Keynote Speakers

Keynote Speakers 1

Producing Biomass Energy and Material through Revegetation of Alang-alang (*Imperata cylindrica*) Fields

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Large parts of deforested areas of Southeast Asia are dominated by *Imperata cylindrica*[1]. This invasive grass weed grows extremely well on poor soil and is resistant to drought and fire. Therefore, it has spread widely in tropical and subtropical regions all over the globe. The area of *Imperata* grasslands in Asia is about 35 million ha, corresponding to approximately 4% of the total land area of Asia[1], and is approximately 8.5 million ha in Indonesia[1]. If a biomass plant that produced 100 t y^{-1} ha^{-1} was cultivated in an area of 35 million ha, the amount of biomass produced would be 3.5 billion t y^{-1}, which is comparable to the annual global oil consumption of 4.2 billion t y^{-1}. This indicates that the conversion of *Imperata* grasslands into biomass crop farmland would be valuable for renewable resource production in a global context, which would contribute to the welfare and socio-economic improvement of Indonesian local communities and therefore may provide long-term sustainable economic benefits to the nation.

In addition, the conversion of *Imperata* grasslands to biomass crop farmland and/or plantation forests of fast-growing trees may lead to restoration of biodiversity; the crops or fast-growing trees may be replaced by diverse local flora, providing benefits for global environmental conservation and restoration.

In this context, the Research Institute for Sustainable Humanosphere and Graduate School of Agriculture, Kyoto University, and KAZUSA DNA Research Institute, together with the Indonesian Institute of Sciences have started "the Project for Producing Biomass Energy and Material through Revegetation of Alang-alang (*Imperata cylindrica*) fields" of SATREPS (Science and Technology Research

Partnership for Sustainable Development supported by JICA (Japan International Cooperation Agency) and JST (Japan Science and Technology Agency).In this project, we are conducting the following four subprojects. First, methods of fertilizer application for plants producing high-energy biomass will be established. Second, protocols to convert degraded land to revegetated land will be established. Third, grass biomass plants with higher-heating value will be developed by breeding. Fourth, environmentally friendly technologies to produce lignocellulose-based materials using grass plants will be established. Based on this research program, technologies for production of sustainable biomass energy and material utilizing alang-alang fields will be developed, which will eventually lead to development of a model for establishment of a sustainable society through innovative bioenergy and material technology in Indonesia.

References

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Keynote Speakers 2

The Recent Status of Marginal Land in Indonesia

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Indonesia is an archipelagic country, however this country has significanly wide area of land. The total land area is about 190 million hectares, and partly is consider as marginal land. There are many perceptions dealing with marginal land as expressed in terminology and the definition of marginal land. There are various terminilogies such as *Imperata cylidrica* land (*lahan alang-alang*), critical land (*lahan kritis*), degraded land (*lahan terdegradasi*), sub-optimal land (*lahan sub-optimal*) and of course marginal land (*lahan marginal*). There are various definition of marginal land as reviewed by Tang, Xie and Geng (2010). However, since objective in the increasing biomass production for fullfilling food and anergy needs, therefore suitable definition is that marginal land refers to land currently not in use, with poor natural condition but able grow plants. It is not used in agricultural production but can grow certain plants (Anonymous, 2008). Since the needs of land for development activities increase in parallel with the increase of total population, especially in developing country, such as Indonesia, marginal lands have strong attention for increasing food and energy production, and at the same time sustainability of production that related to environmental issues also also have strong attention.

Related to the marginal land definition as above mention, the total area of marginal land in Indonesia is about 17.8 million hectares or 9.36 percent of the total land area, both in the forestry area and non forestry area (BPN, 2012). The marginal lands are includes, dry land, acid dry land, wetland, and peatland. The marginality of land relates to topography, climate, soil characteristics and the intesity of land management. The current landuses of the marginal land are mostly grass land (*padang rumput*), alang-alang land (*padang alang-alang*), shrub land (*semak belukar*), and open land (*lahan terbuka*). Based on the characteristics, the marginal lands have potentially to be developed become productive land by introduction of technology and management. Recently some of stapple food materials of Indonesia are still imported (such as: rice, corn, soya bean and meat), therefore these land could be partly allocated for food

production based on their potential capability. Of course for the lands that have very limited/no capability for food production, have to be kept as conservation area.

There is no spesific regulation and policy dealing with intensification use/utilization of the marginal land, however there are many laws and regulations must be considered in use/utilisation of those marginal land, such as Law number 41, 1999 about Forestry, Law number 32, 2009 about Environment, Law number 26, 2007 about Spatial Planning, Law number 5, 1960 about Basic Agraria. Etc. There are law and regulation could be used for intensification use/utilization such as: Law number 41, 2009 about Guarding Sustainable Agricultural Land, and Goverment Regulation number 11, 2010 about Regulation and Utilization of Abandonned Land , however the workability of these law and regulation is very weak. Actually the recent goverment has program the so called Agrarian Reform (*Reforma Agraria*), however up to now the draft of Presidencial Regulation (Perpres) is still not published yet.

Key words: marginal land, landuse, regulation and policy

Keynote Speakers 3

The Project for Producing Biomass Energy and Material through Revegetation of Alang-alang (*Imperata cylindrica*) Fields: The Importance of LCA Studies as Part of the Environmentally Friendly Technologies Assessment

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In recent years, the increasing demand for sustainable renewable energy and material sources to reduce the pollution and dependency on conventional energy and material resources creates a path to assess the various energy and material sources for their sustainability. One renewable energy and material source might be very attractive is to produce lignocelluloses based materials using grass plants by converting alang-alang grasslands to productive lands that can be used at reasonable costs and in an environment-friendly manner through biotechnology. It is considered beneficial not only for Indonesia but for other countries where alang-alang grasslands prevail. The commercial-scale production of these energy and material sources requires careful consideration of several issues that can be broadly categorized as raw material production, technology, by-products, etc. It is however very important to assess the real sustainability of a natural or recycled material, and to verify the total energy use and the environmental impact in its production process. To this extent, LCA can be of help. LCA involves tracing out the major stages and processes involved over life cycle of a product/process/ system covering raw materials extraction, manufacturing, product use, recycling and final disposal, identifying and quantifying relevant environmental impacts at each stage.The lifecycle assessment is a tool that can be used effectively in evaluating various renewable energy and material sources for their sustainability and can help policy makers choose the best energy source for specific purpose. This presentation is an effort to highlight the importance of LCA studies as part of the environmentally friendly technologies assessment of producing biomass energy and material through revegetation of Alang-alang (*Imperata cylindrica*) Fields.

Keywords: Life cycle assessment, grass, alang-alang (*Imperata cylindrica*), revegetation, energy, material, sustainability