



# Biotics in Soil Restoration & Site Revegetation

Restore – Reveg - Reclaim



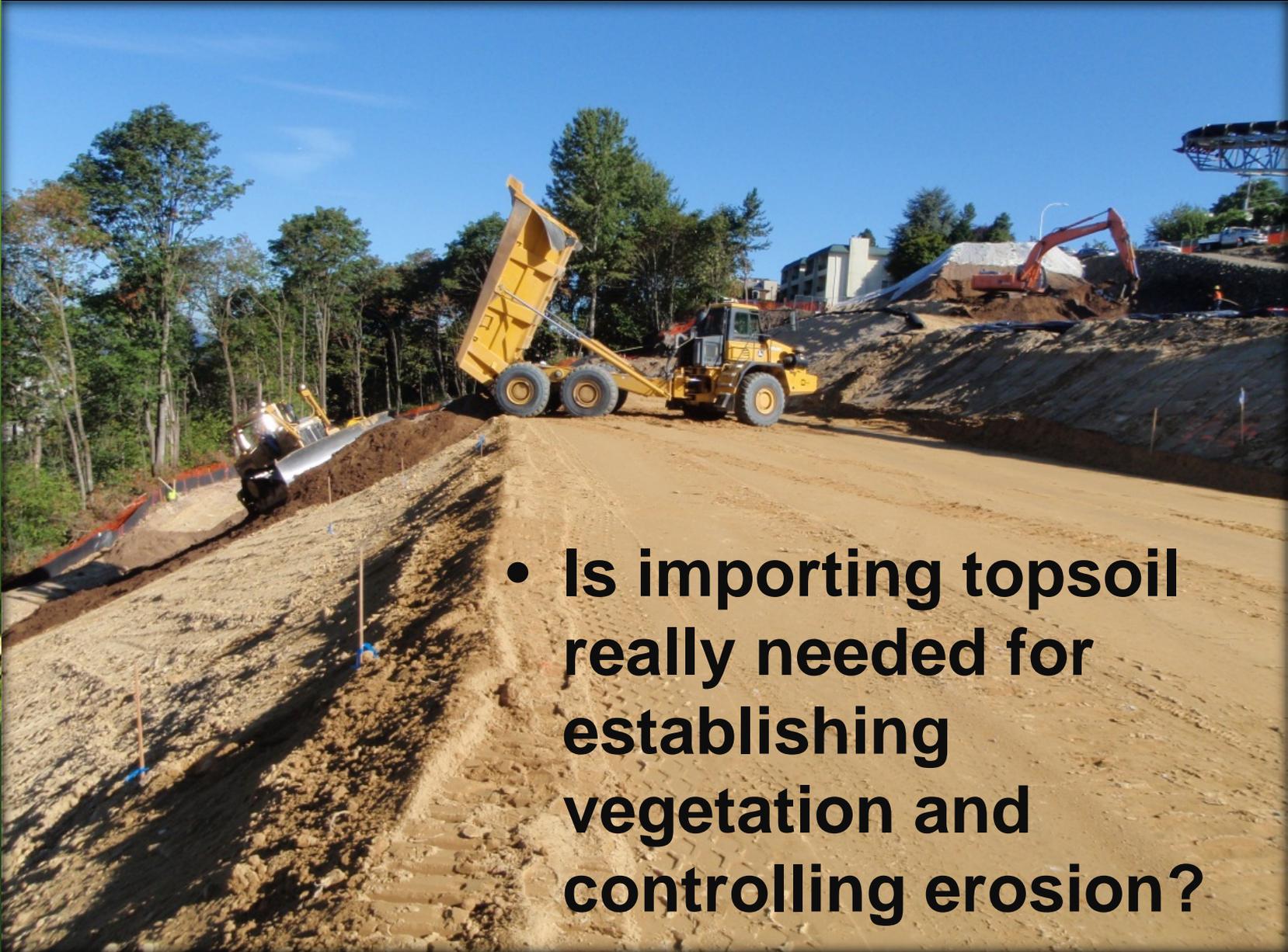
**NEW SOLUTIONS**

**FOR THE SAME  
OLD PROBLEM**





# The Biotic Approach Asks...



- Is importing topsoil really needed for establishing vegetation and controlling erosion?



# Conventional "Fixes"

- Sit upon the surface and focus more on immediate surface protection from detachment.



# Good Erosion Control





- The function of biotic elements is soil improvement.
- They should promote natural microbial activity, and natural topsoil forming processes, the hallmarks of healthy vegetation-supporting soil systems.

# Vegetation Performance Failures



**Without Biological Function**

**Vegetation is Unsustainable**



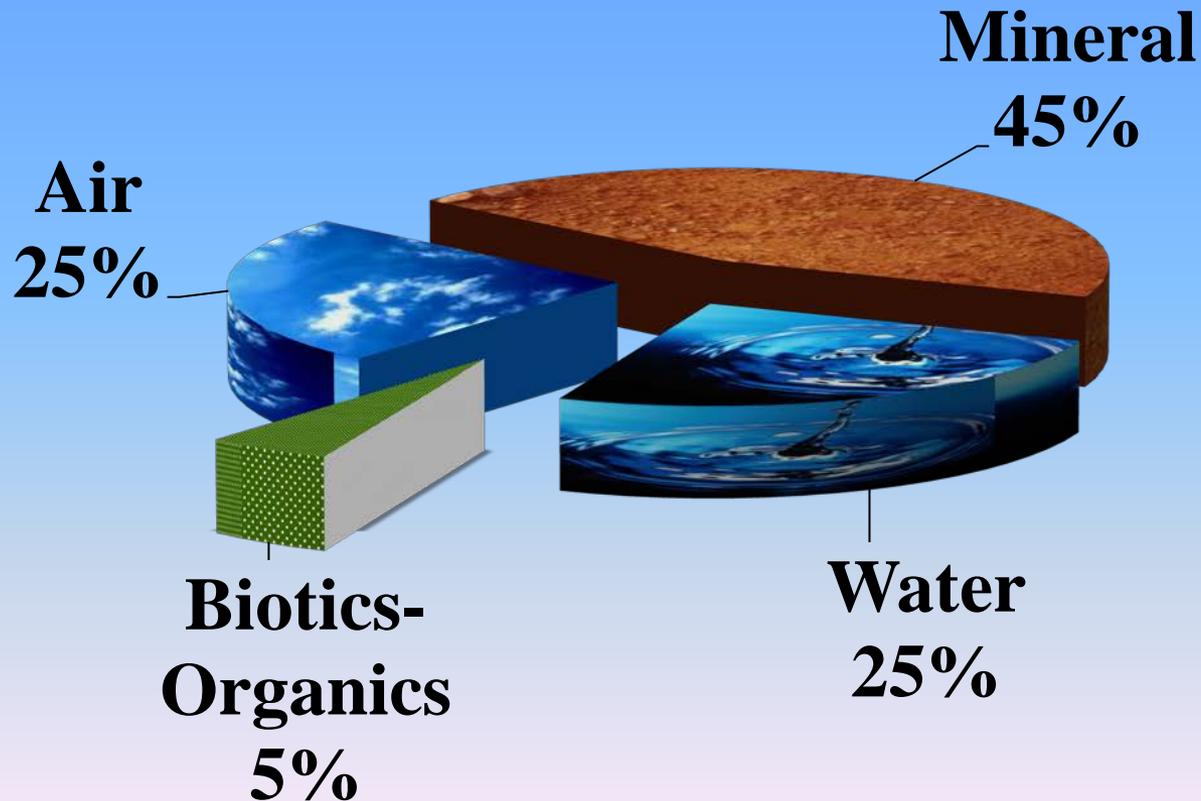
# Conventional Reactions

Apply Herbicides,  
Chemicals,  
Fertilizer & Re-seed



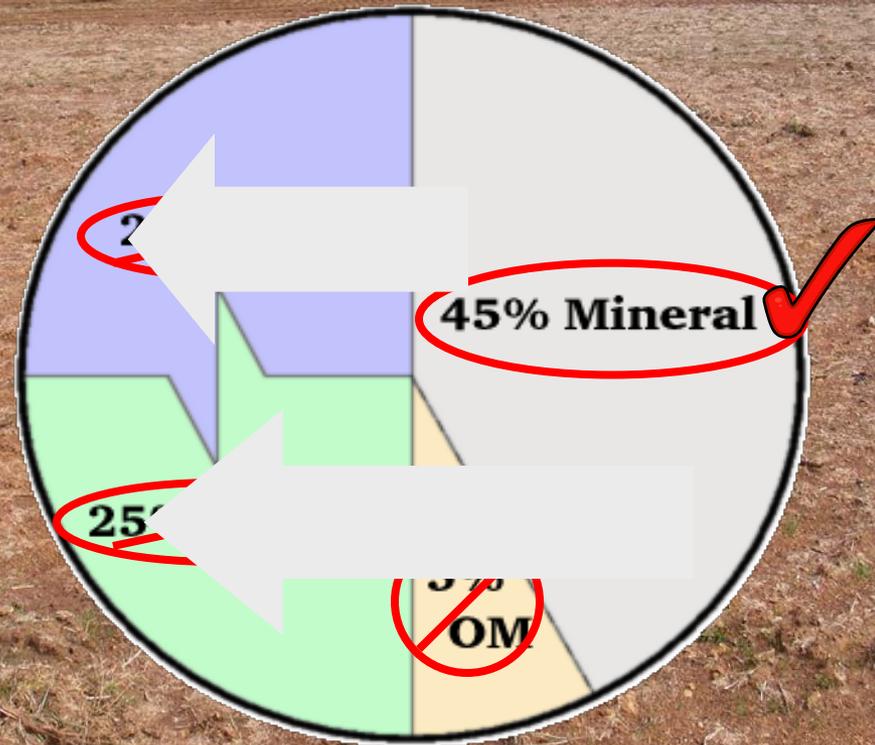
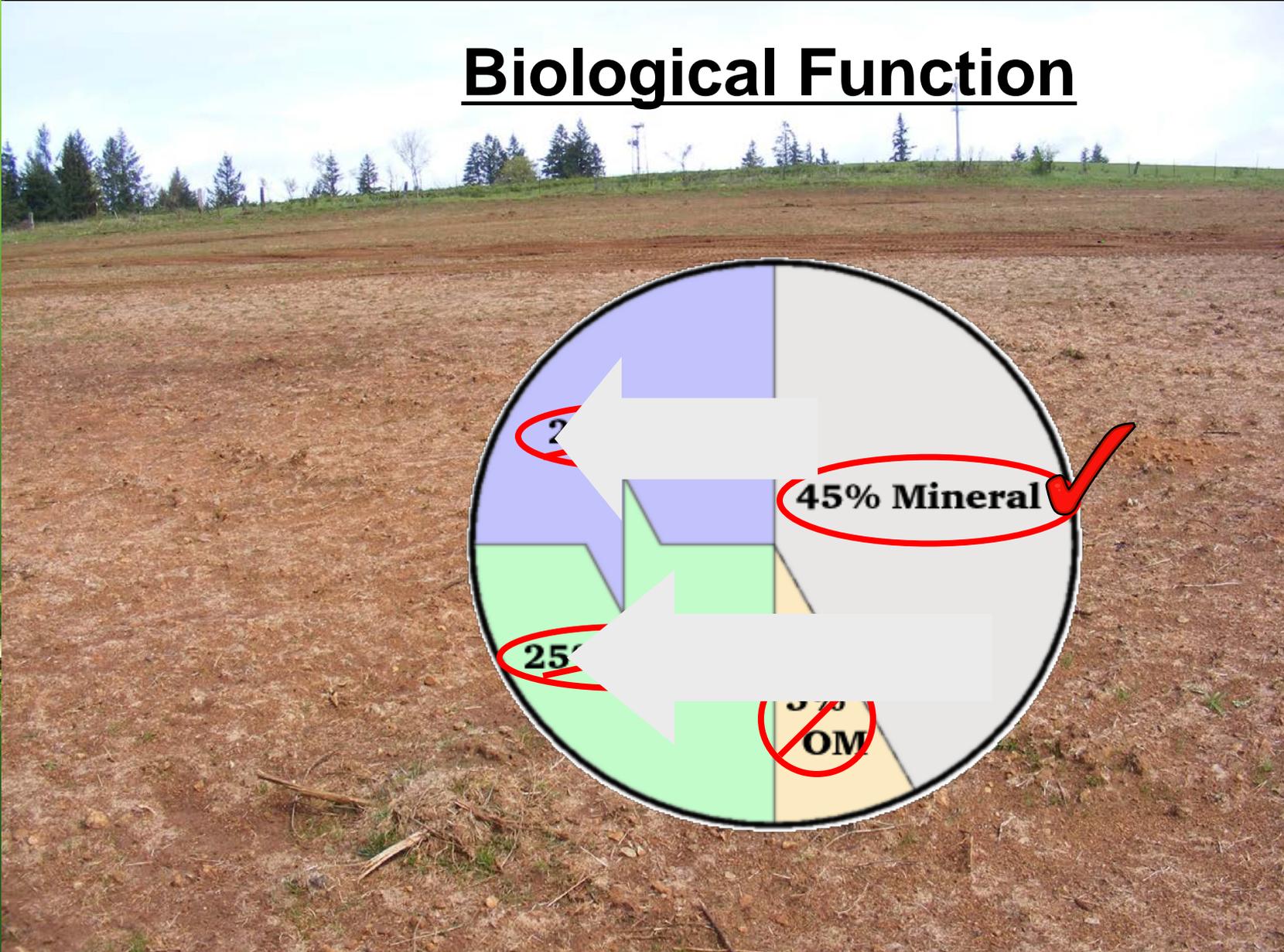
# What is Soil?

## Composition



# What's Missing For Revegetation?

## Biological Function



What sources of organic matter are available?

- Peat Moss is a great source of organic matter and a favorable growing medium; and a renewable natural resource
- Compost may contain some nutrients however, frequently it is not consistent in texture, quality, and *may* import contaminants such as hydrocarbons, metals, pathogens, pesticides and weeds

# Why Peat Moss?



HONEYCOMB STRUCTURE

This photomicrograph of a peat moss particle shows its natural capillary and porous structure (natural sponge). It increases the water and nutrient retention as compared with any other source of organic matter (compost, manure, wood, etc. The peat absorbs water and nutrients and avoids the leaching and loss of nutrients to the environment.

**Why is it the most popular green house growing medium in the world?**

# What are Biotic Soil Amendments?

- 100% Recycled Soil Building Organics
  - ✓ Biochar
  - ✓ Humic Compounds
  - ✓ Degradable Fibers
    - ✓ Straw – Jute - Flax
  - ✓ Mycorrhizae and Microbes
    - ✓ Beneficial Bacteria
  - ✓ Water Retaining Organic Polymers
- Hydraulically or Broadcast Applied



# DESIGNED USING BIO MIMICRY

*Think of it as "innovation inspired by nature." The core idea is that nature, imaginative by necessity, has already solved many of the problems we are grappling with today. Plants, animals, and microbes are the consummate engineers. They have found what works, what is appropriate, and most important, what lasts here on Earth. This is the real news of bio mimicry: After 4.2 billion years of research and development, failures are fossils, and the successes are living all around us!*

Bio mimicry 3.8



# What Biotics Do

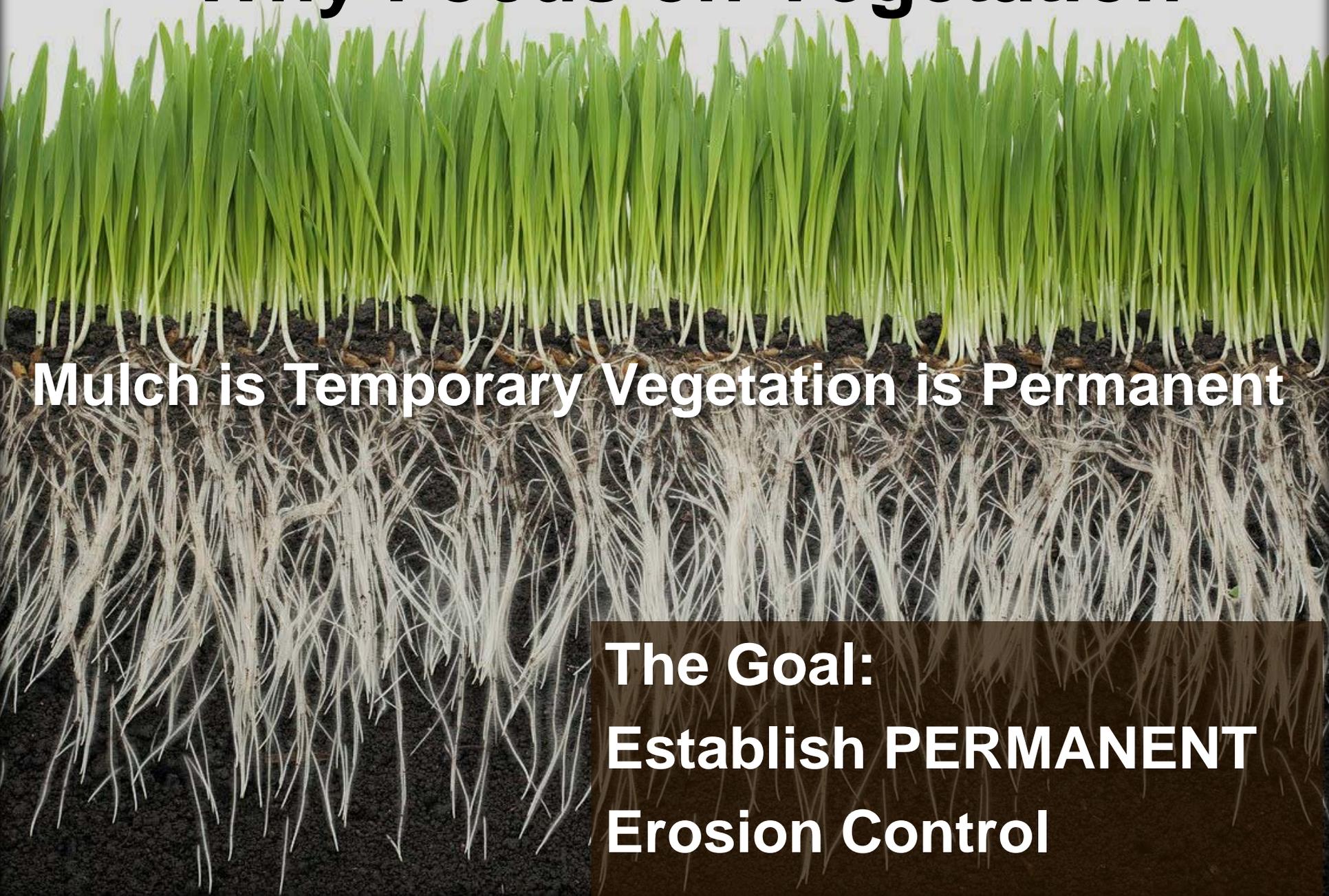
- **Restore Biological Function**
- **Mimic Natural Processes**
- **Improve Plant Establishment**
- **Ensure Project Success**
- **Save Money!**



# How Biotics Work!



# Why Focus on Vegetation



**Mulch is Temporary Vegetation is Permanent**

**The Goal:  
Establish PERMANENT  
Erosion Control**

# Vegetation Establishment



- **Vegetation Heals the Soil**
- **Increases Biological Activity**
- **Mulch does not have Roots**

# Sustainability: A Challenge

**Habitat**



# Germination

Just Add Water



# IT STARTS HERE

Seeds Germination



# Why Biochar?

- Optimum Microbial Host
- Mycorrhizal-Microbial Interaction
- Soil Structure
  - Water Retention-Filtering
  - Porosity
  - CEC-
  - Permeability



No Char

With Char



# Case Study: Wyeth OR



- PermaMatrix Applied October 4<sup>th</sup> 2010

# Case Study: Wyeth OR



- PermaMatrix Applied October 4<sup>th</sup> 2010



# Case Study: Wyeth OR



- PermaMatrix Full Native Cover Spring 2011



# Case Study: Wyeth OR



- PermaMatrix On Right of Photo

# Case Study: Wyeth OR



- PermaMatrix in swale areas established sedge and rush species from seed to mature plants that went to seed head in the 1<sup>st</sup> year!

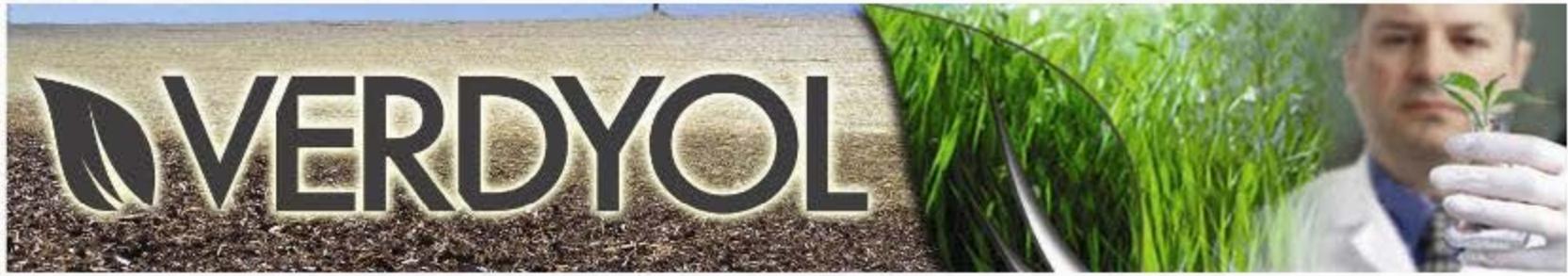


# Case Study: Wyeth OR



- Spring 2012 No Additional Inputs!





# Milner Ridge Manitoba

- Government of Manitoba
- Medium security jail
- 70,000 square meter waste water pond
- PROBLEM
  - Very sandy material
  - marginal natural topsoil – not reclaimable

# Milner Ridge Manitoba

3500lbs/acre

3900kg/ha



**Seed and  
fertilizer added  
right in the mix**





2 weeks later



**3 weeks later**



**7 weeks later**



**13 Weeks later**



**14 Months later**





Effects of mycorrhizea  
(a strong root system)



Biotic layer mimics the natural O horizon







# Case Study: Stormwater Basin



# Case Study: Stormwater Basin



# Case Study: Road Cut



March 10<sup>th</sup> 2009



May 22<sup>nd</sup> 2009



June 15<sup>th</sup> 2009



August 2010, 1 Year





# Back to the Start



# Take The Challenge

“Healing the Disturbed Soil to Support Vegetation”



- Agencies
  - ✓ Require Successful Natural Processes
- Architects & Engineers
  - ✓ Design Sustainable Systems
- Contractors
  - ✓ Drive New Technologies





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A hydraulically applied **BIOTIC SOIL AMENDMENT**  
Patent Pending



# Revegetation Current Practices



# Hydro Straw BFM Formulation All in 1 Technology

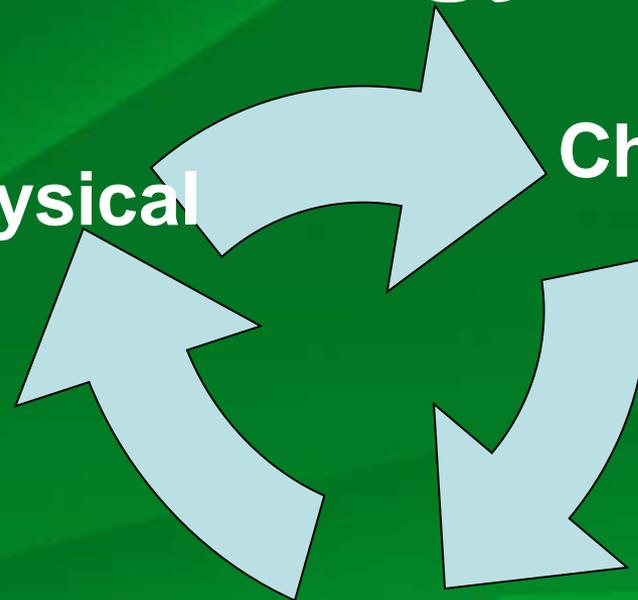
- 75% HydroStraw & Glues/Binders

- 25% Nutrients, Soil Builders, Biological

Physical

Chemical

Biological



- No field Mixing
- 4-6,000 lbs / acre



Without

With HydroStraw

# Hydro Straw All in 1 Technology

- **No Infield Mixing of Additives Increases Accuracy**
- **Application Rate: 4,000 – 6,000 lbs per Acre**
- **Soil Testing Services**