

Cookstoves that produce biochar for soil improvement and carbon sequestration

Research in Kenya 2006-2013-2020

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Biochar improves yields in tropical soils



Long-term trials

Biochar addition persistently increased soil fertility and yields in maize-soybean rotations over 10 years in sub-humid regions of Kenya

Kätterer *et al*, 2019.

Climate benefits



+



+



= Climate change mitigation
with carbon dioxide removal

Sustainable biomass + efficient and clean conversion + carbon sequestration

(1)

(2)

(3)

Risk:

**Will biochar demand drive
unsustainable charcoal production?**

(1) and (2) are usually not fulfilled in charcoal production

Biomass sources



Gasifier cookstove



- Less emissions
- Less fuel
- 17%(wt) biochar
- Users perceive benefits
- Barriers:
 - fuel preparation
 - lighting
 - re-loading

Gasifier can provide charcoal fuel



or



or



?

Multiple uses – competition or flexibility?

System with multiple benefits

- Multiple benefits: energy, climate, agriculture, health, gender,
- Several disciplines
- Co-learning with 150 farmers in 3 regions in Kenya



Less fuel



Less smoke
Suitability?



Higher yields
Carbon sequestration



Other fuels



Competition: Biochar
in soil or as fuel?

Net negative
GHG emissions ?

Gitau, K. J.; Sundberg, C.; Mendum, R.; Mutune, J.; Njenga, M. Use of Biochar-Producing Gasifier Cookstove Improves Energy Use Efficiency and Indoor Air Quality in Rural Households. *Energies*. 2019

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Policy brief: Biochar stoves for socio-ecological resilience

Webinar: <https://www.youtube.com/watch?v=ZhGX0WkOeNc>

www.biochar.abe.kth.se

Jeffery et al, 2017. Biochar boosts tropical but not temperate crop yields. *Environ. Res. Lett.* 12, 053001

Thank you!

Questions?

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