Production of Charcoal from invasive species

Prosopis juliflora (mesquite)

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Prosopis juliflora (mesquite)

- A prosopis species, identified as *Prosopis juliflora* (mesquite) was introduced in 1917 to Sudan to combat desertification. In the Delta of the Red sea, it has flourished due to the existence of favorable conditions and presence of various agents of seed dispersal for spreading.
- Most farmers abandoned their fields, pasture areas shrank due to the thick canopy of Mesquite
Prosopis invasion at Gash-Barka region *Prosopis* competing with native species
The potential economic value of mesquite for small holders and IDPs with regard to charcoal, building material, fire wood and other uses is fairly bright.

- The estimated income of charcoal producers is satisfying.
- Charcoal production through the development of improved kilns; could help manage the expansion of mesquite trees.
- The charcoal production season extends for 8 months with annual income of the individual charcoal producer is SDG 6400-8000 assuming he works 25-20 days per month.
Illegal charcoal production is a major cause of deforestation in Southern Kordofan.

A charcoal market at Khartoum.
The traditional kiln technology is prevalent throughout the country, the vast majority of which is made up of earth mound kilns, is archaic and extremely inefficient (16%). Kilns are quick to assemble as the wood only needs to be covered with earth and other materials.

Traditional kilns range in size, loading from 600-3000kg of wood per cycle, and producing 200-700kg of charcoal per cycle. Traditional kiln operation usually has a 7 day cycle. The total process, including wood collection and loading charcoal for transport, can take up to 18 days.
Traditional charcoal production
Some facts about the Adam Retort Biochar Kiln:

1. Capacity 1 tonne to 1.5 tonne Biomass Cycle approximately 8 hours.
2. Output 300kgs – 500kgs of Biochar.
3. Efficiency 50kgs of wood can pyrolyse 1.5 tonne through self heating mechanisms. 30:1 ratio.
Adam retort is designed for carbonization of *prosopis* with efficiency around 35 - 45 %. The wood burns evenly and hot, as it has a high density and a calorific value estimated at 4,220 kcal/kg in young trees that increases as the trees mature. Approximately 3-6 kg of *prosopis* wood is required to produce one kilogram of charcoal, depending on the production method.

Each *Adam retort* is capable of producing 250 kg of charcoal in each batch process with a 30-hour batch duration. At 80-percent capacity utilization, each retort has an annual production of 58.4 tons of charcoal.
Adam retort kiln
Adam retort materials requirements

- 2 large galvanized or better stainless metal sheets. One sheet is about 1.22m x 2.44m (4feet x 8feet). The sheet is to be strong (3mm thick, gauge, 3/32" to 1/8"). The other sheet is thinner (0.8mm). Corrugated sheet to make one chimney bricks (about 1400 small ones, or less if bricks are of larger size), sand, gravel and cement
- Capacity 1tonne to 1.5 tonne biomass, cycle approximately 8 hours
- Output 300kgs – 500kgs
- Efficiency 50kgs of wood can pyrolyse 1.5 tonne through self heating mechanisms. 30:1 ratio
Inside the kiln before and after filling the kiln
Filling the kiln with wood
kiln lid
Expected benefits from CDM charcoal projects

- Increased employment and revenue for rural populations
- Increase of productivity and profit at charcoal makers;
- Improved charcoal quality, resulting in a higher price for a better product;
- Increased local capacity and skills base;
- Improvement in working conditions for families engaged in charcoal production