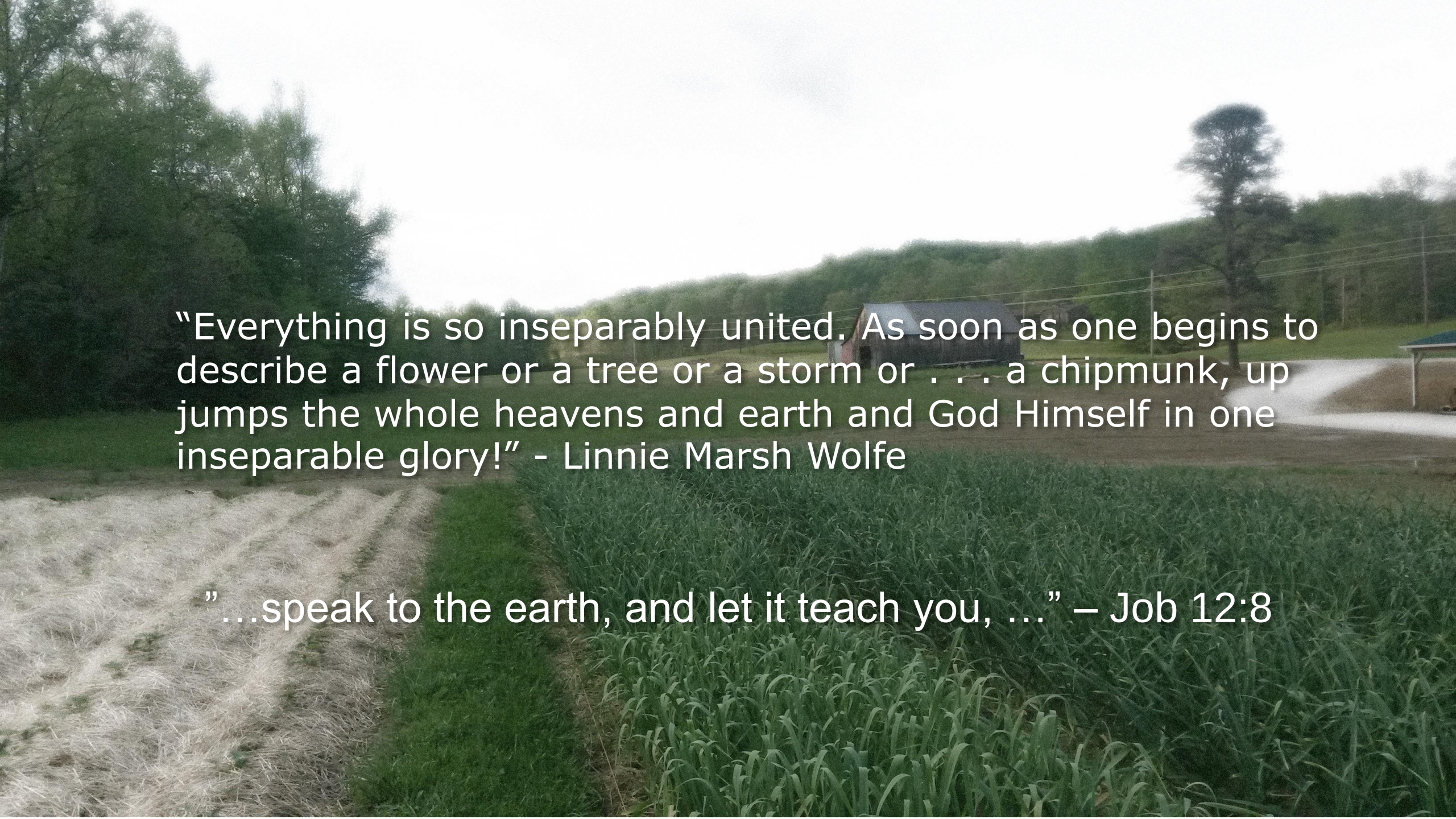
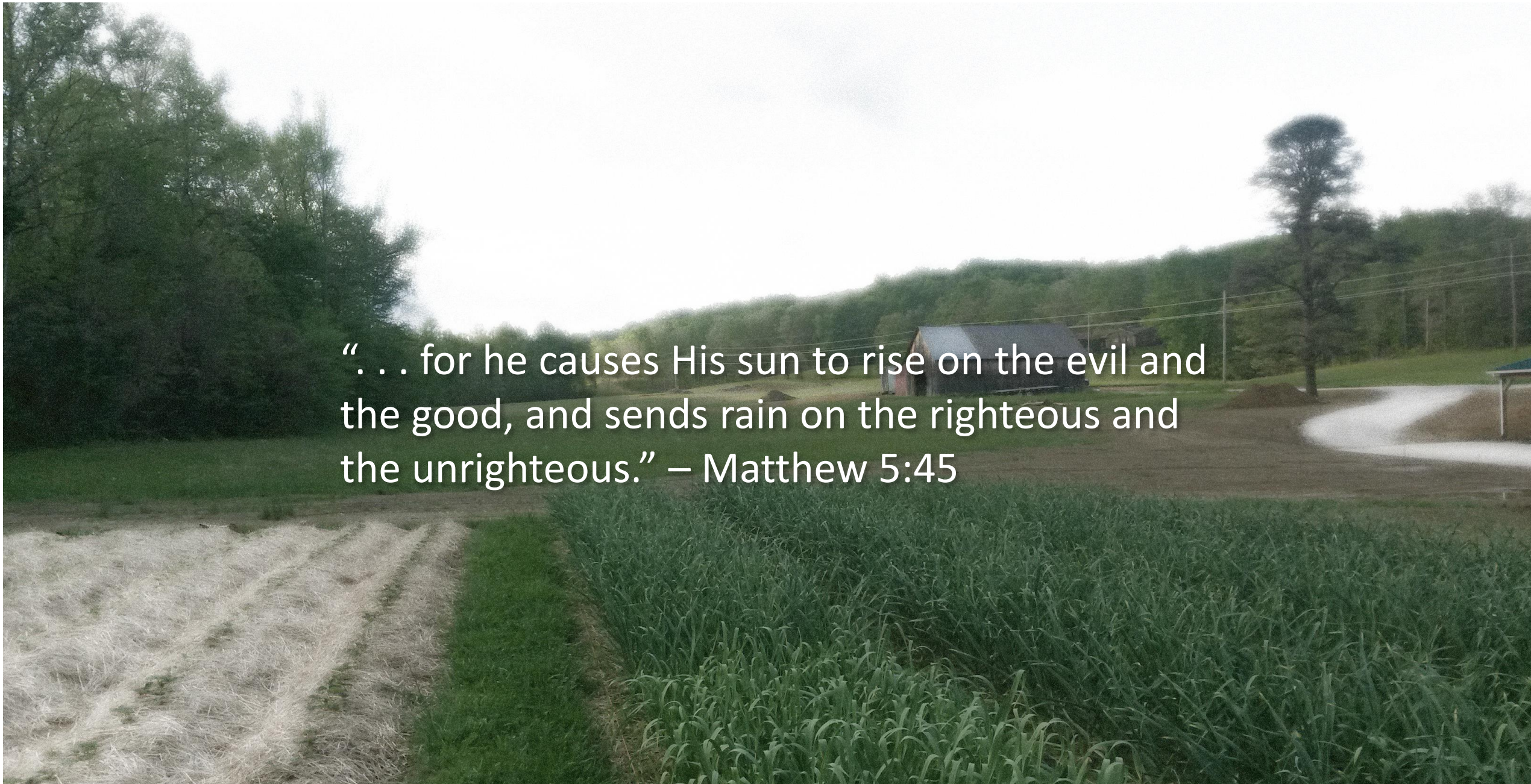
SOIL FERTILITY FUNDAMENTALS:

WHAT COULD POSSIBLY GO WRONG?


“Everything is so inseparably united. As soon as one begins to describe a flower or a tree or a storm or . . . a chipmunk, up jumps the whole heavens and earth and God Himself in one inseparable glory!” - Linnie Marsh Wolfe
”…speak to the earth, and let it teach you, …” – Job 12:8

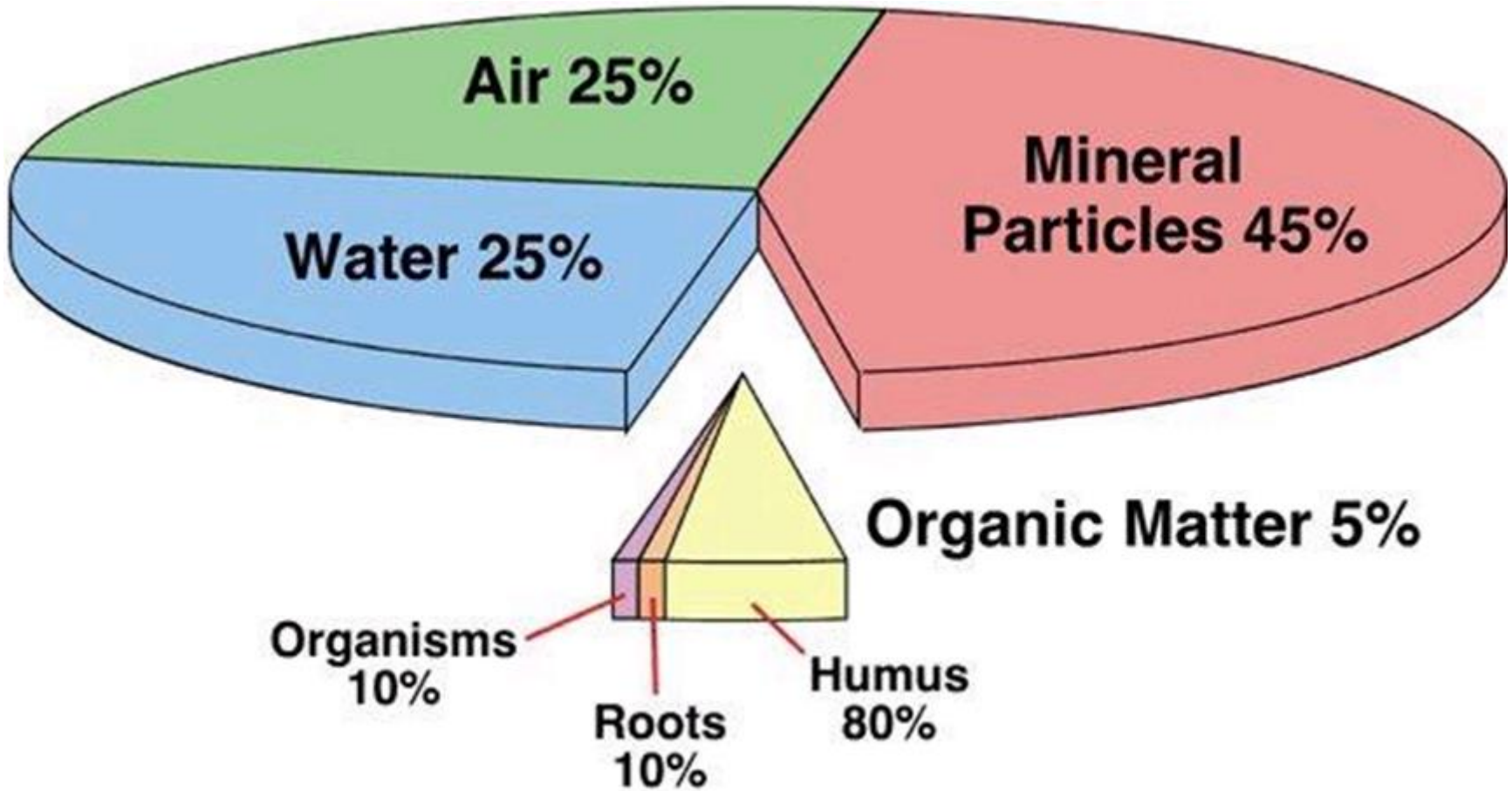

“. . . for he causes His sun to rise on the evil and the good, and sends rain on the righteous and the unrighteous.” – Matthew 5:45


Seeds want to grow.


What is organic growth?
Seeing what you look at.


Intervention: Imposed or imparted?


Is there an ideal/model soil?

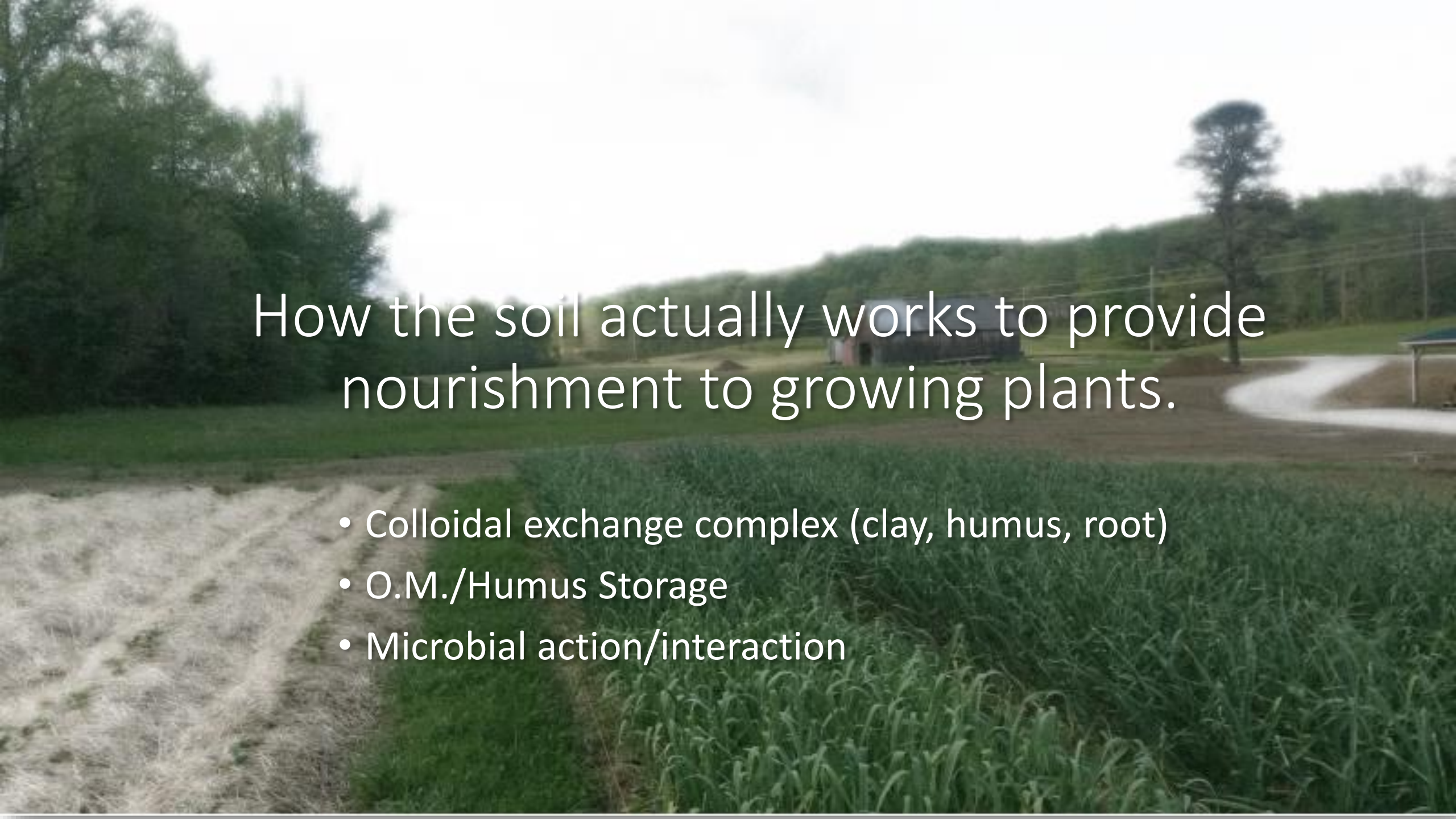

Air 25%
Water 25%
Mineral Particles 45%
Organic Matter 5%
Organisms 10%
Roots 10%
Humus 80%

Different schools of thought

- Conventional – Selective chemistry mediation
- Organic – Farm generated mediation
- Bio-Dynamic – Holistic, esoteric mediation
- Permaculture – Natural ecosystem mediation
- Biological – Microbial mediation
- Albrecht/CEC – Complete and balanced chemistry mediation
- Regenerative – Microbial mediation

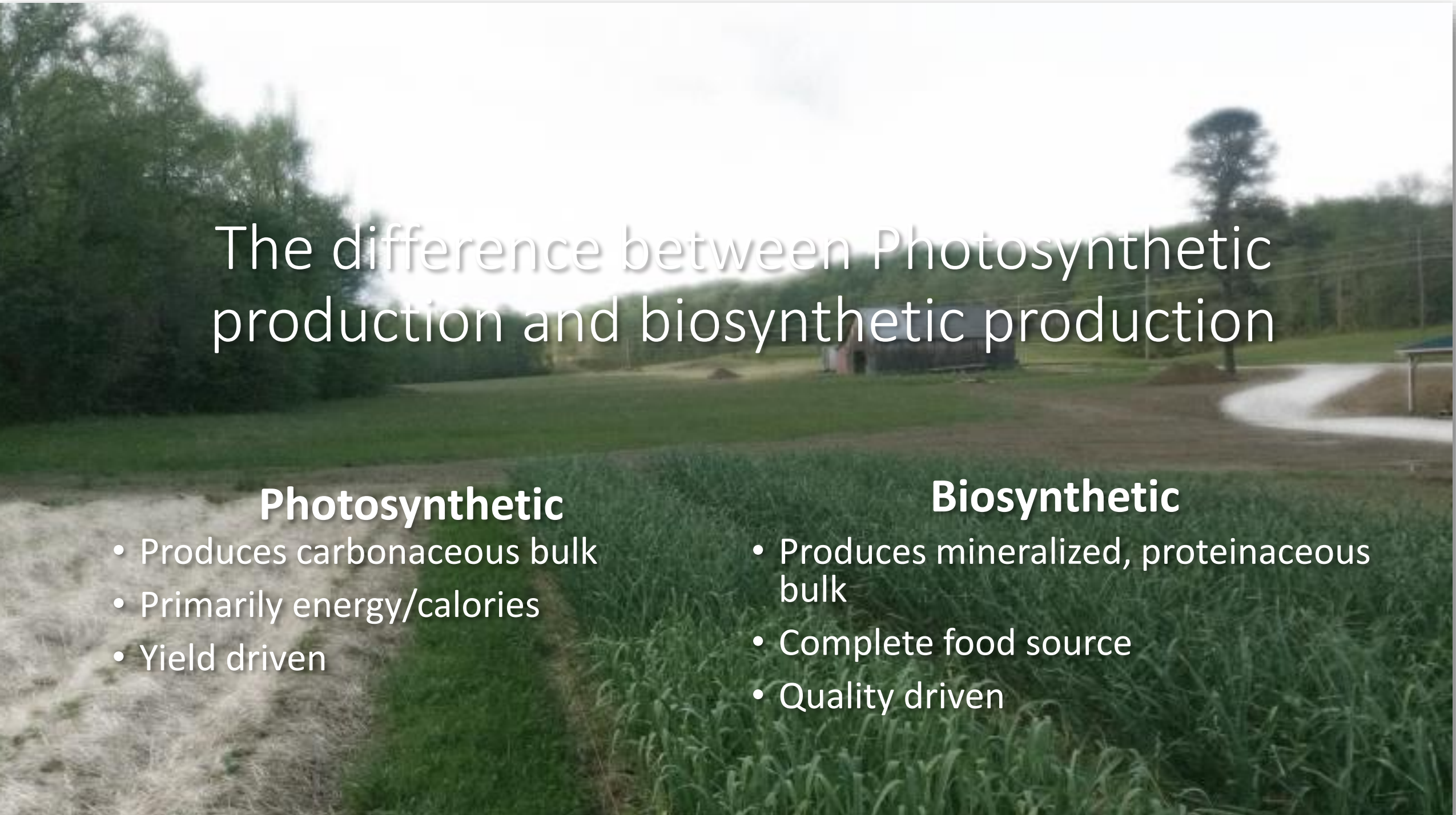
Soil health principles

- Complete and balanced chemistry
- Living roots in the ground.
- Keep it covered
- Diversity
- Minimal disturbance
- Know your context



How the soil actually works to provide nourishment to growing plants.

- Colloidal exchange complex (clay, humus, root)
- O.M./Humus Storage
- Microbial action/interaction



The difference between Photosynthetic production and biosynthetic production

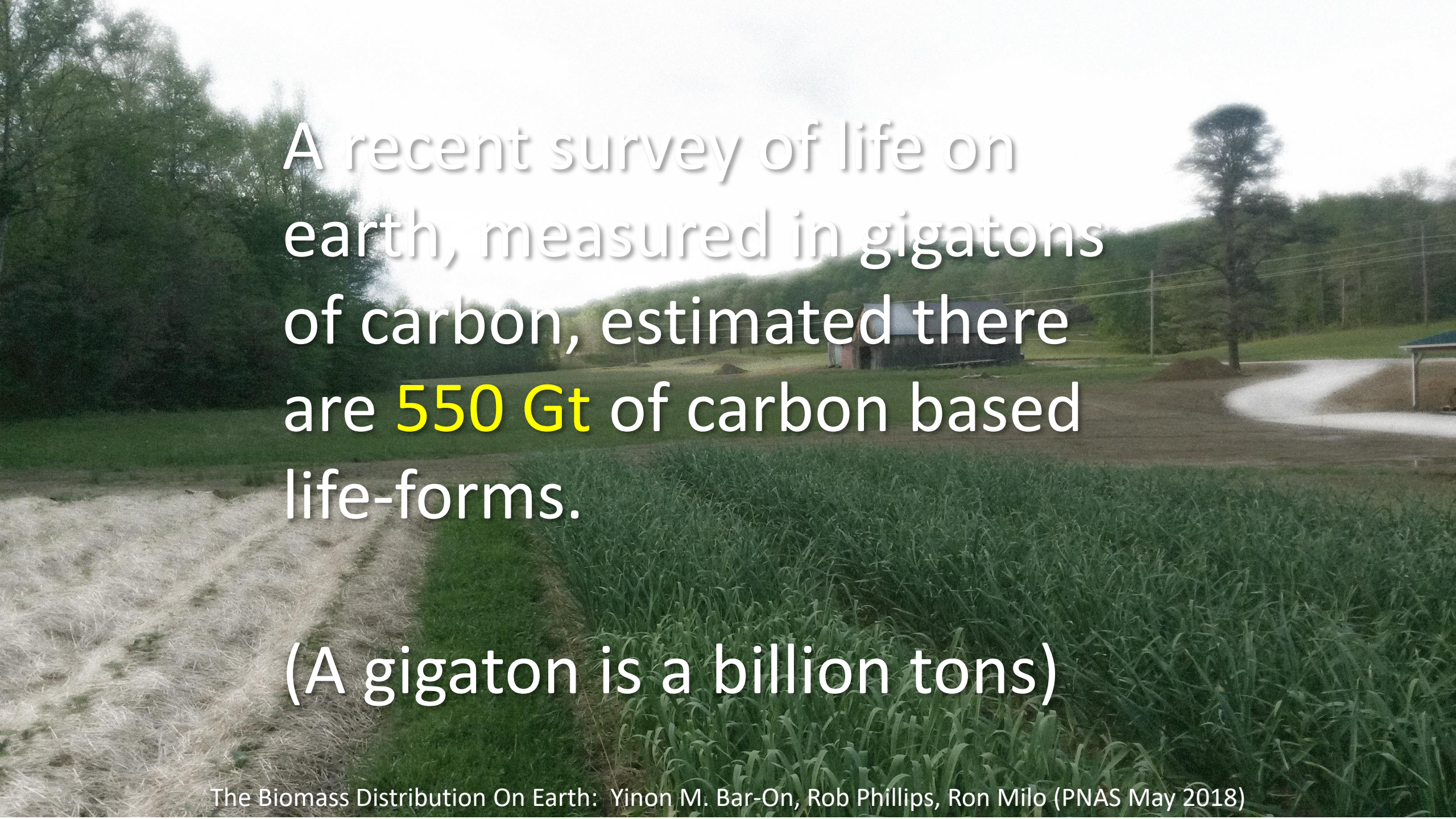
Photosynthetic

- Produces carbonaceous bulk
- Primarily energy/calories
- Yield driven

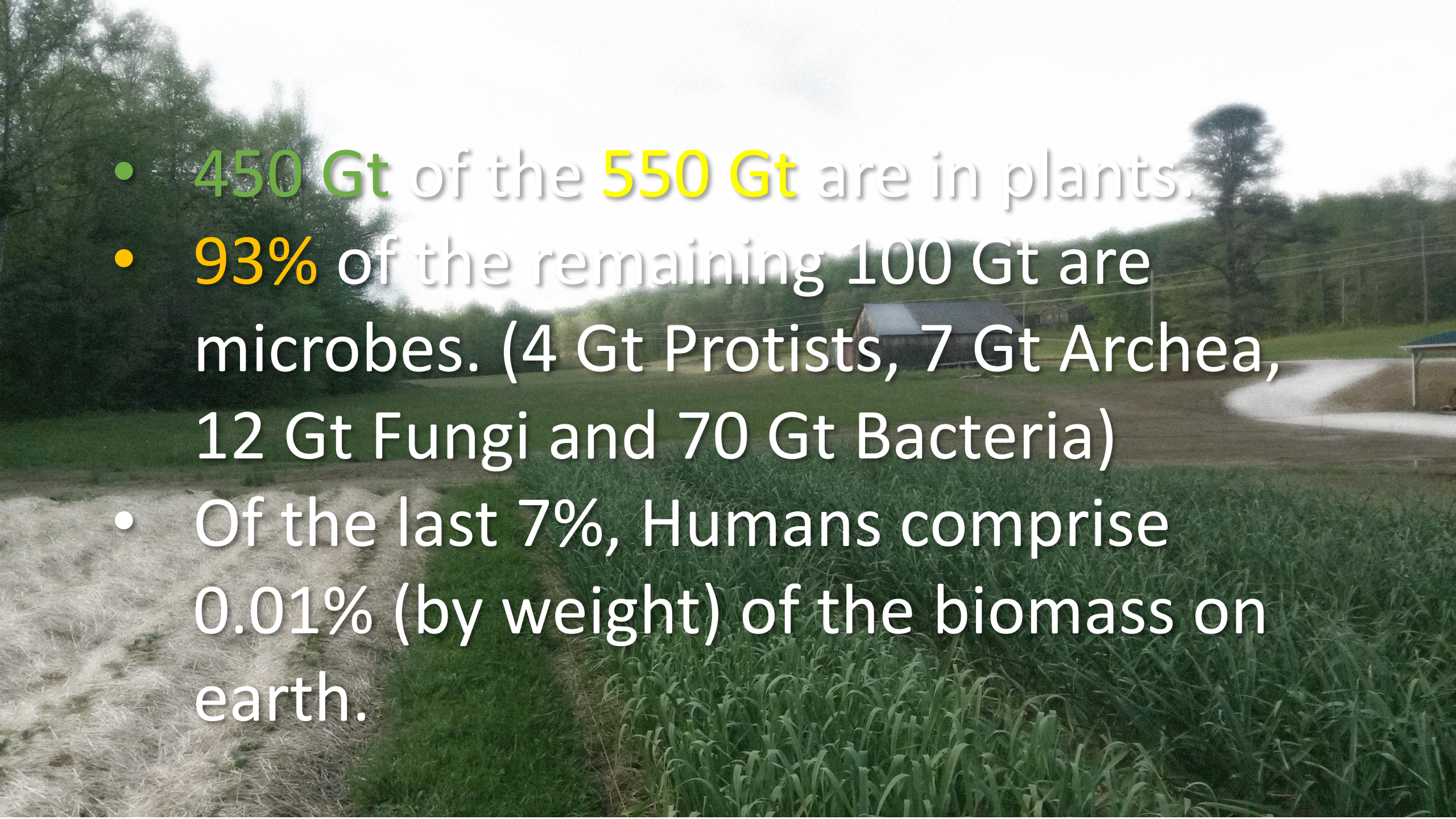
Biosynthetic

- Produces mineralized, proteinaceous bulk
- Complete food source
- Quality driven


Feed the soil and let the
soil feed the crop



The Biomass Distribution On Earth: Yinon M. Bar-On, Rob Phillips, Ron Milo (PNAS May 2018)

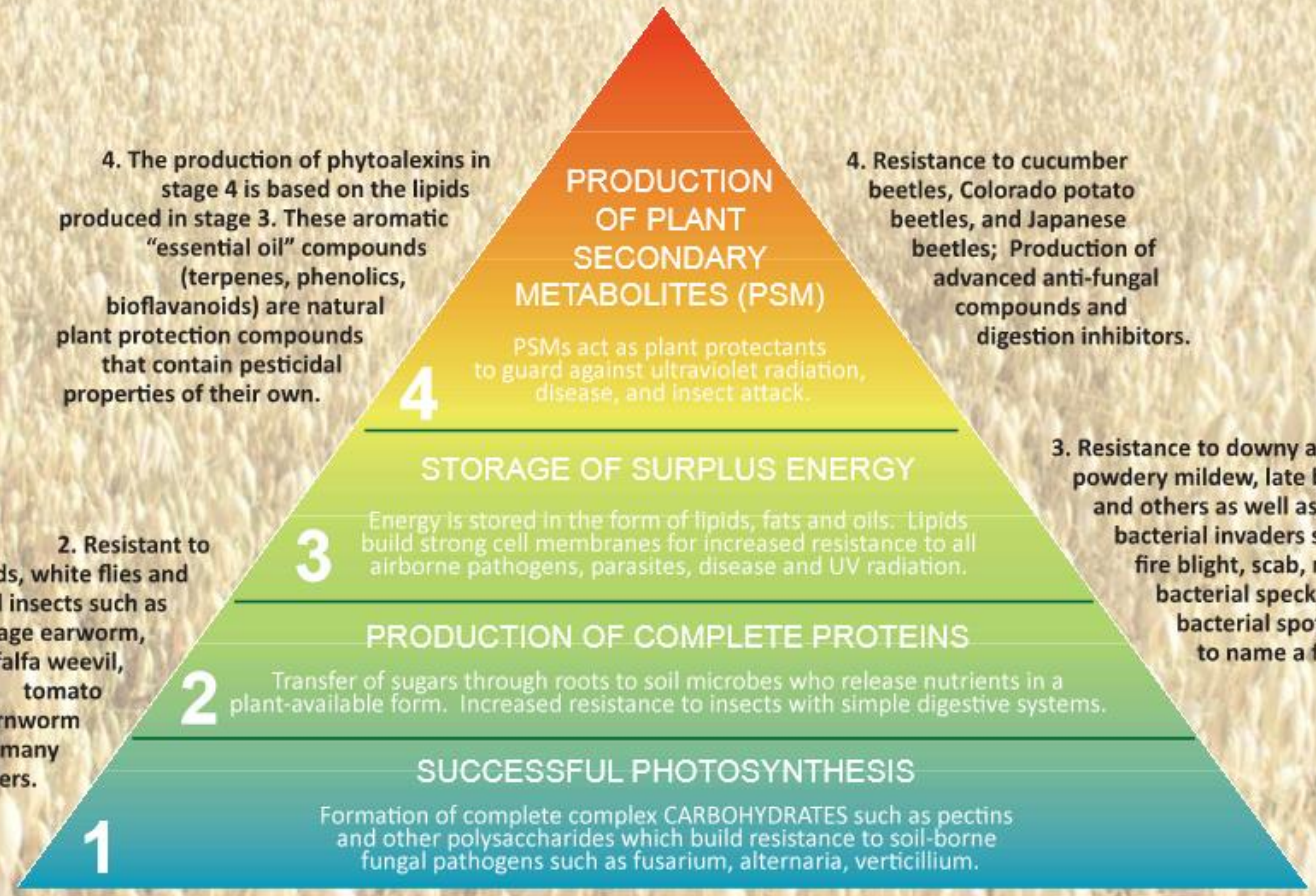


- 450 Gt of the 550 Gt are in plants.
- 93% of the remaining 100 Gt are microbes. (4 Gt Protists, 7 Gt Archea, 12 Gt Fungi and 70 Gt Bacteria)
- Of the last 7%, Humans comprise 0.01% (by weight) of the biomass on earth.

Insects and diseases

Optimal Nutrition Enables Advanced Function in Plants

As soils and crops transition toward biological farming practices, they pass through stages of increasingly better health. The progression toward better health restores the natural and biological abilities of the plant and soil system. Innate characteristics and advanced functions are enabled such as immunity to soil and airborne pathogens, resistance to insects, production of lipids which strengthen cell membranes for tastier, more storable fruit, and more.

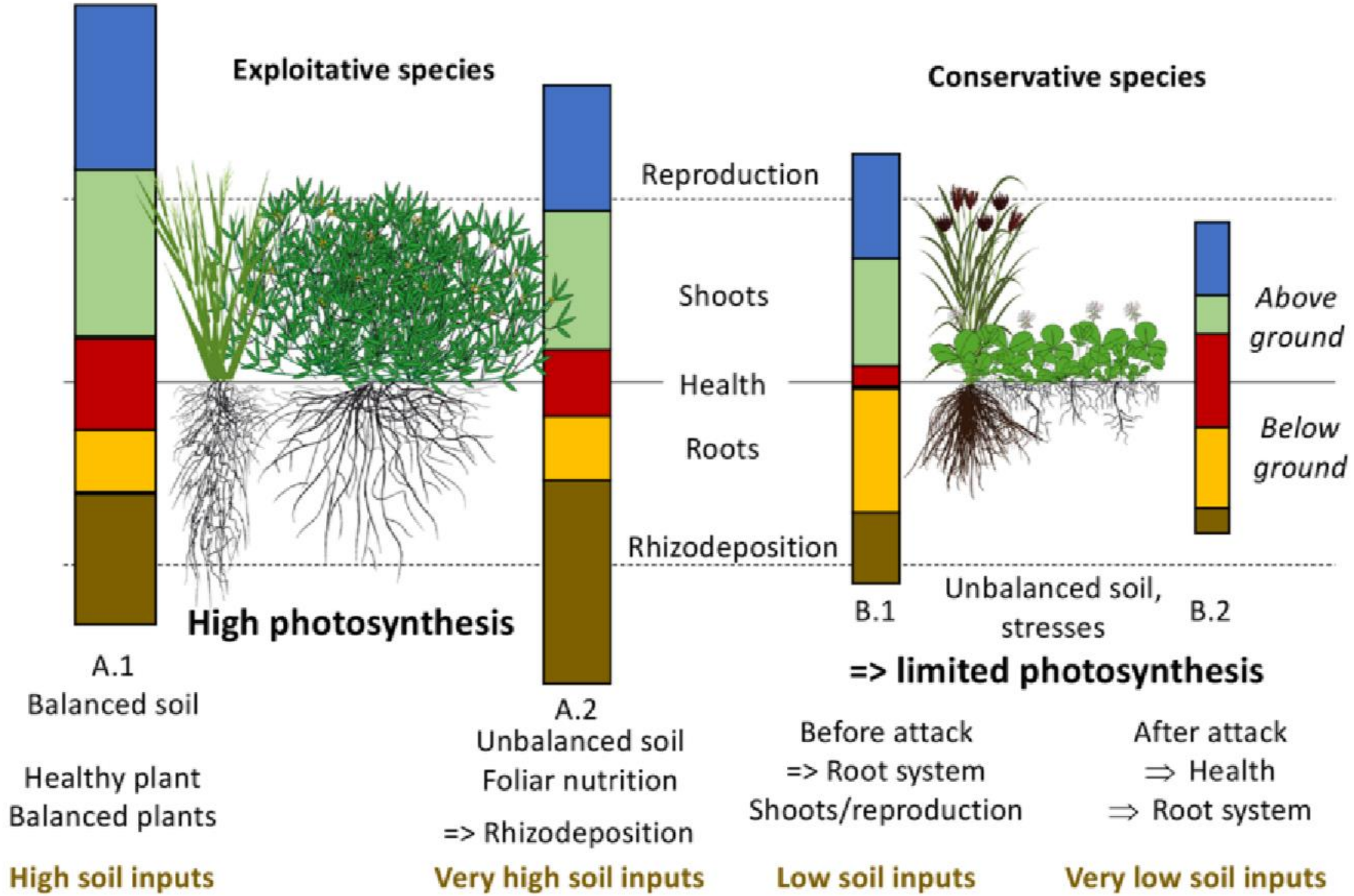


If we wish to produce "food as medicine" this is where the medicine is.

Weeds

Causes

- Parent material
- Environmental influences
- Incomplete and/or imbalanced mineralization
- Inappropriate porosity and/or capillarity


Exploitative species
Conservative species
Reproduction
Shoots
Health
Roots
Rhizodeposition
Above ground
Below ground
High photosynthesis
A.1
Balanced soil
A.2
Unbalanced soil
Foliar nutrition
=> Rhizodeposition
B.1
Unbalanced soil, stresses
B.2
=> limited photosynthesis
Healthy plant
Balanced plants
High soil inputs
Very high soil inputs
Before attack
=> Root system
Shoots/reproduction
Low soil inputs
After attack
⇒ Health
⇒ Root system
Very low soil inputs


Questions?