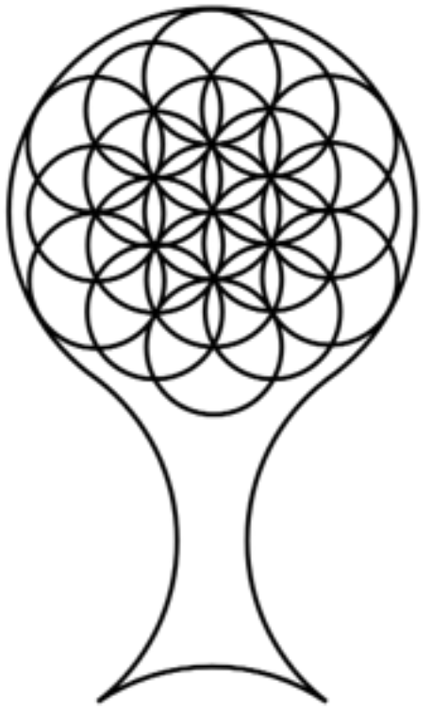
Creating a Healthier Soil Environment



Natural Farming Hawai’i - Macnut Orchard Crops

old paradigm

Ignore beneficial soil biology.

new paradigm

Hope plants attract the correct biology.

natural farming paradigm

Intentionally seeding the most beneficial biology.

Farm Tours in Korea with Master Cho demonstrating success

Natural Farming applied in an orchard environment in Korea

Microscope

- 400x is sufficient
- cost about $400 w/ camera
- essential for experimentation
- quickly and easily check and verify soil biology

Protozoa / **Nematodes** - Recyclers

Fungus - Architects, Engineers

Bacteria - Building Material / Foundation

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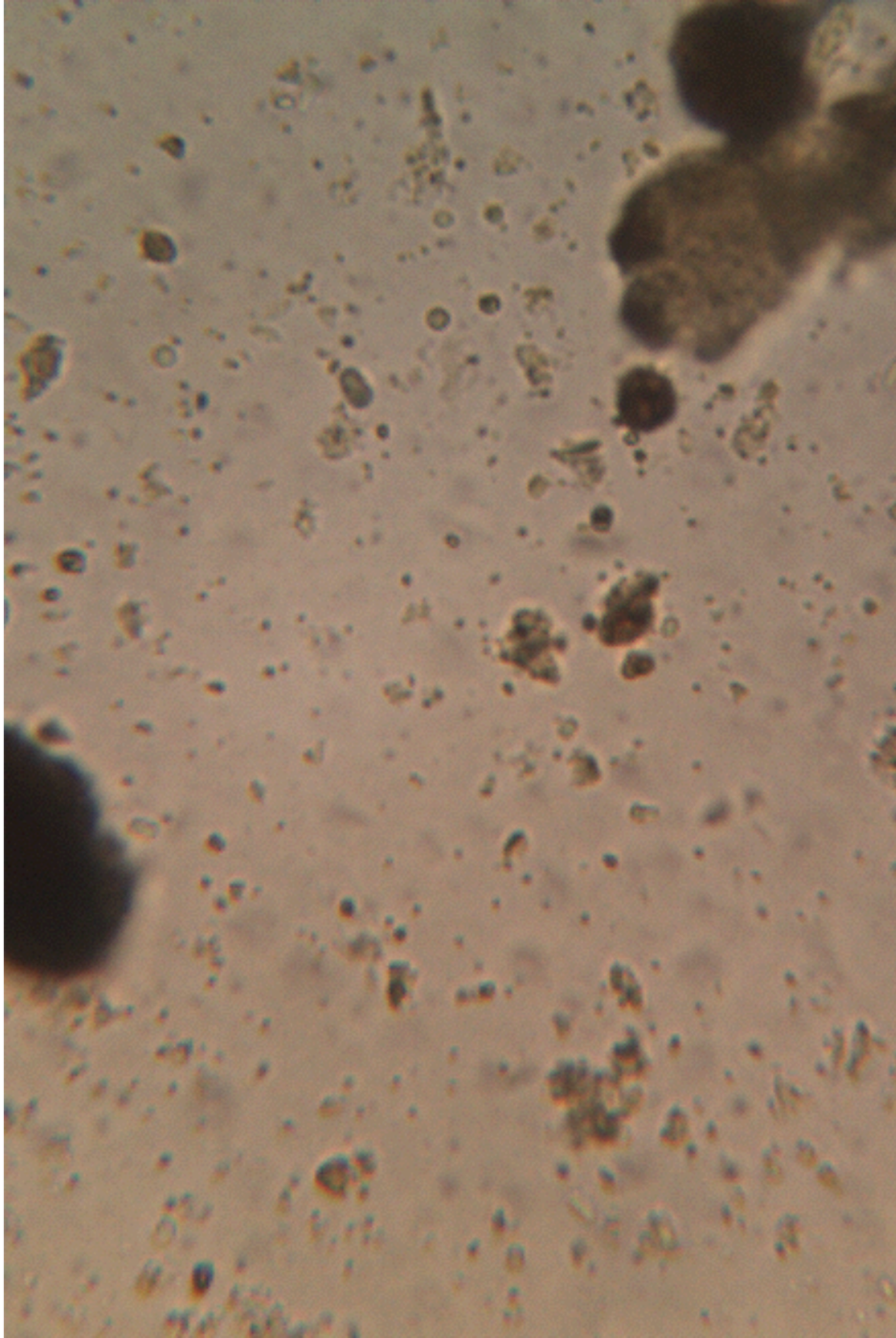
3 Tiers of the Soil Food Web

Focus on Fungus

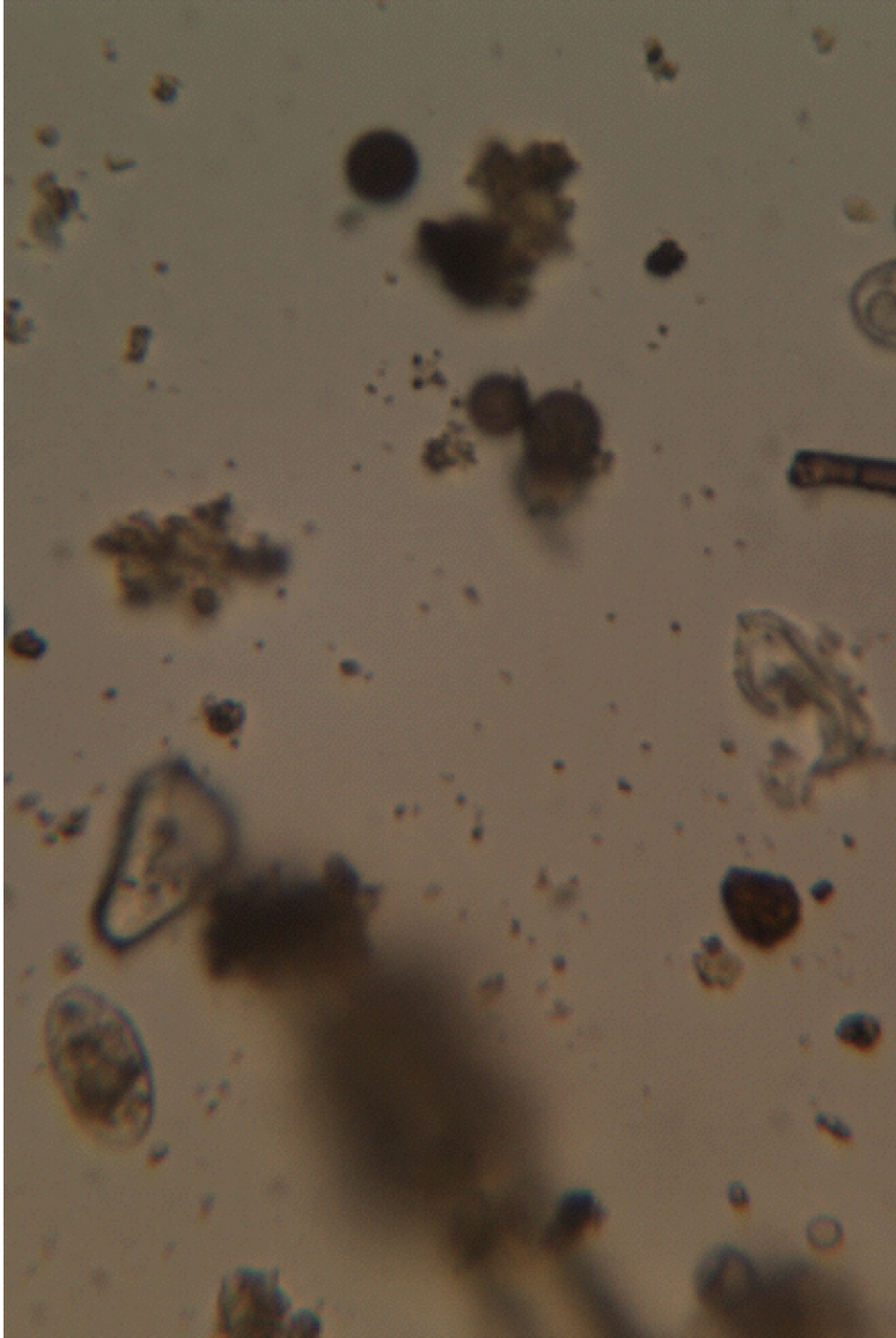
Soil Bacteria

- foundational life found everywhere.
- stabilize and store NPK in body structure, much like how you are made of meat and blood.
- bacteria glue to each other and particles to form aggregates creating soil texture / aeration
- bacteria grow by eating sugars produced by plants / sun
- plant will change sugars to alter bacterial populations



Beneficial Fungus

- most important to natural farmer
- runs electric, water, air lines throughout the soil
- **every plant has beneficial fungus within the plant.**
- plant and soil fungus can join to virtually extends your plants root system millions of miles
- fungus creates larger soil aggregates which allow for movement/management of protozoa and nematodes



Identifying Beneficial Fungus

- uniform width along length
- >3.5 micrometers in width
- brown / darker in color
- 1 chunk of fungus per view at 1:5 dilution indicates equal fungus to bacteria ratios

Nematodes

- abundant and important:
  4 out of 5 multicellular animals

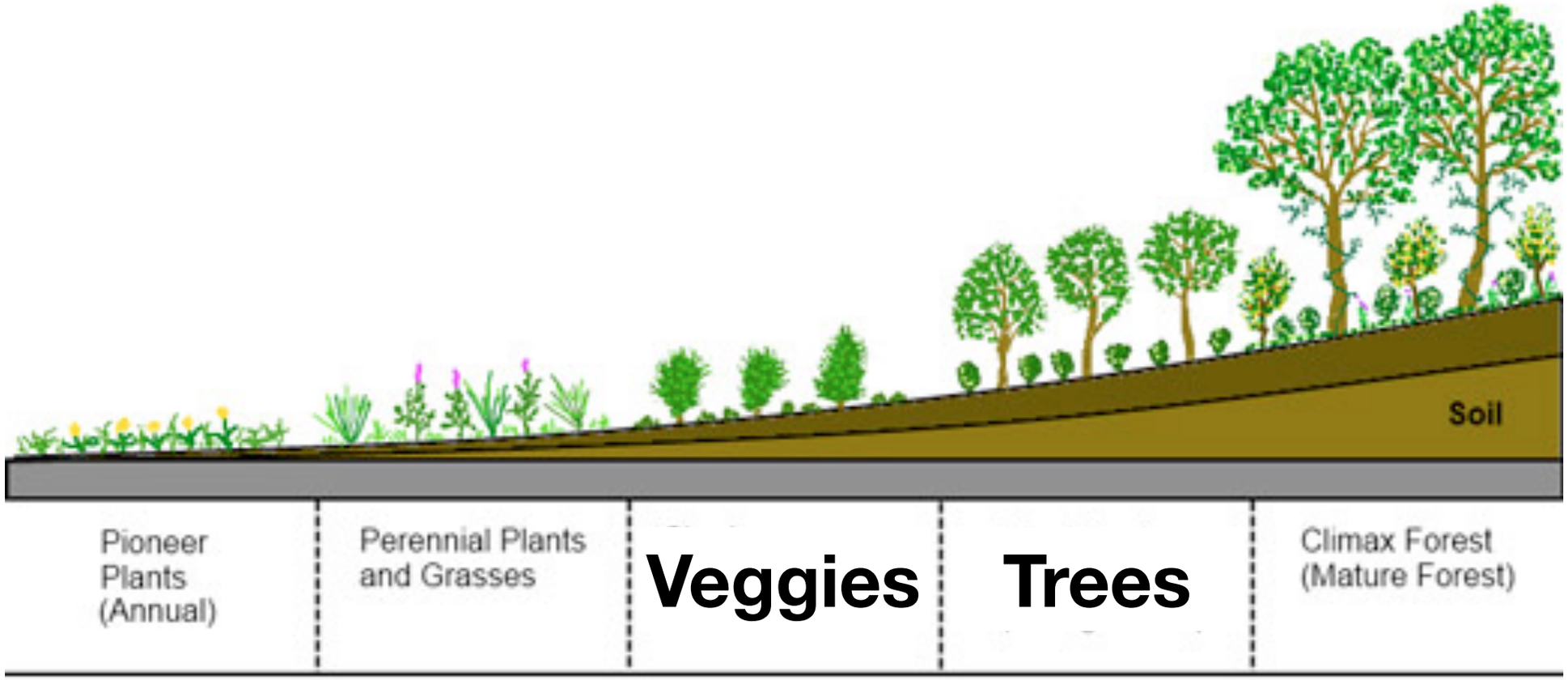
- deposit very rich, plant available food by digesting bacteria and releasing NPK

- concentrates NPK in root zone where bacteria are most abundant feeding on sugars

- activity aerates the soil for plant root hairs.

- nematodes will naturally be in balance in soils with ample beneficial fungus

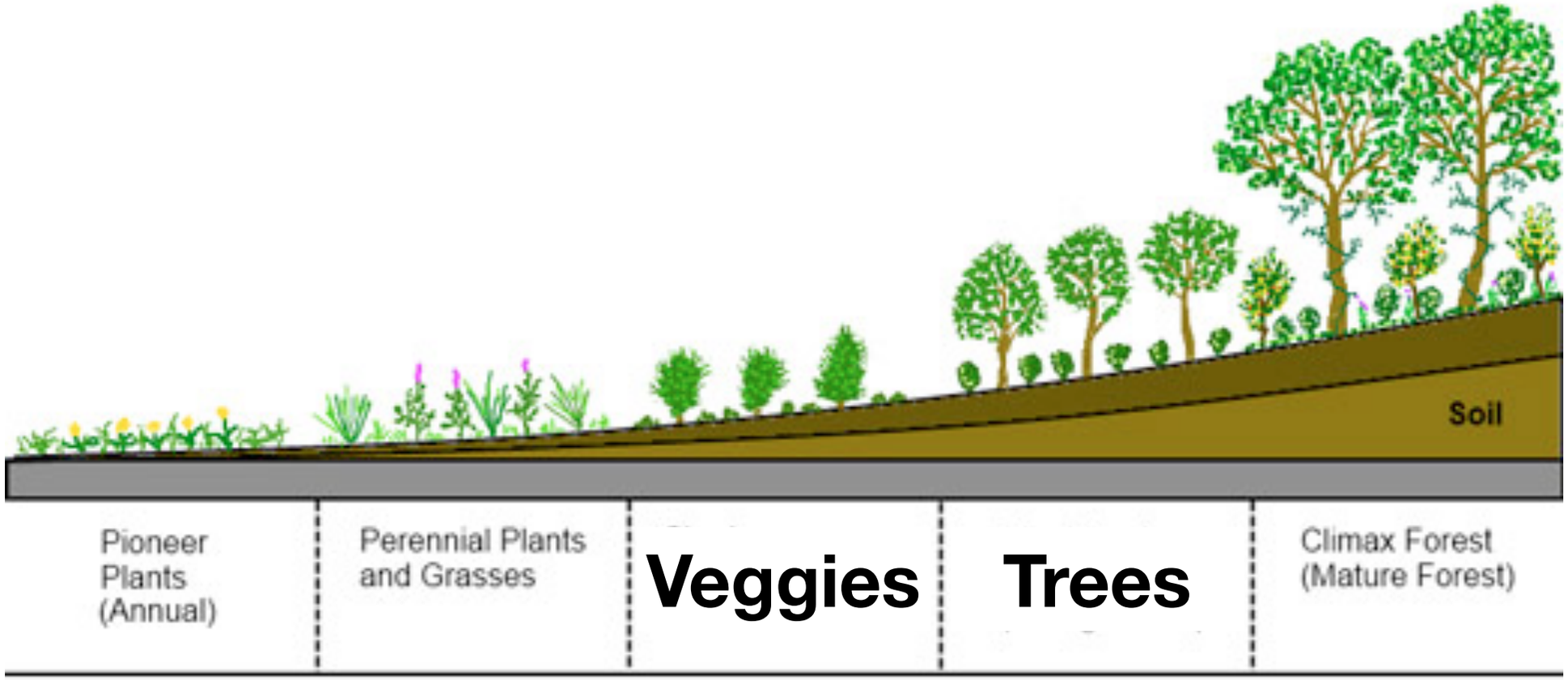
Key: Plant / Biology Relationship



	Weeds			**Veggies**	**Trees**	
Bacteria	10	100	500	600	500	700
Fungus	0	10	250	600	800	7,000

Often, we'll start here with major soil disturbances and toxins

Key: Plant / Biology Relationship



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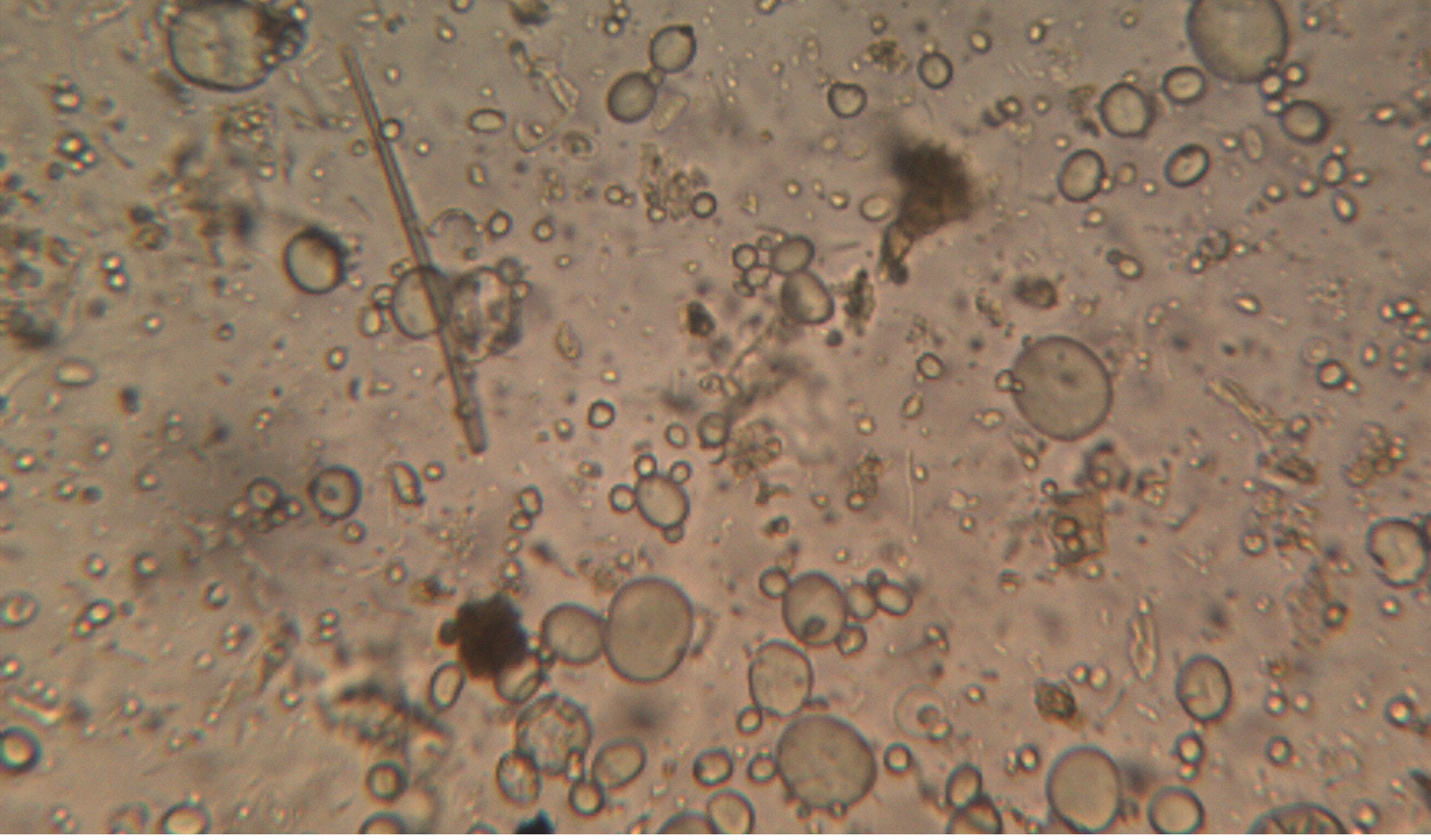
CHO IMO#4 can rapidly get any conventional farm here



IMO#4 = fungal spores

A four step process to
concentrate optimal biology

Collect and Concentrate Beneficial Fungal Spores

cultured in a forest environment
with 500:800 bacteria:fungus

Bulk up the culture with food. When temperatures approach 120 spores are formed and the pile is turned. Dirt is added to adapt fungus for soil.

Liquid inputs are sprayed to feed biology and
encourage fungus to expand it’s networks feeding trees

Natural Farming Orchard Prices

- **$680 / acre** soil foundation - once year for first 3 years
- **$1-4000 / acre per year** - weekly maintenance spray
- http://tiny.cc/NFHawaiiPrice

Orchard Benefits

- grass and weeds under trees naturally subside = reduced mowing

- trees regrow from the inside out = dead trees return to life

- farmers do not have to apply poisons: all natural farming inputs are edible and safe

- natural fertility increases over time = less labor/cost in the long run; work with better biology.

- robust orchard immune system

Any Questions?

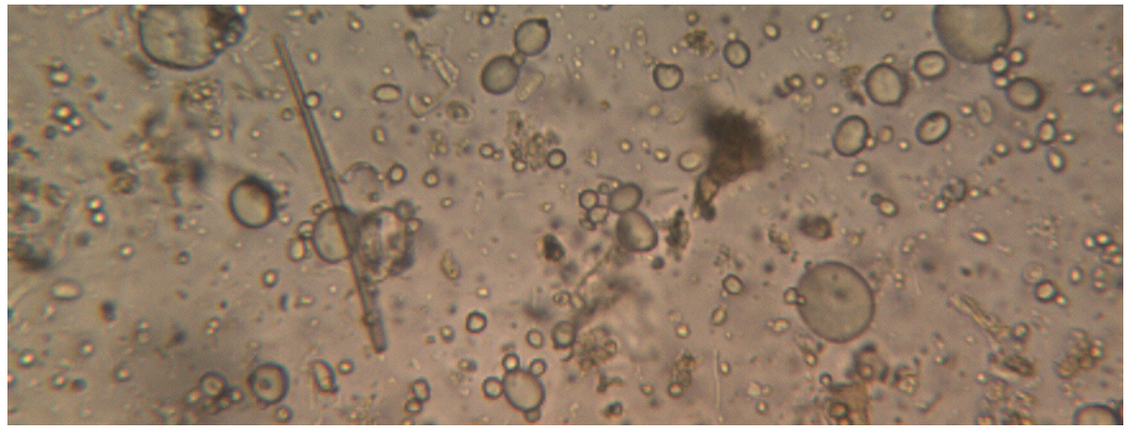
- drake@NaturalFarmingHawaii.net
- **may the beneficial fungus be with you!**

Macnut Farm Tour in Kohala

- http://tiny.cc/NFHawaiiMacnuts

Transforming Kamehameha Avenue

Kalaniana’ole School Garden



we make and study IMO

What we were interested in is the IMO's and concepts of the Korean Natural Farming as it may apply to Macadamia Nut Orchards. Related subject matter in a healthier soil would be aeration, organic matter and ??? You tell me. How can older orchards be improved? Do we have to start over again from scratch?

We have heard so much about IMO and the Korean Natural Farming, yet it seems to be oriented towards row crops. So its potential application to orchard crops was the inquiry of the organizing committee of the conferecne. Growing macadamia's in the unique soils of the Big Island is challenging and expensive. I feel like I'm so constrained in how to keep my orchard green and productive...I am contained within the chemical "box" and do not how or what I can do to think "outside of this box".