

# coolterra<sup>®</sup>

## ORGANIC

*featuring* **ENGINEERED BIOCARBON** *technology*

Innovating to Change the World for Good

coolplanet

# Biochar is the carbon skeleton left over from biomass

coolplanet

**BIOMASS → PYROLYSIS → BIOCHAR**

High Heat  
(300-800+ C)  
without Oxygen



Biomass selection, pyrolysis conditions, and other factors impact the quality of biochar

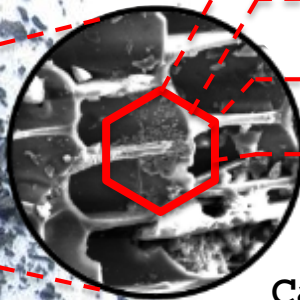


# ...but raw biochar has historically proven inconsistent

Historically, biochar has been inconsistent, due to lack of understanding of key properties and production process

## Key physical and chemical properties

- High pH levels
- High phytotoxic concentration
- Low pore capacity
- Low process control



*Biochar as co-produced with hydrocarbons*

## Can lead to inconsistent results

- Degraded elements of soil health
- Decreased production and plant quality

*Raw biochar*



# Soil carbon is a key component of soil health

Soil carbon comes in many forms and each play an important role



Labile

- Compost and manure
- Nutrient rich
- Highly degradable
- Short-lived



Humic

- Humus
- Humic / fluvic acids
- Complex organic compounds
- Degradable



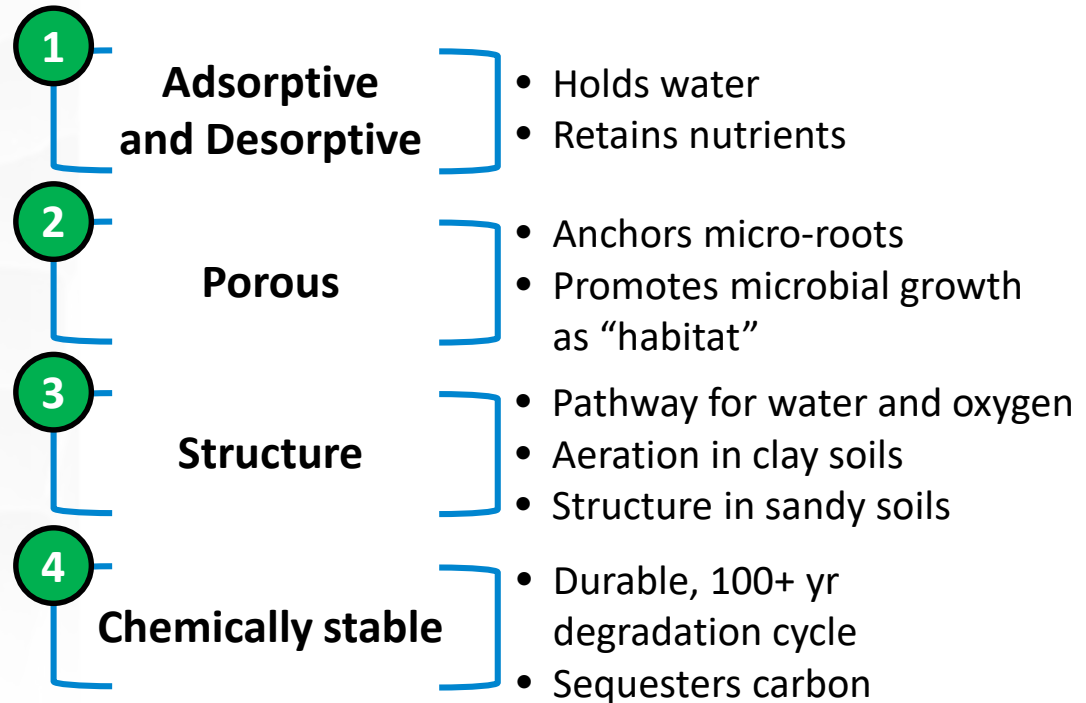
Recalcitrant

- Mostly pyrogenic
- Structural
- Fixed Carbon
- Long-lasting (100+ years)

These three types of carbon can complement each other

# Recalcitrant fixed carbon has the potential to address a range of soil issues...

## Features & Benefits of recalcitrant carbon

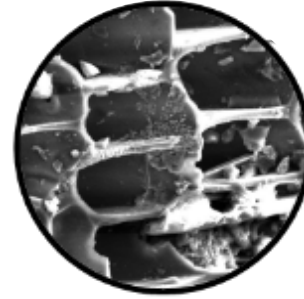
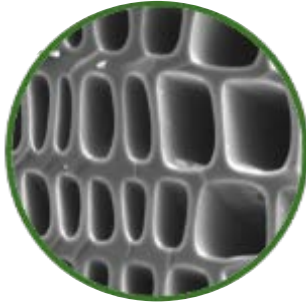
- 
- 1** **Adsorptive and Desorptive**
    - Holds water
    - Retains nutrients
  - 2** **Porous**
    - Anchors micro-roots
    - Promotes microbial growth as “habitat”
  - 3** **Structure**
    - Pathway for water and oxygen
    - Aeration in clay soils
    - Structure in sandy soils
  - 4** **Chemically stable**
    - Durable, 100+ yr degradation cycle
    - Sequesters carbon

*Cool Terra Structure under a scanning electron microscope*

# Modern science and engineering applied to biochar to harness the good and eliminate the bad



coolterra®



Biochar

Predictable characteristics and performance

High variability

Processed to eliminate compounds which negatively impact plant growth

Potentially contains phytotoxins or other problematic compounds (dioxins)

**Hydrophillic:** Ready-to-use immediately

**Hydrophobic:** May need 'aging' to utilize

Low dust, higher crush strength

High dust content, low crush strength

Designed to flow through most common application equipment

Difficult to apply: flowability issues / large variability in particle sizes

Low application rates

High application rates

Proprietary process transforms biochar into a consistent, durable, and stable soil revitalizer



# Cool Terra works to optimize the soil through physical, chemical, and biological mechanisms:



## PHYSICAL



### ENHANCE SOIL STRUCTURE

- High porosity benefits water and nutrient holding
- Expansive surface area creates free air space in heavy soil and can improve infiltration
- Water holding capacity improves plant available water and reduces evaporative loss in highly evaporative soils

## CHEMICAL



### ENHANCE NUTRIENT EFFICIENCY

- High ion (CEC and AEC) exchange capacity can promote nutrient exchange and availability – holding nutrients in the root zone longer
- Porous structure of recalcitrant carbon can delay leaching – giving plants more time to use nutrients

## BIOLOGICAL



### ENHANCE MICROBIAL ACTIVITY

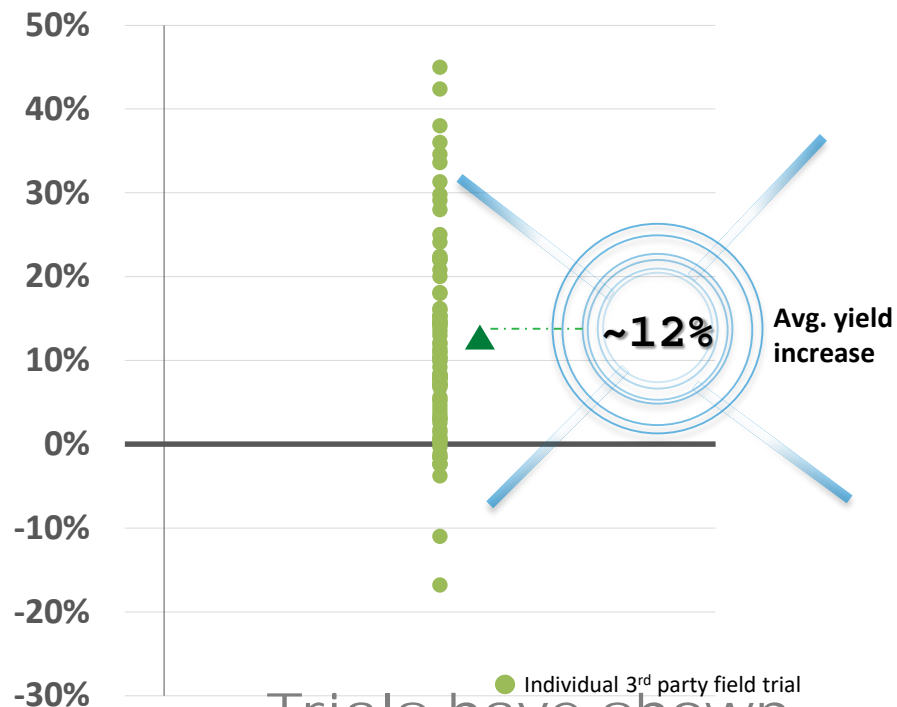
- Strong and durable cell walls enhance the structural habitat for microbes
- Neutral pH provides optimal microbial environment
- Pore-size distribution benefits microbial populations



# Results from 100+ independent field trials have shown consistent yield increases



## Improvement in marketable yield (%) Cool Terra vs. control



Trials have shown average yield increase of ~12% with greater than 3:1 grower ROI

## Trial result highlights

Results vs. grower standard (typical levels of water and fertilizer)



### KS: 8% Increase

Corn bushels / acre  
1 year ROI: 4x



### OR: 15% Increase

Wheat lbs / acre  
1 year ROI: 5x



### FL: 9.2% Increase

Tomato lbs / acre  
1 year ROI: 5.1x



### CA: 42% Increase

Strawberry flats / acre  
1 year ROI: 18x



### OR: 35% Increase

Potato lbs / acre  
1 year ROI: 4.9x



# Cool Terra: Profitability AND Sustainability



**Optimizes water holding in soil**



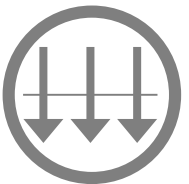
**Increases nutrient efficiency**



**Nurtures microbial growth**



**Impacts germination and establishment**



**Sequesters carbon**

1 ton CT = 2.7 tons CO<sub>2</sub> removed from atmosphere

**Feeding more people...**

Higher crop yield

**...with higher grower profitability...**

More production. Optimized inputs

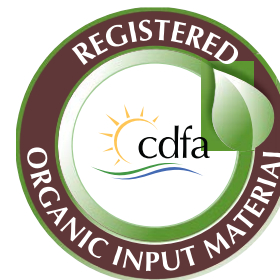
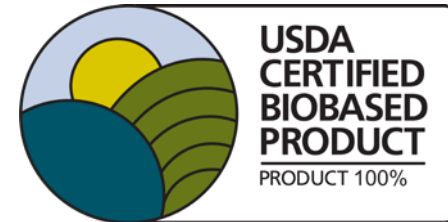
**...and a healthier planet**

Improved soil health | less fertilizer leaching

Carbon sequestration | Detoxified soil



coolterra<sup>®</sup>  
ORGANIC



Cool Terra is produced with 100% biobased biochar