The Invisible Life of Soil and Urban Stream Restoration

by:

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The Central Role of Soil Biology in the Web of Life
Soil Organic Material

- Cyst
- Amoeba
- Flagellate
- Bacterial Colonies
- Nematode
- Ciliate
- Clay-Organic Matter Complex
- Decomposing Plant Cells
- Fungal Hyphae and Spores
- Actinomysete hyphae and Spores
Soil Biology Function in Riparian Zones

Holding and Cycling Nutrients

Shoot Biomass after 77 Days

- Sterile Soil
- Soil with Bacteria
- Soil with Bacteria and Nematodes
Soil Biology Function in Riparian Zones

Improved Soil Structure: Infiltration and Water-Holding Capacity
Soil Biology Function in Riparian Zones

Disease Suppression
For example: Earthworm produce an enzyme in their digestive tracts that kill Escherichia coli.
Soil Biology Function in Riparian Zones

Pollution
Degradation
Preserving Soil Biology During Riparian Restoration

Limit Soil Compaction
  – Tight Limits of Construction
  – Restrict The use of Heavy Equipment
Preserving Soil Biology During Riparian Restoration

Maintain Optimum Soil Moisture

– Good Drainage
– Limit Stock-Piling
– Use De-Chlorinated Water
Preserving Soil Biology During Riparian Restoration

Appropriate Soil Amendments

– Finely-Ground Carbon
– Well-Aged Compost
Preserving Soil Biology During Riparian Restoration

Biological Inoculants

- Should be tuned to riparian ecology
- Most research is in agricultural applications
# Soil Measures of Riparian Biological Function

<table>
<thead>
<tr>
<th>Description</th>
<th>Character</th>
<th>Texture</th>
<th>Solvita ppm</th>
<th>%OM Humus</th>
<th>pH</th>
<th>EC mmhos/cm</th>
<th>NO3 lbs/acre</th>
<th>NO3 mg/Kg</th>
<th>P2O5 lbs/acre</th>
<th>P2O5 mg/Kg</th>
<th>K (H2O) ppm</th>
<th>K (CO2) ppm</th>
<th>Na (H2O) ppm</th>
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<th>Ca (H2O) ppm</th>
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<th>Mg (H2O) ppm</th>
<th>Mg (CO2) ppm</th>
<th>Zn ppm</th>
<th>Fe ppm</th>
<th>Mn ppm</th>
<th>Cu ppm</th>
<th>Total Bacteria ug/g</th>
<th>Total Fungi ug/g</th>
<th>Hyphal Diameter um</th>
<th>TF/TB</th>
<th>Actino Bacteria ug/g</th>
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Solvita CO2 Burst Test

ppm
Soil Measures of Riparian Biological Function

%OM Humus

Reference
Reference
Degraded
Degraded
Degraded
Degraded

0.00
1.00
2.00
3.00
4.00
5.00
6.00
Soil Measures of Riparian Biological Function

Total Fungi
ug/g

Reference
Reference
Degraded
Degraded
Degraded
Degraded
Soil Measures of Riparian Biological Function

Total Bacteria
ug/g

- Reference
- Reference
- Degraded
- Degraded
- Degraded
- Degraded
Soil Measures of Riparian Biological Function

![TF/TB Graph](image-url)