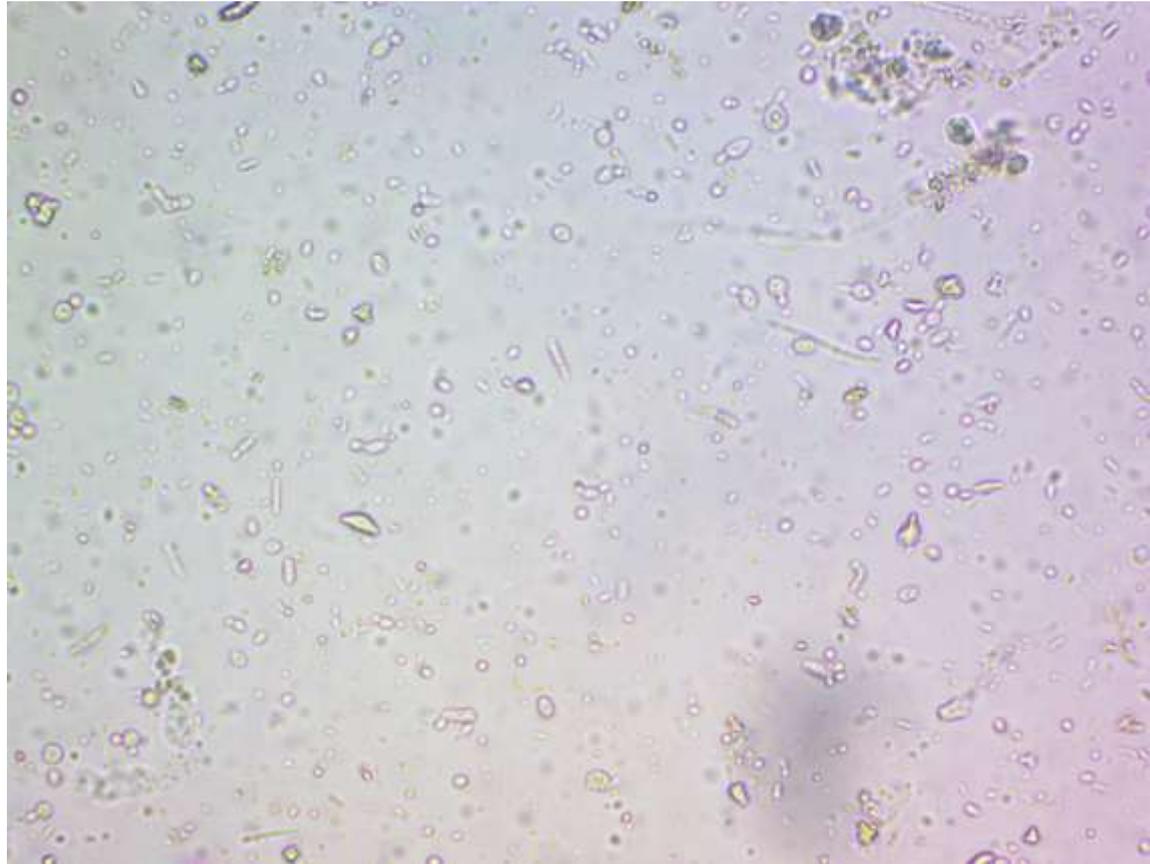
## Need

- Wild turkeys
- Air
- Water
- Food
- Comfort (Habitat)



# Bacteria

- Recycle simple organic matter
  - Manure, alfalfa, green grass (Green, high nitrogen)
  - Fix nitrogen





# Fungi

- Recycle more complex organic matter
  - Wood chips, leaves, straw, etc (woody, high Carbon)

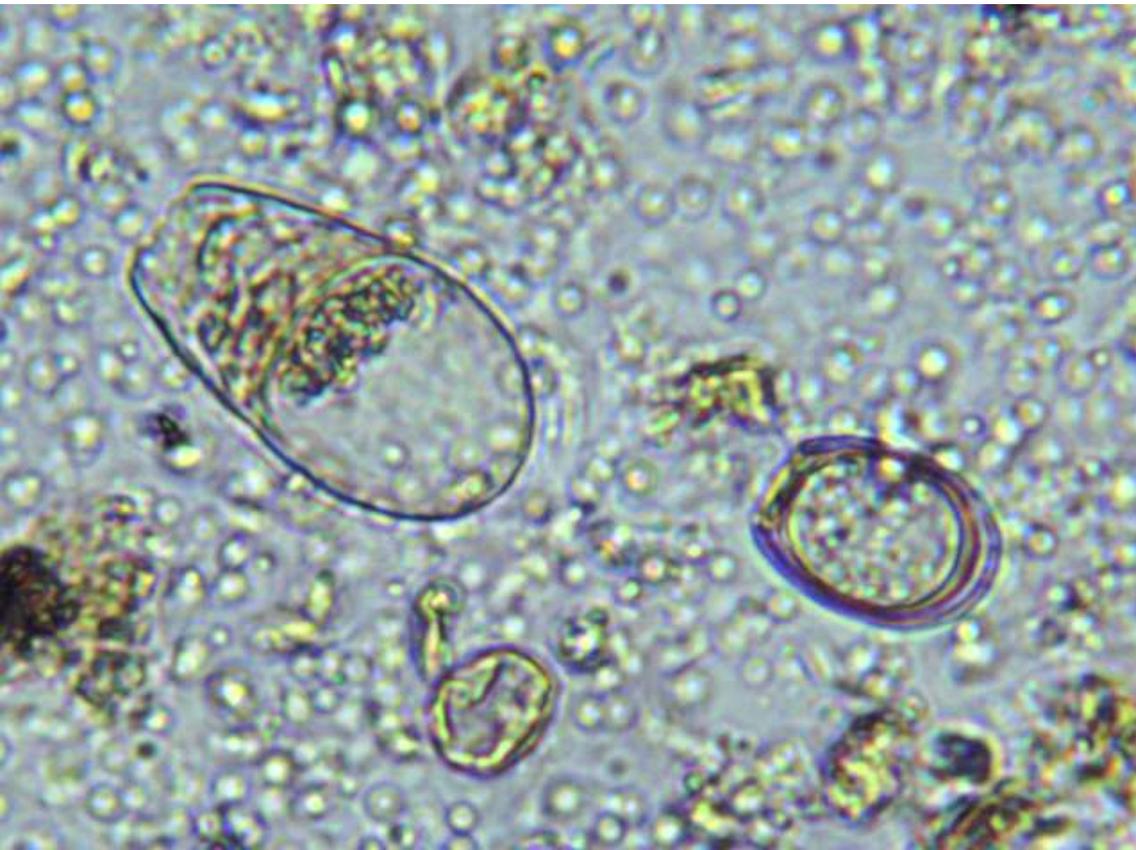






Photo Source: Israel Chemicals Limited Growing Solutions

# Protozoa--Predator

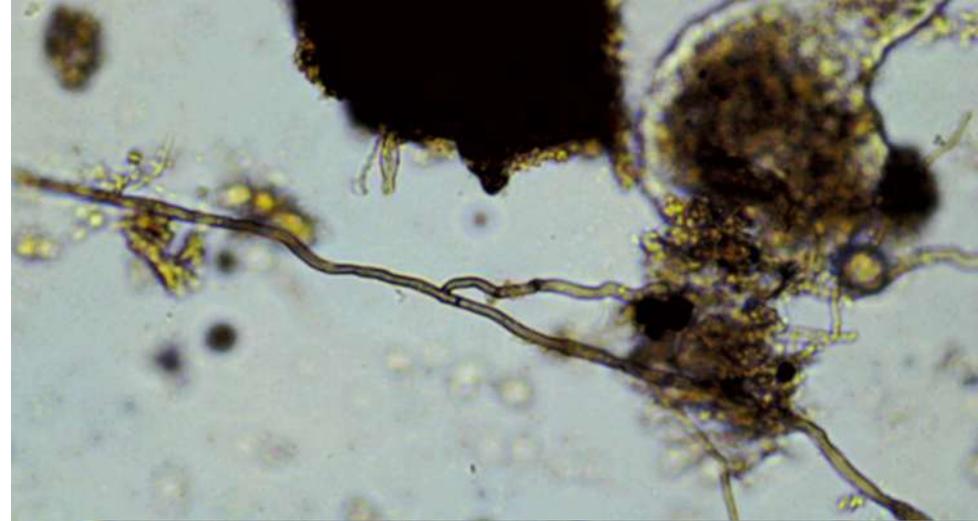


# Nematodes--Predator



# Sources of Soil Microbes

- Raw Milk
- Manure
- Commercial Products
- “Pristine” Soil
- Worm Castings
- Compost
- Korean Natural Farming



# Raw Milk





# Persistent Herbicides

- Corteva's Grazon<sup>®</sup> (Aminopyralid)
  - Broadleaf weed control in pasture
  - NC State Ext "Herbicide Carryover"





# Hay—Facebook #1

- “Good, clean grass hay sprayed for Weeds”
- \$60/bale



# Hay—Facebook #2

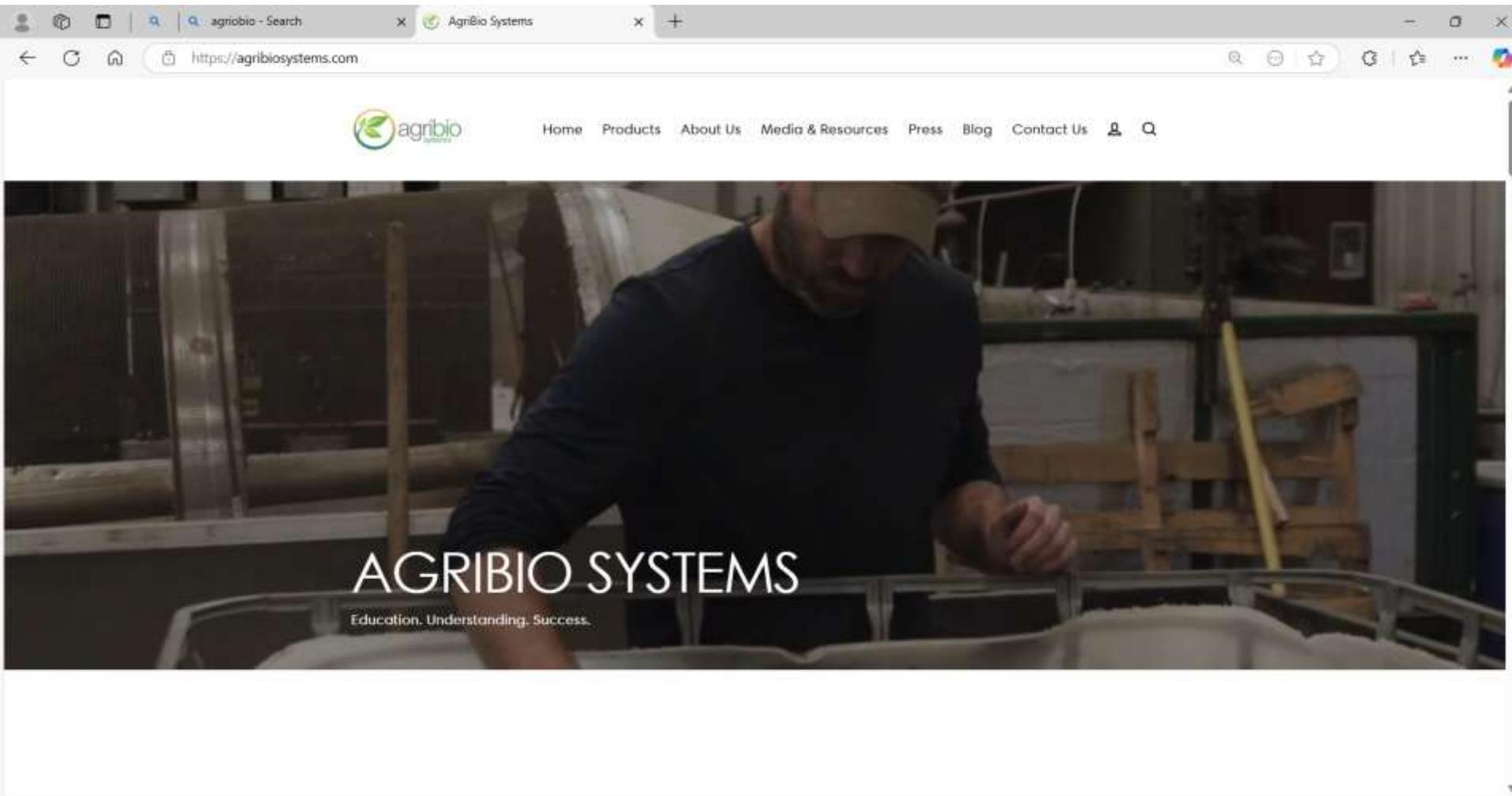
- “Not great quality Hay”
- \$35/bale



# Commercial—Worm Castings



# Commercial--Agribio Systems



# Agribio Extract

The screenshot shows a web browser window with two tabs: 'agribio illinois - Search' and 'BioMax E - Concentrated Liquid Biology'. The address bar shows the URL 'https://agribiosystems.com/products/biomax-e-concentrated-liquid-biology'. The website header features the Agribio Systems logo and a navigation menu with links for Home, Products, About Us, Media & Resources, Press, Blog, and Contact Us. The main content area displays a product page for 'Biomax E - Concentrated Liquid Biology'. On the left, there are two small thumbnail images of the product. The central image is a large white plastic jug with a handle and a white cap. The label on the jug is green and white, featuring the Agribio logo and the text 'BioMax-E CONCENTRATED LIQUID BIOLOGY'. To the right of the jug, the product name 'BIOMAX E - CONCENTRATED LIQUID BIOLOGY' is displayed in a large, bold, black font. Below the name, the price '\$8.39' is shown. Underneath the price, the word 'Size' is followed by three radio button options: '1 Gallon' (which is selected), '2.5 Gallon', and '275 Gallon'. Below the size options, the word 'Quantity' is followed by a text input field containing the number '1'. At the bottom of the product information, there are two buttons: a white button with a black border labeled 'Add to cart' and a solid blue button labeled 'Buy with shop Pay'.

agribio systems

Home Products About Us Media & Resources Press Blog Contact Us

BIOMAX E -  
CONCENTRATED LIQUID  
BIOLOGY

\$8.39

Size

1 Gallon 2.5 Gallon 275 Gallon

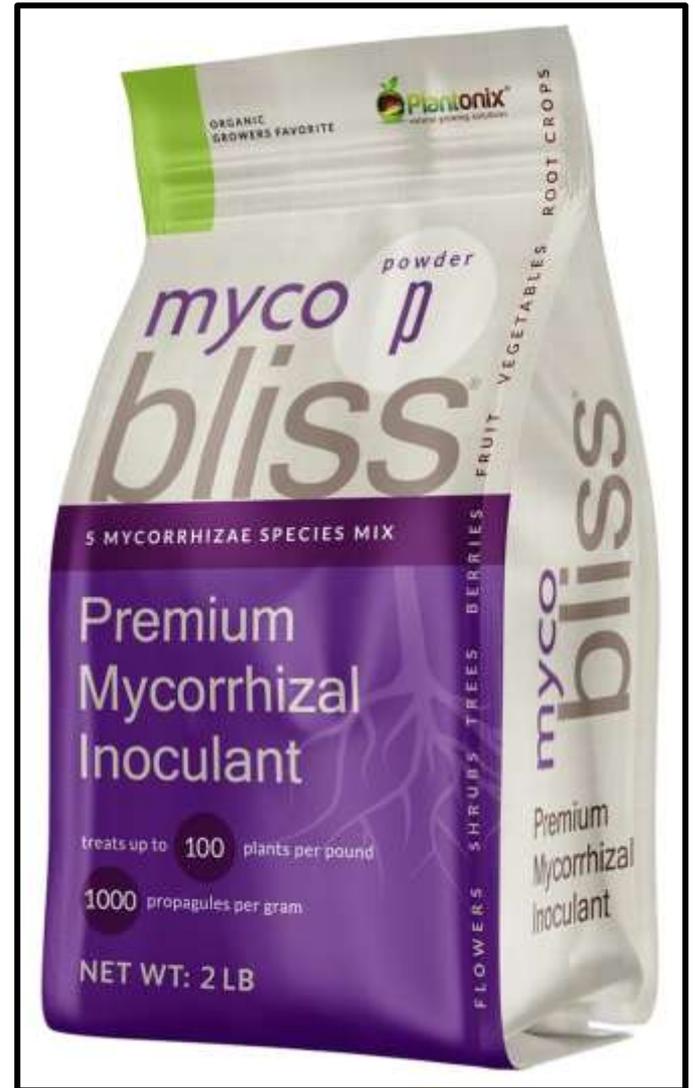
Quantity

1

Add to cart

Buy with shop Pay

# Mycorrhizae Fungal Spores



# “Pristine” Soil



# Worm Farm (Vermicompost)

- Red Wigglers (*Eisenia fetida*)
- Air & Water
- Food scraps, grass clippings, weeds, manure, etc
- Comfort--Worm bin & temp 40-120°F (85°F)

**35** TH ANNIVERSARY  
OVER 200,000  
COPIES SOLD

BY MARY APPELHOF  
AND JOANNE OLSZEWSKI  
FOREWORD BY AMY STEWART

# WORMS EAT MY GARBAGE

- COMPOST FOOD WASTE
- PRODUCE FERTILIZER FOR HOUSEPLANTS AND GARDEN
- EDUCATE YOUR KIDS AND FAMILY

HOW TO SET UP AND  
MAINTAIN A WORM  
COMPOSTING SYSTEM

# Compost Tea Making

For Organic Healthier Vegetables  
Flowers · Orchards · Vineyards · Lawns



Marc Remillard



BN-LINK Heat Mat

10" x 20.75"

Temperature	Power Consumption	Voltage
100°F	100W	120V
110°F	110W	120V
120°F	120W	120V
130°F	130W	120V
140°F	140W	120V
150°F	150W	120V
160°F	160W	120V
170°F	170W	120V
180°F	180W	120V
190°F	190W	120V
200°F	200W	120V

←←←←←

BN-LINK





SEA-90<sup>®</sup>  
MINERAL AND TRACE ELEMENTS  
Known to All Crops and P...  
Including...  
...  
...  
...







# Worm Sifter













PERMA-BRAND PRODUCTS, INC.  
CAUTION!  
Open flame - combustible

Keep away from open flame  
CAUTION!  
PERMA-BRAND PRODUCTS, INC.

DO IT RIGHT  
Lowe's

RESTROOM





# FCMP Essential Living Worm Composter



# Hiwassee Products



# Wormpeople.com

- Capt Matt



- <https://www.memesworms.com/>
- <https://unclejimswormfarm.com/>

# Nashville Client--Hydrangeas



# What If We Brought Together?

- Bacteria & Fungi
  - Air
  - Water
  - Food
  - Comfort/right temperature
- **COMPOST!!!**

# Different Types of Composting

- **Static**
- Thermophilic
- Dr David Johnson Bioreactor
- Korean Natural Farming













# Static Compost (Not Heated)



# Static Compost—Urban Style



# Different Types of Composting

- Static
- **Thermophilic**
- Dr David Johnson Bioreactor
- Korean Natural Farming

# Time & Temp Goals

- 131-150°F—72 hours
- 150-160°F—48 hours
- 160-165°F—24 hours
- 165-170°F—12 hours
- $\geq 170^\circ\text{F}$ —Now

# Where's "Heat" Come From?

- (Air/Water/Food/Comfort)
- Bacteria reproduce every 20 min
  - 1 to 2 in 20 min
  - 2 to 68.7 billion in 12 hours
- Fungal growth too



# What Foods?

- Primary decomposers (Aerobic)
  - Bacteria
    - Less complex materials
    - Simple sugars, green grass, manure
  - Fungi
    - More complex materials
    - Leaves, wood chips, cardboard

# Food Categories

1. Hi-Nitrogen “Hi-N” (C:N=5-15:1)
  - Manure, Alfalfa pellets
2. Green (C:N=20-30:1)
  - Hay, Grass clippings, weeds
3. Woody (C:N=60-400:1)
  - Wood chips, leaves, cardboard, paper, straw







**TROY-BILT**

**10HP CHIPPER SHREDDER**

- Commercial Grade
- 7' Discharge Capacity
- All Steel Design
- Cleanest Chipper Blades

PowerBall

10 HP





# TYPICAL RECIPE

- Hi-Nitrogen
  - Manure Cow, Chicken (15%)
- Green
  - Grass, Hay (35%)
- Woody
  - Leaves, Wood Chips, Cardboard (55%)









# Different Types of Composting

- Static
- Thermophilic
- **Dr David Johnson Bioreactor**
- Korean Natural Farming

# Johnson/Su Reactor

- Dr David Johnson









# Different Types of Composting

- Static
- Thermophilic
- Dr David Johnson Bioreactor
- **Korean Natural Farming**

## Korean Natural Farming

- Indigenous Microorganisms (IMO) 1



# IMO2



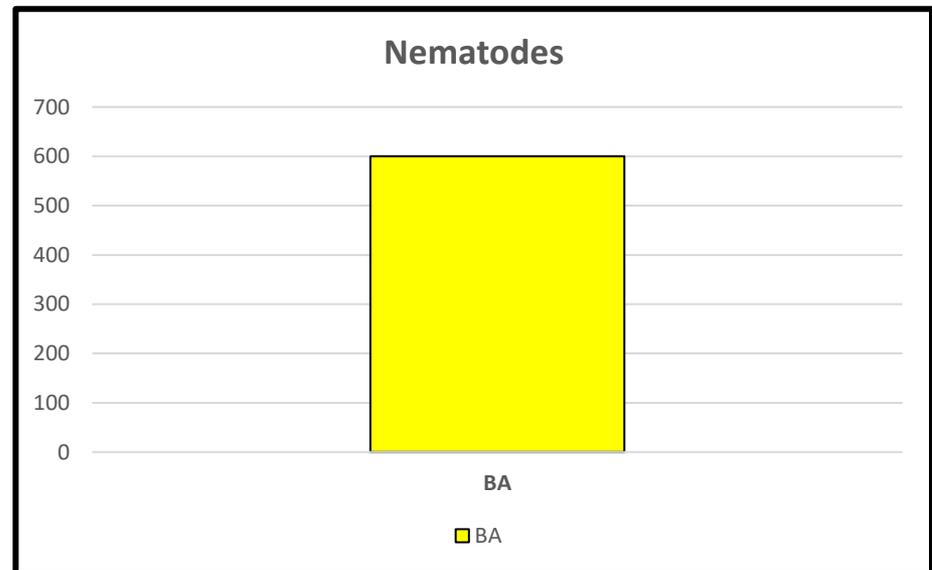
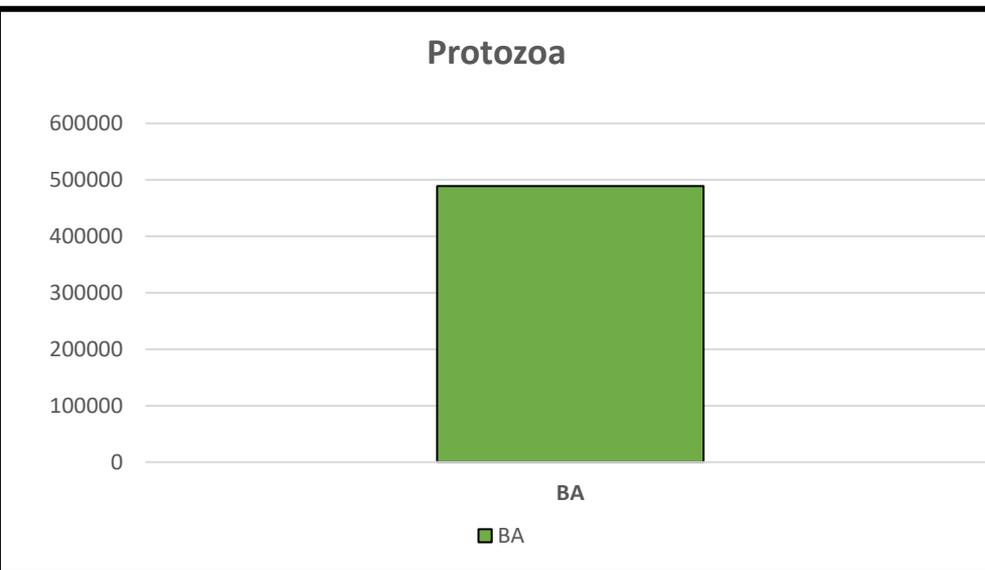
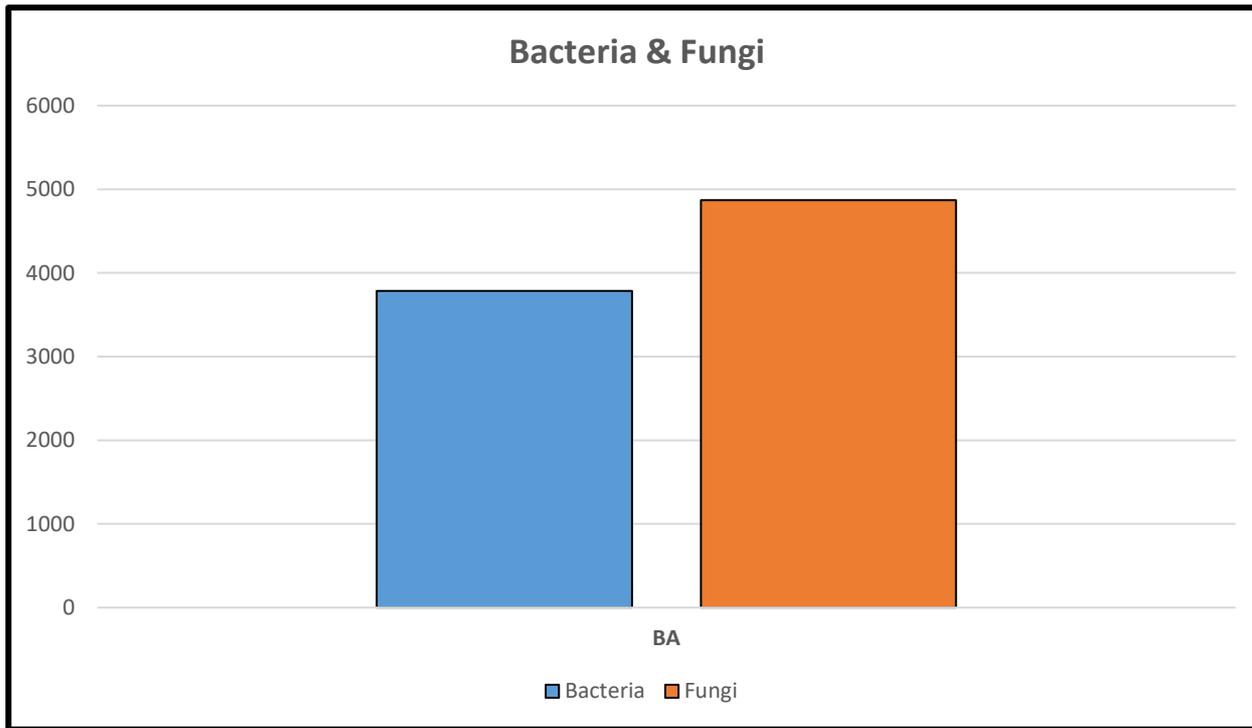
# KNF's IMO 4



# KNF Foliar Sprays







# Underwear Test



# Three Forms of Biology

- Compost—solid
- Liquid Extract—simple liquid
  - Compost + water + agitation
- Compost Tea—“Brewed” liquid
  - Compost + air + water + food + 24-36 hours



# Liquid Extract











# Compost Tea--“Activating Life”

- Compost
  - 2.38% compost, .5% molasses
  - (Tim Wilson @ <https://microbeorganics.com/>)
- Korean Natural Farming
  - IMO, Brown Sugar, ACV, FPJ, OHN, HA











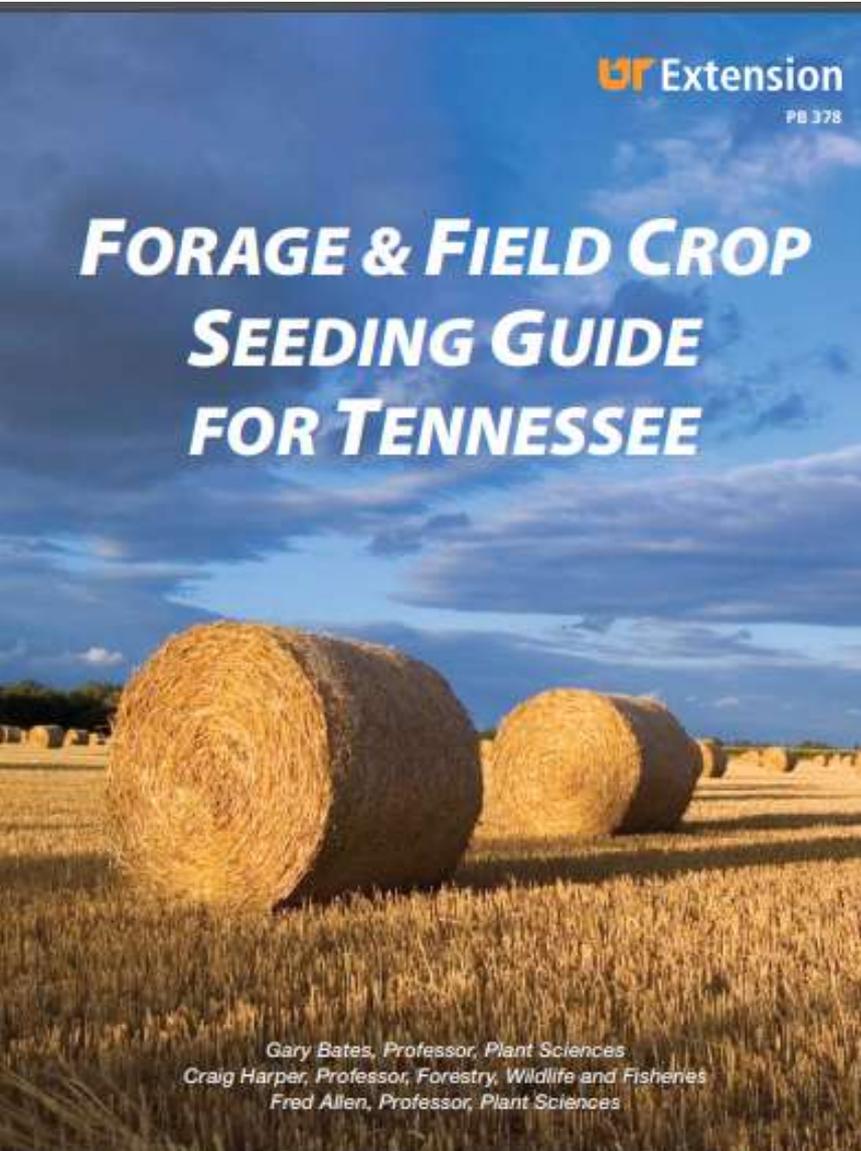
# Microbe Habitat







# Cover Plant Diversity





# What If Mowed 24/7??





# 2025 “Living Soil” Classes

- Sep 6 & 20, 2025 (8:30 AM-4:00 PM)
- Liberty Trace Farm—Hampshire, TN
- Hands-on thermophilic, worms, farm tour, farm lunch
- Details: [www.libertytracefarm.com](http://www.libertytracefarm.com)
- Sign up: [Libertytracefarm@gmail.com](mailto:Libertytracefarm@gmail.com)

**THANK YOU!!!!!!**