3rd GBEP Bioenergy Week
Social Sustainability – *Smallholder involvement and development.*
*Rice hush for bioenergy, biochar and food security enhancement*
Indonesia, Medan (Sumatera)
Santika Premiere Dyandra Hotel, 25-29 May 2015

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I. Agriculture and Biomass situation in Cambodia

Agriculture dominates the economy of Cambodia, contributing 28.7% in 2014 of the gross domestic product (GDP), while industry sector is about 25.5% and services sector is about 40.5%;

Rice is the most important crop in terms of production and significance to Cambodian population and occupies approximately 70% of the total available cultivated land, while secondary crop is about 21.8% and rubber plantation is about 8.2% in 2014;

Agriculture also employs around 80% of the rural population and provides the main source of income in rural areas;

However, agricultural residues such as rice husk, rice straw, corn cob, sugarcane baggasse, etc, are limited to use for power generation and soil amendment.
II. Biomass resources used in Cambodia

There are some biomass resources are used for energy consumption and soil amendment such as:

- **Biogas** resource from digestion of animal waste;
  - Plastic-made household biodigester;
  - Concrete-made household biodigester.
- **Biogasifier** from the agricultural wasted products and firewood including improved cook stove;
- **Biofuel** from the Jatropha;
- **Biochar** from the agricultural residues;
- **Bioethanol** from the cassava chips.
III. What we can convert agricultural wasted products into energy and soil improvement in Cambodia?

The agricultural wasted products are rice husk, rice straw, stubble straw, corn cobs, wood chips, coconut shells, cane sugar residues, peanut shells, etc.
VI. Government policy on Biomass used in Cambodia

The government policy of promoting biomass used is linked with reducing poverty by supplying energy and helping improved soil condition to the poor, especially in the remote areas;

The use of locally available biomass resources are considered to be ideal in line with supporting local agricultural activities;

The efficient utilization of biomass for Biochar production & application is considered at present for soil amendment in Cambodia in order to minimize used of chemical fertilizer and reduction of CO$_2$ emission in the atmosphere.
V. ADB biomass pilot project in Cambodia

The pilot project is to provide Capacity Building for Efficient Utilization of Biomass for Bioenergy and Food Security in the Greater Mekong Subregion;

This pilot project supported by ADB (TA 7833) and implemented by CLV countries from July 2011 to Dec 2014 and it probably extends until Dec 2015;

The project focuses on 4 key technologies, lead to both GHG mitigation and climate change adaptation for poor rural households:

i) Biogas and efficient use of bioslurry;

ii) Biochar and clean charcoal;

iii) Improved cook stoves (ICS); and

iv) Intercropping oil seed crops.
VI. Research and development on biochar making device

- Chiveak Tyoung biochar kiln: making biochar from rice husk and other agricultural wasted products;
- Its capacity: 20 kg of rice husk can get 9.5-10 kg of biochar (about 50%).
- Burning duration: 5 hrs
VI. Research and development on biochar making device – cont’d
VII. Research and development on biochar making stove
VII. Research and development on biochar making stove – cont’d
VIII. Biochar trial at Dept of Ag Engineering/GDA

This trial was carried out at the compound of Department of Agricultural Engineering.
VIII. Biochar trial at Dept of Ag Engineering/GDA (cont’d)

T1 - biochar 100% (3kg/m²)
T2 - biochar 50% (1.5kg/m²) & NPK 50% (0.01g/m²)
T3 - biochar 50% (1.5kg/m²) & manure 50% (1.5kg/m²)
T4 - NPK 100% (0.02g/m²)
T5 - Control
Result of biochar trial on Chinese cabbage at Dept of AEng

Crop yield

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Crop Yield (Kg per plot)</th>
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<tbody>
<tr>
<td>T1=Bio100%</td>
<td>5.6</td>
</tr>
<tr>
<td>T2=Bio50%+NPK50%</td>
<td>5.26</td>
</tr>
<tr>
<td>T3=Bio50%+Manure50%</td>
<td>6.9</td>
</tr>
<tr>
<td>T4=NPK100%</td>
<td>4.9</td>
</tr>
<tr>
<td>T5=Control</td>
<td>4.14</td>
</tr>
</tbody>
</table>
VIII. Biochar trial at Dept of Ag Engineering/GDA (cont’d)

T1 – Biochar 100%

T2 – Biochar 50% + NPK 50%

T3 – Biochar 50% + Manure 50%

T4 – NPK 100%

T5 – Plain soil
Result of biochar trial on radish at Dept of AEng
VIII. Biochar trial at Dept of Ag Engineering/GDA (cont’d)
Result of biochar trial on salad at Dept of AEng
IX. Biochar training workshop for smallholder farmers
X. Distribution of biochar kilns
XI. Monitoring of biochar field demos

Rice, maize and vegetable crops were introduced with biochar application at farmer’s fields.
Some of pilot farmers after attending the biochar training workshop have started to apply biochar on various crops such as watermelon, papaya and cucumber at their fields in Samrong Commune, Tramkok District, Takeo Province.
XIII. Conclusion

Å Agricultural residues in Cambodia such as rice husk, rice straw, stable straw, corn cob, sugarcane baggasses, etc. are limited to use for power generation and soil amendment;

Å Agricultural residues are considered as a positive solution to increase food security, scarce organic resources, and inadequate water and chemical fertilizer supplies;

Å The efficient utilization of biomass for Bioenergy and Food Security can contribute to reduce CO$_2$ emission in the atmosphere and keep environmental friendly agriculture.
XIV. Future plan

Â Awareness raising with relevant stakeholders including Agricultural Educational Institutions;

Â Better information sharing and extension of the technology through national and regional workshops on the benefits of utilization of biomass for Bioenergy and Food Security;

Â In close cooperation with development partners and private sector on research and development of biomass utilization;

Â Organize a training workshop and field demonstration to farmers and relevant stakeholders on efficient utilization of Biomass for Bioenergy and Food Security.
Thank you for your attention!