



The 5<sup>th</sup> 2012

www.ibc-2012.org



Santosa Hotel, Senggigi Beach  
Mataram, Lombok Island  
Province of West Nusa Tenggara, Indonesia  
**July 4<sup>th</sup> - 7<sup>th</sup> 2012**

*The 5<sup>th</sup> Indonesia Biotechnology Conference  
An International Forum*

*“Green Industrial Innovation through Biotechnology”*

# PROCEEDINGS



published by:

*Indonesian Biotechnology Consortium*  
2012

**The 5<sup>th</sup>  
Indonesia  
Biotechnology  
Conference**

**An International Forum**

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**“Green Industrial Innovation through  
Biotechnology”**

Mataram, July 4th-7th 2012

**Indonesian Biotechnology Consortium  
2012**

## Series Description

Indonesia Biotechnology Conference is an annual conference held by Indonesian Biotechnology Consortium. This year is the 5th year the conference being held by Indonesian Biotechnology Consortium. The fifth conference's theme is "Green Industrial Innovation through Biotechnology" and the topics are Agriculture & Forestry Biotechnology, Health & Medical Biotechnology, Energy and Environmental Biotechnology, Marine Biotechnology and Industrial Biotechnology. The proceeding book will consist of academic papers presented in the conference.

Managed by : IBC V Committee  
Published by : Konsortium Biotechnology Indonesia  
Website : [www.abc-2012.org](http://www.abc-2012.org)

This proceedings is published once every 4 year in conjunction to the conference "Indonesia Biotechnology Conference"

ISSN: 2301 - 8216

Scientific topics of interest :

- Agriculture & Forestry Biotechnology
- Health & Medical Biotechnology
- Energy and Environmental Biotechnology
- Marine Biotechnology
- Industrial Biotechnology

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**“Green Industrial Innovation through  
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**July 4<sup>th</sup>-7<sup>th</sup> 2012**

Santosa Hotel, Senggigi Beach  
Mataram, Lombok Island  
Province of West Nusa Tenggara, Indonesia

**Hosted by:  
Indonesian Biotechnology Consortium  
(KBI)**

**The 5<sup>th</sup>**  
**Indonesia Biotechnology Conference**  
**An International Forum**

**“Green Industrial Innovation through Biotechnology”**

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# Chairman of Organizing Committee Misri Gozan

Dear distinguished guests and participants,

We cordially welcome you to the 5th Indonesia Biotechnology Conference (IBC V) in Senggigi Beach, Lombok Island. This IBC V is organized by the Konsorsium Bioteknologi Indonesia (Indonesian Biotechnology Consortium) supported by Universitas Mataram (UNRAM), Universitas Indonesia (UI), LIPI, and all 50 KBI's members. We are sincerely grateful to welcome honorable keynote speakers, distinguished invited speakers and excellent all participants. Today, more than 300 participants from Sumatra, Jawa, Bali, Kalimantan, Sulawesi, Nusa Tenggara Barat and many more gather in this place. We are also having scientists from several different countries, among them are from Japan, Korea, India, Pakistan, Bangladesh, Srilanka, Germany, the United States, Australia and others. We believe that IBC V has become truly a melting pot of scientists and engineers to nurture the Biotechnology development for the benefit of humankind.

As global warming unavoidably touches various aspects of human life immensely, managing earth resources in sustainable manner has never been more important. The wide spectrum of green, red, blue and white biotechnology has been providing answers to many industrial problems. Therefore, the theme "Green Industrial Innovation through Biotechnology" was selected for this conference.



We hope IBC V will be a journey through many inovations in the field of agricultural, health, medical, energy, enviromental, food, and industrial biotechnology. Through green industrial inovation, biotechnology will keep playing important roles in positive ways for the future.

On behalf of the organizing committee, I gratefully thanks many sponsors for supporting the 5th Indonesia Biotechnology Conference. We thank all KBI members that make this event happens and meaningfull. In this ocassion, let me express my special thanks to UNRAM which is one of the youngest member of KBI but has been giving a tremendous support to this event. Most importantly and above all, we thank God for giving us this earth, life and blessing us with everything on them.

I hope we all have fruitfull discussion while sharing knowledge, trends, and products during the conference, exhibition, and meeting occasions. To all participants, please also enjoy the venue, the food, the tradition, the trip and the hospitality of people in Lombok Island!

Through the 5th Indonesia Biotechnology Conference, let us genetically engineer the prosperity of future generations!

Assoc. Prof. Misri Gozan  
Chairman of Organizing Committee

# President of KBI Bambang Prasetya



First of all, let us pray to God the Almighty for His blessings bestowed on us so that we can be here to attend the 5th Indonesia Biotechnology Conference, an International Forum "Green Industrial Innovation Through Biotechnology", in Mataram 4th-7th July 2012 Lombok Island Indonesia. On behalf of the chairman of the Indonesian Biotechnology Consortium (KBI), I am delighted to convey my warmest welcome to foreign delegates, speakers and participants.

As we are all aware we are living in the era, which we have to increase our effort to make significantly contribution to emerging and reemerging problem in related environment, food security, health and energy security, and green technology as well. Many scientific of the world are confident that biotechnology are one of powerfull tools facing these issues and move forward to achieve for a better live and prosperity. Success stories that in many countries biotechnology have been a driving factor to accelerate the sustainable development and achieve the Millenium Development Goals.

Based on this fact, the theme in this conference is focused on "Green Industrial Innovation Through Biotechnology". This theme is directly related to the goals of KBI, such as the establishment of a Consortium of Biotechnology to accelerate meeting the basic human needs in Indonesia. The availability and also the accessibility of health care services and adequate food supply are very important and critical in achieving human prosperity. It is recognized that food and health is essential, not only for survival, but more important, for achieving quality of life.

Due to their priority in human needs, research and study in the field of food and medical care has to be increased and improved. To ensure the availability and accessibility of food and health services, the role of biotechnology must be enhanced.

Therefore, some research fields are the focus of the Indonesian Consortium of Biotechnology, such as food and medical biotechnology, forestry and agricultural biotechnology, environmental and industrial biotechnology.

In Indonesia, there are so many cities which are surrounded by industrial activities. At any time the development of industrial company can not be prevented, but we can try to give as much beneficial effect as possible to human beings. Application of Green Industrial system is one method for improving the ecosystem. Therefore, the green industrial innovation through Biotechnology is important to be discussed and hence to be implemented in Indonesia.

This conference is important since it has provided us, specifically for scientists, and biotechnologists a medium for exchanging ideas to study recent developments in biotechnology from a local, regional and international perspective. Also, we have chance to align our perceptions on the direction and main priorities of biotechnology development. Just for your information that one of the important missions of KBI is to strengthen the development of biotechnology in Indonesia through the strengthening of collaboration, networking, information sharing, exchanging of scientific resources, human resource development, facilitation as well as coordination of collaboration between members and institutions from overseas.

In this meeting, we are happy to have an opportunity to listen to and discuss with the group of experts in the area of biotechnology. I would like to congratulate the Organizing Committee for holding such an important conference. To the distinguished participants from overseas, I wish to welcome you all to Indonesia, and I hope you all, including the domestic participants, have a fruitful conference. To conclude my remarks, on behalf of the chairman of Indonesian Biotechnology Consortium, I hope the seminar and conference run effectively in achieving all their goals.

Finally, a hearty welcome awaits all of you to explore the beauty nature and exotic culture in Lombok Island.

Prof. Dr. Ir. Bambang Prasetya  
President of KBI  
(Indonesian Biotechnology Consortium)  
Board of 2010-2014

Rector of Universitas Indonesia

# Gumilar R. Somantri



The world is facing numerous challenges that will likely continue to happen in the future. First, the demographics of the world are alarming because of human population growth is uncontrolled. Second, the imbalance between supply and demand for food and agricultural products would continue to increase. Third, the energy crisis caused by the consumption of renewable energy in large quantities. Then, last but not least, is the impact of technological and industrial development on the environment.

In answer to these global challenges, biotechnology has a strategic role and position. This is evidenced by the rapid growth in biotechnology research, and many products of biotechnology that have been benefitting mankind in various aspects of life, such as agriculture, food, health, environmental, and other industries.

Universitas Indonesia is becoming a world-class research university. Since the year 2010 UI form clusters of 3 disciplines, namely cluster of Health Sciences, cluster of Science and Technology, as well as cluster of Social Sciences and Humanities. Development and utilization of biotechnology researches at the Universitas Indonesia, which is a multidisciplinary activity, are currently running in an encouraging atmosphere. Faculty of Medicine, Faculty of Natural Sciences, Faculty of Pharmacy and Faculty of Engineering have research

centers of their superior research-based biotechnology, such as: leading genome research, bioenergy, pharmaceuticals and cosmeceuticals. Universitas Indonesia have been through the process of internationalization by increasing its funding especially on research cooperation and international publication.

Therefore, Universitas Indonesia gives it's full support for the 5th Indonesia Biotechnology Conference organized by the Indonesian Biotechnology Consortium, where we are a member of it.

We sincerely expect this event to generate more cooperation in research and in education. Such cooperation can lead to progress in all areas of Biotechnology for the welfare of mankind.

My warmest greetings to you all who have the spirit of research. Congratulations and enjoy the conference in the atmosphere of both local and global communities.

Prof. Dr. der Soz. Drs. Gumilar Rusliwa Somantri  
Rector of Universitas Indonesia

# Rector of Universitas Mataram Sunarpi



**D**istinguished Ministry of Science and Technology - Republic of Indonesia, Governor West Nusa Tenggara, Respected Guests, Keynote speakers, Conference Participants, and all other participants.

It is a great honor for me to address the opening of the 5th Indonesian Biotechnology Conference (IBC), here in Lombok. I would like to take this opportunity to cordially welcome you all to Lombok, an Island in West Nusa Tenggara where the University of Mataram is. Lombok is known for its natural and cultural diversity with beaches, waterfalls, mountain, traditional villages and handicraft of many ethnics including Sasak, Samawa, Mbojo, Balinese, Chinese, Arabic and many others. Therefore, while presenting and sharing ideas in the Conference, participants could experience Lombok and its unique nature and culture.

The IBC Conference is held regularly by the Indonesian Consortium of Biotechnology (KBI). The current event is organized in collaboration with Universitas Indonesia (UI) and University of Mataram (Unram). On behalf of Unram, I would like to express my appreciation to the Steering and Organizing Committees from KBI, UI and Unram for the excellent work and collaboration. I wish such excellent collaboration could be maintained and improved in the future.

My appreciation also goes to the Governor of West Nusa Tenggara, PT Newmont Nusa Tenggara, NTB Branch of BI, BTN, Bank Mandiri and all others sponsors for their willingness to support this event.

Ladies and Gentlemen, as we are aware that in the scientific conference, keynotes and invited speakers are very important, and I am very pleased that the committee were able to invite and bring knowledgeable keynotes and invited speakers from Indonesia and overseas. Herewith, I would like to acknowledge all of National and International invited speakers for their willingness to come to Lombok, and present their acknowledged works. I understand the time, and efforts, given for this conference, and therefore I would like to express my high appreciation to all keynote and invited speakers. Thanks also to all participants for the high interest in attending this conference. I hope that this conference will be a good forum, not only in communicating and sharing ideas and knowledge in Biotechnology, but also in building and enhancing network of collaboration amongs academia, students and industry.

Finally, I wish you most successful conference, and hope that this may provide new ideas and strategies in biotechnology innovation towards green industry.

Prof. Ir. Sunarpi, Ph.D.  
Rector of Universitas Mataram

General Schedule: Day 1

# Wednesday, July 4

## 8:00am-9:00am Registration

## 9:00am-10:30am Opening

- 09:00am-09:10am Report from Organizing Committee  
Dr.-Ing. Misri Gozan
- 09:10am-09:25am Remarks from President of Indonesian Biotechnology Consortium (KBI)  
Prof. Dr. Ir. Bambang Prasetya
- 09:25am-09:40am Welcoming Remarks from Rector of Universitas Mataram  
Prof. Ir. Sunarpi, Ph.D.
- 09:40am-10:00am Opening Remarks from the Governor of West Nusa Tenggara  
Dr. TGH. M. Zainul Majdi, MA

## 10:00am-11:00am Press Conference; Morning Tea; Poster and Exhibition Viewing

Poster: [P 1] - [P 49]

## 11:00am-12:30am Plenary Session I

Ballroom Bima

Moderator: Dr. Ir. Witjaksono

- 11:00am-11:20am [KS 1] Use of Porcine Embryonic Stem Cell to Advance Xenotransplantation and Human Stem Cell Research  
Prof. Dr. Mark Nottle  
(University of Adelaide, Australia)
- 11:20am-11:40am [KS 2] Regulation of Innovative Technologies for Agriculture  
Dr. Judith Chambers  
(Regulation of Innovative Technologies for Agriculture)
- 11:40am-12:00am [KS 3] Kinesin Transport Human Diseases and Infection  
Prof. Dr. Masashi Kawaichi  
(Nara Institute of Science and Technology, Japan)
- 12:00am-12:30am Discussion

## 12:30am-1:00pm Lunch Symposia I

Destination: System Biology

M. Arys Rahardja, M.Sc. (PT Merck Indonesia)

## 1:00am-1:30pm Lunch; Poster and Exhibition Viewing

Poster: [P 1] - [P 49]

## 1:30pm-3:30pm Parallel Session I

|               | <b>Room: Bima 2</b><br><b>Agriculture &amp; Forestry</b><br>Moderator 1: Dr. Ir. Ni Made Laksmi Ernawati, M.P.  | <b>Room: Bima 3</b><br><b>Industrial Biotechnology</b><br>Moderator 2: Dr. Saptowo Pardal  | <b>Room: Arjuna</b><br><b>Health &amp; Medicine</b><br>Moderator 3: Drs. L. Zulkifli, Ph.D.   |
|---------------|---|--|---|
| 1:30pm-1:40pm | [O 1] Nurita Toruan Mathius<br>Abnormality of Oil Palm Clones and Its Correlation with DNA Methylation  | [O 9] Hermansyah<br>Yeast <i>Saccharomyces cerevisiae</i> as Model to Identify Mengkudu ( <i>Morinda citrifolia</i> ) as an Anticancer Medicinal Plants Candidates With Antiproliferative Properties | [O 17] Melva Louisa<br>Analysis of Several Drug Transporters Gene Expressions in HepG2 and Huh-7it Cell Lines   |
| 1:40pm-1:50pm | [O 2] Widyah Budinarta<br>Observing Genes Responsible in Embryogenesis of Oil Palm ( <i>Elaeis guineensis</i> )   | [O 10] Aditya Fitriarsi<br>Combination of <i>Garcinia mangostana</i> Fruit Hull and Doxorubicin on Breast Cancer Cell Line   | [O 18] Hendrikus MB Bolly<br>Isolate and Clone of mtrA gene of <i>Mycobacterium tuberculosis</i> in Local Isolates: Challenges in Tuberculosis's New Drug Development and Pathogenicity related to <i>Mycobacterium</i> |
| 1:50pm-2:00pm | [O 3] Aluh Nikmatullah<br>Isolation of 1-aminocyclopropane-1-carboxylic Acid Synthase (ACS) Genes from White Clover ( <i>Trifolium repens</i> L.) Subjected to a Water Deficit Condition        | [O 11] Hilda Ismail<br>Performance of Lipase from <i>Carica papaya</i> Latex as Catalyst in the Synthesis of Paracetamol   | [O 19] Satya Narayan Chaudhuri<br>Studies on Pediatric Urinary Tract Infections and Drug Susceptibility   |
| 2:00pm-2:10pm | [O 4] Maftuchah Masdoekie<br>The Improvement of Drought Tolerance Trait on the Promising Clones of Indonesian <i>Jatropha curcas</i> L. from In Vitro Selection Using Polyethylene Glycol (PEG) | [O 12] Melisa Intan Barliana<br>High Glucose Exposure Altered GPR34 Endogenous Expression in Human Liver Cell Lines  | [O 20] Merisa Bestari Faiz<br>Human Milk Fat Substitute (HMFS) Synthesis by Selective Interesterification of Ethyl Oleate with Tripalmitate using Porcine Pancreatic Lipase   |
| 2:10pm-2:30pm | <b>Discussion</b>   |  |   |

## 1:30pm-3:30pm Parallel Session I

|               | <b>Room: Bima 2</b><br><b>Agriculture &amp; Forestry</b><br>Moderator 4: Dr. Ir. Ni Made Laksmi Ernawati, M.P.                         | <b>Room: Bima 3</b><br><b>Industrial Biotechnology</b><br>Moderator 5:<br>Dr. Saptowo Pardal  | <b>Room: Arjuna</b><br><b>Health &amp; Medicine</b><br>Moderator 6:<br>Drs. L. Zulkifli, Ph.D.   |
|---------------|--|---|--|
| 2:30pm-2:40pm | [O 5] Nirmala Friyanti Devy<br>In Vitro Somatic Embryogenesis in Some Mandarins Citrus ( <i>Citrus reticulata</i> )                    | [O 13] Mohammad Sadikin<br>Isolation and Purification of Thiamine Binding Protein from Mung Bean ( <i>Phaseolus Radiatus</i> L.)  | [O 21] Yulia Irdidayanti<br>Changes of GFAP and Vimentin Protein Expression In Brain due to the Plastic Base Material, 2-Methoxyethanol            |
| 2:40pm-2:50pm | [O 6] Nesti Fronika Sianipar<br>In Vitro Propagation of Indonesian <i>Typhonium flagelliforme</i> from Pekalongan by Using NAA and BAP | [O 14] Eka Ruriani<br>Cellulolytic Bacteria Isolated from Banana Stem as Indigenous Starter for Dietary Fiber Production  | [O 22] Abu Nasar Siddique<br>Auto-methylation of Mouse DNA-(cytosine C5)-methyltransferase Dnmt3a at Its Active Site Cytosine Residue Proteasome   |
| 2:50pm-3:00pm | [O 7] Sony Suharsono<br>Involvement of Glutathione S-transferase (GST12) Gene from Soybean to Aluminum Toxicity                        | [O 15] Ade Andriani<br>Enzymatic Hydrolysis of Starch from Indigenous Black Potato ( <i>Coleus tuberosus Benth.</i> ) by Amylase from <i>Brevibacterium Sp</i> and Characterization of Products | [O 23] Saurabha Srivastava<br>Diagnostic Evaluation of <i>Setaria cervi</i> HSP70 and <i>Brugia malayi</i> HSP70 in Filarial Infected Endemic Area |
| 3:00pm-3:10pm | [O 8] Miftahudin<br>Cloning a Rice Aluminum Tolerance Gene Candidate Using Rice/Rye Micro-colinearity                                  | [O 16] Nurhayati<br>Isolation and Phenotypic Identification of Amylolytic Bacteria Isolated from Fermented Unripe Plantain  | [O 24] Kishan Veerabrahma<br>Isolation of Antibiotic against Linezolid Resistant Cultures  |
| 3:10pm-3:30pm | <b>Discussion</b>  |   |  |

## 3:30pm-4:00pm Afternoon Tea; Poster and Exhibition Viewing

Poster: [P 1] - [P 49]

## 4:00pm-5:00pm Parallel Session II

|               | <b>Room: Bima 2</b><br><b>Environment</b><br>Moderator 4:<br>Dr. Ir. Heri Hermansyah  | <b>Room: Bima 3</b><br><b>Bioenergy</b><br>Moderator 5:<br>Dr. Abu Amar   | <b>Room: Arjuna</b><br><b>Environment</b><br>Moderator 6:<br>Dr. Wahyu Purbowasito   |
|---------------|---|---|--|
| 4:00pm-4:10pm | [O 25] Keigo Inami<br>Genetic Diversity of <i>Rigidoporus microporus</i> , a Pathogen of Para Rubber White Root, Isolated from North Sumatra and West Java, Indonesia     | [O 29] Evi Susanti<br>Study of Optimization of Bioethanol Production From Sugarcane Baggase Based on Cellulase Systems of <i>Bacillus circulans</i>   | [O 33] Mohamad Taufik Fauzi<br>Development of Local <i>Fusarium</i> sp. as a Biological Control Agent of Water Hyacinth ( <i>Eichhornia crassipes</i> )                        |
| 4:10pm-4:20pm | [O 26] Made Srisiah<br>Identification of <i>Mycobacterium avium</i> Subspecies Paratuberculosis Strain 316F Genes Encoding Exported Proteins Using PhoA Fusion Technology | [O 30] Hadiyanto<br>The Utilization of Palm Oil Mill Effluent (POME) for Bioenergy through Wild Algae Treatment   | [O 34] Krishman Kumar Kapoor<br>Microbial Interventions for Efficient Utilization of Agricultural Wastes   |
| 4:20pm-4:30pm | [O 27] Ferisman Tindaon<br>The Ecological Dose Value for Assessing Agrochemical Toxicity on Non Target Microbial Activities in Soils                                      | [O 31] Nadia Chrisayu Natasha<br>Variation of Composition and Sources of Nutrition for Mycellium in Midrib of Palm Oil Weathering Process to Degrade Lignin with <i>Pleurotus ostreatus</i> | [O 35] Chandra Paska Bakti<br>Optimization of Cellulase Production from <i>Bacillus</i> sp. BPPT CC RK2 with Variance of pH and Temperature using Response Surface Methodology |
| 4:30pm-4:40pm | [O 28] Nani Pasaribu<br>The Study of Antibacterial Activity of Water Extract Of Butterfly Pea ( <i>Clitoria ternatea</i> ) Seeds  | [O 32] Dini Asyifa<br>Immobilization of Lipase in Membrane Microreactor for Transesterification of CPO to Methyl ester  | [O 36] Wibowo Mangunwardoyo<br>The Effect of Carbon and Nitrogen Sources on Antifungal Activity of <i>Aspergillus flavus</i> UICC 360  |
| 4:40pm-5:00pm | <b>Discussion</b>   |   |  |

## 5.00pm-9.00pm Welcoming Dinner

Venue: Santosa Hotel

All participants are invited for dinner with the Governor of West Nusa Tenggara Province and the State Minister of Science and Technology

## 8:00am-5:00pm **General**

### 8:00am-10:00am **Plenary Session II**

Ballroom Bima

Moderator: Prof. Dr. Suharsono

8:00am-8:20am **[KS 4]** Industrial Policy to Support Biotechnology Based Industry

Dr. Ir. Ngakan Timur Antara  
(Head of Pulp and Paper Institute, Indonesia)

8:20am-8:40am **[KS 5]** Biotechnology of Plant Reproduction: from Control of Pollination to Fruit Set and Development

Prof. Dr. Celestine Mariani  
(Radboud University of Nijmegen, The Netherlands)

8:40am-9:00am **[KS 6]** High Quality *Solanaceous* Vegetables by Exploration of Natural Biodiversity (INDOSOL)

Prof. Dr. Sjaak v Heusden  
(Wageningen University, The Netherlands)

9:00am-9:30am **Discussion**

### 9:30am-10:00am **Morning Tea; Poster and Exhibition Viewing**

Poster: [P 50] - [P 95]

### 10:00am-11:30am **Plenary Session III**

Ballroom Bima

Moderator: Dr. Siswa Setyahadi

10:00am-10:20am **[KS 7]** Deciphering Secrets of Oleoresin Induction and Diversity in Agrawood Using Plant Biotechnology Tools

Prof. Dr. Claudio Cerboncini  
(Forschungszentrum Julich GmbH, Institute for Bio- and Geoscience, Plant Sciences, Julich)

10:20am-10:40am **[KS 8]** Microalgal Biorefinery - Energy and Economic Solutions

Prof. Dr. Christopher Franco  
(Flinders University, Australia)

## 8:00am-5:00pm **General**

10:40am-11:00am **[KS 9]** Medical Biotechnology Development in Indonesia  
Drs. Iskandar, Apt. MM.  
(PT Bio Farma)

11:00am-11:30am **Discussion**

## 11:30am-12:00am **Lunch Symposia II**

New Revolution in Confocal Live Cell Imaging - FV10iLIV  
Chai Chuan Chung (PT Fajar Mas Murni)

## 12:00am-1:00pm **Lunch; Poster and Exhibition Viewing**

Poster: [P 50] - [P 95]

## 1:00pm-2:30pm **Plenary Session IV**

Ballroom Bima

Moderator: Dr.-Ing. Misri Gozan

1:00pm-1:20pm **[KS 10]** Marine and Mussel and Derived Adhesive  
Biomaterial and Its Diverse Applications  
Prof. Dr. Hyung Joon Cha  
(Marine Biomaterials Research Center,  
Pohang University of Science and Technology, Korea)

1:20pm-1:40pm **[KS 11]** Marine Biotechnology Research in Indonesia:  
Biomaterial and Its Diverse Applications  
Prof. Dr. Hari Eko Irianto  
(Research Center for Marine and Fisheries Product Processing  
and Biotechnology, Indonesia)

1:40pm-2:00pm **Discussion**

2:00pm-2:30pm Room Preparation for Parallel Session III

# Thursday, July 5

## 8:00am-5:00pm **General**

### 2:30pm-3:30pm **Parallel Session III**

**Room: Bima 2**  
**Agricultural Biotechnology**  
 Moderator 7: Dr. Hayati Minarsih

**Room: Bima 3**  
**Workshop Student by NAIST**  
 Moderator: Dr. Amarila Malik

2:30pm-2:40pm [O 37] Endang Semiarti  
 Multishoot Production in the 35s::Knat1 Transformant of *Coelogyne pandurata* Lindley Orchids Plants

Introduction:  
 Prof. M. Kawaichi, MD, Ph.D

2:40pm-2:50pm [O 38] Rindang Dwiyani  
 The Roles of Pre-Culture Treatment and Ascorbic Acid on *Agrobacterium*-Mediated Transformation of an Indonesian Wild Orchid *Vanda tricolor* Lindl.

[P 23] Satohiko Murayama  
 Analysis of Transcriptional Regulation using RNA Polymerase  $\alpha$ -CTD Mutant in *B. subtilis* Genome

2:50pm-3:00pm [O 39] Ixora Sartika Mercuriani  
 Insertion of a Flowering Gene, PaFT, into *Phalaenopsis amabilis* Orchid using *Agrobacterium tumefaciens*

[P 35] Takunari Kono  
 Analysis of Archaeal Homologues of the Calvin Cycle Enzymes

3:00pm-3:40pm [O 40] Ellen Tanudjaja  
 Identification and Characterization of *Lactobacillus fermentum* from Local Chicken Crops

[P 79] Tsolmonbaatar Ariunzaya, Ikuhisa Nishida, Hiroshi Takagi  
 Functional Analysis of Avt7 in Yeast *Saccharomyces cerevisiae*

3:10pm-3:30pm **Discussion**

### 3:30pm-4:00pm **Afternoon Tea; Poster and Exhibition Viewing**

Poster: [P 50] - [P 95]

### 4:00pm-5:00pm **Parallel Session IV**

**Room: Bima 2**  
**Agricultural Biotechnology**

Moderator 9: Dr. Saidatul Idiyah

4:00pm-4:10pm [O 41] Farida Yulianti  
 An Improved Protocol for Isolating High Quality DNA of Strawberry (*Fragaria X ananassa* Dutch.)

4:10pm-4:20pm [O 42] Norie Watanabe  
 A Rapid Method for Differential Determination of White Root Rot Pathogen (*Rigidoporus microporus*) of Rubber Tree (*Hevea brasiliensis*) in Indonesia

4:20pm-4:30pm [O 43] Utut Widyastuti  
 Expression of CYP71AV Gene During Leaf Developments of *Artemisia annua* L. for Artemisinin Production

4:30pm-4:40pm [O 44] Edy Meiyanto  
*Garcinia mangostana* Fruit Hull Increase the Cytotoxic Activity of Doxorubicin on Colon Cancer Cell Lines

4:40pm-5:00pm **Discussion**

### 6:30pm-9:00pm **IBC Member Meeting**

**Room: Arjuna**  
 Only for IBC Members

# Thursday, July 5

## 8:00am-5:30pm **DAAD & INDOSOL Workshop**

### 8:00am-11:45am **Workshop of DAAD**

Room: Arjuna

Moderator: Dr. Agus Wijaya and Dr. Asmarinah

- 8:00am-8:15am [WD 1] Imdadul Hoque  
Improvement of Some Grain Legumes through *Agrobacterium*-Mediated Genetic Transformation
- 8:15am-8:30am [WD 2] Nadimpalli Siva  
Evolutionary Conservation of Lysosomal Enzymes and Their Receptors in
- 8:30am-8:45am [WD 3] Rajiv Prakash  
Electrochemical Detection of DNA Hybridization over Modified Sensor Electrodes: Genosensors for BRCA1 and Kala-agar
- 8:45am-9:00am [WD 4] Muh. Sayyar  
Glutathione: a Key Player in Arsenic Detoxification in *Arabidopsis*
- 8:00am-8:15am [WD 5] Naveed Jan  
Heavy Metal Tolerance of Fungus Isolated from the Soil Contaminated with Sewage and Industrial Wastewater
- 8:15am-8:30am [WD 6] AgusWijaya  
Molecular Determination of Virulence Trait on *Enterococcus* Probiotic Candidates
- 8:30am-8:45am [WD 7] Morina Riauwati  
A New Species of Clinostomum (Digenea: Clinostomidae) from Climbing Perch (*Trichogaster trichopterus*) in Riau, Indonesia
- 8:45am-9:00am [WD 8] JanakaWijesundara  
Biogas Technology as an Alternative Fuel in Sri Lanka

### 10:00am-10:15am **Morning Tea**

- 10:15am-10:30am [WD 9] Hettiage RY. Parera  
Evaluation of the Potential Biogas from Food Waste and Process Limitations of a Plug Flow Type Biogas Reactor
- 10:30am-10:45am [WD 10] Panji Sakti Basunanda  
Genetic Diversity of Local Rice Cultivars from Central Java
- 10:45am-11:00am [WD 11] Asmarinah  
Production of VDAC3 Recombinant Protein for the Development of Post-testicular Male Contraception Vaccine
- 11:00am-11:15am [WD 12] Catur Sri Herwanto  
Studies on the Phosphate-Solubilizing Bacteria Isolated from Rice Fields on Java
- 11:15am-11:30am [WD 13] Suseno  
Paclotrazol Stimulate Chlorophyll Number and Root Number on Plantlet of Patchouli (*Pogostemon cablin* benth.) cv. Sidikalang and Tapaktuan *In vitro*.
- 11:30am-11:45am [WD 14] Niknik Nurhayati  
Cloning and Sequencing of the Pac Gene Encoding Penicillin G Acylase of *Bacillus thuringiensis*

### 1:00pm-1:30pm **Lunch; Poster and Exhibition Viewing**

Poster: [P 50] - [P 95]

## 8:00am-5:30pm **DAAD & INDOSOL Workshop**

### 1:30pm-5:30pm **Workshop of INDOSOL**

Room: Arjuna

Moderator: Prof. Dr. Suharsono

1:30pm-1:35pm [WI 1] Awang Maharijaya  
Resistance Factors in Pepper Inhibit Larval Development of Thrips (*Frankliniella occidentalis*)

1:55pm-2:15pm [WI 2] SyarifinFirdaus  
Quantitative Trait Loci (QTLs) of Whitefly Resistance Components in Tomato

2:15pm-2:35pm [WI 3] WahyuniPurwoto  
The Influence of Fruit Ripening on the Flavonoid Pathway in a High-Flavonoid Pepper Accession

2:55pm-3:15pm [WI 4] Hakim Kurniawan  
Diversity of the Indonesian Eggplant (*Solanum melongena*) and Related Species

3:15pm-3:35pm [WD 5] Hartati  
Identification of New Sources of Resistance Against *Ralstonia solanacearum* in Eggplant

### 3:35pm-4:00pm **Afternoon Tea**

4:00pm-4:15pm [WI 6] Eny Sudarmonowati  
Superior Traits Related to Vitamin C, Insect and Drought Resistance Assessment of *Solanaceae* Accessions

4:15pm-4:30pm [WI 7] Richard Visser  
Field Evaluation of Genetically Modified Commercial Cassava in Indonesia

4:30pm-4:45pm [WI 8] Ben Vosmen  
Allele Mining in *Solanum*; Diversity and Distribution of Late Blight Resistance Genes

4:45pm-5:00pm [WI 9] Roeland Voorrips  
SNP Genotyping of Tetraploid Potato Cultivars: Identification Of 5 Genotypic Classes and Trait Associations

5:00pm-5:15pm [WI 10] Arnaud Bovy  
Isolating the Gene for "Smoky" Flavour in Tomato Fruit

5:15pm-5:30pm [WI 11] Ana R. Ballester  
Transcriptomic Analysis and Phenylpropanoid Metabolism of Orange-*Penicillium digitatum* Interaction

## 8:00am-10:00am **Plenary Session V**

Ballroom Bima

Moderator: Prof. Dr. Sri Widyastuti A., App. Sc., Ph.D.

8:00am-8:20am [KS 12] Food Biotechnology with Particular Focus on Plant Food Stuff Processing

Prof. Dr. rer. nat. Reinhold Carle  
(Institut fuer Lebensmittelwissenschaft und Biotechnologie,  
Hohenheim University, Germany)

8:20am-8:40am [KS 13] Structure, Function and Application of Hyperthermophilic Molecular Chaperones

Prof. Dr. Masafumi Yohda  
(Tokyo University of Agriculture and Technology, Japan)

8:40am-9:00am [KS 14] Challenges of Establishment of Bio-Supporting-Products Industries in Indonesia

Dr. Ir. Darmono Taniwiryono  
(Indonesian Biotechnology Research Institute for Estate Crops,  
Bogor, Indonesia)

9:00am-9:30am **Discussion**

## 9:30am-10:00am **Morning Tea and Exhibition Viewing**

## 10:00am-11:30am **Plenary Session VI**

Ballroom Bima

Moderator: Dr. Wibowo Mangunwardoyo

10:00am-10:20am [KS 15] Current Bioprocess Engineering Research at Bioprocess Engineering Study Program Universitas Indonesia: Bioenergy, Environmental Biotechnology and Natural Product

Dr.Ir. Heri Hermansyah, M.Eng  
(Universitas Indonesia)

10:20am-10:40am [KS 16] Industrial Biotechnology : Gene Regulation

Prof. Dr. Masaru Ohme-Takagi  
(Bioproduction Research Institute, National Institute of  
Advanced Industrial Science and Technology, Japan)

10:40am-11:00am [KS 17] Industrial Enzyme Development in Indonesia

Dr. Siswa Setyahadi  
(Centre for Bioindustrial Technology, Agency for Assessment and  
Application of Technology, Indonesia)

11:00am-11:30am **Discussion**

# Friday, July 6

## 11:30am-1:30pm Friday Praying; Lunch

## 1:30pm-2:30pm Parallel Session V

|               | <b>Room: Bima 2</b><br>Moderator 9:<br>Dr. Ekowati Chasanah  | <b>Room: Bima 3</b><br>Moderator 10:<br>Dr. Yanni Sudiyani  | <b>Room: Arjuna</b><br>Moderator 11:<br>Dr. Reinhard Pinontoan  |
|---------------|--|---|---|
| 1:30pm-1:40pm | [O 45] Wahyu Irawati<br>Isolation and Molecular Characterization of Mercury Resistant Bacteria from Gold Mining in Pongkor Village Bogor | [O 52] Eko Agus Suyono<br>Growth Optimization of <i>Tetraselmis</i> sp. to Produce Carbohydrate as Substrate for Ethanol Production   | [O 59] Heddur Manjappa Gowda Jayaprakasha<br>Biotechnological Applications in Development of Functional Weaning Food  |
| 1:40pm-1:50pm | [O 46] Amal K. Paul<br>Reduction of Hexavalent Chromium by Aerobic Heterotrophic Bacteria Indigenous to Chromite Mine                    | [O 53] Agung Marssada Biorata<br>Optimization of Cellulase Production from <i>Bacillus</i> sp. BPPT CC RK2 using Response Surface Methodology by the Variations of Ratio C/N and Time of Fermentation | [O 60] Nursilawaty<br>Nitrite Reduction in Fermented Sausage (Pepperoni) by Lactic Acid Bacteria  |
| 1:50pm-2:00pm | [O 47] Shazia Iftikhar<br>Biosorption of Heavy Metals by Dead Fungal Biomass   | [O 54] Suharti<br>Elucidation of UV-vis Spectroscopic Phenomena of A Novel Nitric Oxide Reductase due to Addition of CO   | [O 61] Tati Barus<br>Genetic Diversity of Yeast from Ragi Tape Based on 5.8S rDNA-ITS Region  |
| 2:00pm-2:10pm | [O 48] Neetin Shivajirao Desai<br>Biodegradation of Textile Dyes using Soil Bacteria <i>Rhizobium</i> Species                            | [O 55] Misri Gozan<br>Oil-Water Surface Tension Change by Microbial Enhanced Oil Recovery   | [O 62] Amarila Malik<br>Cloning and Expression of Fructansucrase Gene ftfCNC-2(1) from <i>Weissella confuse</i> MBFCNC-2(1) in <i>Bacillus subtilis</i> 168 |
| 2:10pm-2:30pm | <b>Discussion</b>  |   |   |

## 2:30pm-3:30pm Parallel Session VI

|               | <b>Room: Bima 2</b><br>Moderator 12:<br>Dr. Ekowati Chasanah   | <b>Room: Bima 3</b><br>Moderator 13:<br>Dr. Yanni Sudiyani  | <b>Room: Arjuna</b><br>Moderator 14:<br>Dr. Reinhard Pinontoan   |
|---------------|--|---|--|
| 2:30pm-2:40pm | [O 49] Dede Heri Yuli Yanto<br>Degradation of Asphalt by Newly Isolated <i>Pestalotiopsis</i> sp. in Artificially Contaminated Environments                              | [O 56] Muhammad Sahlan<br>Encapsulation of Extract Leave <i>Phaleria macrocarpa</i> (Mahkota Dewa) by Casein as Antihyperglycemic Agent                       | [O 63] Kuruba Sreeramulu:<br>Production And Characterization of Extreme Alkaliphilic and Thermostable Keratinase and Keratin Disulfide Reductase from The <i>Bacillus halodurans</i> PPKS-2  |
| 2:40pm-2:50pm | [O 50] Puspita Lisdiyanti<br>Urease activity in Bacterially Induced-Calcium Carbonate Precipitation from Indonesia for Soft Technology of Bio-mediated Sands Improvement | [O 57] Oktira Roka Aji<br>Screening Lipase Producing Bacteria and Characterization of Lipase from Selected Isolate for Application in Pulp and Paper Industry | [O 64] Nurrahmi Dewi Fajarningsih<br>Screening of Antitumor and Antioxidant Activity of Fungi Associated with Macroalgae from Indrayanti Beach, Jogjakarta                                   |
| 2:50pm-3:00pm | [O 51] Praswasti P.D.K. Wulan:<br>Synthesis of Carbon Nanotubes from Banana Peel   | [O 58] Benjaram Mahipal Reddy<br>Liquid-liquid Extraction Methods for Downstream Processing of Lipase   | [O 65] Irvan Faizal<br>Identification and Design a Specific Primer for Transferrin Gene In Indonesian <i>Nile tilapia</i> to Obtain A Potential Strain for Brackish and Seawater Aquaculture |
| 3:00pm-3:10pm | <b>Discussion</b>  |   | [O 66] Rani Sauriasari<br>Evaluation of Pyrogallol-induced Cytotoxicity in Catalase-mutant <i>Escherichia coli</i> and Mutagenicity in <i>Salmonella typhimurium</i>                         |
| 3:10pm-3:20pm |  |   | <b>Discussion</b>  |

## 3:30pm-4:00pm Closing Ceremony Photo Session; End of Program

## The Utilization of Palm Oil Mill Effluent (POME) for Bioenergy through Wild Algae Treatment

*Hadiyanto*

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Besides of high content of COD/BOD, Palm Oil Mill Effluent (POME) is also potential for nutrient source for microalgae growth. Reducing COD/BOD in pond aerobic system could not reduce its level to allowable limit, and therefore another additional waste treatment method is required. Treatment by using wild algae is relatively cheap and not require chemical for its treatment. Wild algae which is wildly grow in nature is able to consume nutrient as well as BOD in their site. With this concept, we evaluate this algae for reducing waste component in POME and then us the filtrate for another algae growth. Chlorella is one of high potential for biodiesel since it has hih lipid content (20-30%). The objective of the research is to determine growth rate and biomass productivity in Chlorella Sp cultured in treated POME by using wild alga. Chlorella Sp was cultured in 20%, 50%, 70% POME using urea concentration 0.1gr/L (low nitrogen source) and 1gr/l (high nitrogen source) at flask disk, pH 6.8-7.2; aerated using aquarium pump and fluorescence lamp 3000-6000 lux as light. The biomass was measured using spectrophotometer Optima Sp-300 OD at 680 wavelength in 15 days At end of cultivation, Chlorella sp was filtered and measured as dry weight. Result indicated that Chlorella sp at 50% POME 1gr/L urea showed higher specific growth rate (0.066/day). Factor affecting growth rate of microalgae is CNP ratio, POME concentration, and urea concentration

**Keywords:** *Wild algae, POME, Bioenergy, microalgae, COD*

## 1. Introduction

Indonesia has been considered as the largest producer of coconut palm oil (CPO) in the world which contributes 44% of world's shared demand (Rupani, et al. 2010). The Indonesian's CPO production tends to increase and it will reach 5.22% per annum as predicted for 2014 (Table 1). This amount of production lead to produce enormous amount of palm oil mill effluent (POME). POME is a liquid waste produced by CPO processing and it is estimated for 1 ton of fresh fruit bunch (FFB) can be converted to 0.2 ton CPO, while 0.66 ton will be released as palm oil mill effluent (POME).

**Table 1.** Commodities of Indonesia agriculture 2010-2014  
(Deptan, 2009)

| Commodities  | Year   |        |        | Growth /annum |
|--------------|--------|--------|--------|---------------|
|              | 2011   | 2012   | 2013   |               |
| Coconut Palm | 24.429 | 25.046 | 27.046 | 5.22%         |
| Rubber       | 2.711  | 2.741  | 2.771  | 1.10%         |
| Coconut      | 3.290  | 3.317  | 3.348  | 0.86%         |

Almost of POME in Indonesia is treated by using open anaerobic ponds to reduce COD and BOD contents. The raw POME from palm mill has high COD level (50000 mg/L) and BOD level (25000 mg/L), while the anaerobic pond is only able to reduce up its level to 1400 mg/L and 700 mg/L for COD and BOD, respectively. The characteristic of POME before and after treatment by using anaerobic pond is listed in Table 2. From the composition, it is noted that POME still high content of nutrient such as COD, Nitrogen and Phosphor with C:N:P of 15:7:1 . These nutrients are highly potential for nutrient of microalgae growth especially to support the photosynthetic reaction and to produce biomass. The biomass which depends on composition can be converted to other valuable products such as lipid for biofuel, protein for feed supplement or carbohydrate for bioethanol.

**Table 2.** POME and POME effluent from pond digestion

| Parameter*         | POME     | POME effluent |
|--------------------|----------|---------------|
| pH                 | 3.91-4.9 | 4-6           |
| COD                | 50000    | 1400          |
| BOD                | 25000    | 700           |
| TSS                | 49233.57 | 700           |
| Total N            | 1494.66  | 456           |
| NH <sub>3</sub> -N | 50.42    | 34.2          |
| PO <sub>4</sub> -P | 315.36   | 68.4          |

\*all in ppm except pH. (Habib et al, 1998, 2003)

One of application of microalgae biomass is bioenergy such biofuel and bioethanol. Biofuel can be obtained from microalgae species with high lipid content while bioethanol from carbohydrates. Since, the need of renewable energy in Indonesia can not be avoided because within 15 years, the oil reserve will be diminished; the exploring of new renewable energy resources is a vital. Microalgae can be considered as the one while POME which has high COD is also potential as biogas sources. To be used as nutrient of microalgae, POME must have low BOD contents. Treatment POME with ponding system doesn't reduce BOD to allowable limit, therefore another addition treatment is required.

Wild algae is an algae species that wildly grow in the nature without any supply external nutrient. This algae can reduce the BOD and other nutrient (N and P) for their growth. Therefore, this research is aimed to utilize wild algae type to reduce BOD/COD in POME such that treated POME is possible for another algae medium.

## 2. Material and Methodology

### 2.1. POME Medium

Medium for cultivation is POME collected from PTPN VII Lampung. The additional nutrient was added such as NaHCO<sub>3</sub>, urea, TSP and NPK to enhance ratio of C:N:P the requirement of N,P an K for photosynthetic.

## 2.2. Algae culture

Wild algae was obtained from pond area in PTPN VII Lampung and Bioprocess Laboratory, Diponegoro University. The wild algae were identified for their species at Bioprocess Laboratory. *Chlorella* sp and *Spirulina* were collected from BBPAP Jepara and cultivated in modified medium 40ppm urea, 30ppm TSP, 10ppm ZA, 1ppm FeCl<sub>3</sub>

## 2.3. Experimental set up

The experiment was done in two bioreactors under batch operation (Figure 1). The first reactor was used to cultivate wild algae in POME medium for 7-10 days and after separation of biomass, the filtrate was used as medium for second bioreactor which was containing *Spirulina* and *Chlorella*.

The *Chlorella* and *Spirulina* were cultivated in different POME concentration (20%, 50%, and 70% ) and different urea concentration (0.1gr/l, and 1gr/l). Light intensity was maintained in 3000 lux, pH 6.8-7.2, 28<sup>o</sup>C temperature, and aerated using air pump to mix the medium in 2 L flask disk glass. The biomass concentration was measured by using spectrophotometer.

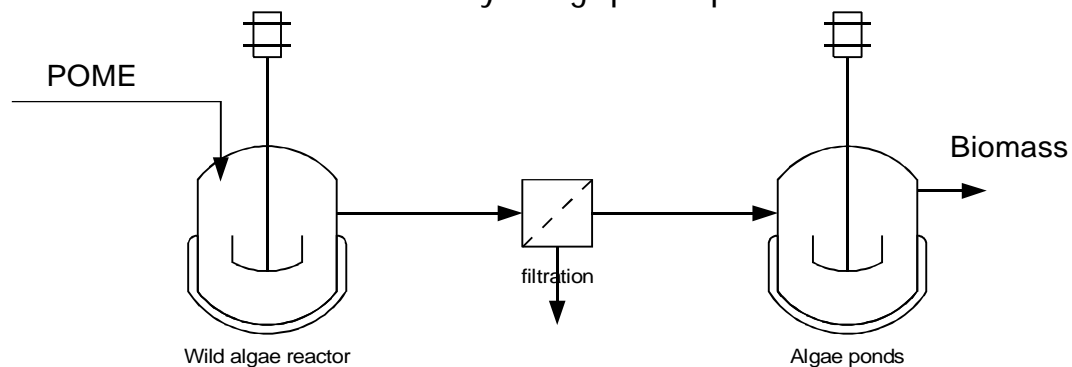


Figure 1. Experimental set up for two stage algae biomass production

## 2.4. Measurement

Medium was measured daily using spectrophotometer Optima sp-300 at 680nm wavelength for 15 days. Optical density was plotted in biomass to make regression between optical density and biomass. Specific growth rate was calculated using equation from exponential growth (Eq 1).

$$\mu = \frac{\ln(x_t) - \ln(x_0)}{t - t_0} \quad (1)$$

Biomass was harvested in the end of cultivation. Biomass was dried at 55°C tray dryer for 2 hours. Biomass productivity (X) (mg/l/d) was calculated using biomass produced divided by cultivation time.

### 3. Result and Discussion

#### 3.1. Wild algae

The wild algae was grown wildly in an open tank, without addition of external nutrients. The most species appeared in the culture were *Chlorella* and *Scenedesmus*. The growth of wild algae was evaluated under POME medium (Table 3)

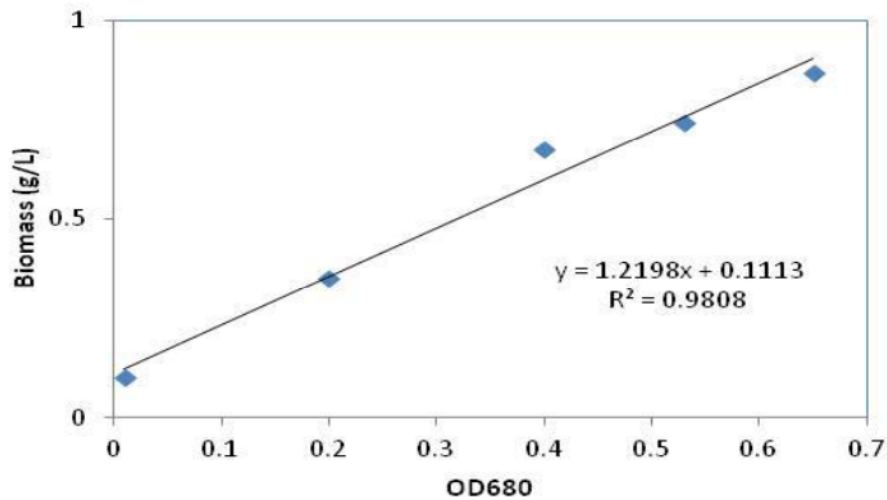
**Table 3.** Growth rate and biomass obtained from wild algae

| Dilution | $\mu$<br>(1/day) | OD<br>max |
|----------|------------------|-----------|
| 0        | 0,055            | 0,167     |

Table 3 shows that the wild algae grow well in POME medium. *Chlorella* and *Scenedesmus* have been recognized as microalgae that produce lipid content between 20-30%.

#### 3.2. Biomass vs Optical density for algae

The relationship between biomass (dry weight) and OD (optical density) for *Chlorella* is shown in Figure 2.



**Figure 2.** Correlation between OD and Dry Mass *Chlorella* sp cultivated in POME at 680nm

Figure 2 shows that the linear correlation between biomass and Optical density was found. It was confirmed that OD 1 = 1.22 g/L . This is slightly different with the one obtained by Puangbut & Leensing (2012) with  $y = 1.5343x$ , ( $R^2 = 0.977$ ). The specific growth rate was determined by Eq 1 and the result is depicted in Table 1. The result indicates that 50% POME and 1gr/l urea has highest specific growth rate ( $\mu$ ) than other variables.

**Table 4.** Specific growth rate ( $\text{day}^{-1}$ ) *Chlorella* sp in different POME and addition of urea concentration

| Urea    | POME concentration |       |       |
|---------|--------------------|-------|-------|
|         | 20%                | 50%   | 70%   |
| 0.1gr/l | 0.036              | 0.057 | 0.058 |
| 1gr/l   | 0.020              | 0.066 | 0.059 |

The result (Table 4) shows that *Chlorella* sp in this experiment has lower growth rate compared to the one obtained by Putri, et al., 2011 ( $\mu = 0.084/\text{da}$ ).

### 3.3. Effect of C:N:P in nutrient

A theoretical of carbon, nitrogen and phosphor in POME was obtained from Habib, et al (1998, 2003) for 20%, 50%, and 70% concentration.

**Table 5.** Concentration carbon, nitrogen, and phosphate in POME in different concentration

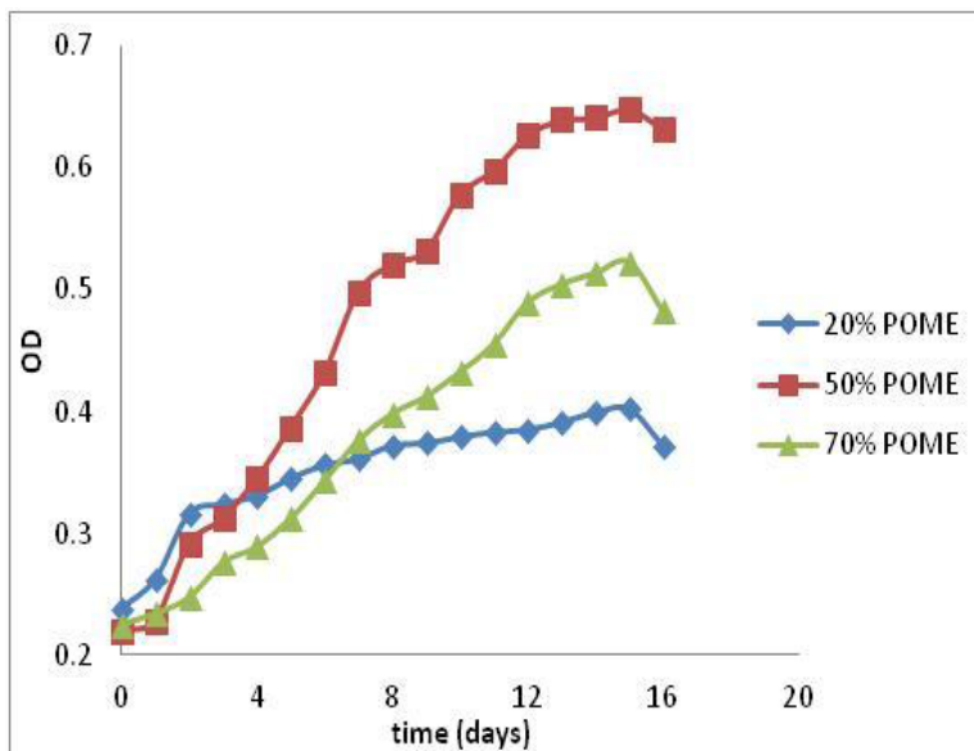
|                | POME |      |        |
|----------------|------|------|--------|
|                | 20%  | 50%  | 70%    |
| Carbon(ppm)    | 1591 | 4017 | 5622.4 |
| Nitrogen (ppm) | 245  | 600  | 837    |
| Phosphor(ppm)  | 34.2 | 85.3 | 119.1  |

High specific growth rate was found in 50% POME 1gr/l urea, followed by 70% POME 1gr/l urea are shown in Table 3. The CNP ratio in medium limits microalgae growth rate (Edwards et al., 1980) with recommended ratio of 56:9:1. According to equation of POME after adding urea, CNP ratio has changed (Table 6):

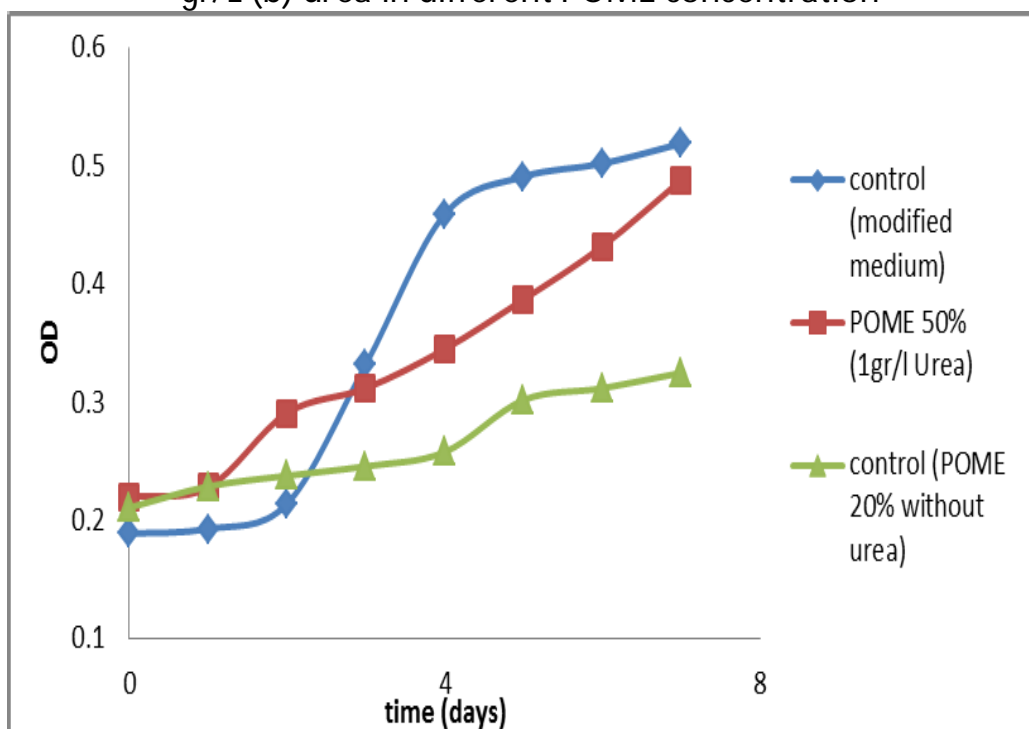
**Table 6 CNP ratio in POME after additional urea**

| Urea    | CNP ratio POME |             |            |
|---------|----------------|-------------|------------|
|         | 20%            | 50%         | 70%        |
| 0.1gr/l | 46.5:8.5:1     | 47.09:7.5:1 | 47.2:7.4:1 |
| 1gr/l   | 46.5:20.6:1    | 47.09:12 :1 | 47.2:10:1  |

For 70% POME and 1gr/l additional urea showed that it is closest to recommended CNP ratio according to Edwards et al., (1980) i.e 56:9:1 of weight ratio. However, high specific growth rate was found in 50% POME 1gr/l.



**Figure 3.** Growth phase *Chlorella* sp at 1gr/l (a) and 0.1 gr/L (b) urea in different POME concentration

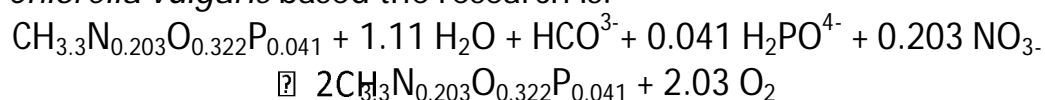


**Figure 4.** Comparison growth phase *Chlorella* sp in different medium

Habib et al (2003) informed that higher POME concentration influences dark brown color in medium which may from tannic acid (Phalakornkule et al.,2010). Tannic acid can inhibit shading in light intensity and photosynthetic reaction. As compared to 50% POME (1gr/l urea), it has higher nitrogen ratio, but *Chlorella* still grow in higher specific growth rate. Lower tannic acid in 50% POME influence growth of microalgae, although nitrogen source is high but *Chlorella* still can tolerance to it. However *Chlorella* sp has lower specific growth rate in POME 20% although the medium has lower tannic acid and has more light intensity. This lower growth rate is caused by high nitrogen content. The nitrogen can be a toxic if it can not be utilized to form biomass.

Putri et al (2011) investigated several microalgae growth in diluted POME (250mg/l COD) and found that *Chlorella sorokiniana* has higher specific growth rate than other microalgae (*Chlorella vulgaris*, *Chlorella pyrenoidosa*, *Botryococcus sudeticus*, *Tetraselmis* sp). The results in Specific growth rate were 0.099/day, 0.084/day, 0.048/day, 0.083/day and 0.065/day, respectively. In the research, diluted POME could have lower tannic acid, so it did not inhibit photosynthetic reaction. Compared by biomass production, the result showed that highest biomass can reached in 8.0 mg/l/day. In this experiment, highest biomass was reached in 58.4 mg/l/day. POME concentration may limit in biomass forming, due to high carbon, nitrogen, and phosphor source.

According to this research, higher urea concentration also influences in specific growth rate of *Chlorella* sp. Urea influences in *Chlorella* `s growth (El Sayed et al., 2011) and the concentration also influences in biomass production (Choochote et al., 2010, Mandalam & Palsson, 1998). Wijanarko (2011) in his research also studied influences urea as nitrogen source and conclude that urea has potential nutrient for *Chlorella* than nitrate. It also can increase growth rate and biomass productivity. The biomass forming *Chlorella vulgaris* based the research is:



Wijanarko (2011) also reported that high urea concentration that exceed in medium could inhibit growth rate caused by toxicity.

#### 4. Conclusion

Cultivation of *Chlorella* sp was done in different POME concentration after wild algae treatment and different additional urea concentration. Highest specific growth rate and biomass productivity are recorded at 50% POME and 1gr/l urea. Factor affecting growth rate of microalgae is CNP ratio, POME concentration, and urea concentration.

#### Acknowledgement

This research is part of project Indonesian Aquatic Biomass, with consortium members: PT Wirana, Maris Project BV and KU Leuven belgium

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July 4<sup>th</sup> - 7<sup>th</sup> 2012

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