BioComplete™ Extract and Tea Course

Lecture 4 - General Concepts (Part 2)

Biomass Levels in BioComplete™ Extracts and Teas

How many prey organisms do predators eat on a daily basis?

- Protozoa eat around 10,000 bacteria per day (bacterial-feeders).
- Nematodes and Micro-arthropods eat 5 to 10 fungal cells per day (fungal-feeders).

Given these feeding rates, is there an adequate amount of prey biomass present?

- If yes, then add the predators.
- If no, then add food for the prey BEFORE adding the predators.

Think Things Through

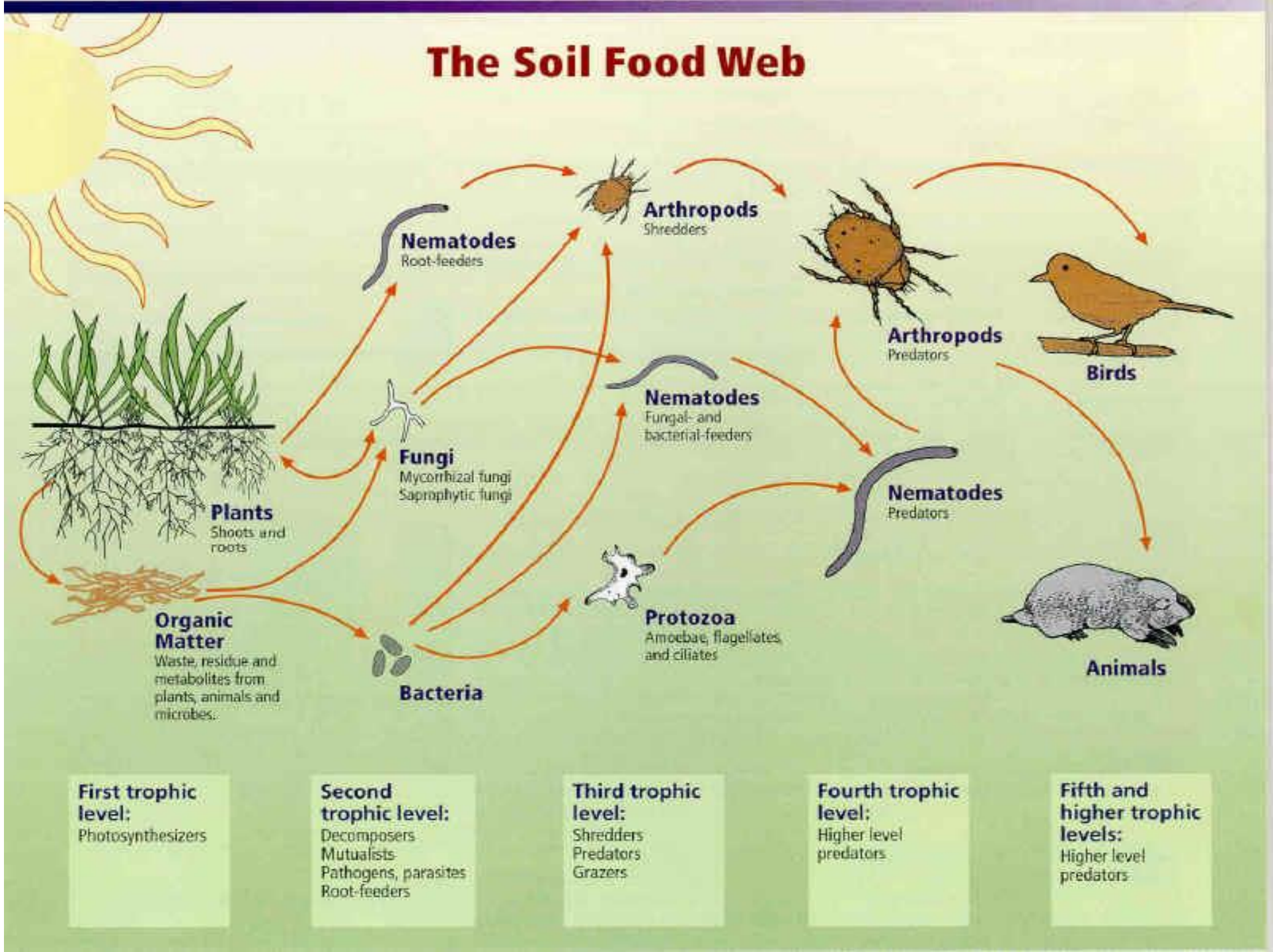
Which groups decompose organic matter?

- Add the types of organic matter that will grow the organisms that are too low.
- If organism groups are missing completely, an inoculum of those organisms will be needed.
- PLUS foods to feed them once you add them back in.

Which groups prey on bacteria or fungi?

- Make sure bacteria and fungi are present and have high enough biomass to bear being eaten.

Who are the predators?



A Healthy Food Web Will:

- Suppress Disease (competition, inhibition, consumption; no more pesticides!)
- Retain Nutrients (stop run-off, leaching)
- Nutrients Available at rates plants require (eliminate fertilizer) leading to flavor and nutrition for animals and humans
- Decompose Toxins
- Build Soil Structure –(reduce water use, increase water holding capacity, increase rooting depth)

Biomass Levels in BioComplete™ Extracts and Teas

- But what if you do everything right, and the food web just isn't growing?

- Talk to the client and field manager…… what exactly has been done in the field? Is drift happening? What's happening with compaction? Did you get the facts on water quality? It's important that you talked about this before signing a contract and set the stage for having to increase the amount of compost, or having the client stop negative practices.

Summary of the Inoculum /Food Question

How much BioComplete™ Compost is needed?

1. Assess biology in the soil.
2. Determine which groups are too low or too high.
3. Add and/or feed bacteria if biomass is low (rare).
4. Add and/or feed fungi if biomass is low.
5. Add bacterial predators if bacterial biomass is too high.
6. Add fungal predators if fungal biomass is too high.

Topics

Definitions

BioComplete™ Compost / Extracts / Teas, Leachates, Ferments, Manure Tea, Put-to-Sleep Teas

General Concepts

Assurance of Success, Foods, Biomass levels, Diversity, Water Quality, Temperature, Aeration

Extracts - Massaging, Duration, Storage

Teas - Foods, Extraction, Aeration, Duration

Application – Pumps, Timing, Cleaning

How Diverse Should the Groups be?

- At least 10 to 15 or more different types of bacterial species should be recognized.
- At least 5 to 10 different fungal species should be observed.
- Several different types of flagellates and amoebae should be observed.
- Since we observe such a small amount of sample using a 1:5 to greater dilution, any beneficial nematode found is good. If the client wants to pay for nematode ID to feeding group, then a Baermann funnel extraction is needed.

Make certain all these bad organisms are not present, or capable of growing

- Human pathogens
- Plant pathogens
- Weed seeds
- Root-feeding nematodes
- Insect pests
- Parasites

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Water Quality

1. Assess water quality in the Initial Site Assessment.
2. Check for heavy metals, pesticides, and E. coli.
3. Filtration to remove contamination is possible, as is talking to land owners “upstream” to prevent toxics from moving into the water.
4. High levels of aerobic biology can complex toxics into the structure of the organic matter thus removing the danger of heavy metals. Pesticides can be decomposed into non-lethal compounds by a healthy soil food web.
5. Increase soil surface organic matter, make sure high levels of biology are maintained to complex toxics. The important fact is to maintain active biology.

The Biological Way to Deal with Chlorine and Chloramine

1. Chlorine (a gas) can be removed by aeration although how much aeration is required to fully remove the gas is difficult to determine.
2. Chloramine is NOT a gas and must be neutralized by addition of organic acids. But how much organic acid?
3. Humic acid has a dark brown, 70% cocoa chocolate color which is lost by reaction with chlorine or chloramine. Thus, test to see how much humic acid is needed to cause a color-change in the water. Generally, one drop of humic acid per gallon will deal with normal chlorine/chloramine levels. If no color change is observed, continue adding drops of humic acid until color change is observed.

Diluting Preservatives

1. Sealed containers of foods such as fish hydrolysate, humic acid and fulvic acid, must contain preservatives to prevent microbial growth. The preservative used generally is phosphoric acid, which can be neutralized by adding adequate amounts of water. Check package to see recommended amount.
2. Use water warmed to ambient temperature when adding foods to BioComplete™ Compost, Extracts, or Teas. Since water from wells or even the tap can be quite cold, fill a tank with water so it can warm up to ambient temperatures.

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Temperature for BioComplete™ Extract / Tea

1. Brew at the temperature the BioComplete™ Extract or Tea will be applied. If cold (below 50 F), the brew cycle may need to be extend to 48 hours. At hot temperatures, the BioComplete™ Tea may be finished in 18 hours. Monitor using the microscope to determine when growth ---- increase in biomass --- ends.
2. Allow the normal daytime – nighttime temperature shifts to occur. This results in a wider diversity of species to wake up and be active for part of the brew cycle.
3. Spraying temperatures: Make sure the BioComplete™ Extracts and Teas are produced at ambient temperatures.

Temperature for BioComplete™ Extract / Tea

1. In the early spring, organisms may grow slowly as temps are cool. Nutrient cycling may be limited.
2. As plants begin to photosynthesize, exudates start to flow from the roots, and microbes will start to grow rapidly. We really want to have the groups of missing organisms applied BEFORE this point.
3. Plants try to pull in all the nutrients they need to go through flowering, reproduction, and seed production BEFORE flowering. If plants don’t get the nutrients they need before that time, plants will pull nutrients from their oldest leaves, a sign the plant is stressed, and something is wrong in the soil.

Temperature for BioComplete™ Extract / Tea

4. Get BioComplete™ Extract drenches on the soil, or injected into the soil around the roots as soon as lower leaves start to yellow.
5. If you are watching carefully, you can catch the signs of problems, and get things fixed before the plants suffer.
6. As flowering occurs, the exudates into the root system drop off markedly, as demonstrated by the reduction in microbial growth. All the plants energy is focused on those seeds, and exudates peter off to very low levels.

Temperature for BioComplete™ Extract / Tea

7. Some late season fungal diseases depend on the reduction exudate “support” to reduce surface coverage of beneficial microbes. For these plants, a late season application of tea may be very important.
8. Weeds and annual plants generally put all their remaining energy and nutrients into their seeds. Perennial plants translocate any nutrients left in the aboveground plant material into the roots. In both cases, hot, dry conditions help produce brittle, “standing dead” plant material with wide C:N, which is good fungal food.