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Biochar producing through rural households in Bangladesh

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Bangladesh is the most densely populated mainland country in the World, with over 1,200 people per square kilometre, having a 'lower middle income' of 1466 $US/yr per capita gross national product (reported BBS April 2016). The country is under energy stress, and twenty-five million households use biomass fuel for cooking of which 40 per cent is wood, with the remaining 60 per cent being a combination of cow dung and poor quality loose plant residues. Using dung and rice straw for fuel, rather than leaving them in agricultural fields is a causing decrease in soil organic matter, and lowering crop yields. Climate change will make the situation worse, because a 1-m rise in sea level could reduce the land area by 20 per cent, and extreme weather will bring longer droughts and heavier rains. The problems faced by the people of Bangladesh are immense, and require multiple solutions. CCDB (Christian Commission for Development in Bangladesh) has been fostering since 2013 the Bangladesh Biochar Initiative (BBI, www.biochar-bangladesh.org) is advancing a two-pronged program that will help the energy issue with efficient gasifier cook stoves, whilst simultaneously producing biochar/charcoal. Biochar is

defined simply as charcoal that is used for agricultural purposes. It created using a pyrolysis process, heating biomass in a low oxygen environment. Once the pyrolysis reaction has begun, it is self-sustaining, requiring no outside energy input. Once it is produced, biochar is spread on agricultural fields and incorporated into the top layer of soil. Biochar has many agricultural benefits. It increases crop yields, sometimes substantially if the soil is in poor condition. It helps to prevent fertilizer runoff and leeching, allowing the use of less fertilizers and diminishing agricultural pollution to the surrounding environment. And it retains moisture, helping plants through periods of drought more easily. Most importantly, it replenishes exhausted or marginal soils with organic carbon and fosters the growth of soil microbes essential for nutrient absorption, particularly mycorrhizal fungi. This 2,000

[1] Downloaded June 5, 2016 from:

http://thedailynewnation.com/news/95600/biochar-producing-through-rural-households-in-bangladesh.html

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year-old practice converts agricultural waste into a soil enhancer that can hold carbon, boost food security, and increase soil biodiversity, and discourage deforestation. The process creates a fine-grained, highly porous charcoal that helps soils retain nutrients and water. This biochar can be used as for increasing the productivity of agricultural and horticultural soils. The BBI is promoting gasifiers and biochar for households. If the technology is adopted, the outcome will be a reduced use of biomass fuels, lower indoor air pollution, and improve household food security and income.

Biochar Technology for Bangladesh

The BBI was founded in 2013 to foster the use of charcoal for enhancing agricultural production. Canadian scientist Prof Dr Julian Winter and CCDB Development Policy Advisor Md Mahbubul Islam invented this low cost TLUD (Top-Lit-Up-Daft) gasifier cookstove, agriculture friendly cookstove Akha recently with locally available material. Biochar (charcoal) can be made in a natural draft, top-lit updraft gasifier (ND·TLUD) cookstove. This agriculture friendly cook stove Akha mechanism and the basic principle of an ND·TLUD is quite simple. Fuel is loaded into a vertical cylinder that has holes in the bottom to permit the entry of a small amount of air. The fuel is lit at the top, and the fire progresses downward through the fuel bed to the bottom of the cylinder. Because the bottom air supply is limited, there is not enough oxygen to burn the fuel to ash, so as the fire moves downward, it leaves charcoal above the ignition front, and produces a lot of smoke. The smoke is flammable. It rises to the top of the cylinder where it is ignited in a gas burner, and produces most of the heat for cooking. Because the smoke is burned, polluting emissions of carbon monoxide (CO) and soot are very low. Once the fire reaches the bottom of the cylinder, it starts to burn the charcoal from the bottom-up. This is not the best way to burn charcoal, because burning charcoal at the bottom of a TLUD is not that efficient for cooking, so it is better to save it for a charcoal-burning stove. Also, charcoal has other uses, such as biochar. Therefore, the charcoal is usually removed from the cylinder, and the fire quenched. The yield of charcoal is around 15 to 25 per cent of ash-free, dry fuel. If cooking is to continue, the stove is reloaded and the cycle repeated. For a cylinder that is 30cm tall, a burning cycle can last from fifteen minutes to more than one hour (depending on the amount of air that enters the bottom of the cylinder and on the bulk density of the fuel).

Biochar Technology in Community Level

Recently (May 3-4, 2016) in Shivalay, Manikganj held an event on biochar technology orientation and demonstration the participants focused on the priority on homesteads rather than on agricultural fields, biochar will have its most immediate and greatest impact. First, there is the simple logistics: making enough biochar for hectares of farm land is an industrial problem, whereas biochar for a garden can be made in a home as a byproduct of cooking. Secondly, fruits and vegetables are crops with the highest economic and nutritional value. Thirdly, homesteads have organic wastes that can be used for soil fertility management. Fourth, wood is an excellent feedstock for cookstove-biochar, and homesteads have the most sustainable and productive forestry in a county where, generally, forest cover is low. Fifth, but not least, applied at the household level, the benefits can be most widely distributed over the population. Distribution of the technology to homesteads is of particular importance for indigenous peoples who are culturally more dependent on their natural surroundings. Co-inventor of this TLUD gasifier Akha M M Islam said that this kind of cookstove is fuel efficient in cooking and automatically producing Biochar as by product. Biochar is very helpful for soil amendment and increase soil fertility and precious inputs for agriculture sector. This Chula is helping healthy environment in kitchen, make clean cooking helping for women and children health, easy to use through any kind of biomass, less smoke and less expensive. It reduces carbon dioxide during cooking and helping reducing carbon in air (Green House Gas) and mitigating climate change, and it's by product Biochar is helpful for soil fertility; purify water from salinity and arsenic. This invention has potential and opportunity for micro enterprise development in rural areas and livelihoods for marginalized people in CCDB working areas.The participants explained during demonstration such as they are astonished at how a ND·TLUD works, impressed by how fast it cooks, and how little fuel it uses compared to traditional chulhas. ND·TLUDs, however, have a distinct advantage over other stoves given that they make charcoal. That could make all the difference for stove adoption. People already know the value of charcoal as fuel, but getting them to use it as biochar will need educational gardens, and peer-to-peer exchanges of experience. It will be necessary to demonstrate the use of biochar in waste management, horticulture, and to show the consequent

improvement in crop yields. Even so, the idea of adding charcoal to soil is not entirely foreign, because people already fertilize soil with cookstove ashes.

Biochar and Livelihoods

The long term objective of introducing TLUD/biochar technology is to improve household food security and income, and foster community commerce. The effect on households of the TLUD/biochar cookstove will improve household air quality, and provide charcoal for various uses. In the homestead garden, biochar could be used to increase the efficiency of nutrient cycling through composting systems. Applying biochar-compost to soil will increase crop yields, and some of that effect will be permanent. Charcoal also has commercial value, and can provide a source of household cash to buy other commodities such as food, clothing, medicines, educational materials, and solar collectors. Surplus fruits and vegetables can also provide income. The net effect on the household should be improved health, nutrition, and financial status. The application of modern stove science to develop locally-made ND·TLUD stoves is important for creating jobs, and sustainable household cooking. The stoves are sustainable if they have no, or minimal requirements for imported materials, create no waste, and are designed for renewable fuels. Improving air quality, increasing cooking efficiency, and producing charcoal for use in food production will have profound effects in Bangladesh.

Small Is Powerful

If one household burning 3kg of wood per day produced 0.6kg of biochar per day, they would have 18kg of biochar per month. For a village of 500 households, that could amount to 108,000 kg biochar per year. Across the landscape, the people of Bangladesh could become the World's largest per capita sequesters of carbon. This is, as a by-product of cooking without cutting any additional forest.

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Orientation of 'Akha' held in Manikganj

Manikganj Correspondent

News Brief: May 8, 2016

Manikganj Correspondent with the assistance of donor organisation ICCO Cooperation, Christian Commission For Development in Bangladesh (CCDB), arranged 2-day long orientation of agriculture helping chula 'Akha' at Shibalaya CCDB Central Training Centre on May 3 and 4. Jayanta Adhikary, Executive Director of CCDB, inaugurated the programme. ICCO Cooperation Representative Heleen Venderbeek, Regional Manager Raisa Choudhary, lobby and advocacy manager Shegufta Sharmin, Shibalaya UNO AKM Galiv Khan, Agriculture Officer Md. Anawar Hossain, CCDB Regional Manager Debashis Kumar Dey, Cooperator Abu Sayed, Biochar project officers Krisno Kumar Shingho, Sheikh Habibur Rahman and Jannatul Ferdous, Reporter Babul Akter Manjur, Principal Mohammad Younus Ali took part in the workshop. Experience of Traditional Chula of 478 families of Daulatpur of Dinajpur, Mandra of Naogoan and Shibalaya of Manikganj was shared in the function. 30 representatives of different areas took part in the programme. Sources said, Canadian Scientist Dr. Julian and CCDB Development Policy Advisor Md. Mahabubul Islam invented the agriculture helping chula 'Akha' recently. Co-inventor of Akha said that this kind of Chula is healthy, quick, easy to use, smoke free and less expensive.