

THE BENEFITS OF BIOTICS IN EROSION CONTROL MATERIALS FOR CRITICAL SITES: BETTER BUSINESS, IMPROVED SOIL AND STRONGER VEGETATION

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Construction Engineering Design

- The premise is to always attempt to minimize amount of earthwork to the minimum necessary
- And to reduce the risk as much as possible

After Construction

is often when the erosion control and revegetation part of the project starts.....



- Organic matter has been lost (usually due to removal)
- Loss of micro and macro pores (air/water exchange)

AFTER CONSTRUCTION

Conventional Approach to Erosion Control Starts by Adding Topsoil

Ontario Provincial Standard Specifications for Topsoil, 2007

“Topsoil shall be a fertile loam material that is free of roots, vegetation, or other debris of a size and quantity that prevents proper placement of the topsoil. The topsoil shall not contain material greater than 25 mm in size, such as stones and clods”.

“Imported topsoil shall not have contaminants that adversely affect plant growth”.

The Biotic Approach Starts By Asking:

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

Biotic Implies

- A living nature, and might thus be said to be found in many traditional erosion control materials, the real meaning—and value—in the word “biotic” is what it does for the soil and thus for the vegetation.



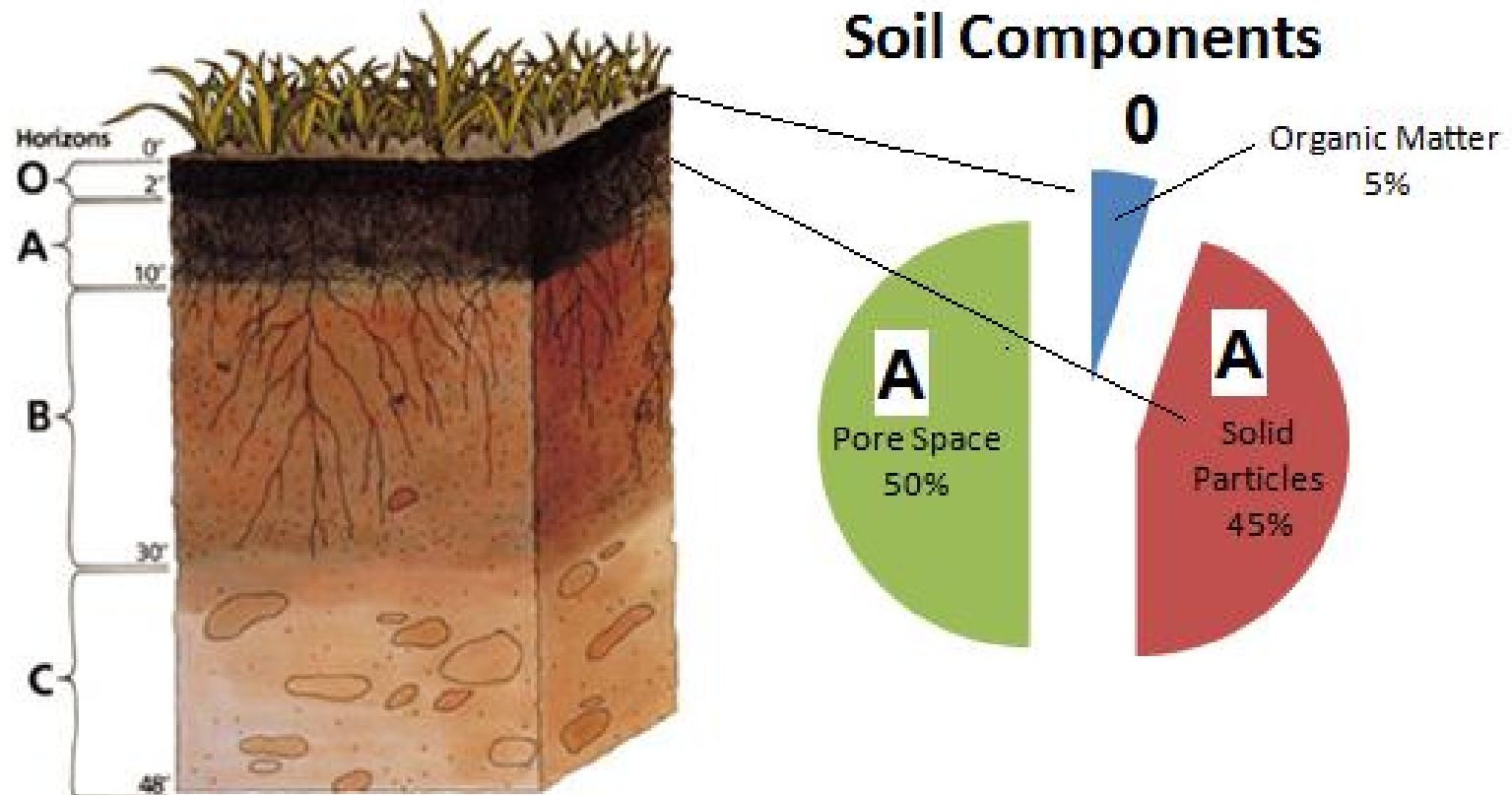


- It is not spoken of with traditional erosion control approaches, which tend to sit upon the surface and focus more on immediate surface protection from just detachment and transportation by wind or water.



- The true function of biotic elements in an erosion control system is soil improvement. They should promote natural microbial activity, soil aggregate formation and other natural topsoil forming processes that are the hallmarks of healthy vegetation-supporting soil systems.

Natural Soil Profile



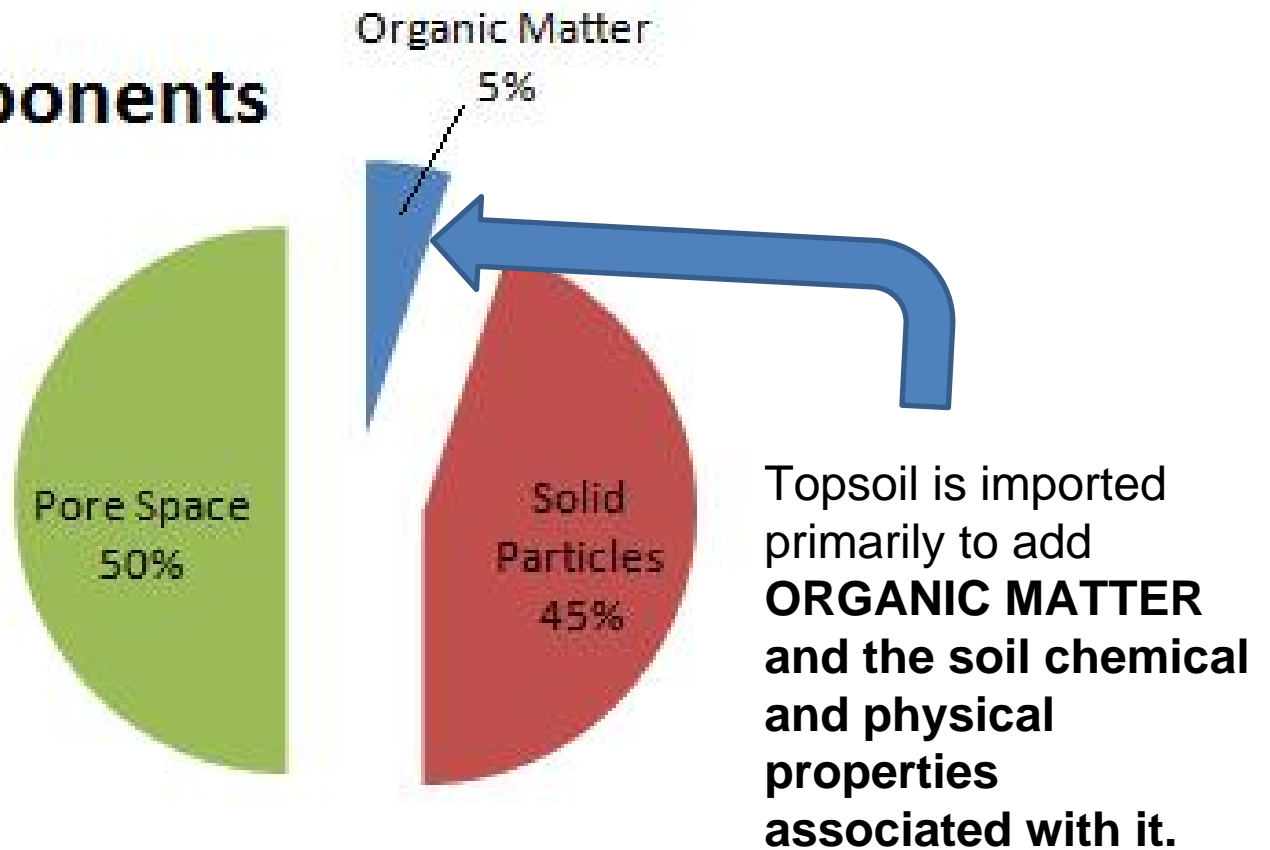
O) Organic matter: Litter layer of plant residues in relatively undecomposed form.

A) Surface soil: Layer of mineral soil

B) Subsoil: This layer accumulates iron, clay, aluminum

Why Topsoil Is Added?

Soil Components



Biotic Approach

- Amend the existing soil with the right organic matter, fertilizer, soil chemistry materials and tillage of the soil if needed to improve the physical and chemical conditions. By doing this, vegetation can be established without the need for importing TOPSOIL





- The **Biotic Approach** follows the design criteria of minimizing the amount of earthwork and is intended to reduce risks as much as possible

What is a Hydraulic Growth Medium

A hydraulically-applied matrix containing at least 20% by volume of prepackaged decomposed/composted organic fibers accepted as growth mediums, such as compost or peat moss that contain other materials and soil chemistry/stabilizers. Used to provide a growth medium for seed germination, plant growth/establishment and soil-building characteristics in conditions of marginal or extremely poor soils and where erosion control is required.

What sources of organic matter are available?

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



Compost Sock in Toronto

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.

This is why it is the most popular green house growing medium in the world.

Peat Moss For Fast & Consistent Vegetation Establishment

- Most popular green house growing medium in the world
- Consistent in texture and quality
- Honeycomb structure holds water and nutrients
- Weed and contaminant free

Straw Benefits

- Cover for erosion control
- Mulching
- Additional source of organic matter
- Water absorption and maintenance

What prevents the peat moss and straw from being washed away?



Peat Moss in combination with Straw, Flexible Flax Fibers and a stabilizing emulsion for soil chemistry and microbial development creates a stable matrix which:

1. temporarily protects exposed soil from erosion
2. Mechanically fixes the peat in place
3. works as an excellent growing medium to accelerate the grass growth

Why Biotic Hydraulic Growth Mediums

- Hydraulic Growth Medium protect the soil but are excellent growing mediums that make the grass establish faster thus, reducing risk because the area will be vegetated sooner.



Soil Amending/Erosion Control?

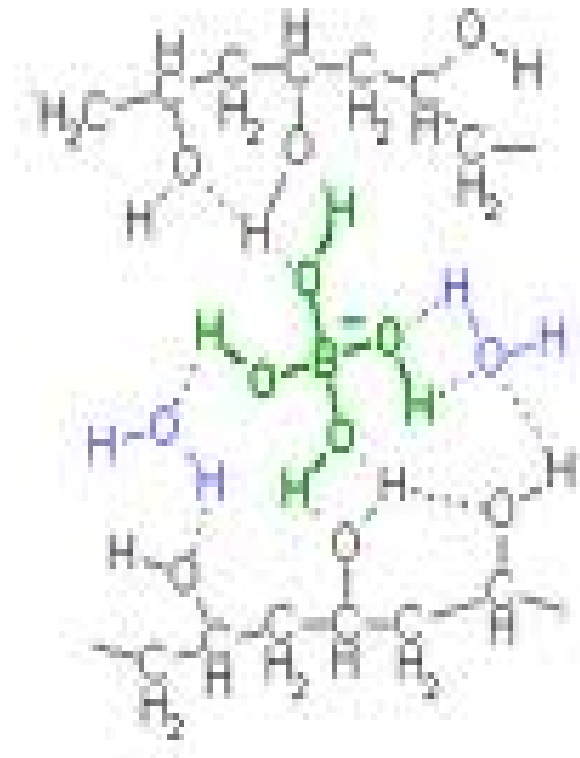
**Achieve Both With
Hydraulic Growth
Mediums**

Soil Chemistry & Stabilizers

Chemically engineered combination of materials to maximize:

- erosion control performance
- soil flocculation
- soil aggregate formation
- vegetation establishment
- stimulate and improve microbial activity

Addition Of Polymer



- Low level of anionic polyacrylamide (PAM)
- Composed of various molecular weights of PAM to work on a variety of soil types
- Causes soil flocculation to aid in:
 - Water infiltration
 - Stable soil aggregate formation
 - Opening of soil pores
 - Reduced erosion and sediment migration

To Maximize Biotic Performance

- Conduct a minimum of 3 soil tests to determine
 - Soil ph (do you need to add lime or sulfur)
 - Fertility requirements
 - Organic content and requirements

Conducting these tests will help improve your vegetation long term.

Benefits of Using HGMs

- Allows for an erosion protection solution that is competitive with traditional blankets
- Can be used in conjunction with them where needed
- Gives the client and contractor flexibility
- Reduces the transportation and labor costs
- The construction window can be shorter
- All of these savings can be realized without sacrificing the integrity of the installation

Milner Ridge Manitoba



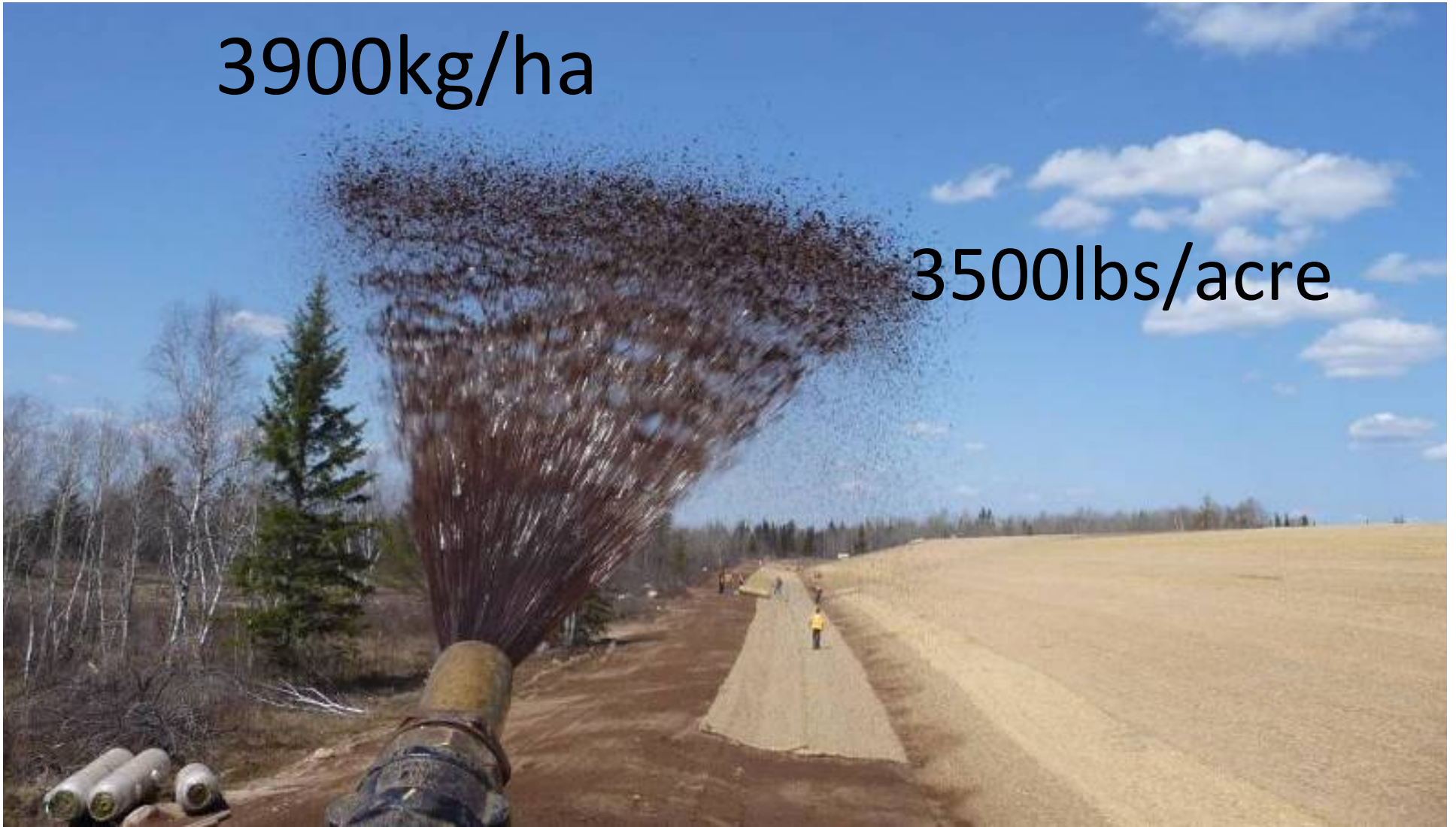


Marginal topsoil layer



3900kg/ha

3500lbs/acre

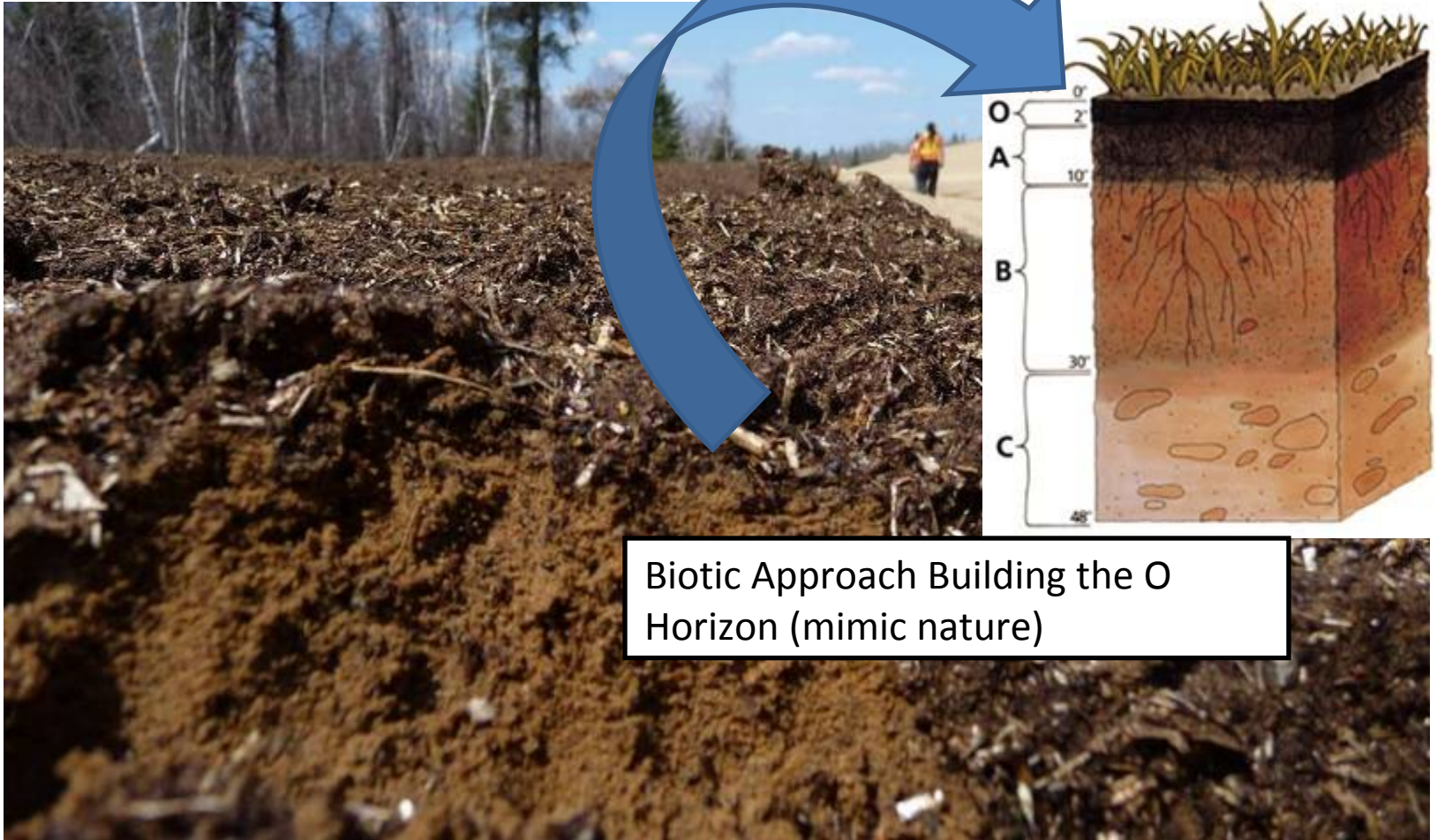




Seed and fertilizer added right in the mix



Complete Ground Cover



Biotic Approach Building the O Horizon (mimic nature)



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



Barrage
de la Nemiscau-1





**We just added what was needed,
THE BEST SOURCE OF ORGANIC
MATTER**







One Year Later

A native seed mix was used

- Creeping Red Fescue
- Timothy
- Bent Grass
- Birdfoot Trefoil
- White Clover Barley
- Reed Canary Grass















One Year Later



Canadian Olympic Park - Calgary







Thank You



