

BIOCHAR



What is Biochar?

Biochar is a carbon-rich product obtained by pyrolyzing organic materials, such as agricultural waste, under controlled

conditions with limited oxygen. This process not only helps manage organic waste but also enhances soil health by improving soil structure, water retention, and nutrient-holding capacity, which is particularly beneficial in SSA and arid regions where soil degradation and water scarcity are common.

Materials Required

- Organic Feedstock: Crop residues (e.g., maize stalks, rice husks), forestry waste, animal manure, or other locally available biomass.
- Equipment: A simple pyrolysis kiln or modified drum oven can be used to produce biochar effectively at the community level.



Step-by-Step Guide on How to Produce Biochar

1. Dry the biomass to a moisture content below 20% and cut it into small pieces. For Kon-Tiki kilns, pack loosely. For drum kilns, compress light materials like rice husks to prevent air pockets and uneven burning.
2. Load the biomass into the kiln, ensuring it limits oxygen flow. In double-barrel systems, use a chimney to improve efficiency and reduce smoke. Place the kiln in a safe, open area.
3. Ignite the biomass at the top to start pyrolysis. Maintain low oxygen levels and keep the temperature between 300°C and 450°C for high-quality biochar.
4. The process typically lasts 3 to 6 hours, depending on the kiln and feedstock. Avoid exceeding 450°C to prevent overly alkaline biochar.
5. Cool the biochar completely to prevent fires. Moisten it slightly to reduce dust and make handling easier.
6. Crush or granulate the biochar for uniform soil application. Properly prepared biochar improves fertility, water retention, and nutrient efficiency.

Application and Rates

- Application Method: Mix biochar with compost or manure for enhanced nutrient availability, or directly apply it to the soil and incorporate it with standard tillage practices.
- Application Rate: Generally, 5–10 tons per hectare (t/ha) is recommended, depending on soil conditions and crop type. In nutrient-depleted soils, higher rates may be beneficial.



Benefits of Biochar in SSA and Arid Regions

- Enhances soil fertility by increasing nutrient retention and reducing leaching.
- Improves water retention, making it ideal for drought-prone areas.
- Supports soil microbial activity, which aids in nutrient cycling and soil structure enhancement.
- Acts as a carbon sink, helping mitigate climate change

Conclusion

- Biochar provides a sustainable and highly effective way to improve soil fertility, water retention, and resilience against environmental stressors in SSA and arid regions. However, for best results, it should be used in combination

with other organic amendments and traditional fertilization practices to maximize nutrient availability, retention, and soil health benefits. Proper safety precautions, both during biochar production and application, are essential to prevent health and fire risks.

- By following this detailed guideline on biochar production, application, and safety practices, farmers can achieve significant improvements in crop yields and soil health, creating a more resilient agricultural system. Furthermore, regular monitoring and adjustments will ensure that biochar's full potential is realized in a sustainable and efficient manner.

Additional Resources

For further information and detailed guidelines, consider consulting the following resources:

Biochar Crop Application Guidelines: Provides practical insights for applying biochar to various crops.

Biochar US

- Biochar Production Technologies: Offers an overview of equipment and methods for biochar production.
- Biochar International
- Biochar in Agriculture Toolkit: A comprehensive collection of resources to assist in biochar application in agricultural systems. NNRG



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