

# Unconventional farming methods could help smallholders fight back against climate change

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New research from Ghana shows less popular methods of biochar application are more effective in promoting cowpea growth and yield. The article, "Method of biochar application affects growth, yield and

nutrient uptake of cowpea" was published in the De Gruyter open access journal *Open Agriculture*.

Cowpea is widely cultivated in sub-Saharan Africa and in warm regions around the world. The crop is an important source of human food, [livestock feed](#), and green manure, and generates income for [smallholder farmers](#). It is valued for its ability to boost soil fertility by fixing nitrogen.

But West African farmers—under pressure from climate change, drought, pests, and low [soil fertility](#)—have struggled to optimize the yield of this valuable crop. Conventional mineral fertilizers remain expensive for smallholders and can cause soil degradation.

Biochar is a charcoal-like substance made by burning waste plant matter. Adding biochar to soil is a relatively new approach, which has been shown to improve crop yields in many ways. It can increase the soil's water-holding capacity, reduce acidity, increase nutrient supply and retention, and promote the growth of beneficial microbes. But to date, there has been little research into the best method of applying biochar to soils to optimize its benefits.

Scientists tested out the different methods of biochar application on fields at Ghana's CSIR-Soil Research Institute. They planted cowpea seeds in the site's sandy soil and tested out the broadcasting, spot, and ring methods of applying biochar, comparing them to a control.

The broadcasting method sees biochar spread uniformly across the surface and worked into the soil using a hoe. For the spot method, biochar is placed into a small hole and covered with soil. For the ring method, biochar is dug into the soil in a ring around the place where the seed is to be planted.

The research team confirmed that biochar improved plant height and girth, the number and weight of nitrogen-fixing nodules on the [cowpea](#), pod number, shoot and seed yield as well as nitrogen and phosphorus uptake. The spot and ring methods significantly improved these various measures of crop success.

"We've shown the traditional method of broadcast and incorporation to be less effective," says lead researcher Edward Yeboah, "whereas the spot and ring methods of biochar application show tremendous benefits for sustainable [soil](#) management. Smallholder farmers can now improve their livelihoods by focussing on spot and ring application of [biochar](#) for maximum benefit."

**More information:** Edward Yeboah et al, Method of biochar application affects growth, yield and nutrient uptake of cowpea, *Open Agriculture* (2020). [DOI: 10.1515/opag-2020-0040](https://doi.org/10.1515/opag-2020-0040)

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