PACIFIC BIOCHAR

To sequester carbon
and leave a legacy of fertile soil

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Pacific Biochar Benefit Corp.

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What is Biochar?

Biochar: biomass charcoal used or found in soils

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What is Biochar?

FIRE-DERIVED ORGANIC MATTER

- Biochar is a natural component of soil organic matter (SOM) that persists for 100s - 1000s of years
- Seasonal fires deposit biochar in soils where it accumulates over time
- Prescribed burning intentionally mimics natural fire regimes
- New vigorous growth emerges in post-fire landscapes, stimulated by the addition of biochar and ash

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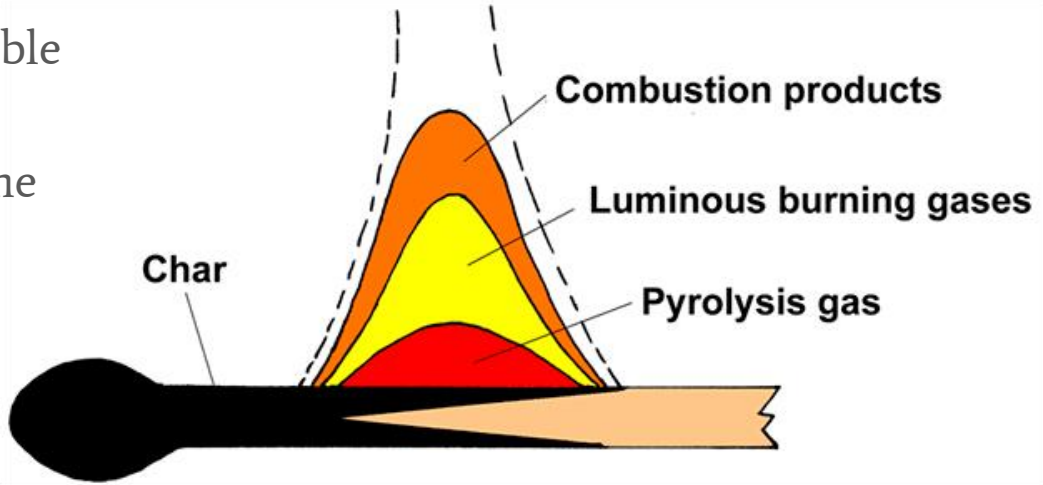
What is Biochar?

BIOMASS BURNS TWICE

- When biomass is heated, combustible gases are released first - pyrolysis
- These gases burn, producing a flame
- Remaining carbon is transformed into char - carbonization
- Char will burn in the presence of oxygen like coals in a campfire
- Different feedstocks will produce biochars with varying properties (i.e. wood, nut shells, straw, manure, etc.)



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Why Biochar?

TERRA PRETA

- People have used biochar to improve soils for millenia (i.e. Amazon Basin)
- Fertile soils around the world often contain high levels of biochar ~30-50% of SOM from natural and intentional burning patterns
- Biochar “ages” in the soil over time becoming more functional
- Composting with biochar can speed up the “aging” process

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Why Biochar?

WATER CONSERVATION

- Biochar **acts like a sponge**
- Biochar can hold 5x its weight in water, possibly more
- Large pores help water soak into poor-draining heavy clay soils
- Small pores hold onto water in arid sandy soils
- Water held on biochar is primarily still plant available water

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Why Biochar?

SOIL BIOLOGY

- Biochar provides an ideal **micro-habitat for soil organisms**
- Porous surfaces retain air, water and nutrients available for microorganisms and root hairs
- Studies consistently demonstrate enhanced biological activity in soils & compost using biochar

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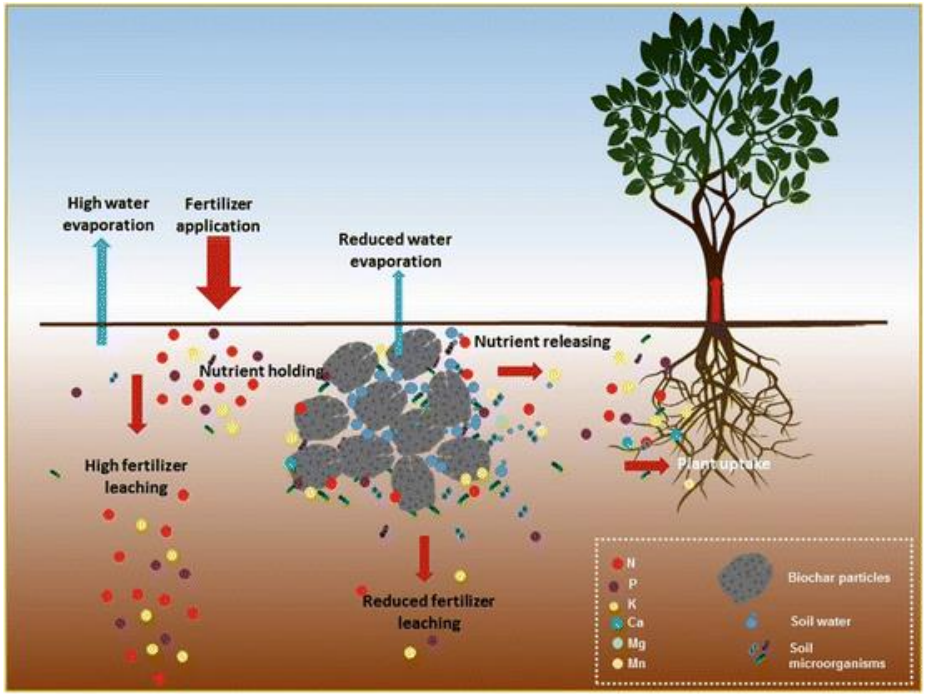
Why Biochar?

NUTRIENT USE EFFICIENCY

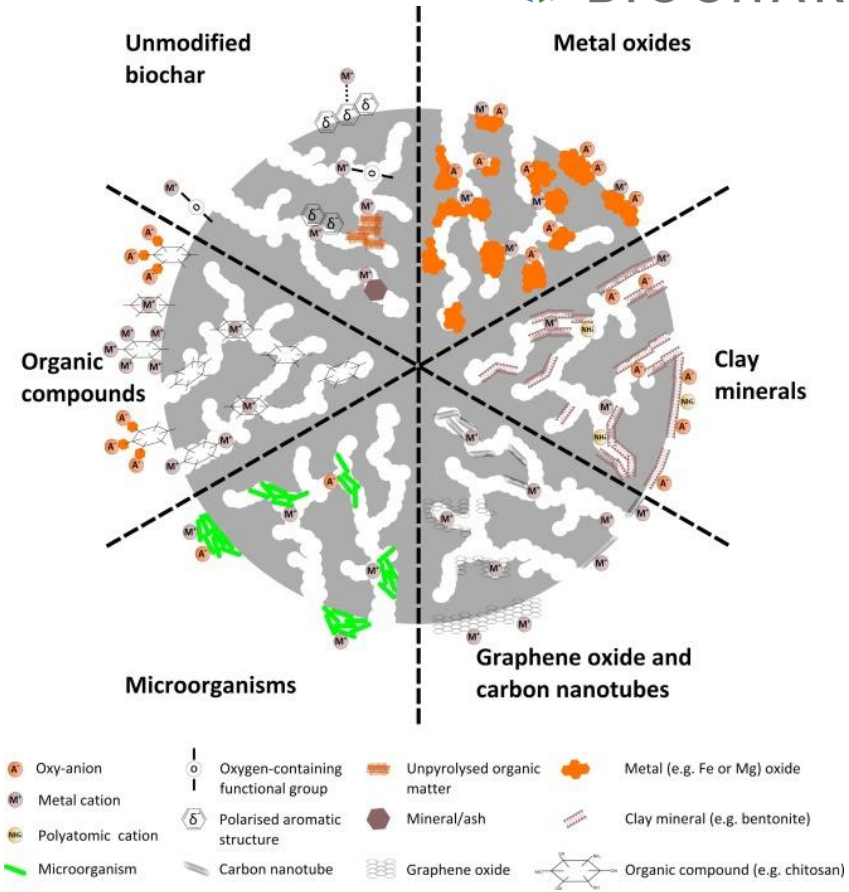
- Biochar acts like a **charcoal filter** that retains nutrients in the soil
- Excess nutrients “stick” on these surfaces, and are released slowly over time
- Less nutrients need to be applied (i.e. fertilizer) and nutrient losses can be reduced
- Nutrients held on biochar surfaces are still plant-available



Why Biochar?

HEAVY METALS & POLLUTANTS

- Biochar surfaces can “soak up” heavy metals and other pollutants from soils and water
- Metals and pollutants are transformed by surface chemistry and active biology into less toxic forms
- Biochar can reduce **bio-availability, groundwater contamination, and toxic runoff**



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How is Biochar Made?

CONSERVATION BURNS

- Dry biomass is stacked in a pile, dense enough to limit air-flow, but loose enough to allow coals to settle
- The pile is ignited from the top to ensure a clean-burn
- Top-lit piles burn gases released from the heated biomass below
- Quenching ensures biochar does not smolder to ash

Photo courtesy of Wines and Vines

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How is Biochar Made?

OPEN PITS & KILNS

- A small fire is started in the pit or kiln and dry biomass is added to maintain a clean-burning fire
- As soon as the coals turn white more biomass is added
- When smoke develops, stop adding biomass to allow the fire to catch-up and burn cleanly
- Quenching ensures biochar does not smolder to ash

How is Biochar Made?

AIR-BURNERS

- Designed originally by the forestry industry as alternative to pile burns, and modified to produce biochar
- Mobile units can be easily moved on-site when needed and removed when project is complete
- Clean burning, high throughput, relatively low char yield
- Can be expensive to rent / buy and operate

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How is Biochar Made?

BIOMASS POWER PLANTS

- Produce heat, electricity, & biochar
- High temperatures produce a very stable biochar ~ 1000+ years
- Biochar is generally highly uniform small particles with consistent physical / chemical characteristics
- Extremely clean burning due to emissions scrubbing equipment
- Alternative fate considerations

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The California Biochar Story

A CARBON WATERSHED

- Excess forest biomass increasing risk of catastrophic wildfires
- Biomass management improves forest health reduces fire risk
- Existing bioenergy facilities converted to biochar production
- Direct carbon sequestration in soils and GHG emission reduction
- Soil health, drought resilience, and environmental remediation




California “Terra Preta” - Sierra Valley

One-time application of high carbon wood ash (biochar) - over 30 years old

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Soil Samples from California “Terra Preta” Sites

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