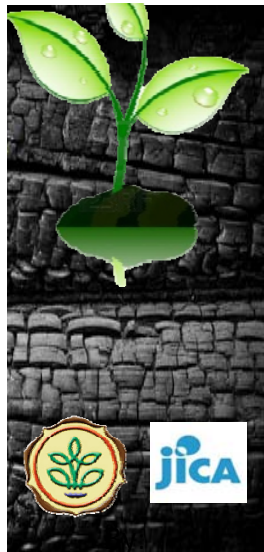


Report
**Workshop on Biochar Promotion in Wetland
of Indonesia**

Bogor, Indonesia, 12-13 July 2013



D. Nursyamsi, N.L. Nurida, L.R. Widowati, D. Setyorini, and Sutono

Cooperation

**Indonesian Agency for Agricultural Research and
Development (IAARD)**

with

Japan International Cooperation Agency (JICA)

Japan Biochar Association (JBA)

Indonesian Biochar Association (IBA)

2013

INTRODUCTION

In the last decade, use of biochar to agriculture in the international community continues to grow. Biochar is a carbon-rich solid resulted from conversion of agricultural waste through pyrolysis process (combustion without oxygen or oxygen-limited) at high temperatures (250-500 ° C). Function of biochar in agriculture is as of soil ameliorant that can improve soil physical and chemical properties: increasing soil pH, soil CEC and water holding capacity and improve soil aeration. Besides that, biochar also has potential function for environmental mitigation of contaminated agricultural with pesticide residues and heavy metals as well as mitigation of greenhouse gas emissions, especially in paddy fields or peat.

Various studies have shown that the application of biochar increased crop productivity, remediated agricultural land, and reduced greenhouse gases emission from agricultural land. Indonesian Center for Agricultural Land Resources Research and Development (ICALRRD) has conducted numerous studies of biochar from 2008 until today, either through a DIPA scheme budgeting and collaboration research with other research institution.

The proposes of this workshop was:

- 1) To strengthen communication between Japan Biochar Association (JBA) and Indonesian Biochar Association (IBA)
- 2) To search possibility how to establish Biochar certification system
- 3) To exchange ideas among scientist and stockholders in different fields
- 4) To discuss how to develop new project
- 5) To visit potential farmer group contribute to sustainable agriculture

Agenda of this workshop is presentations about use of biochar at both keynote speech and plenary presentations at the first day as well as field trips to the Organic Farming System in Cisarua, Bogor at the second day (Attachment 1). Participants of the workshop came from Japan Biochar Association (JBA), Indonesia Biochar Association (IBA), Japan International Cooperation Agency (JICA), Indonesian Agency for Agricultural Research and Development (IAARD), Forestry Research and Development Agency (FORDA), Indonesian Institute of Sciences (LIPI), International Rice Research Institute (IRRI), Hokkaido University, University of Lambung Mangkurat, University of Palangkaraya, Universitas of Padjadjaran, Borneo University, Agency for Assessment and Application of Technology (BPPT), National Council on Climate Change (NCCC), and PT Great Giant Pineapple (Attachment 2).

RESULTS OF WORKSHOP

On the 21st century, agricultural technology was moving on important issues such as climate change, soil degradation, deforestation, blue energy, and sustainable agricultural system. In Japan, charcoal has been applied for agricultural land since 1697. The oldest description of charcoal use in agriculture said that: "After carbonization of wastes, condensed human excreta should be mixed with the charcoal and stacked for a while. When you apply this manure to the fields, it improves any crop yield, and is particularly good for legumes. This manure has been called 'charcoal compost'." Nowadays, biochar was a potential material used for "Integrated agriculture management for sustainable crop production, improved soil fertility production and climate change mitigation".

From Japan experience, "Carbon Minus Project" has been implemented at Kameoka City-Kyoto Prefecture since 2007 supported by Suntory, Daiwa House, Bridgestone as a part of their CSR. This project was covered "Sustainable rural development through Carbon Capture & Storage (CCS) by biochar in farmland for GHG mitigation". This product provides from these project called "COOL VEGETABLE" system was sealed as Local Eco-Socio brand. By those activities, biochar application has economic advantages indicated by increase farmer income from the product.

Experiences of the application of Biochar in Indonesia :

- Area of acid sulphate soil in Indonesia is about 6,7 million ha potentially used for wetland rice cultivation. However this soil has limitation on soil reaction, Fe stress and fertility. The application of biochar (from rice husk) in greenhouse scale improve soil chemical properties that is increasing soil pH, plant nutrient availability, soil organic-C, CEC, and decreasing Al toxicity. It also improves soil physical properties that are soil aggregation, increasing available water, and decreasing bulk density and penetration resistance. From the point of view of crop growth and production, biochar has positive effect.
- Research application of biochar on wetland soil in Kalimantan also have been conducted by Lambung Mangkurat University shows that : (1) the used of biochar able to reduce CO₂ and N₂O emissions from the lowland rice compared to control treatment, (2) the insertion of rice in between oil palm (IRIAN system) applied with biochar will eliminated CO₂ gas emissions from the field to the atmosphere, mainly due to the uptake by rice.
- Indonesian Peat land Research Institute at South Kalimantan also will try to solve acid sulphate soil constrains by conducting a series of experiment including: (1) characterization of biochar from several kinds of organic matter in swampland; (2) to study the effect of biochar on soil characteristics and plant growth in peat and acid sulphate soil and (3) the use of biochar as a carrier of microbes.
- Soil degradation in Indonesia have been occur continuously trough deforestation and miss management of mining, and erosion. In purpose to improve land quality have been conducted by selection of adapted plant species to this condition then manipulated for high quality seedling by infection of Mycorrhizas carried by biochar.

- Green revolution program produce reduction of soil properties and C organic content less than 1%. While soil quality is a function of available water holding capacity, soil organic matter level, root density, CEC, clay content and time. From those factor, SOM is most important factors which direct and indirect improves other variables. Combination of biomass and biochar are as key factor for improve soil C-organic content and to support sustainable management. There is also a prospect of application of granulated biochar-compost enriched with bio-fertilizer.
- The utilization of rice husk, coconut and cacao shell directly is not recommended, however the transformation of those organic material in to biochar has some benefits. ISRI researcher obtain research result from utilization of biochar with positive effect: 1) Biochar has potency to retain water: 60 soil samples from different part of Indonesia (sand fraction >40%); 2) reduce CO₂, CH₄, and N₂O emissions from upland and lowland rice field. Changing the size of biochar in to submicron is able to improve the affectiveness and rate of biochar. Biochar also potentially used for bio-fertilizer and mitigate agricultural environment by trapping pesticide residues and reduce GHG emission.

Undoubt, there are some advantages from the use of biochar because it resistant to decomposition and the most recalcitrant material towards biological degradation, and have positive properties can be used for improve soil quality. Biochar is locally available and produced by simple method.

Important points from discussion result:

1. Standard minimum parameters for biochar should be created, which is simple and applicable.
2. The application of biochar is depend on type of material and the availability, therefore it is not depend on the definit rate.
3. Indonesia may adopt the system on reducing CO₂ emission gradually by area.
4. Rekommeded to search fund nationally (Indonesian government) and internationally (FAO) in purpose to develop integrated project relate to biochar utilization and exploration. JBA will support the plan in composing proposal.

Following action after this workshop:

- Develop working group and have meeting 2 or 3 times by inviting additional participant from goverment (Ministry of the Environment, Ministry of Agriculture, BPPT, LIPI)
- Compose proposal on biochar project and submitted to international agency (eg. FAO) and local institution (CSR fund of Pertamina, Timber Company)
- Strengthen the network of IBA, the secretary provide filled form trough email.
- Socio economic of biochar and basic science of biochar to increasing soil fertility
 - o Training carbon trade and
 - o Propose brand C credit
- increasing soil fertility in term of "low carbon system" by local society, model social contruction. Biochar in part of carbon cycle.

- Biochar enhance increasing microbe activities (matrix function), make more standar in increasing the use biochar as matrix of microbe. Combination of microbe activities. Important to increase the aggregation in soil idirect to soil fertility, soil microbe, worm
- Longterm study of biochar utilization should be develop in field. Should be setup permanent field study with treatment with and without biochar and obserb continuously. IAARD should make long term approach on biochar.
 2. JIKA hopefully will support 2/3 meeting and invite some people from govrment (Forestry, BPPT) to develop big project in Carbon issues which have to reduce to 26%. Deforestation, degradation will impact in carbon sequestration will be as discusse issue.
 3. CO2 emission by agriculture → change and find how to

Attachment 1. Agenda

Time	Material	Speaker/Institution
Thursday, 11 July 2013	Participants arrival in Bogor	
Friday, 12 July 2013		
08.30 – 09.00	Participant Registration	Organizing committee
09.00 – 09.15	Welcome speech	JST-JICA SATREPS (Prof. Mitsuru OSAKI, Hokkaido University)
09.15 – 09.30	Opening Ceremony	Director of ICALRRD (Dr. Muhrizal Sawani)
09.30 – 10.30	Keynote speech I	Japan Biochar Association, JBA (Prof. Akira Shibata)
10.30 – 11.30	Keynote speech II	Indonesian Biochar Association, IBA (Prof. Wani Hadi Utomo)
11.30 – 13.00	Break	
13.00 – 15.30	Plenary presentation (Use of biochar to increase plant yield and mitigate agricultural environment)	<ol style="list-style-type: none"> 1) FORDA (Dr. Maman Turjaman) 2) LIPI (Dr. Sarjiya Antonius) 3) IAARD (Dr. Dedi Nursyamsi) 4) Lambung Mangkurat Univ. (Prof. Abdul Hadi) 5) IAARD (Dr. Mukhlis) 6) Univ. of Borneo, Tarakan (Dr. Erry Purnomo)
15.30 – 16.30	Discussion	
16.30 – 16.45	Wrap up	Hokkaido Univ. (Prof. Mitsuru OSAKI)
16.45 – 17.00	Closing speech	Hokkaido Univ. (Prof. Mitsuru OSAKI)
18.00 – 20.00	DINNER at de Leuit Restaurant	Hosted by IAARD
Saturday, 13 July 2013	FIELDTRIP: Visit organic farm in Tugu Selatan, Cisarua, Bogor (to gather in front of hotel on 8.00 AM)	Organizing committee

Attachment 2. List of Participants

No.	Name	Institution
1.	Prof. Mitsuru OSAKI	Hokkaido Univ.
2.	Prof. Akira Shibata	JBA
3.	Dr. Hendrik Segah	University of Palangkaraya
4.	Dr. Amanda Katili	DNPI
5.	Dr. Sarjiya Antonius	LIPI
6.	Dr. Erry Purnomo	University of Borneo, Tarakan
7.	Dr. MamanTurjaman	FORDA
8.	Prof. Abdul Hadi	Lambung Mangkurat Univ.
9.	Dr. K. Hayashi	IRRI
10.	Ms. Eriko Momota	Hokkaido Univ.
11.	Prof. Wani Hadi Utomo	IBA
12.	Dr. Muhrizal Sarwani	IAARD
13.	Dr. Sri Rochayati	IAARD
14.	Prof. Gustan Pari	FORDA
15.	Dr. Dedi Nursyamsi	IAARD
16.	Dr. Neneng Laila Nurida	IAARD
17.	Dr. Husnain	IAARD
18.	Mr. Sutono	IAARD
19.	Dr. Diah Setyorini	IAARD
20.	Dr. Ladiyani Retno Widowati	IAARD
21.	Dr. Mukhlis	IAARD
22.	Mr. Rahman Efendi	FORDA
23.	Dr. Wiwik Hartatik	IAARD
24.	Dr. Asep Nugraha	IAARD
25.	Dr. Edi Husen	IAARD
26.	Dr. Muhammad Evri	BPPT
27.	Prof. Takashi Hirano	Hokkaido Univ.
28.	Dr. Nobuyuki Tsuji	Hokkaido Univ.
29.	Mr. Mamoru Izumi	JICA
30.	Dr. Renhart Jemi	University of Palangkaraya
31.	Prof. Tualar Simarmata	Padjadjaran Univ, Bandung
32.	Dr. Widowati	IBA
33.	Mr. Ruslan Krisno	PT Great Giant Pineapple
34.	Prof. Zulkifli Zaini	IRRI
35.	Dr. Ai Dariah	IAARD
36.	Dr. Umi Haryati	IAARD
37.	Dr. Maswar	IAARD
38.	Ms. Jubaedah	IAARD
39.	Ms. Larasati Suyoto	JICA



Attachment 3.

Participants of workshop and field trip