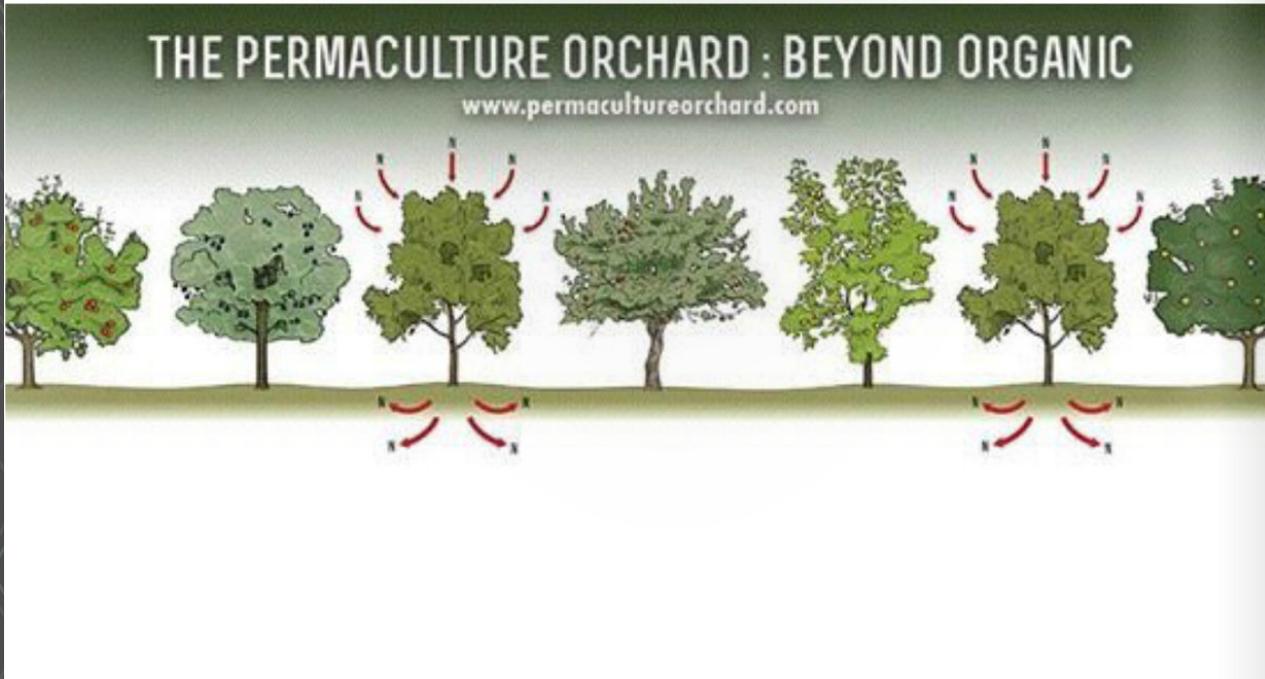




# Soil Preparation, Orchid Layout & Organic Pesticides

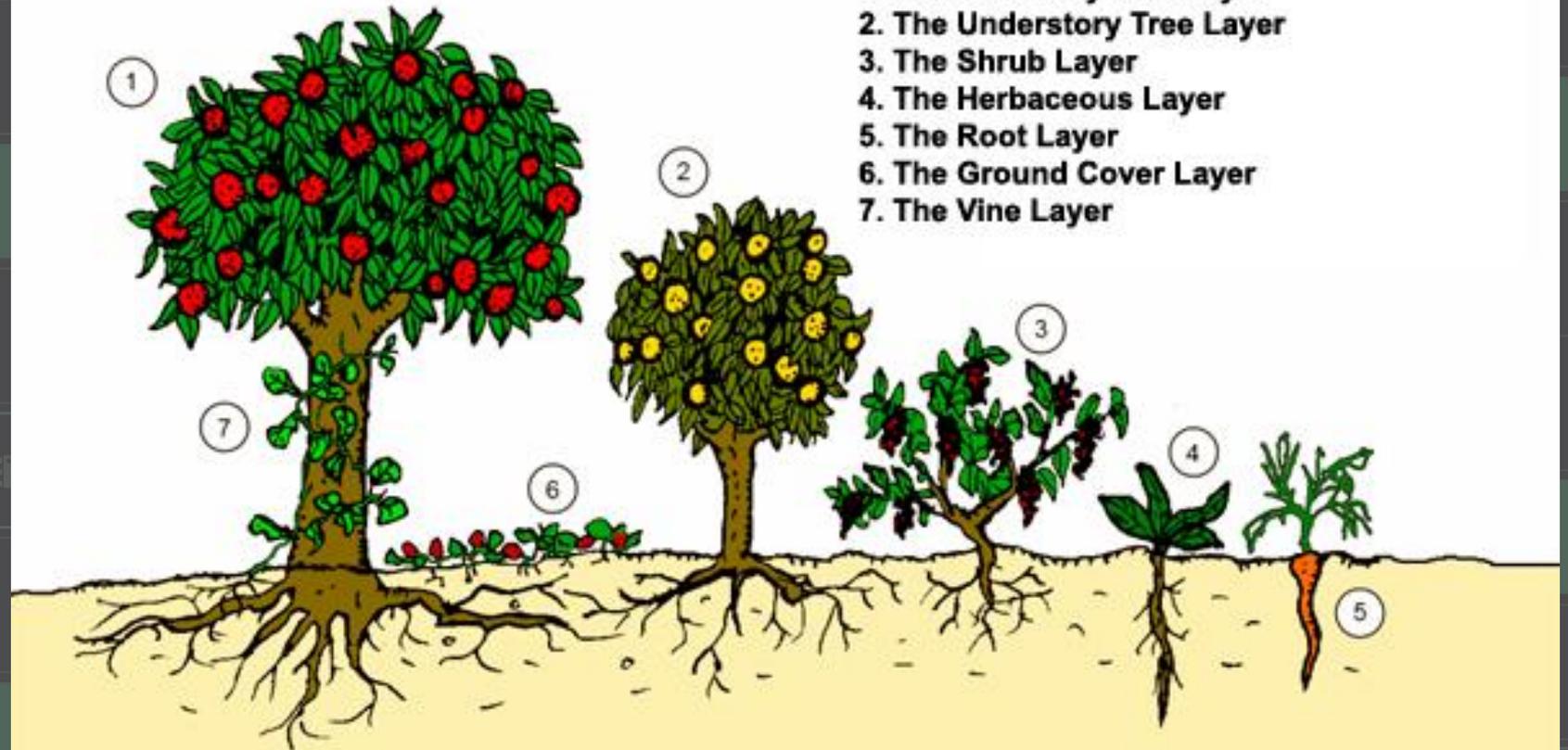
# Orchard Layout

Each fruit tree is next to a N-fixer

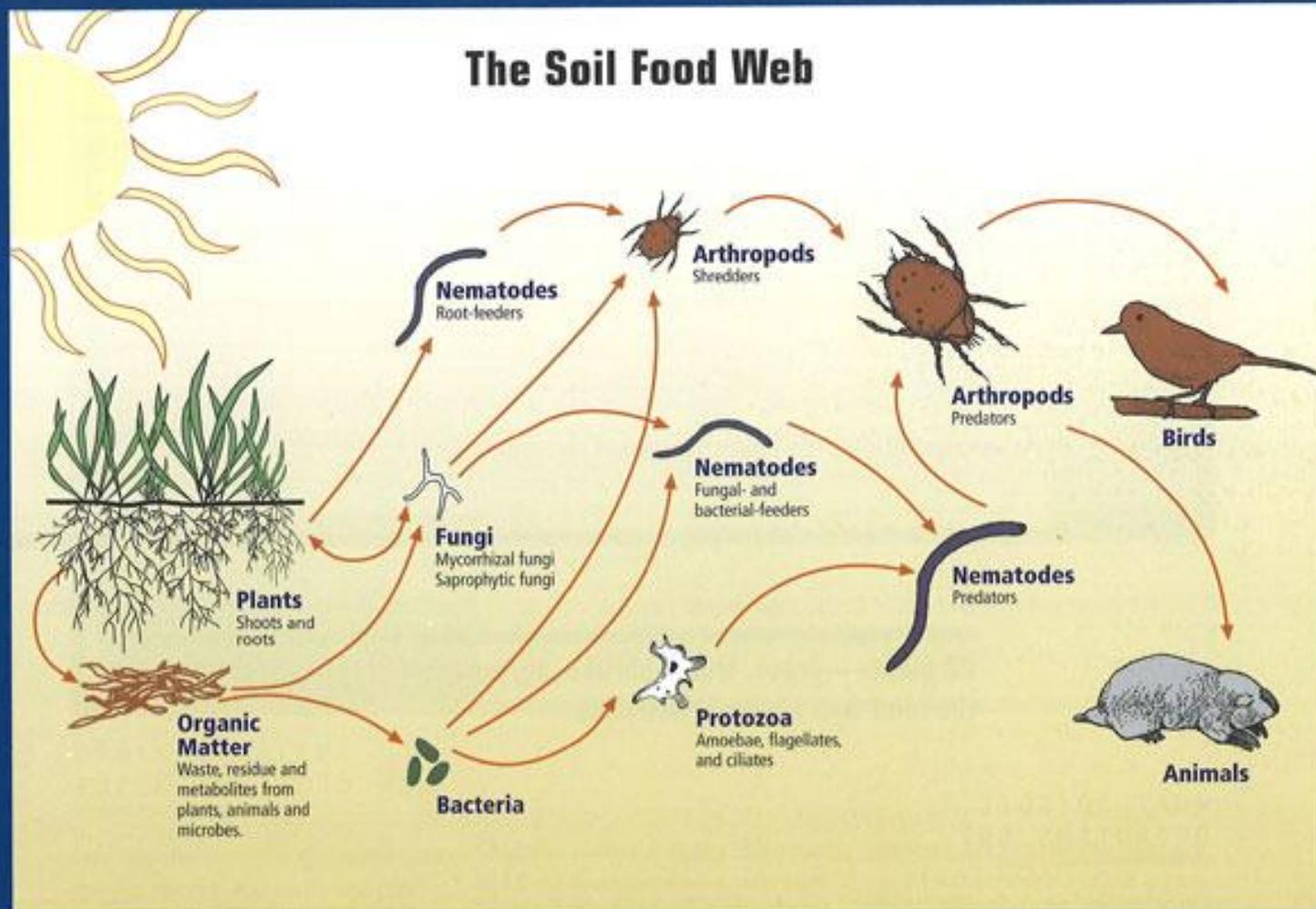


# The Seven Layers of Every Forest

1. The Overstory Tree Layer
2. The Understory Tree Layer
3. The Shrub Layer
4. The Herbaceous Layer
5. The Root Layer
6. The Ground Cover Layer
7. The Vine Layer



# The Soil Food Web



**First trophic level:**  
Photosynthesizers

**Second trophic level:**  
Decomposers Mutualists

**Third trophic level:**  
Shredders

**Fourth trophic level:**  
Higher level predators

**Fifth and higher trophic levels:**

# Vermiculture

What is Vermiculture? Vermiculture is the process of using worms to decompose organic food waste, turning the waste into a nutrient-rich material capable of supplying necessary nutrients to help sustain plant growth.

Why is it useful? It converts waste that would otherwise end up in landfill into a precious resource, so much so its even referred to as black gold in some circles.

Earthworms "act as an innumerable army of pistons pumping air in and out of the soils on a 24-hour cycle (more rapidly at night) - Bill Mollison

# Worm Workers

- Species most commonly used - Eisenia Fetida (Red Wigglers)
- Hermaphrodite
- Breathe through their skin ~ Moisture!
- Hyrdostatic skeletons - 2 fluid coelom chambers
- Birthed fully formed lacking sexual organs - Fully grown 60 - 90 days
- Fully grown at 1 YR
- Lifespan Field Cond 4 - 8 YRS in garden 2-3 YRS
- When forces are measured according to body weight, hatchlings can push 500 times their own body weight whereas large adults can push only 10 times their own body weight



# Types of worms

Earthworms are classified into three main ecophysiological categories:

(1) leaf litter- or compost-dwelling worms that are non-burrowing, live at soil-litter interface and eat decomposing OM (called Epigeic) e.g. *Eisenia fetida*;

(2) topsoil- or subsoil-dwelling worms that feed (on soil), burrow and cast within soil, creating horizontal burrows in upper 10–30 cm of soil (called Endogeics);

(3) worms that construct permanent deep vertical burrows which they use to visit the surface to obtain plant material for food, such as leaves (called Anecic (meaning "reaching up")), e.g.

*Lumbricus terrestris*



# Worm farm

We prefer to be placed in shade in summer and in the sun during winter. Please cut organic material into small pieces as we have only small mouths.

## ✓ Yes

✓ Vegetable scraps



✓ Egg shells  
(grind them finely)



✓ Organic fruit  
(no pesticides)



✓ Shredded paper



✓ Tea bags  
(remove string and staple)



✓ Coffee grinds



## ✗ No

✗ Pineapple



✗ Citrus



✗ Onions and garlic



✗ Oils



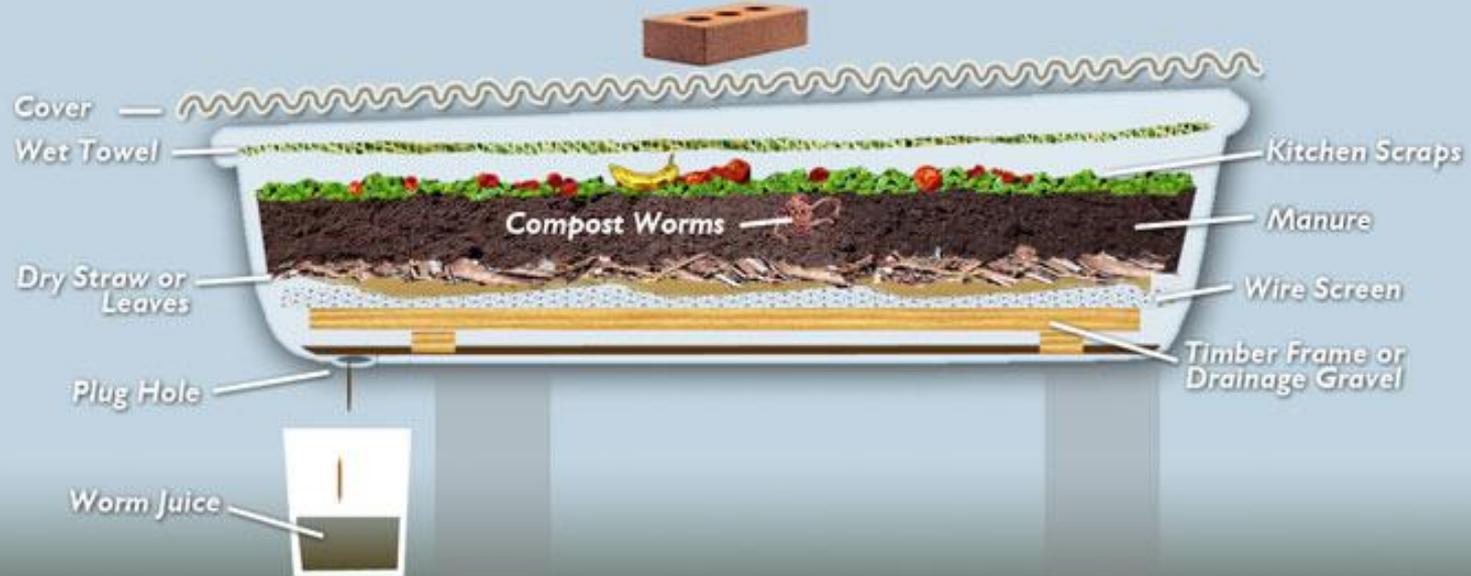
✗ Meat or dairy products



✗ Fresh grass clippings and raw sawdust



# Bathtub Vermiculture



**Bathtub Worm Farm**

## WORM BIN SMELLS BAD 1

- |   |  |
|---|--|
|  Overfeeding            |  Feed less             |
|  Uncovered food scraps |  Bury all food scraps |
|  Too much liquid       |  Drain excess liquid  |
|  No drainage           |  Mix in dry bedding   |

## WORM BIN ATTRACTS FRUIT FLIES 2

- |   |  |
|---|--|
|  Uncovered food scraps |  Bury all food scraps   |
|  Overfeeding           |  Build a fruit fly trap |

## WORM BIN IS TOO WET 3

- |   |   |
|---|---|
|  Overfeeding         |  Feed less             |
|  Not enough air flow |  Mix in dry bedding    |
|  No drainage         |  Add ventilation holes |
|   |  Drain excess liquid   |

## WORM BIN IS TOO DRY 4

- |   |   |
|---|---|
|  Dry bedding recently added    |  Spray bin with water  |
|  Too much air flow/ventilation |  Add several sheets of soaked newspaper to the top of your bin |

# Worm Bin

## TROUBLESHOOTING

A Simple Guide to Diagnosing and Solving Your Worm Composting Bin Problems



## 5 WORMS ARE LEAVING THE BIN

- |  |   |
|--|---|
|  Extremely bad conditions inside bin, <i>this is rare</i> |  Correct bin conditions, <i>worms will only leave if things get really bad</i> |
|  |  Shine light on bin to encourage worms to burrow in bedding                    |

## 6 COMPOSTING WORMS ARE DYING

- |   |   |
|---|---|
|  Extremely bad conditions inside bin             |  Correct bin conditions, <i>worms will only leave if things get really bad</i> |
|  Way too wet, way too dry, no food               |  Correct worm bin temperature  |
|  Extreme temperatures, way too hot, way too cold |   |

## 7 RODENTS IN YOUR WORM BIN

- |   |   |
|---|---|
|  Outdoor worm bin with exposed food scraps |  Move worm bin inside  |
|   |  Keep worm bin sealed  |
|   |  Reduce feeding amount |
|  Overfeeding                               |  Bury all food scraps  |

# Worm Castings & Benefits

- Fresh earthworm castings are 5 x richer in available nitrogen, 7 x richer in available phosphates, and 11 x richer in available potassium than the surrounding upper 6 inches (150 mm) of soil.
- In conditions where humus is plentiful, the weight of casts produced may be greater than 4.5 kg per worm per year.



# Worm Tea

- Can be made using Castings or Leachate ( the juice collected at the bottom of unit or infusing castings in tea)
- Worm teas provide the ability to increase microbiological activity which is the building block for your soil in a chemical free environment.
- Worm teas provide bacteria, fungi, actinomycetes and a host of other good things.

# Worm casting Compounds

- Organic Carbon 20-30%
- Nitrogen 1.8-2%
- Phosphorus 1.2-1.9%
- Potassium 1.2-1.5%
- Nitrogen Carbon 14-15%
- Calcium 3-4.5%
- Magnesium 0.4-0.7%
- Sodium .02-.03%
- Sulphur 0.40%
- Iron 0.3%
- Zinc 0.025%
- Copper 0.0032%
- Boron 0.0032%
- Alumynium Traces 0.070%

These will differ depending upon Vermiculture Inputs

# Worm Tea Preparation Method

To do this, simply grab an old sock or other porous fabric and add one full cup of worm castings and tie it up in a knot. Suspend this in a five-gallon bucket three-quarters filled with clean, cool water.

Drop in an aquarium air stone and cover it up, then let it brew for 24 hours. It is important that not only the water becomes aerated, but the surface tension of the water is disrupted as well.

This gives more CO<sub>2</sub> into the solution and increases the benefits, so a good air source is required. Think of blowing through a straw into your drink cup and watch all the bubbles that are forced into the liquid as that is what you want to achieve.

# Organic Pest deterrents - Chilli Garlic Spray

**Applications** - Use for treatment of - infestations of aphids, white flies, or mealy bugs

## Ingredients

- 12 large cloves of garlic (roughly one whole garlic bulb)
- 6 hot chili peppers, dried or fresh
- 2 cups water
- 1 tablespoon liquid castile soap (Shaklee, Dr. Bronner's, or Kirk's); you can use liquid dish soap, but make sure it does not contain a de-greaser and isn't anti-bacterial

# Directions

1.) Combine the garlic, chilies, and water in a blender and puree until it forms into a frothy orangey-pink concoction. Let the blended ingredients stand overnight to gain potency and so that the solids settle to the bottom. 2.) Pour the mixture through a strainer lined with cheesecloth (you can use coffee filters if you don't have cheesecloth.) Make sure you get all the particles out; otherwise it will clog up your garden sprayer. 3.) Pour the concentrate into a jar with a plastic lid (it will react with metal.) 4.) Stir in the liquid soap and label the jar. 5.) When ready to use, mix 2 tablespoons of concentrate per quart of water in a garden sprayer. Anything stronger than this could cause damage to the plants so don't get aggressive. 6.) Spray infested plants during the late afternoon. If you spray early in the morning, the sun mixed with the spray may burn the plants.