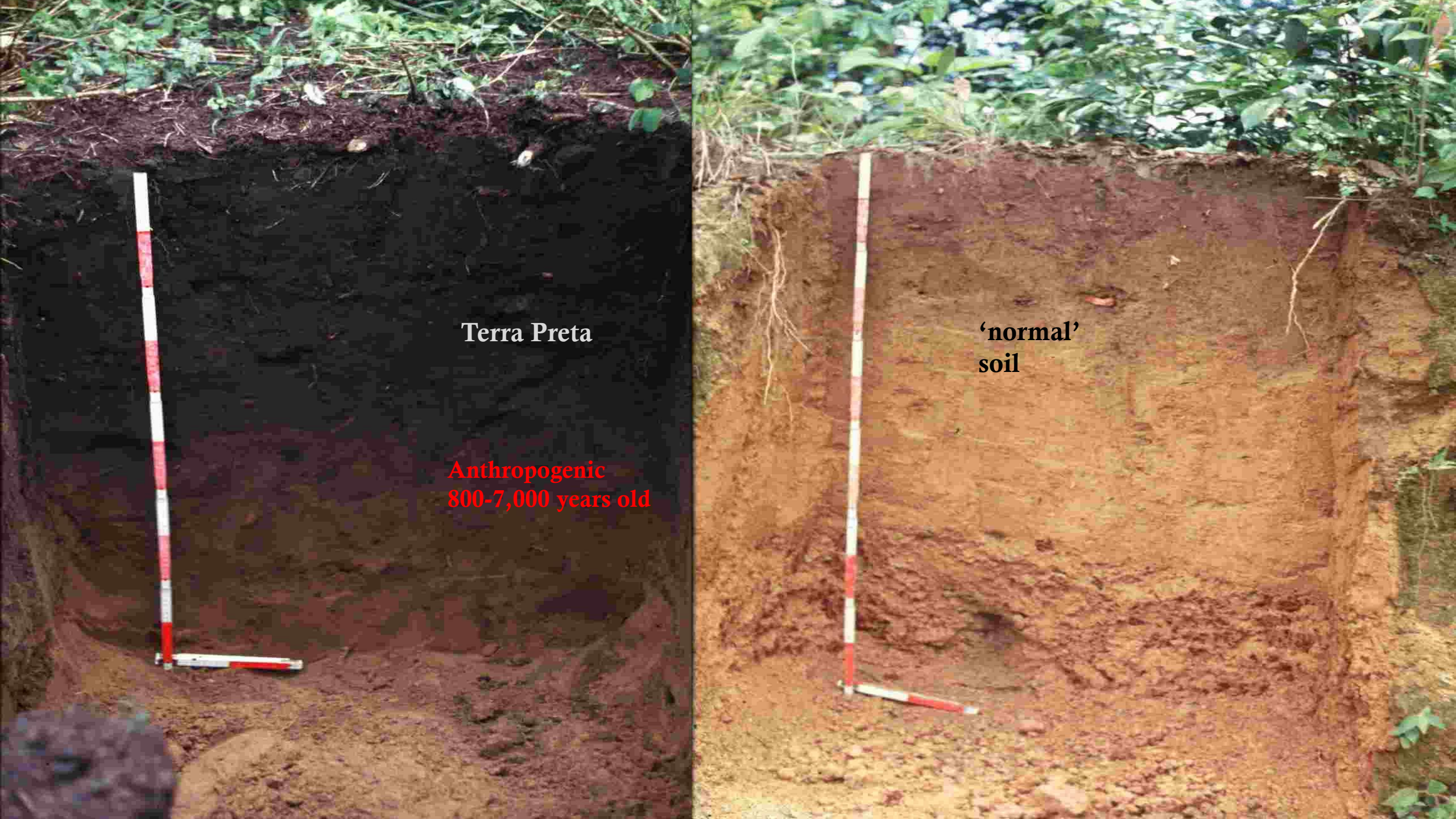
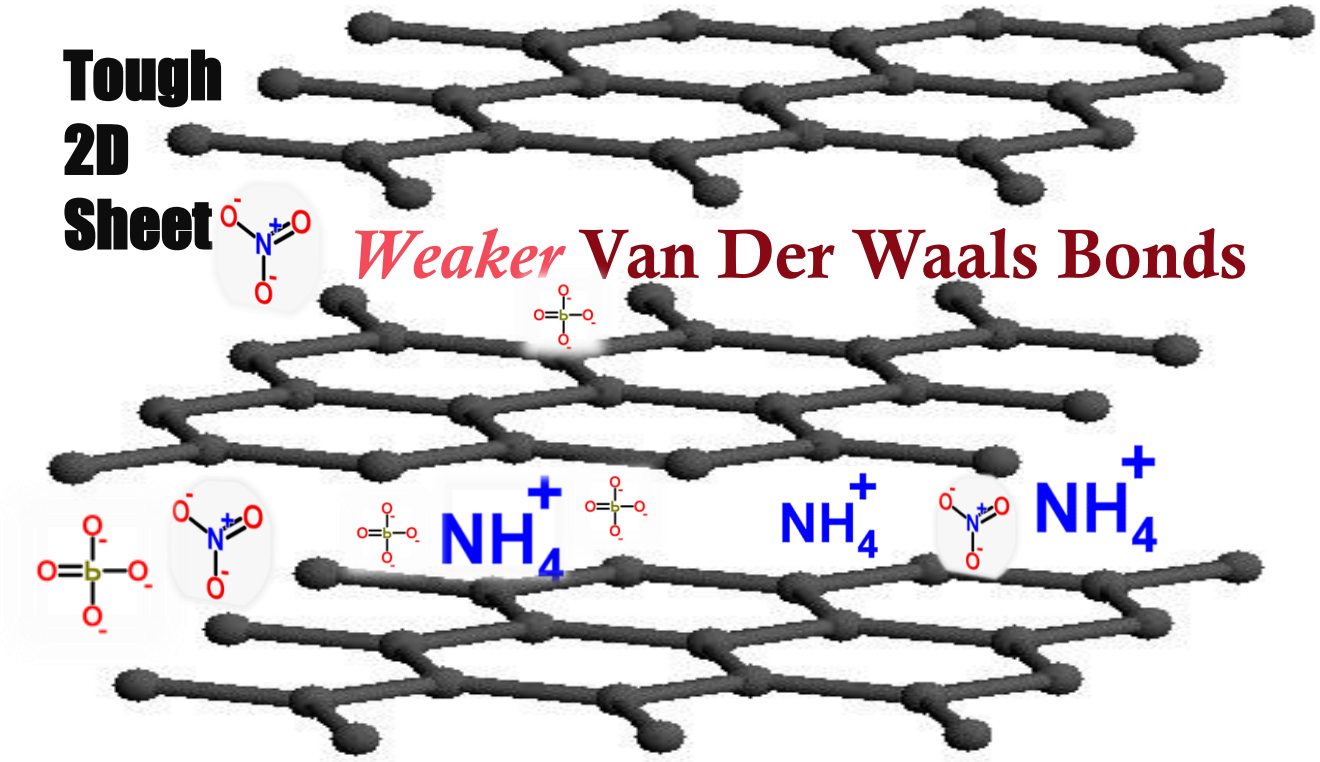
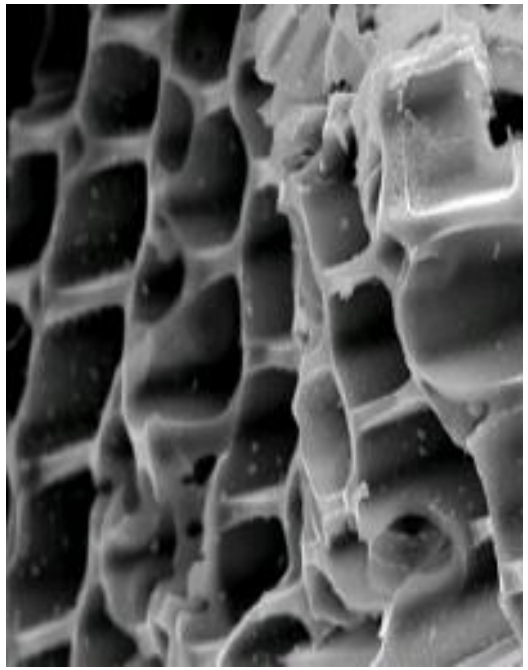
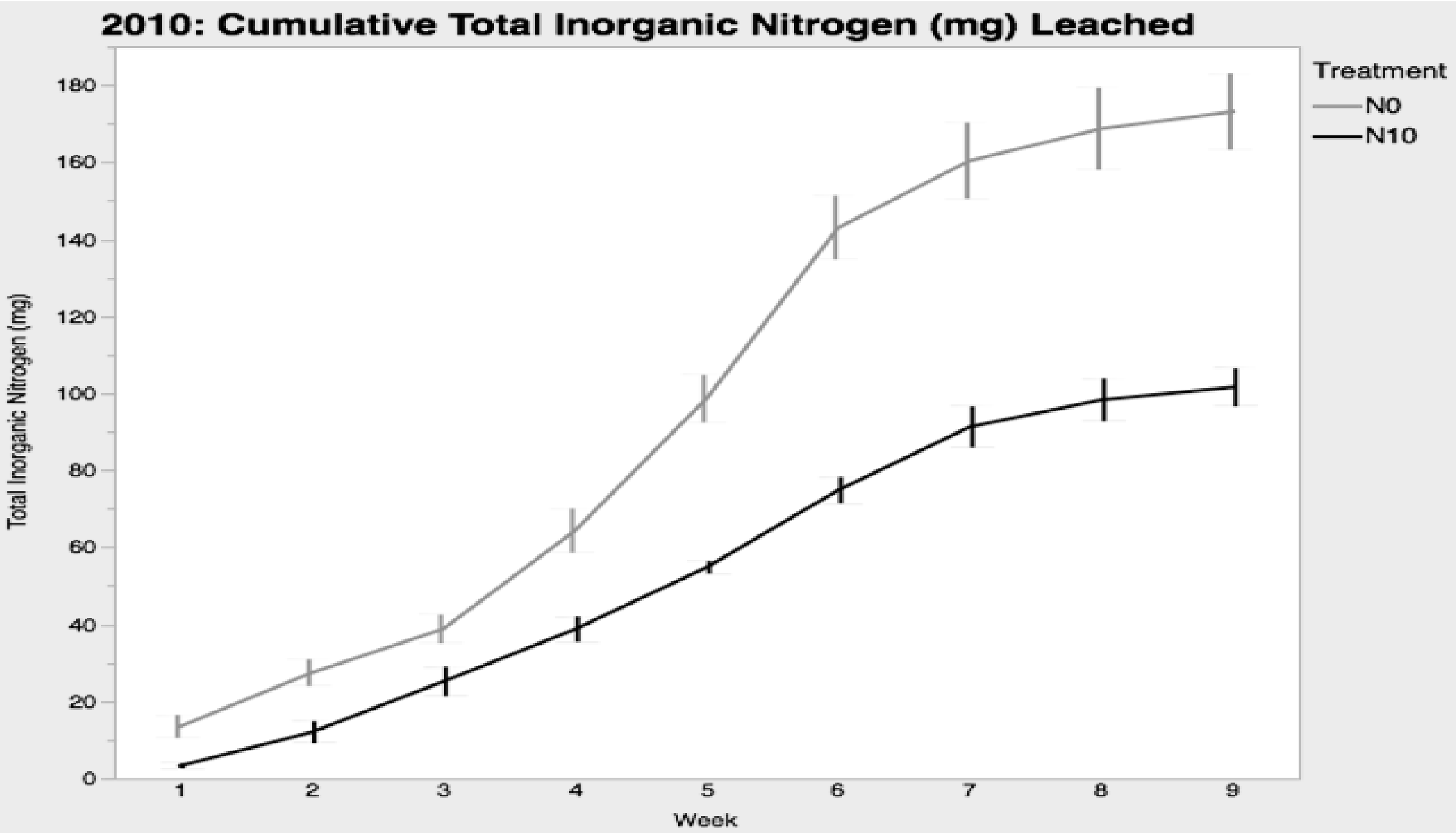

Terra Preta
Anthropogenic
800-7,000 years old
‘normal’
soil


Tough
2D
Sheet
Weaker Van Der Waals Bonds
NH4+
NH4+
NH4+

Water and Nutrient Sponge

- **Pores hold water**
- **Nutrients dissolved in water**
- **Nutrients on exchange sites**
- **⇧surface, ⇧exchange**
- **Add biochar, soil holds more water and nutrients**




2010: Cumulative Total Inorganic Nitrogen (mg) Leached
Total Inorganic Nitrogen (mg)
0
20
40
60
80
100
120
140
160
180
1
2
3
4
5
6
7
8
9
Week
Treatment
N0
N10


C
1BC
5BC
2BS+5BC
2 BS

Biochar Enhances Legume Symbiosis

Collect agricultural soils

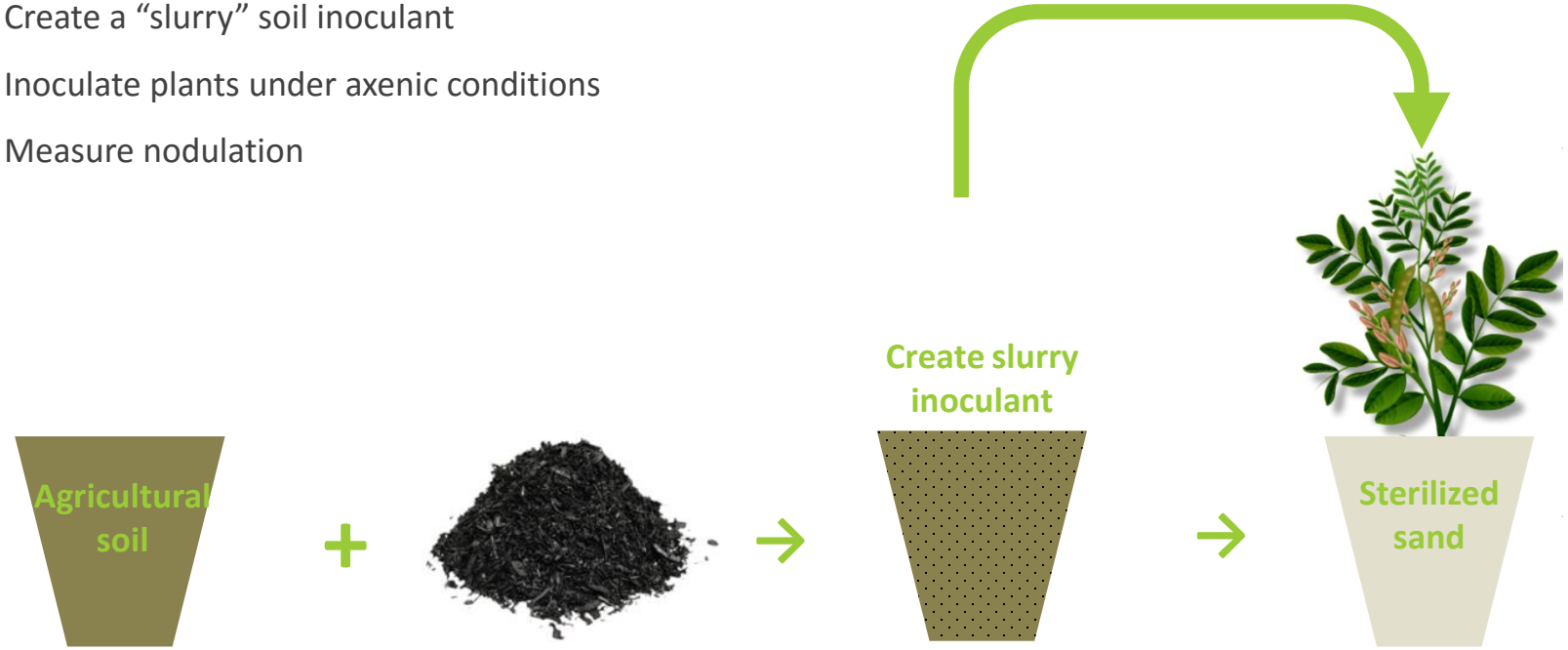
Amend with biochar

Grow plants under greenhouse conditions

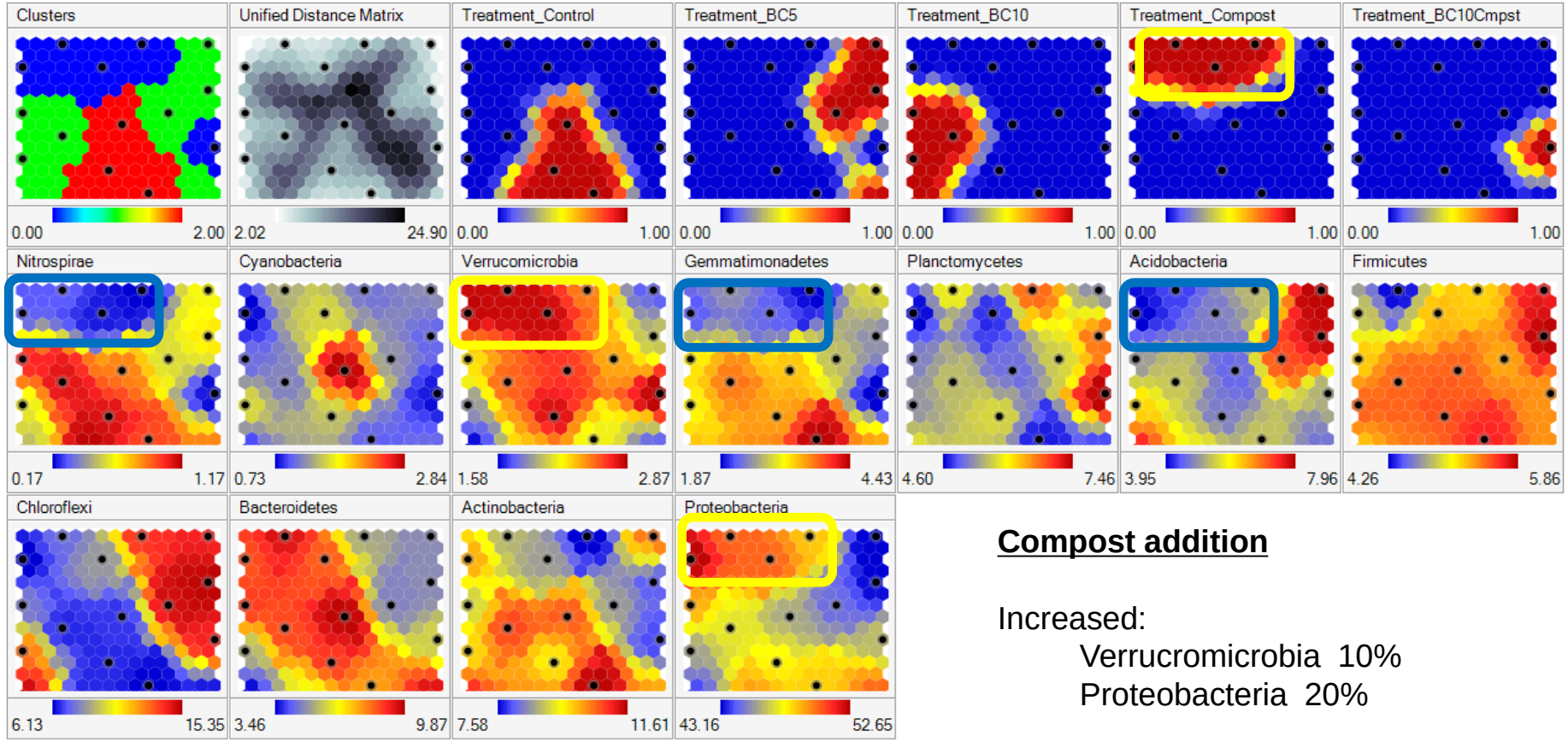
Create a “slurry” soil inoculant

Inoculate plants under axenic conditions

Measure nodulation



Kohonen Self Organizing Map of Shifts in Bacterial Community Structures in Biochar and Compost Amended Sandy Loam Soil under Turfgrass



<u>Compost addition</u>

Increased:

- Verrucromicrobia 10%
- Proteobacteria 20%

Decreased

- Nitrospirae 3X
- Gemmatimonadetes 50%
- Actinobacteria 50%

Future of Biochar

- Definition related to functionality -- Certification
- Carbon trading credit money or not?
  - Verifiable, long term sequestration
  - IF $$$, more biochar production
- More materials science approaches
  - Designer char
  - Apply like fertilizer
- Always had biochar, always will
  - Labile vs recalcitrant soil carbon

High Volume Biochar/Charcoal Uses

- Land Reclamation: poor drainage, high salt soils – Imperial Valley
- Carbon source with open matrix – asphalt
- Water Purification
- Feed to cattle to reduce GH gases, improve production
- Improve composting – more bulk, adsorb gases and nutrients
- Biochar has exchange sites, activated charcoal grabs and doesn't let go.