



Design a System that Converts Sugarcane Waste into Cooking Charcoal Charcoal Briquette Maker

proposed by Amy Smith

Haiti is in dire need of an alternative fuel source. Currently, wood and wood-based charcoal are the primary cooking fuels in Haiti, but the country 98% deforested. Wood for charcoal is extremely scarce and demand creates soaring fuel prices and environmental devastation. With an average income of about one dollar per day, imported fuels are not a viable option.

A partial solution to these problems was developed by a team of researchers at the Massachusetts Institute of Technology. Using little more than an oil drum and a starchy food known as manioka, they were able to transform a commonly available agricultural waste product into cooking-grade charcoal. Bagasse, the waste product from sugarcane processing, is used as the carbon source for the charcoal and provides an alternative to chopping down trees. Another motivation driving the project is to provide the technology required for the development of small sugarcane charcoal micro-enterprises. This project therefore not only creates jobs, but also puts an alternative charcoal in the marketplace that does not contribute to deforestation.

The first step is to carbonize the sugarcane waste by burning it in a sealed oil drum. A porridge made from manioka is used to bind the charcoal dust and the resulting mixture is formed by hand into briquettes. These charcoal briquettes are of sufficient quality to boil water, but not for as long as wood charcoal. The hand-formed briquettes also tend to break more easily than solid wood charcoal. What's more, their lighter weight does not appeal to customers who are used to the higher density of wood charcoal.

To improve the quality of the briquettes, their strength and density must be increased. This design challenge is to develop a machine that is able of forming charcoal briquettes with a density comparable to that of wood charcoal. This machine should cost less than US\$100 and produce at least ten briquettes per minute. The device should not require electricity for to operate, and it should be able to be constructed using locally available materials and skills whenever possible.



A relatively expensive pre-fabricated briquette press, tested at an earlier stage of the MIT team's research



Hand formed briquettes crumble upon burning and are unable to boil water for as long as wood charcoal.



To learn more about the process developed at MIT and their on-going research to date, go to <http://web.mit.edu/d-lab/portfolio>