

# Can biochar improve tuber yield in yam systems?

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## 1. Motivation



Yam *Dioscorea* sp. is an important tuber crop for the livelihoods of many people in West Africa.



Yams are usually grown on light textured soils, generally of low fertility.



Current cultivation practices could result in decreased soil organic matter stocks and further decline of soil fertility.



The addition of biochar could be a strategy to maintain soil organic matter and soil fertility.

## 2. Biochar

- Biochar is carbonized biomass made through pyrolysis.
- Biochar can act as a long-term carbon storage in the soil due to its large proportion of aromatic carbon.
- Biochar can provide similar functions in the soil as soil organic matter and may thereby mitigate certain soil fertility constraints and increase crop productivity.



Fig. 1: Biomass (left), biochar (centre), biochar applied to field (right). Cotton gin trash (upper row); cashew nut shell (lower row).

## 3. Field experiment

Field experiments installed at two sites of different soil fertility levels in Côte d'Ivoire:

- Tiéningboué: High soil fertility
- Kouassi Kouassikro: Low soil fertility

Two biochars applied at 5 or 10 t ha<sup>-1</sup>, as sole applications or in combination with manure or mineral fertilizers.



## 4. Results

- No significant biochar-induced effect on tuber yields was observed after two years.
- Overall yield increases in Kouassi Kouassikro can probably be explained by increased amount and better distribution of rainfall during the second cropping season.
- Tuber yields of 20-25 t ha<sup>-1</sup> are high compared to conventional yields. The yields of the control treatment are already high and thus the potential effect of any treatment is relatively small.

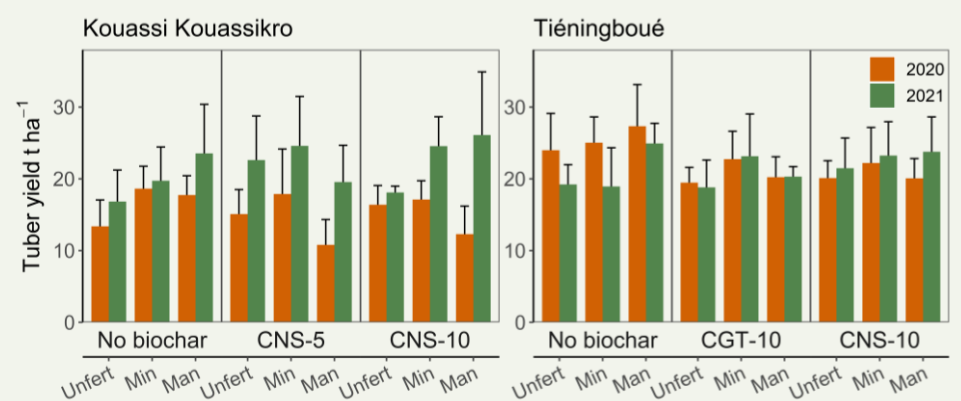


Fig. 2: Fresh tuber yield from two cropping seasons. Unfert: unfertilized control, Min: mineral fertilizers, Man: manure, CGT: cotton gin trash-derived biochar, CNS: cashew nut-derived biochar. Biochars applied at 5 or 10 t ha<sup>-1</sup>. Error bars represent standard deviations.

## 5. Contribution to Sustainable Food Systems

This project aims at improving soil fertility and crop productivity in yam cultivation. Yam is an important crop for the livelihoods of millions of people in West Africa. Soil degradation is a main constraint to increase the productivity and sustainability of yam systems.



Fig. 3: Yams at market in Tiéningboué, Nov 2019, and yam plants in Kouassi Kouassikro, Nov 2021.