

Biochar and Terra Preta



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“What of thee, O earth, (I) dig out,
let that quickly grow over
let me not hit thy vitals,
nor thy heart.....
O cleansing one !”

Atharva Veda

Whitney, 1905

What is biochar?

- Charcoal made from biomass
- Used as a soil amendment
 - Normally made at less than 500 degrees
 - Not activated



Dr. Jocelyn

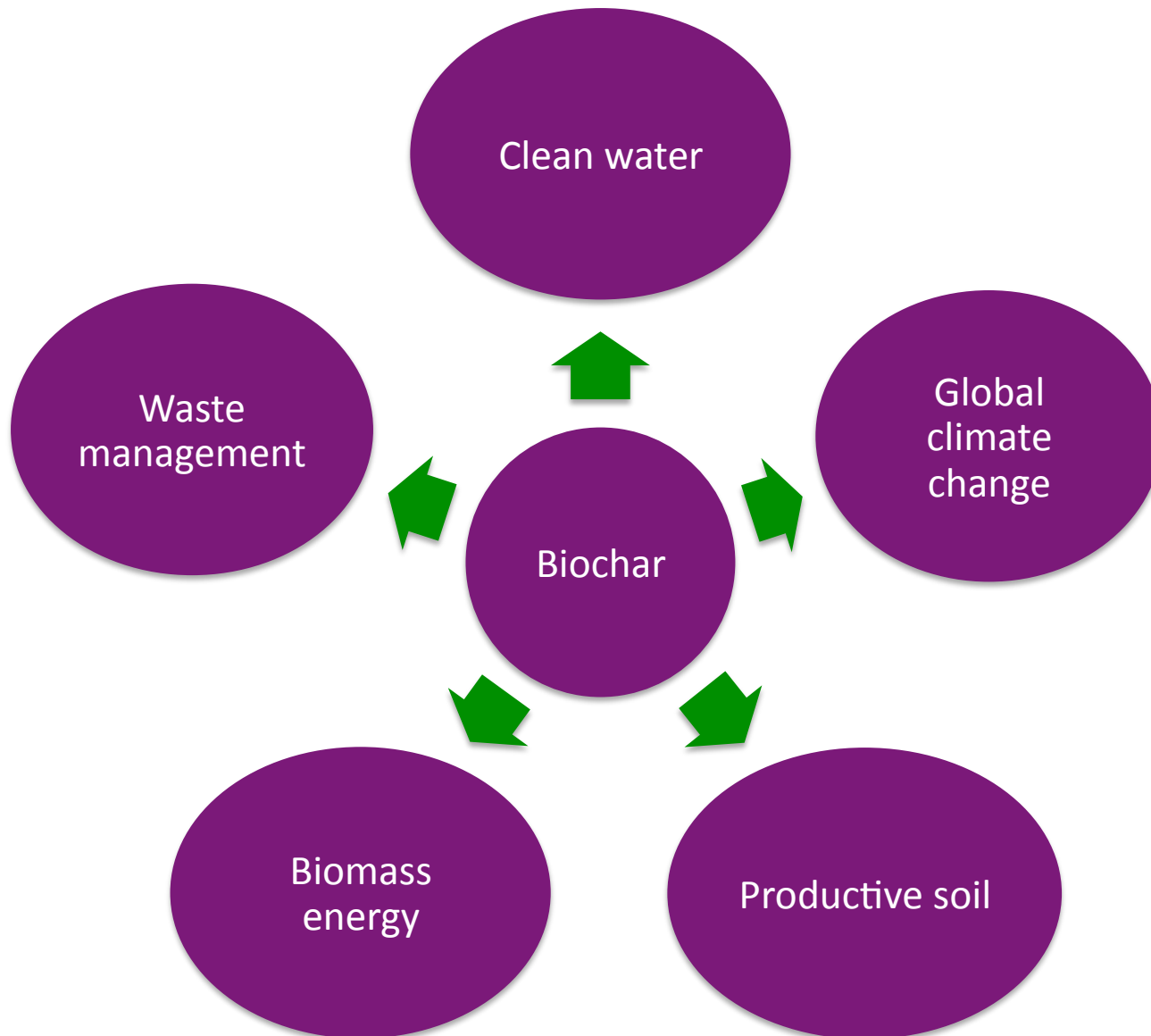
<http://biocharproject.org/charmasters-log/biochar-electron-microscope-images/>

What is Terra Preta?

- Terra Preta soils in Amazon
- Highly productive
- Man made
- Biochar was a main component
- Basis for civilizations like “El Dorado”

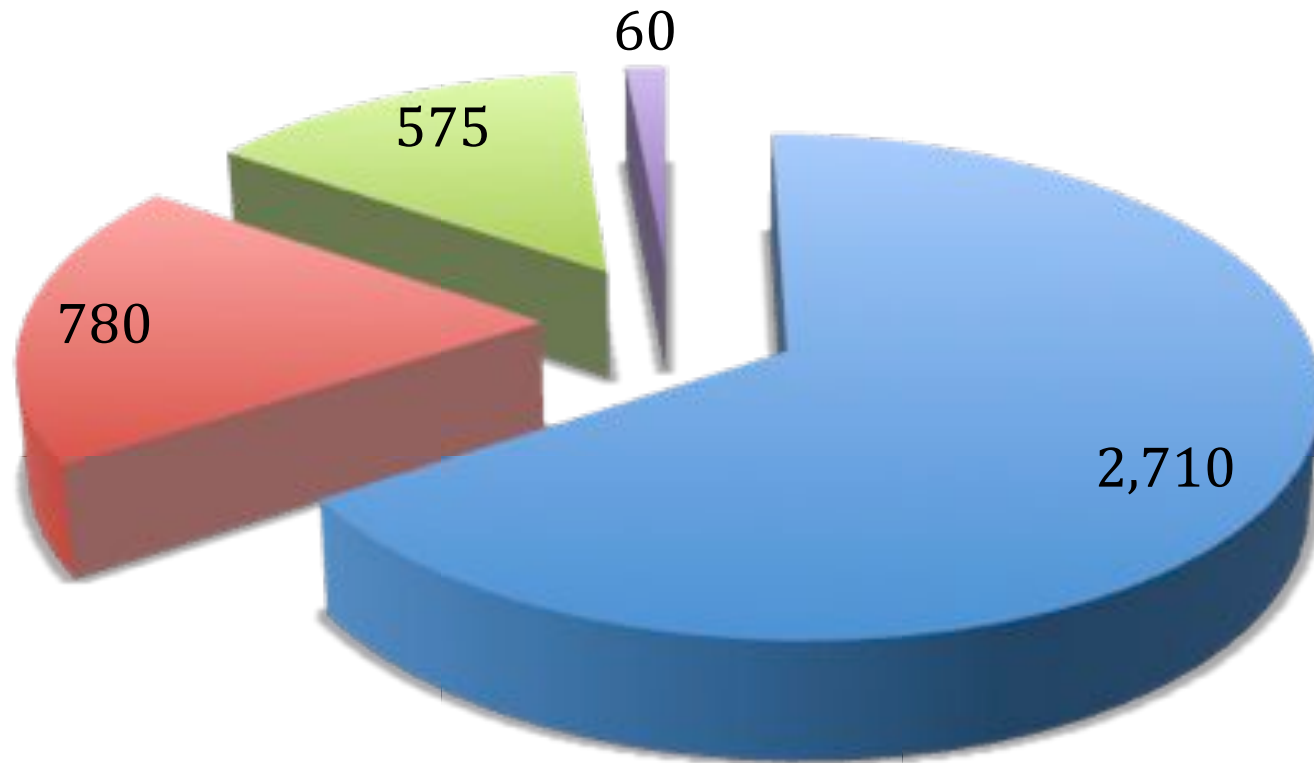


Why is it important?



Why is it important? – Global climate change

■ soil ■ atmosphere ■ biotic ■ annual turnover

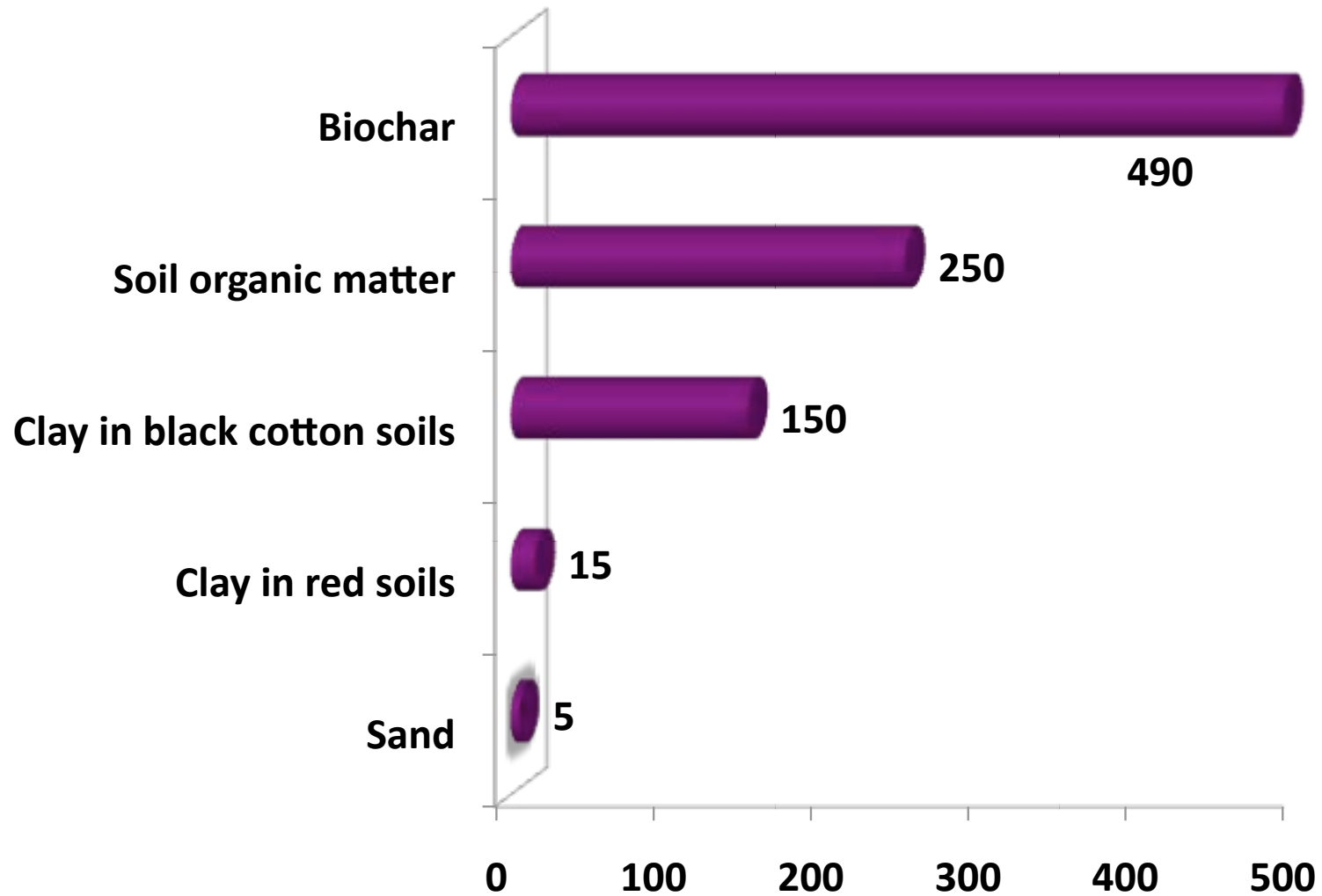


**Carbon Pools in Gigatonnes in the world
(simplified, geologic and oceanic pools not shown)**

Lal, 2008

How does biochar work?

Acts as nutrient bank



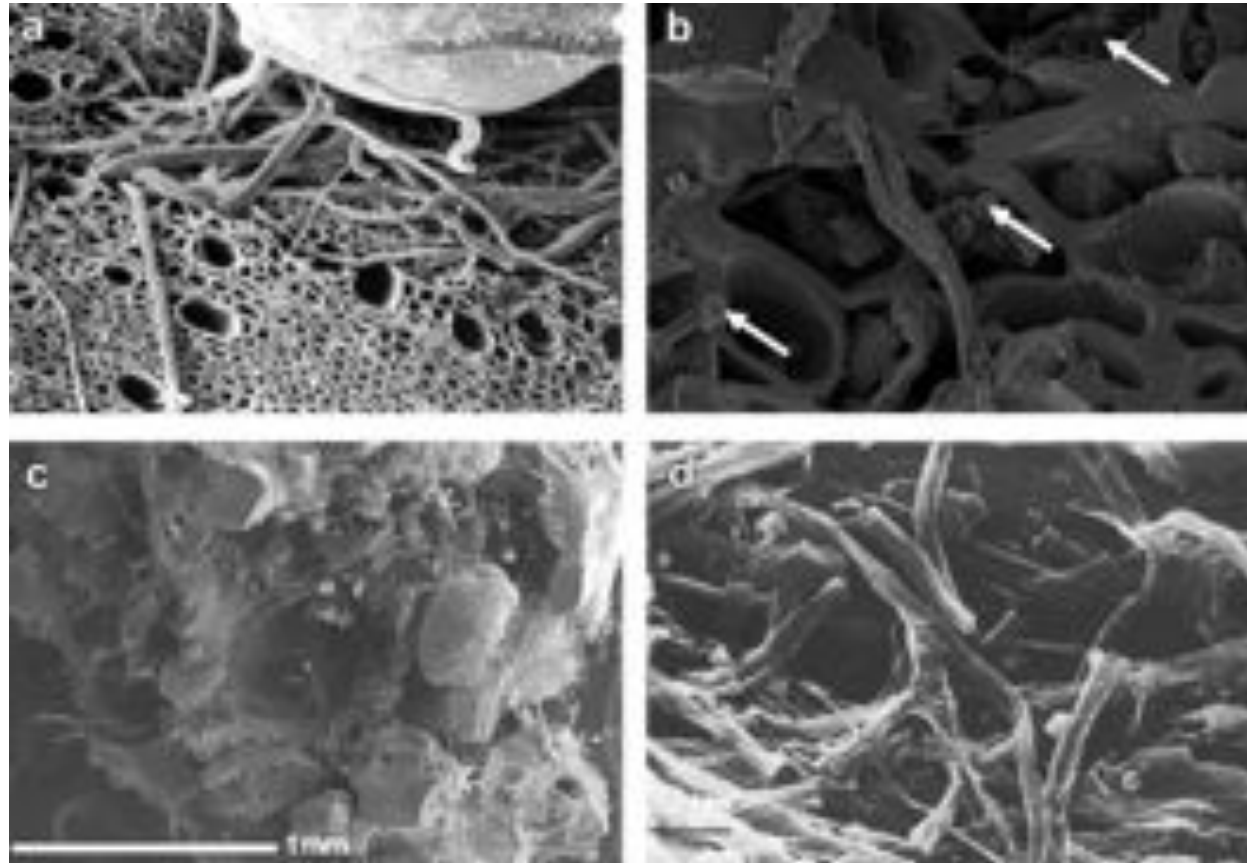
Brady and Weil., 2008; Radlein et al., 1996

Helps the soil to conserve water



Field trial in Discipline farm, Auroville

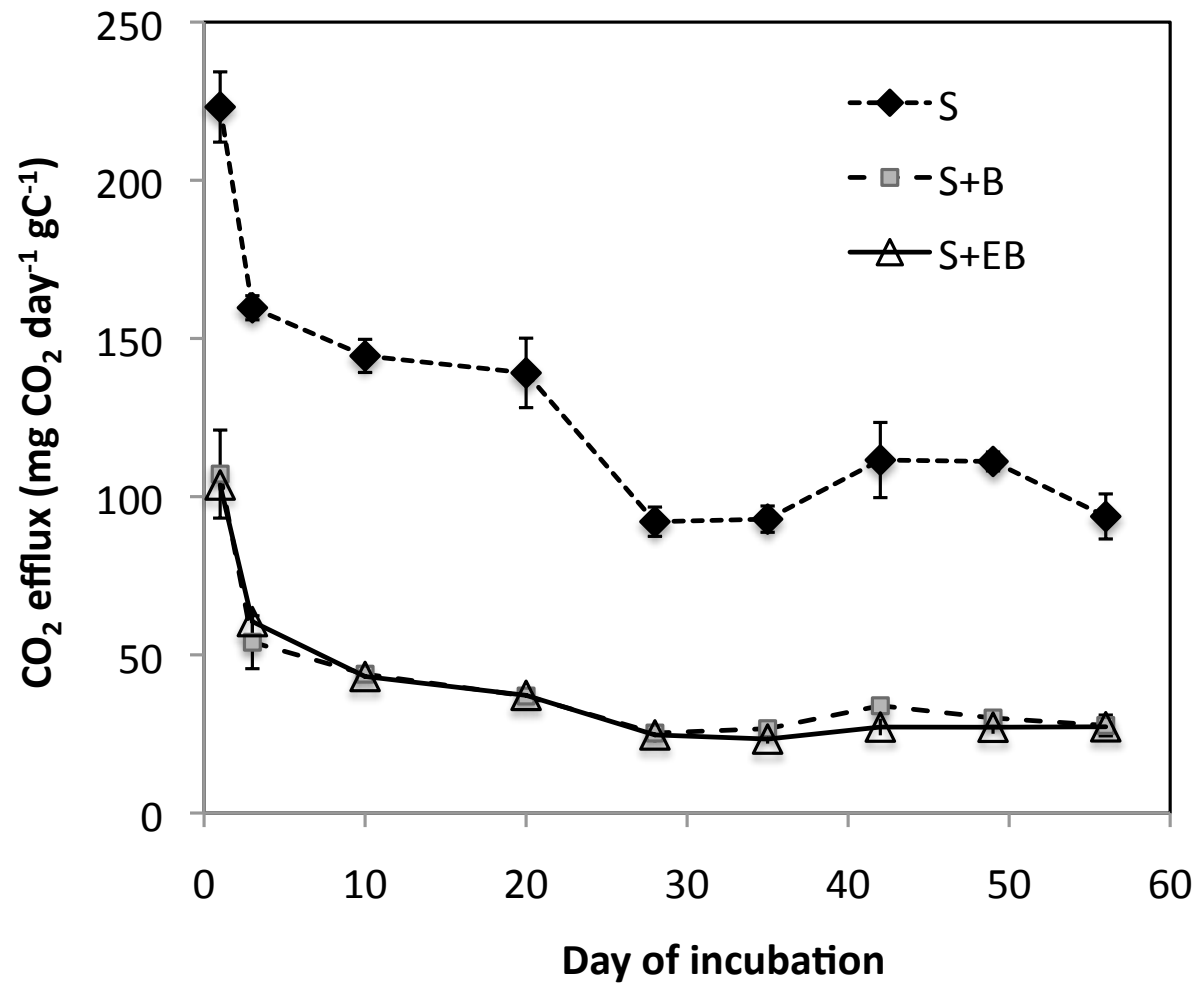
Home for soil microorganisms



(a) fresh biochar showing fungal hyphae

(b) fresh corn biochar showing microorganisms in pores (arrows).

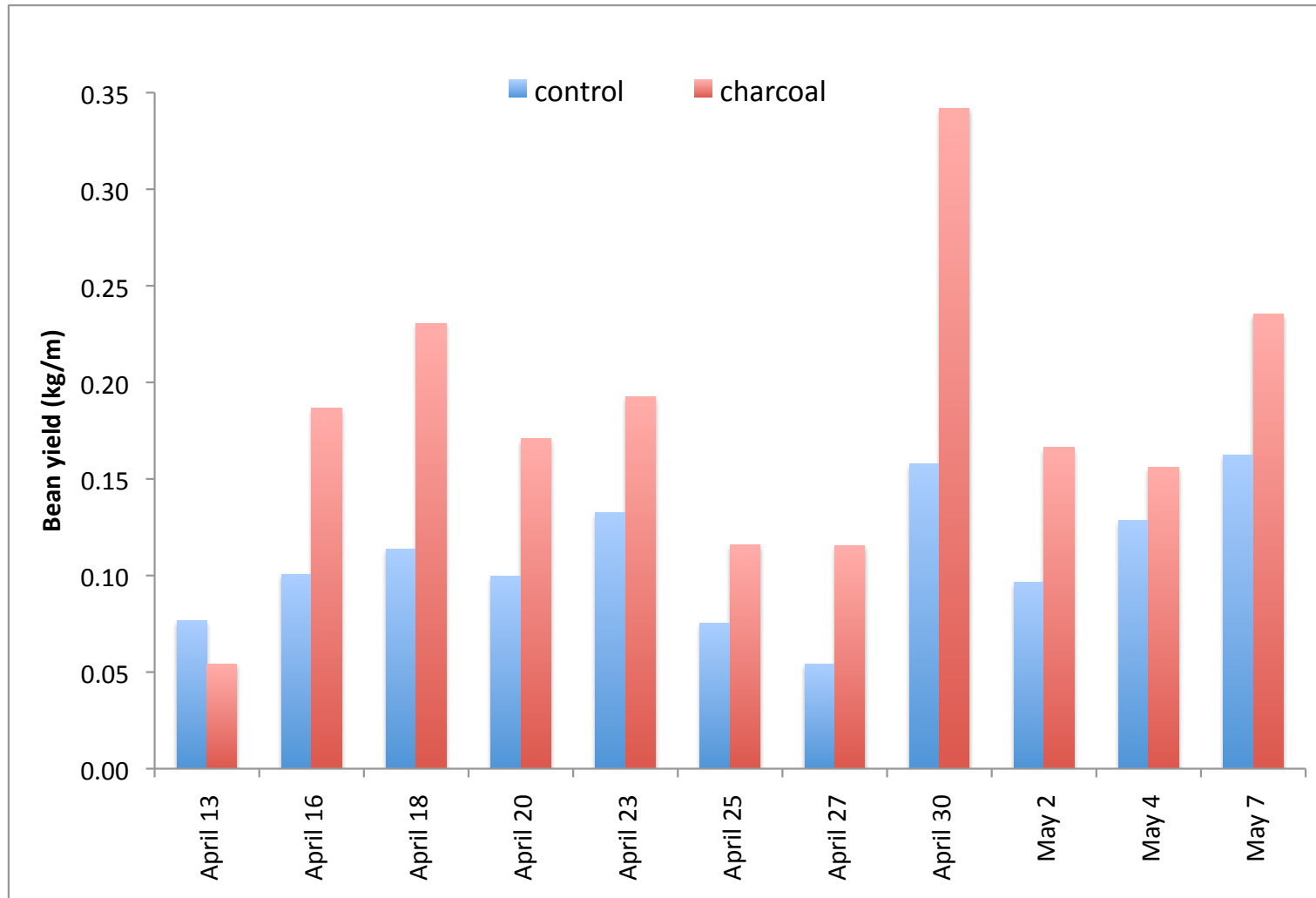
Reduction in greenhouse gas emissions



Other benefits of Biochar

- Increase in pH in the root zone
- Absorption of harmful compounds in soil

Increase in crop yields



Field trial in Auro Orchard farm, Auroville

Biochar in Auroville

- Charcoal kilns
- Charcoal making biomass cookstoves
- Field trials
 - Discipline
 - Windarra
 - Auro orchard
 - Annapurna
 - Siddhartha

Traditional charcoal making

- Low efficiency
- Risky
- Pollution of air and long term health problems
- Loss of carbon (leaves, straw, soil carbon)



Iwasaki kiln in Discipline farm



30-40% efficiency*
30 Kg capacity
Rs 13000

* Depending on skill of operator, biomass type and other factors

ARTI kiln in Windarra farm



20-30%
efficiency
20 kg
capacity*
Rs 8000

* Depending on skill of operator, biomass type and other factors

Adam retort in Cuppa chai campus



30-40% efficiency*
750 kg capacity
Rs 55000

* Depending on skill of operator, biomass type and other factors

TLUD stove



25-30% efficiency*
40-50% wood saving*
Rs 2300

* Depending on skill of operator, biomass type and other factors

Nutrient enrichment of Biochar

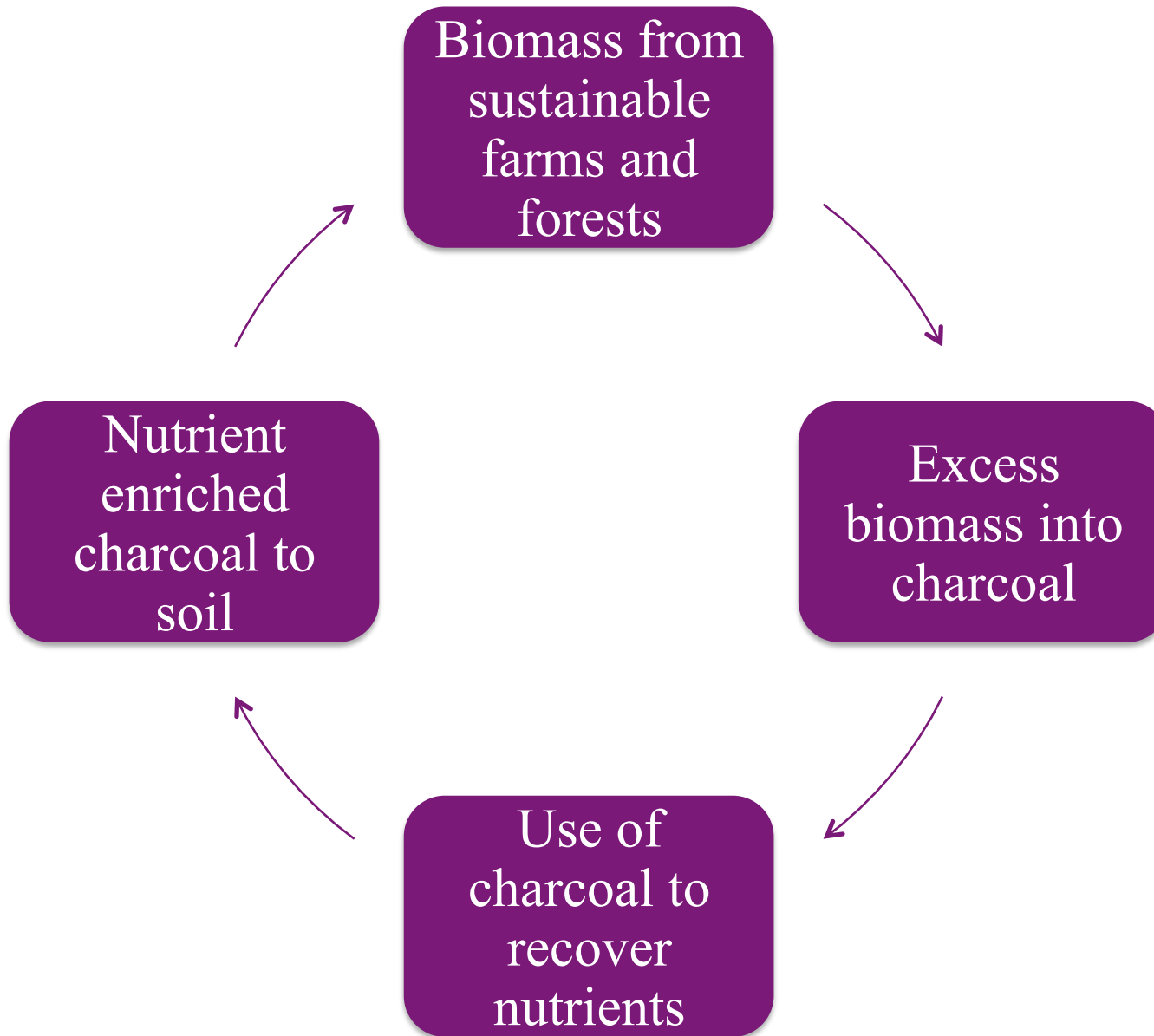
- Mixing with compost
- Soaking in cow urine
- Soaking in human urine
- No enrichment



Field trials



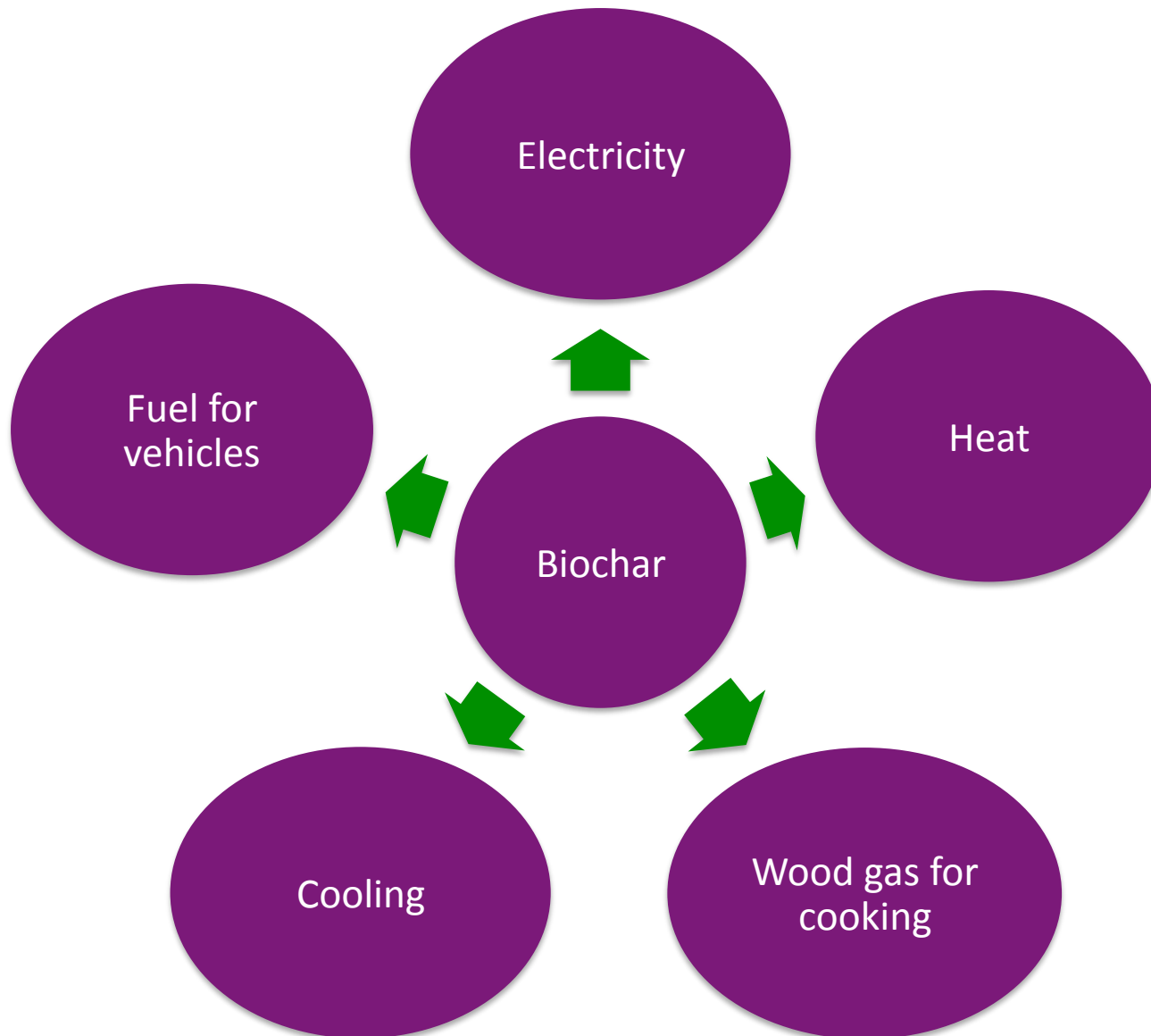
Closing the loop



What next?

- Reaching out to more homes, farms and forests
- Lectures and experiments in schools
- Better use of energy released during charcoal production

Biomass energy



Potential uses in cities

- Waste management
- Gasifier cookstoves and small kilns
- Odor reduction and nutrient recovery in public toilets
- Use in city gardens to reduce leaching and groundwater pollution

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Thank you!

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