



## Fuel from the Fields Charcoal



Fuel from the Fields charcoal is an inexpensive, clean-burning, environmentally friendly alternative cooking fuel that is made from agricultural waste materials and thus does not lead to deforestation. This instruction sheet explains how to make Fuel from the Fields charcoal; the process can and should be adapted to your local environment. We encourage you to experiment and let us know your results (you can email us at [charcoal@mit.edu](mailto:charcoal@mit.edu))

# Elements for making Charcoal

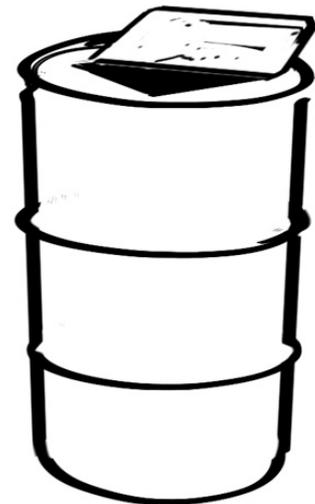
The main step in making Fuel from the Fields charcoal is carbonization, which requires three things: dry organic material (also called biomass), heat, and control of the amount of oxygen. The biomass may be any of a variety of agricultural waste materials including: corncobs, sugarcane waste (bagasse), millet stalks, groundnut shells, palm leaves or bamboo. It must be very dry in order to burn properly. The heat is generated by setting the biomass on fire, and the oxygen-free environment is created by sealing the drum with sand or soil. The carbonized material is then crushed, mixed with a binder, and then made into briquettes.



Biomass



Heat



Oxygen Control

# 1. Preparing the Kiln

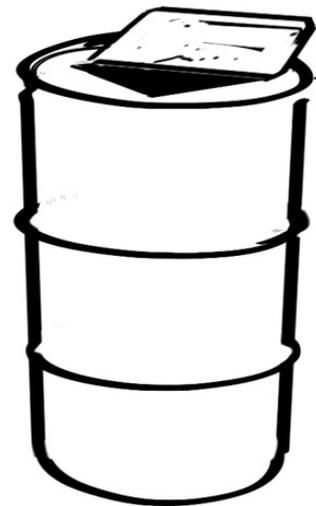
A 55 gallon oil drum can be used as a kiln to make charcoal



Cut a large opening for filling the kiln with the material you want to carbonize.



Cut several holes in the bottom of the drum. These holes allow air to flow through the drum while burning, which results in a hotter fire and produces better charcoal.



A piece of sheet metal is needed to cover the top hole and prevent oxygen from entering the drum, allowing the material inside to carbonize.

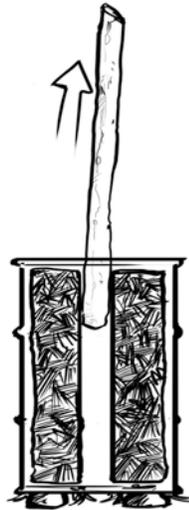
Burn away oil residue from the drum before making the first batch of charcoal !!!

## 2. Filling the Drum



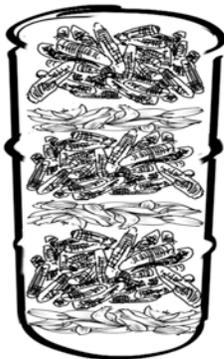
Tip the drum on its side, and stuff the air vents on the bottom with a material that ignites easily.

This will make it easy to light the drum from the bottom.



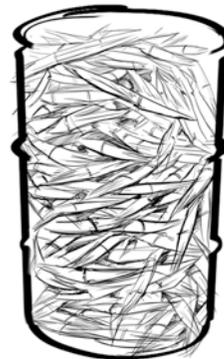
Put a large stick in the center of the drum.

This will create an airway shaft to make the fire burn better.



### **Corn Cobs**

Alternate thin (5cm) layers of corn husks with thicker (25cm) layers corn cobs until the drum is full.



### **Bagasse**

Fill the drum with bagasse.

### 3. Lighting the Fire



Before starting the burn, place the drum on top of three stones, so that air can flow through the holes in the bottom.

Remove the stick in the center for ventilation.



Light the material at the bottom of the barrel.



The burning material will produce a lot of smoke...



After 5-10 minutes, the smoke will be hot enough that you can ignite it to make the fire burn more cleanly.

## 4. Sealing the Drum



After another 5-10 minutes, cover the drum with the metal lid.



Carefully remove the stones from under the drum while supporting the drum with a stick.



Seal the bottom edges and the top of the drum with sand or dirt to prevent oxygen from entering. Wait at least 2 hours before opening.

## 5. Crushing the Charcoal



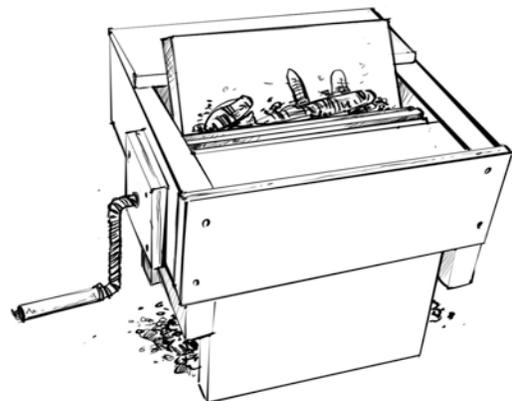
There are many ways to crush charcoal. Adding water while crushing helps to prevent dust from spreading around.



You can crush charcoal in a bag with a stick, or with a mortar and pestle using a cover to prevent dust from flaring up,



or on a tarp using stones.



A charcoal crushing machine can be used for large quantities.

## 6. Making the Binder

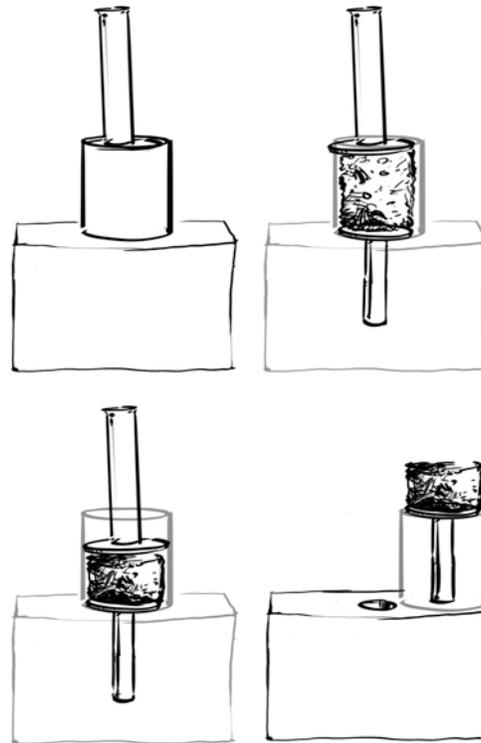
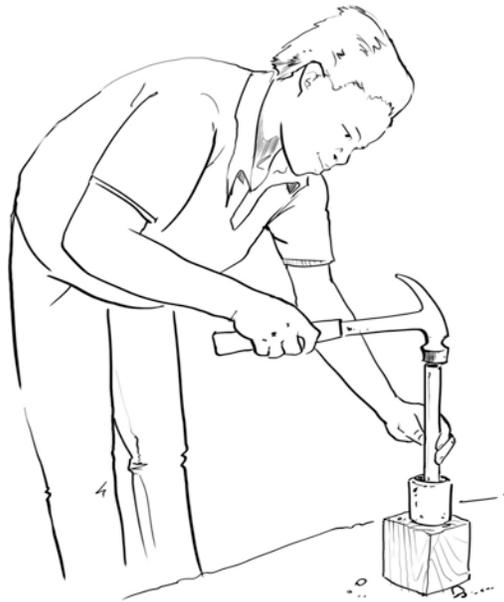
The binder for making the briquettes can be made from many different materials: cassava, aloe, or banana.



## 7. Making Briquettes



Fill the press with charcoal mixture.

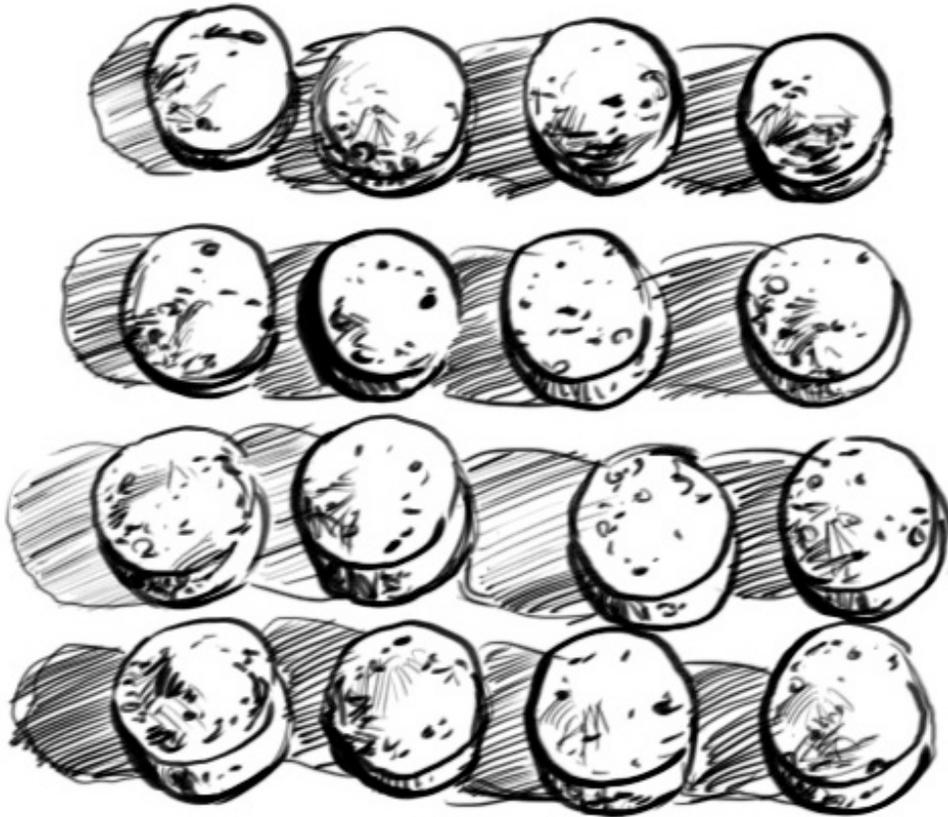


Hit plunger to form the briquette.

Push up the ejector to remove the briquette.

## 8. Drying Briquettes

Let the briquettes dry in the sun for 3 -4 days.



Documentation by *D-Lab* at MIT

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