

MAKE BIOCHAR AT HOME

REQUIRED MATERIALS

- 🔥 **Open fire permit** from Guam Fire Department
(Permit found here:
<https://www.govguamdocs.com/gfd/docs/BurningPermit.pdf>)
- 🔥 **Fire-safe equipment and clothing** (i.e., face mask, gloves, eye protection, metal container for biochar storage)
- 🔥 **Water and a Fire Extinguisher** (an ABC)
- 🔥 **Lighter or matches**
- 🔥 **A metal drum or soil pit**
- 🔥 **Thermometer** that can measure temperatures between **300°C to 700°C**. A non-contact infrared thermometer is recommended for safety.
- 🔥 **Woodchipper (optional)**
- 🔥 **Biomass** (Wood chips, coconut husks, bamboo, or any plant material are recommended)
- 🔥 **Shovel**

RESOURCE GUIDE

- **Fire Permit** - Guam Fire Department (671-472-3311)
<https://www.govguamdocs.com/gfd/docs/BurningPermit.pdf>
- **Local weather service** - www.weather.gov/gum
- **Items such as the fire-safe clothing, fire extinguisher, lighter/matches, infrared thermometer, and shovel can be found at any hardware store such as Bensons, Home Depot, or Guam Home Center**

What is biochar? Biochar is a charcoal-like substance derived from biomass, using *pyrolysis*, which is converted into a more stable form of carbon. Biomass refers to any organic and renewable materials, including plants, trees, and animal waste. Biochar sequesters carbon into the soil and neutralizes soil acidity by raising pH, thereby improving soil fertility.

CONTACT US

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DIY BIOCHAR GUIDE

Climate Smart Farms

STEP-BY-STEP GUIDE

⚠ PRECAUTION ⚠

Do not start a fire when it's windy outside. Check the local weather service for more guidance.

1. **Apply for a residential burn permit - Call the Guam Fire Department at (671)472-3311** for more information as this may require time for approval and may be subject to an inspection. This document can be found at www.govguamdocs.com/gfd/docs/BurningPermit.pdf.
2. **Check the weather** - Ensure that the weather indicates no hazardous fire watch. Ideal conditions: no/low wind and dry weather. Check with the local weather service at (www.weather.gov/gum) to ensure there is no Red Flag Warning.
3. **Prepare the materials** - Gather all listed materials and set them aside. Make sure you have a **stable water source** to fully extinguish the fire, and keep a fire extinguisher nearby in case of emergency. Wear your fire-safe clothing and gear.
4. **Prepare the biomass** - Gather any dry biomass that is readily available to you. Place dry biomass into the metal drum or a pit. Avoid treated wood that may contain toxic chemicals.
5. **Start the burn (pyrolysis) process** - Safely ignite the biomass from the top with a lighter or matches. Once the biomass begins burning, use an infrared thermometer to check the temperature and monitor from a safe distance.

6. **Monitor the fire** - While using fire safe gloves, use an infrared thermometer to check the temperature often. Aim for both the hottest and the lowest temperatures of the flames. Take several readings to determine an average temperature. Point the thermometer at least 5 feet away from the flames to prevent injury. When the temperature reaches above **300 °C**, use fire safe gloves to gradually close the cover of the drum or the soil pit to reduce the oxygen supply. The heating of an organic material at a high temperature with little oxygen is known as pyrolysis. Time of completion may vary.

7. **Monitor and control airflow** - To further restrict airflow, **soil** can be applied on top of the cover and around the edges to reduce oxygen supply.

8. **Quench the fire** - Using heat-resistant gloves, carefully remove the lid. Closely monitor the biomass as it transforms into blackened, lightweight pieces (biochar). Once this stage is reached, quench the fire thoroughly using water or soil until all smoke and steam have stopped. Stir the contents with a shovel to eliminate any remaining hot spots. Do not handle the biochar until it is completely cool to the touch.

Use a fire extinguisher only if the fire becomes unmanageable or poses a safety risk.

9. **Crush and store** - Break down the biochar into smaller pieces. To make it easier and faster, a wood chipper can be used. Store the biochar in a cool, dry place or mix directly in the soil.



Figure 1. Metal drum



Figure 2. Biochar



Figure 3. Recommended Infrared Thermometer