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ENGINEERING & TECHNOLOGY DEVELOPMENT
UBL ICETD
2013

The Second International Conference on Engineering and Technology Development

2nd ICETD 2013

27, 28, 29 August 2013, Bandar Lampung, Indonesia

PROCEEDINGS

In Cooperations With :

APTIKOM

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

SURYA INSTITUTE

Hosted by :
Faculty of Engineering and Faculty of Computer Science,
Bandar Lampung University (UBL), Indonesia

2nd ICETD 2013

The Second International Conference On Engineering And Technology Development

28 -30 January 2013
Bandar Lampung University (UBL)
Lampung, Indonesia

PROCEEDINGS

Organized by:

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PREFACE

The Activities of the International Conference is in line and very appropriate with the vision and mission of Bandar Lampung University (UBL) to promote training and education as well as research in these areas.

On behalf of the Second International Conference on Engineering and Technology Development (2nd ICETD 2013) organizing committee, we are very pleased with the very good response especially from the keynote speaker and from the participans. It is noteworthy to point out that about 80 technical papers were received for this conference.

The participants of the conference come from many well known universities, among others : University Kebangsaan Malaysia – Malaysia, APTIKOM – Indonesia, Institut Teknologi sepuluh November – Indonesia, Surya Institute – Indonesia, International Islamic University – Malaysia, STMIK Mitra Lampung – lampung, Bandung Institut of Technology – Bandung, Lecture of The Malahayati University, B2TP – BPPT Researcher – lampung, Starch Technology Center – Lampung, Universitas Islam Indonesia – Indonesia, Politeknik Negeri Malang – Malang,University of Kitakyushu – Japan, Gadjah Mada University – Indonesia, Universitas Malahayati – Lampung, Lampung University – lampung, Starch Technology Center – Lampung, Universitas Riau – Riau, Hasanuddin University – Indonesia, Diponegoro University – Indonesia, King Abdulaziz University – Saudi Arabia, Parahyangan Catholic University – Indonesia , National Taiwan University– Taiwan, Surakarta Christian University – Indonesia, Sugijapranata Catholic University – Indonesia, Semarang University – Indonesia, University of Brawijaya – Indonesia, PPKIA Tarakanita Rahmawati – Indonesia, Kyushu University, Fukuoka – Japan, Science and Technology Beijing – China, Institut Teknologi Sepuluh Nopember – Surabaya, Researcher of Starch Technology Center, Universitas Muhammadiyah Metro – Metro, National University of Malaysia – Malaysia.

I would like to express my deepest gratitude to the International Advisory Board members, sponsor and also to all keynote speakers and all participants. I am also gratefull to all organizing committee and all of the reviewers who contribute to the high standard of the conference. Also I would like to express my deepest gratitude to the Rector of Bandar Lampung University (UBL) who give us endless support to these activities, so that the conference can be administrated on time

Bandar Lampung, 29 August 2013-08-26

Mustofa Usman, Ph.D
2nd ICETD Chairman

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MATERIAL UTILIZATION TECHNOLOGY OF AGRICULTURE AND FORESTRY WASTE

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Abstract : *Indonesia have a large amount of biomass wastes, either species or quantitity. If those biomass were not be treatment will be give some negative environmental impacts. To eliminate the negative impact, the biomass waste must be treatment to produce a new product with higher added value. The material utilization of biomass can mainly be categorized into the utilization of the material applying its own property, the utilization of raw material applying its composition and the utilization of it as fertilizer and feed. Convertion into fertilizer, feed, ligneous plastic, biomass mixing, biodegradable plastic are the kind of material utilizations of agriculture and forest waste*

Key word : material utilization, agriculture and forest waste, fertilizer, feed, biodegradable plasti

1. INTRODUCTION

As a agrarian country, Indonesia have a large amount of biomass waste, that carried out from domestic, agriculture and forestry activity. Those biomass waste will give negative environmental impact if not be treated. For eliminate the environmental impact, the biomass waste must be treatment to produce new product with higher added value

In the regard to the utilization of biomass, three major point must be considered. First, as biomass is generally thinly and widely dispersed, there is a large amount of biomass not easily collectable, thus there is a need to establish a more efficient way of transportation and collkected method. Second, in order to effectively utilize the transported and collected biomass, it is necessary to develop also highly effective ways for practical utilization of the biomass. Third, there is need to fully consider the business feasibility, where cost reduction plays an nimportant role. That mean reducing running costs such as for collection,transportation, management and developing effective technologies as busness grows.

The material utilization of biomass can mainly be categorized into the utilization of the material applying its own property, the utilization of raw material applying its composition and the utilization of it as fertilizer and feed. Of these categories, the utilization of biomasss waste as fertilizier and feed continues to be widely accepted. The reasons being that are as waste material it is cheaper to convert the biomass waste into fertilizier and feed than to implement adqute treatment, in terms of strategic utilization of the raw materials, better economical ways are a crucial factor.

AGRICULTURE AND FOREST WASTE

The agriculture and forestry waste are content of major lignocellulosic material. Garotte et.al.were reported compilation of lignocellulosic waste material of different hardwoods, softwood and agriculture residue. The hardwoods contain 39-54% cellulose, 14-37% hemicelluloses and 17-30% lignin. The softwoods contain 41-50% cellulose, 11-27% hemicelluloses and 20-30% lignin. The composition of agriculture residues are ries widely.

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THE MATERIAL UTILIZATION TECHNOLOGY OF BIOMASS WASTE

Details of the technologies available with material utilizations of biomass waste are given in the figure 1.

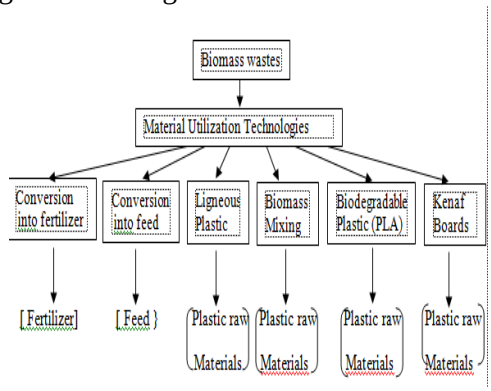

Figure 1 : Material Utilization Technologies of Biomass Waste

Composting

The composting of the biomass is a technology where the organic and inorganic substances making up the biomass are adequately converted into nutrients necessary for the growth of plants . When added to the soil without convertion, the acid created during the decomposition of organic substances, that can cause harm to plant growth. To utilized the biomass as fertilizer, it is necessary to allow air contact with organic substances for oxidation, treat the biomass above a set temperature for over a set period to destroy the bacteria and bring the decomposition to a level where all acid is eliminated. As for liquid fertilizer, the liquid containing nutrient yielded during the wet process, such as methane fermentation.

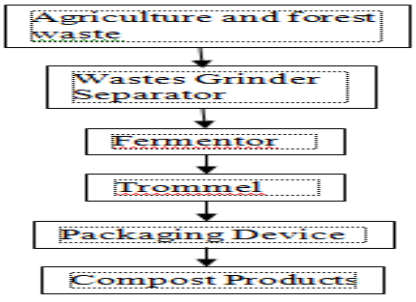

Figure 2 . Example of composting system flow chart

Convertion into feed

The convertion into feed is a technique applied to wastes rendered unusable as feed without convertion, it involves the removal of unwanted substances from the biomass, followed by adequately crushing, heating and adjusting the content of the biomass to convert it into usable feed.

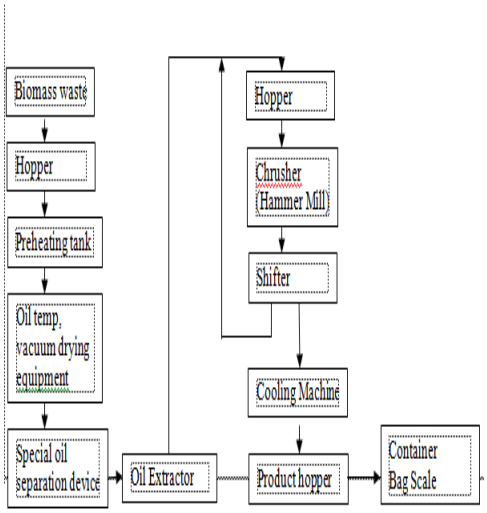

Figure 3. Example of Convertion of Biomass Waste Into Feed

Ligneous Plastic

Wood materials contain mainly cellulose, hemicelluloses and lignin. Nin is a substance that has phenol skeleton and can be utilized to produce resin via polymerization reaction. There is technology that involves the sseparation of lignin and the compounding with used paper to produce ligneous plastic that has been developed. In this way, components in ligneous biomass such as thinned timber or waste timber are separated and restructured to develop ligneous plastic, thus making it possible to utilize ligneous content that are unusable as building material. However, separation of ligneous components is not an easy process, and with only lignin being utilized it remains an issue how the remaining components should be effectively used.

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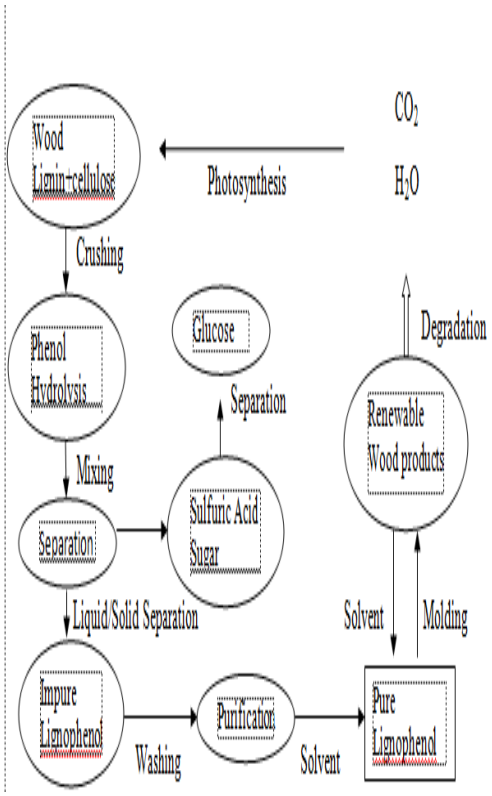

Figure 4 Utilization of Lignophenol

Biomass Mixing

The technology of biomass mixing involves the mixing of biomass with thermoplastic resin. It is the efficient utilization biomass as supplement materials fully into thermoplastic, i.e. biomass plastic. With this technology, through chemical treatment of the biomass such as esterification and oligoesterification, it is possible to bring affinity with the main ingredient thermoplastic, and to evenly disperse the uneven dispersion of biomass particles

Biodegradable Plastic

This is a utilization where plastic is produced from sugar and starchy-containing biomass waste. Lactic acid is obtained via fermentation of sugar and by polymerizing it, plastic can be made. Due to the biodegradable nature of this type of plastic, it has the merit of becoming less threatening to animals and the natural environment, since it differs from petroleum-based plastics.

2. CONCLUSION

1. The material utilization of agriculture and forest wastes can mainly be categorized into the utilization of the material applying its own property, the utilization of the material applying its composition and the utilization of it as fertilizer and feed.
2. The kind of material utilization of agriculture and forestry wastes are convertion into fertilizer, feed, ligneous plastic, biomass mixing, biodegradable plastic

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