Newsletter – January 2022

Fighting against deforestation and climate change in Africa with pyrolytic clean cookstoves

Africa suffers from deforestation and indoor air pollution

The use of wood energy for cooking purposes is, after the clearing of land for agricultural and pastoral purposes, largely recognized as one of the major causes of deforestation and one of the major global contributor to greenhouse gasses emissions in developing countries. In these countries, traditional cookstoves are relatively inefficient — they consume lots of wood, thus accelerating deforestation, worsening climate change, and making access to this fuel more and more difficult for local populations. Furthermore, poor combustion of wood emits air pollution that can harm respiratory and cardiac health.

Three billion people worldwide rely on open fire cookstoves. The fumes from these stoves are the largest environmental health threat in the world today, killing 4.3 million people a year — more deaths than caused by malaria and HIV/AIDS combined.

Cookstoves that burn cleaner can help fight this epidemic, but they can do even more than that when configured to produce biochar, a dark, fine-grained residue that can become a prized asset for rural communities.

Biochar-producing stoves to benefit climate, health, and soil

Pyrolysis is an innovative process, timely and cost effective, which rapidly heats biomass in the absence of oxygen, driving off hydrogen and carbon monoxide and turning the residue into biochar, a carbon rich solid.

Biochar can be made from any organic feedstock with high carbon content including perennial grasses, corn cobs, palm kernel shells and wood shavings. waste biomass is a sustainable and viable option for pyrolysis to occur.

Biochar leads to improved socio-economic status of households, as less money, time and energy is spent on collecting fuel wood for cooking, while also promoting a cleaner cooking solution.

Reduction of indoor air pollution and improved human health of the climate-vulnerable households, with special emphasis to resource-poor female and children and elderly people is ensured. A range of improved cookstoves are nowadays available on the market.

One of the best is ELSA adapted and promoted by the ASA Initiative, its characteristics are quite interesting for the local communities. It is a clean cookstove with a biochar micro-gasifier burner-unit. It can be adjusted to different types of feed stock. Crop residues are the largest source of non-timber biomass fuel - straw, stem, stalk, leaves, husks, shells, stubble, peanuts shelves, etc. ELSA is a T-LUD gasifier unit that has been co-designed with local communities.

These biochar-producing stoves have lower greenhouse gas (carbon dioxide and methane) and black carbon emissions, create biochar that can be used to sequester carbon in soils, and reduce the use of fossil-fuel based fertilizers. They use less fuel from a wider waste biomass variety and can replace inefficient and climate unfriendly charcoal production technologies.

Integrated renewable energy management through effective agricultural and agro-industrial biomass residue recycling via ELSA clean-burning system will help reducing deforestation, fuel wood use and pressure on the natural forest and landscape.

The innovative concept of pyrolysis stoves and its manufacturing

New stove technologies can produce both heat for cooking and biochar for carbon sequestration and soil permanent productivity. Biochar-producing stoves are much cleaner, with lower emissions of carbon monoxide, hydrocarbons, and fine particles.

Very few tools and materials are required in order to build the ELSA burning unit and this device can be built by locals. It is made of different metal pieces which can be locally available such as metal pipes or cylinders. As an alternative, cylinders can be constructed starting from metallic plates through appropriate cuts, incisions, joints and bends. Very few tools are required: a hammer, a metal chisel with a point and another metal chisel slot, flat nose pliers, and a tinsmith shear. With little working experience a complete stove can be produced in about 15 minutes.

The added value of this improved stove concept, compared with the others, is the accessibility and affordability for the local population, as well as acceptance of local communities.

Those stoves are improving dramatically indoor air quality and human health of the climate-vulnerable households, with special emphasis to resource-poor female and children and elderly people.

The great agronomical and environmental value of biochar

Biochar enhances soil fertility, crop productivity and food security, sequester carbon in agricultural soils and natural landscapes and thus support climate change mitigation, adaptation and resilience based on landscape restoration project.

Biochar-producing stoves create biochar that sequesters carbon in soils thus removing carbon from the atmosphere, reduce emissions of nitrous oxide (a powerful greenhouse gas) from soils, improves fertility, and increases productivity in degraded soils.

Highly productive vegetable gardens with biochar

Biochar is a carbon negative technology acknowledged by the IPCC. A sound methodology to generate credits from carbon removals from small scale biochar systems is not yet available. It is limiting the opportunity for smallholders to generate more income from this emerging market.

The example of the Burundi Project

The effectiveness of biochar as a soil amendment that could be integrated into the agricultural system through pyrolytic gasification stoves has been piloted in Bujumbura Rural in Burundi.

On-farm agronomic trials involving smallholder farmers were conducted to assess the potential of biochar with common bean. Biochar for the field trial was produced using palm oil kernels. Pre- and post-harvest soils were sampled for analyses; the yields with biochar alone and biochar plus Triple Superphosphate treatment exceeded the control by 70 and 246% respectively. The biochar trials contributed to the villagers' understanding and utilization of ELSA pyrolytic burner for clean cooking, ensuring that clean cooking energy and biochar could be produced locally, within the subsistence system. The project was coordinated by Starter, a consultancy firm based in Italy, with the scientific support from Cornell University and the Italian University of Udine, with funding from the World Bank.

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Video at: https://vimeo.com/641826057 or https://www.youtube.com/watch?v=W52nAmMjsX0

Last year's best news: the creation of NetZero, a start-up company specializing in industrial-scale production of biochar in the tropics, with its first site located in Cameroon. For more information: www.netzero.green

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