

Briquetted Charcoal from Sugarcane Trash



Dry leaves, left in field after harvest of sugarcane, are called trash. On an average, a hectare of sugarcane generates about 10 tonnes of trash. Because it has no value as cattle fodder, and because it also resists decomposition, the trash is burnt in situ, in order to clear the field for the next crop. It is estimated that in the state of Maharashtra, more than 4,000,000 tonnes of trash are destroyed in this way. Pyrolysing the trash and converting it into fuel briquettes, can be a very profitable, small scale, rural business.

The Process

The charring kiln, a portable cylindrical structure, about 150 cm wide and 100 cm tall) made out of sheet iron is placed in the field where sugarcane harvest is in progress.

The trash is filled into cylindrical metal containers 37.5 cm wide and 60 cm tall.

The kiln takes 7 such containers at a time. All containers together accommodate 21 kg trash.

After loading the containers into the kiln, the top of the kiln is closed with sheet metal lid, which is provided with a chimney.



About 10 kg trash are burnt underneath the containers (in the kiln) to start the process of pyrolysis. The heat of the trash burning underneath the containers pyrolyses the trash in the container. Pyrolysis gas generated in the process leaves the containers through holes in their bottom, and it too burns, to serve as additional fuel in this process.

Each batch, taking about 40 min to complete, produces about 7 kg char (30% of the trash filled in the barrels). Three workers can simultaneously operate two kilns to produce about 80-100 kg char daily.

The char is powdered, mixed with a suitable binder, and shaped, with the help of a mold into briquettes. Our mold allows one person to produce daily about 100 kg briquettes.

The briquettes are laid out in the sun for drying.



Economic considerations

For a family-owned enterprise:

The capital cost of two kilns with a set of 28 containers, and a small briquetting machine is about Rs.50,000 (USD 1250).

A family unit of 3 persons can produce daily 100 kg briquettes. The briquettes have a ready market in towns, where a cheap and cleanly burning fuel is in demand. An NGO, SHG or a cooperative has to arrange the marketing of the briquettes in the neighbouring townships. The family making the briquettes can thus earn daily Rs.800-1000 (USD 20-25), which is equivalent to the income of an urban middle class family.

Use can be made of other agricultural waste material such as stems of cotton, pigeonpea, safflower, wheat and rice straw, maize cobs, or leaf litter from any plantation crop like rubber, cashew, mango, papaya, palms, etc. Wood can also be converted into charcoal using this unit. If wood is used as the raw material, there is no need for converting into briquettes.

If the 16 weeks of the rainy (monsoon) season are excluded, such a unit can work for about 36 weeks in a year, earning about Rs.200,000 (USD 5000). The metallic kilns and barrels would however eventually burn out. Even assuming total replacement of these items every year, the profit from this operation would be annually Rs.150,000 or more than Rs.10,000 per month, which is a very good income by Indian rural standards.

For mass production:

This business can also be conducted by an entrepreneur, who invests about Rs.500,000 in 20 kilns, a large capacity extruder and a shed. He gives two kilns each to 10 families, who make charcoal from whatever waste biomass that is locally available. The entrepreneur buys the char from them at a price of Rs.3 per kg. Within a working period of 200 days a year, the entrepreneur can get about 200 tonnes of char, which, after converting into briquettes, can be sold at a wholesale price of Rs.2,000,000 (USD 50000) After deducting depreciation on the equipment, bank charges, operating expenses and overheads, the entrepreneur is left with a net annual profit of about Rs.1,000,000 (USD 25000).

Note: This profit has been calculated on the assumption that the briquettes would be sold by the operators at Rs.10 per kg. The retail price in Pune is Rs.15 per kg.

The Sarai Cooking System

ARTI has also developed a non-pressurised cooker in which char briquettes are used as fuel. The cooking device has a stainless steel body with a built-in charcoal brazier. The brazier takes just about 100-150 gm of the briquettes. The vessel takes three pots, so that rice, dal and vegetable (or even meat) can be cooked simultaneously.



The housewife starts the fire, places the cooking vessel on the brazier and then she can do any other chores like washing cloths, shopping, taking a bath, etc. The food is ready in about 45 min-1 hr, by which time the char briquettes have burnt themselves out and the fire has extinguished itself.

The cooking system is so designed that the food remains warm upto two hours, if the vessel is not opened. The cost of Sarai Cooking System is Rs.500 (about USD 12). The convenience of use and the low cost of fuel are the main attractions for the users.

There are about 5000 families in Pune who use the Sarai cooking system on a daily basis and this has generated a monthly demand for about 5 tonnes of char briquettes in Pune city alone.

Product Cost:

1. Charring Kiln (ex factory, transport charges extra): Rs 20,000
2. Briquetting Machine (ex factory, transport charges extra): Rs 10,000
3. Briquetting Molds Pair (ex factory, transport charges extra): Rs 500
4. Char Briquettes: In Pune - Rs. 15 per kg

- Elsewhere in India (M.R.P. inclusive of taxes and transport) - Rs. 20 per kg
5. Sarai Cooking System (M.R.P. inclusive of taxes and transport anywhere in India)
 - For 8 lit capacity: Rs. 800
 - For 12 lit capacity: Rs. 1000

We have a video CD which shows the entire process of charring, briquette making and use of the Sarai cooking device. The VCD costs Rs.200 (including packaging and postage charges) in India. Those who wish to purchase the VCD are requested send a DD of Rs.200, drawn in the name of Appropriate Rural Technology Institute, payable at Pune. [Click here](#) for our contact address.