



I C P S - Improved Charcoal Production System (adam-retort)

The ICPS is a modern, innovative and environmentally friendly system to produce charcoal from bio mass.

Advantages:

- 1) High economy and better efficiency approx. 40% (Instead of about 18% efficiency compared to the traditional systems; calculated from dry weight).
- 2) Recycling and clean combustion of the pyrolysis gas during the 2nd phase of operation (retort-system) results in a low-emission of carbon monoxides during the charcoal production! The effective carbonization of the biomass takes only 12 hours.
- 3) Low investment costs (about 200 Euros in countries with cheap labour) and a simple construction with locally available materials.
- 4) About 2,5m³ of biomass (corresponding to approx. 600 to 700kg wood, coconut shells, etc.) can be converted to up to 250kg of charcoal.
- 5) An effective 30 hour production cycle (batch) and a simple operation of the plant result in an increased income for its operators. The right system to be used at forest projects, energy-wood plantations and charcoal makers.
- 6) Only waste and residual biomass needs to be burnt (~50kg) in a separate fire box to dry and heat the wood and initiate the carbonization process during the 1st phase.

Details of the ICPS (Improved Charcoal Production System / adam-retort)

-which was developed in Burundi/East Africa and in South India near Pondicherry. Dimensions may differ in other countries, depending on brick size and size of galvanized sheets available.

The size of the inner wood chamber: 2,4m x 1,1m x 0,95m height (**volume: 2,5m³**)

Thickness of walls: 0,07m + 0,04m(space) + 0,07m = 0,18m

The size of the outer wood chamber: 2,76m length x **1,46m width** x 1m height

Length including chimney box and fire box: 2,76m + 0,4m + 0,6m = **3,76m length**

Construction time: about one week to ten days by a trained team of 2-3 workers.

Cost for material and labour: about **200 – 300 Euros** depending on the situation in the country.

If the wood which to be carbonized, has a bulk weight of about 300kg/m³, about approximately **750kg of wood** can be loaded into the wood chamber. Other bio mass as **coconut shells** can also be carbonized.

Calculated on **oven dry wood** (with all the water content deducted) about **600 kg** can be loaded. (150kg water refers to wood with 20%humidity, wet weight basis (wwb), or 25%humidity, dry weight basis (dwb)).

About 250 kg wood charcoal can be obtained after the carbonization of the wood.

This reflects an efficiency of about 40 % (referred to the dry weight of the wood).

Production cycle for a single operation about **24 to 30 hours** (working in shifts), corresponding to about **7,5 tons to 6 tons** of charcoal production per month.



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