Humanosphere Science School (HSS) 2016
&
The 6th International Symposium of Sustainable Humanosphere (ISSH)
“Integrating Bio-Resources and Advanced Technology for Sustainable Development”

PROGRAM BOOK

Bogor, Indonesia
November, 15-16th 2016

Presented by:
Publication of this program book is organized by:

Indonesian Institute of Sciences (LIPI)
Research Institute for Sustainable Humanosphere (RISH, Kyoto Univ.)

co-hosted by:

Japan-ASEAN Science, Technology and Innovation Platform (JASTIP, JST)
Science and Technology Research Partnership for Sustainable Development (SATREPS, JICA/JST)
Asia Research Node (ARN, Kyoto Univ./LIPI)
National Institute of Aeronautics and Space (LAPAN)

and supported by:

Kyoto University Research Coordination Alliance (KURCA, Kyoto Univ.)
Foreword

Human activity and its interaction with environment, well known as humanosphere, transform the natural existence. Excessive exploitation nowadays of humanosphere causes a dangerous crisis to social and environment. One of the most urgent global issues of our time is to cope with the impacts of the clearly recognized climatic changes, and associated extreme weather and water-related hazards, such as floods and droughts. This situation raises apprehension and creates effort to repair natural condition.

Research Center for Biomaterials, Indonesian Institute of Sciences (LIPI), Research Institute for Sustainable Humanosphere (RISH), Kyoto University proudly present Humanosphere Science School 2016. Humanosphere Science School (HSS) provides learning experience by sharing knowledge, science, and technology for sustainable future delivered by experts specializing in subjects related to specified topics. This School also will be held as activities of the JST-supported JASTIP and the JICA/JST-supported SATREPS projects, which are ongoing international collaboration works between LIPI and Kyoto University, etc. HSS will also hold a forum for inter-disciplinary researchers, practitioners and professionals to share their knowledge or results of scientific research in The International Symposium for Sustainable Humanosphere (ISSH). The main theme for this year conference is “Integrating Bio-Resources and Advanced Technology for Sustainable Development” The objective of the conference is to provide an international forum for the exchange of information and knowledge through keynote addresses, plenary sessions, oral and poster presentations. In this year, the conference theme focuses on integrating utilization of bio-resources that contributions in advanced science and technology to encourage and motivate current and future development for achieving sustainable development. HSS will be held in 2 days and is divided into several sessions depend on the topics.

This book contains the schedules of the school and symposium, together with the abstracts of the HSS and ISSH 2016 that vary in the broad scope of humanosphere science, i.e. in the field of forest science, biological science, Earth science, community-based development and advanced science and technology. This year, the committee has received paper submissions with oral presentations and poster presentations for the symposium.

Jakarta, 15 November 2016

Bramantyo Wikantyoso S.Si
Chairman of HSS-ISSH 2016
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General Coordinator:
Prof. Dr. Sulaeman Yusuf, M.Agr. (LIPI)
Assoc. Prof. Kenji Umemura (RISH, Kyoto Univ. / JASTIP/ SATREPS)

Advisory Board/Steering Committee:
Prof. Takashi Watanabe (RISH, Kyoto Univ. / JASTIP)
Prof. Toshiaki Umezawa (RISH, Kyoto Univ. / SATREPS)
Prof. Dr. Subyakto, M.Agr. (LIPI)
Prof. Dr. Made Sudiana, M.Sc. (LIPI)
Dr. Lisman Suryanegara, M.Agr. (LIPI)
Dr. Ir. Euis Hermiati M.Sc. (LIPI)
Dr. Wahyu Dwianto, M.Agr. (LIPI)

Chairman:
Bramantyo Wikantyoso, S.Si (LIPI)

Vice Chair:
Nissa Nurfajrin Solihat, S.Si (LIPI)

Secretariat:
Dwi Ajias Pramasari S.T.P (LIPI)
Fahriya Puspita Sari S.T (LIPI)
Eka Lestari, S.Hut (LIPI)

Treasury and Meal:
Triastuti, S.T (LIPI)
Erlin Herlinawati, S.E (LIPI)

Programme:
Ni Putu Ratna Ayu K, S.P, M.Si (LIPI)
Dr. Titik Kartika M.Agr. (LIPI)
Aprawi Zulfiri M.Sc. (LIPI)
Lilik Astari M.For.Ecosys.Sc. (LIPI)
Deni Zulfiana M.Si. (LIPI)
Triyani Fajriutami M.Eng.(LIPI)
Sita Heris Anita, M.Si. (LIPI)
Maulida Oktaviani S.Si (LIPI)
Yeyen Nurhamiyah, S.Si (LIPI)
Eko Widodo, S.T (LIPI)
Anis Sri Lestari, M.S (LIPI)
**Publication and Documentation:**
Syam Budi Iryanto, S.Komp. (LIPI)
Agung Sumarno, S.T., M.T. (LIPI)
Fazhar Akbar (LIPI)

**Accomodation and Transportation:**
Herry Samsi, M.T (LIPI)
Yusup Amin, M.Si (LIPI)
Adik Bahanawan, S.Hut (LIPI)

**Logistic:**
Sudarmanto, S.T (LIPI)
Teguh Darmawan, S.T. (LIPI)
Ananto Nugroho M.T (LIPI)
Raden Budi Permana Laksana (LIPI)
Arief Heru Prianto M.Si (LIPI)

**Sponsorship:**
Ririn Dyah Wijayanti, S.T.P (LIPI)
## Time Schedule

### Day 1
**November 15th, 2016**
- 08.30 - 09.00 Registration
- 08.30 - 09.00 Coffee Morning
- 09.00 - 09.10 Opening ceremony of HSS-ISSH 2016
- 09.10 - 09.25 Opening remarks LIPI by Prof. Sulaeman Yusuf, LIPI
- 09.25 - 09.40 Opening remarks by Prof. Takashi Watanabe-RISH, Kyoto Univ.
- 09.40 - 09.45 Photo session
- 09.45 - 10.00 Brief introduction on new collaborative project between LIPI – RISH by Prof. Toshiaki Umezawa

**Lecture Session I**
- 10.00 - 10.40 Lecture 1 (Assoc. Prof. Masaru Kobayashi – GSA, Kyoto Univ.) – Plant Nutrition
- 10.40 - 11.20 Lecture 2 (Assoc. Prof. Masahiro Sakamoto – GSA, Kyoto Univ.) – Plant Molecular Biology
- 11.20 - 12.00 Lecture 3 (Prof. Daisuke Shibata - Kazusa DNA Research Institute) - Bioinformatics
- 12.00 - 13.00 Lunch

**Lecture Session II**
- 13.00 - 13.30 Poster session I
- 13.30 - 14.10 Lecture 4 (Prof. Cecep Kusmana -IPB) - Forest Ecology
- 14.10 - 14.50 Lecture 5 (Dr. Himlal Baral - CIFOR) – Forestry Issue
- 14.50 - 15.30 Lecture 6 (Robertus Heru Triharjanto - LAPAN) - Satellite Technology

**Parallel Session of ISSH**
- 15.30 - 17.00 Parallel session 1
- 17.00 - 17.05 Closing Day 1
- 18.30 - 21.00 Banquet

### Day 2
**November 16th, 2016**
- 08.30 - 09.00 Registration
- 08.30 - 09.00 Coffee Morning

**Lecture Session III**
- 08.30 - 09.10 Lecture 7 (Assist. Prof. Takuro Mori - RISH, Kyoto Univ.) - Wood Structure
- 09.10 - 09.50 Lecture 8 (Dr. Euis Hermiati - LIPI) - Wood Adhesive from Natural Latex
- 09.50 - 10.30 Lecture 9 (Assoc. Prof. Kenji Umemura - RISH, Kyoto Univ) - Wood Based Material
- 10.30 - 11.10 Lecture 10 (Prof. Naoki Shinohara - RISH, Kyoto Univ.) - Wireless Power Transmission
- 11.10 - 11.50 Lecture 11 (Dr. Danny H Natawidjaja - LIPI) - Earth Science and Disaster
- 11.50 - 12.00 JST Funding Program for International Collaborative Research (Masahito Yano - JST)
- 12.00 - 13.00 Lunch

**Parallel Session of ISSH**
- 13.00 - 13.30 Poster session II
- 13.30 - 14.30 Parallel session 2
- 14.30 - 15.30 Parallel session 3
- 15.30 - 15.45 Announcement of the best presentation
- 15.45 - 16.00 Closing ceremony
LECTURERS/
KEYNOTE SPEAKERS
MASARU KOBAYASHI

Address : Kitashirakawa Oiwakecho, Sakyo, Kyoto 606-8502 Japan
Current Position : Associate Professor
E-mail : kobayashi.masaru.8e@kyoto-u.ac.jp

Research Area
Plant Nutrition

Research Experience

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Period</th>
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<tbody>
<tr>
<td>1.</td>
<td>Boron nutrition of vascular plants</td>
<td>1994 - present</td>
</tr>
<tr>
<td>2.</td>
<td>Nucleotide sugar biosynthesis in plants</td>
<td>2000 - present</td>
</tr>
<tr>
<td>4.</td>
<td>Metagenomic analysis of soil microbiota</td>
<td>2015 - present</td>
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Educational background

<table>
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<tr>
<th>Year</th>
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<th>University</th>
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<tr>
<td>1992</td>
<td>Bachelor</td>
<td>Kyoto University</td>
<td>Kyoto, Japan</td>
<td>Plant Nutrition</td>
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<tr>
<td>1994</td>
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<td>Plant Nutrition</td>
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<tr>
<td>2000</td>
<td>Ph.D</td>
<td>Kyoto University</td>
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<td>Plant Nutrition</td>
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</tr>
</tbody>
</table>
MASAHIRO SAKAMOTO

Address: Kitashirakawa Oiwake-cho, Sakyō-ku, 606-8502 Kyoto, Japan
Current Position: Associate Professor
Research Interest: Plant Molecular Biology
E-mail: masak@kais.kyoto-u.ac.jp

Educational Background

<table>
<thead>
<tr>
<th>No.</th>
<th>University</th>
<th>City &amp; Country</th>
<th>Academic Degree</th>
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<tbody>
<tr>
<td>1.</td>
<td>Kyoto University</td>
<td>Kyoto, Japan</td>
<td>Bachelor</td>
<td>1982</td>
<td>Wood Science &amp; Technology</td>
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<tr>
<td>2.</td>
<td>Kyoto University</td>
<td>Kyoto, Japan</td>
<td>Master</td>
<td>1984</td>
<td>Wood Science &amp; Technology</td>
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<tr>
<td>3.</td>
<td>Kyoto University</td>
<td>Kyoto, Japan</td>
<td>Ph.D</td>
<td>2007</td>
<td>Wood Science &amp; Technology</td>
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Research Experience

<table>
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<tr>
<th>No.</th>
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<tbody>
<tr>
<td>1.</td>
<td>X-ray analysis of Cellulose crystalinity of Old Wood</td>
<td>1981</td>
</tr>
<tr>
<td>4.</td>
<td>Molecular Mechanism of Flowering and Shoot Elongation of Bamboo</td>
<td>1998 – present</td>
</tr>
<tr>
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<tr>
<td>1.</td>
<td>Prize of Article of Japanese Society of Plant Cell and Molecular Biology</td>
<td>2013</td>
</tr>
</tbody>
</table>
DAISUKE SHIBATA

Address: 2-6-7 Kazusa-Kamatari, Kisarazu, Chiba 292-0818, Japan
Current Position: Department Head of Kazusa DNA Research Institute
E-mail: shibata@kazusa.or.jp

Research Area
Genomics, metabolomics and biotechnology

Educational background

<table>
<thead>
<tr>
<th>No.</th>
<th>University</th>
<th>City &amp; Country</th>
<th>Academic Degree</th>
<th>Graduation Year</th>
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<tr>
<td>1.</td>
<td>Kobe University</td>
<td>Kobe, Japan</td>
<td>Agriculture</td>
<td>1978</td>
<td>Protein</td>
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<tr>
<td>2.</td>
<td>Kyoto University</td>
<td>Uji, Japan</td>
<td>Agriculture</td>
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<td>Protein</td>
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Research Experience

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<tbody>
<tr>
<td>1.</td>
<td>Posdoc researcher (Purdue University)</td>
<td>1984-1986</td>
</tr>
<tr>
<td>2.</td>
<td>Senior researcher (Mitsui Plant Biotech.)</td>
<td>1988-1999</td>
</tr>
<tr>
<td>3.</td>
<td>Kazusa DNA Research Institute as PI</td>
<td>1999-present</td>
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<tr>
<td>No.</td>
<td>Description</td>
<td>Year</td>
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<tr>
<td>-----</td>
<td>------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>2.</td>
<td>Genomic research on plants</td>
<td>1999-present</td>
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<tr>
<td>3.</td>
<td>Metabolomics research</td>
<td>2002-present</td>
</tr>
<tr>
<td>4.</td>
<td>Development of solar cells</td>
<td>2011-present</td>
</tr>
</tbody>
</table>
CECEP KUSMANA

Address : Division of Forest Ecology, Departement of Silviculture, Faculty of Forestry, Bogor Agricultural University (IPB), Indonesia
Phone : (0251) 8626806
Fax. : (0251) 8626886
Email : ckmangrove@gmail.com

Research Area
Ecology and Silviculture of Mangrove

Educational Background

<table>
<thead>
<tr>
<th>Year</th>
<th>Level</th>
<th>University</th>
<th>Expertise</th>
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<tbody>
<tr>
<td>1983</td>
<td>Bachelor</td>
<td>Bogor Agricultural University, Indonesia</td>
<td>Forest Management</td>
</tr>
<tr>
<td>1988</td>
<td>Master</td>
<td>Bogor Agricultural University, Indonesia</td>
<td>Natural Resources and Environmental Management</td>
</tr>
<tr>
<td>1993</td>
<td>Doctoral</td>
<td>Kyoto University, Japan</td>
<td>Forestry</td>
</tr>
</tbody>
</table>

Selected Publications


The 6th International Symposium of Sustainable Humanosphere
Humansphere Science School 2016
Bogor, 15 – 16 November 2016
HIMLAL BARAL

Address: Jl. CIFOR, Site Gede, Bogor Barat 16115, Bogor, Indonesia
E-mail: h.baral@cgiar.org; himlal.baral@gmail.com

Summary of Key Skills

- Capacity in landscape level analysis, research design and implementation in forestry and natural resource management
- High level skills in GIS and related technologies and their application in forestry and natural resources management
- Participatory GIS – capturing local knowledge into GIS system in various settings e.g., Community GIS, University-community partnership
- Teaching experiences at tertiary level – Introduction to GIS, Ecosystem Services, Ecological Restoration
- Landscape modelling – modelling the visual impact of various harvesting techniques on forested landscapes
- Forest information systems and preparation of forest management plans
- Forest management, resource inventory and silvicultural systems – both small and large industrial forestry environment

Educational Background

2008 – 2013 PhD – Land and Environment
Melbourne School of Land and Environment
University of Melbourne (UoM), Australia
(Thesis Title: Ecosystem goods and services in production landscapes in south-eastern Australia)

2002 – 2004 Master of Forest Science (Research)
School of Forest and Ecosystem Science,
University of Melbourne (UoM), Australia
(Thesis title: Application of GIS in community based forest management in Australia and Nepal)

2002 Postgraduate study in Mountain Forestry
(Dec – Jul) University of Natural Resources and Life Sciences
(UNI BOKU), Vienna, Austria

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1996 – 1998  Master of Arts (Sociology/Anthropology)  
Tribhuban University (TU), Department of Sociology and Anthropology Patan Multiple Campus, Nepal

1991 – 1994  B. Sc. (Forestry), TU, Institute of Forestry, Nepal

<table>
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<tr>
<th>Year</th>
<th>Achievement</th>
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<tbody>
<tr>
<td>2013</td>
<td>Postgraduate research publishing award – 2013, Melbourne School of Land and Environment, The University of Melbourne</td>
</tr>
<tr>
<td>2012</td>
<td>SF Pond Travelling Scholarship to attend 5th Ecosystem Services Partnership Conference in Portland, OR, USA</td>
</tr>
<tr>
<td>2008</td>
<td>CRC for Forestry top-up scholarship to pursue PhD degree at the University of Melbourne</td>
</tr>
<tr>
<td>2007</td>
<td>University of Melbourne Research Scholarship to pursue PhD</td>
</tr>
<tr>
<td>2004</td>
<td>University of Melbourne Travelling Scholarship to attend Map Asia World Conference in Beijing</td>
</tr>
<tr>
<td>2002</td>
<td>Asian Development Bank (ADB) Scholarship to pursue MSc study at University of Melbourne</td>
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<tr>
<td>2001</td>
<td>Own World Scholarship awarded by Austrian Government to pursue International Mountain forestry course at University of Natural Resources and Applied Sciences, Vienna</td>
</tr>
<tr>
<td>1998</td>
<td>Danish International Development Assistance (DanIDA) fellowship for Forest Management and Private Forestry Training in Denmark.</td>
</tr>
</tbody>
</table>
ROBERTUS HERU TRIHARJANTO

Current Position: Researcher at LAPAN

Educational background
- Bachelor of Science in Aerospace Engineering, 1995: North Carolina State University, Raleigh, NC, USA
- Master of Science in Aerospace Engineering, 1997: Texas A&M University, College Station, TX, USA
- Currently PhD Student of Aerospace Engineering: Institut Teknologi Bandung

Professional experience
- 1995-1997: Research Assistant, Department of Aerospace Engineering, Texas A&M University (Nickel Titanium alloy research project)
- 1997-Now: National Institute for Aeronautic & Space (LAPAN)
- 1999-2001: Assistant Researcher at Center for Rocket & Satellite Technology
- 2001-2006: Associate Researcher at Center for Aerospace Vehicle Technology
- 2007-2009: Researcher at Center for Aerospace Vehicle Technology
- 2009-2011: Head of Aerospace Mechatronics Division, Center for Aerospace Electronics
- 2011-2014: Head of Bus Technology Division, Center for Satellite Technology
- 2014-Now: Senior Researcher at Center for Satellite Technology

Selected Publications

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TAKURO MORI

Address: Gokasho, Uji, Kyoto, Japan
Current Position: Assistant Professor
E-mail: moritakuro@rish.kyoto-u.ac.jp

Research Area
Timber structure

Educational background

<table>
<thead>
<tr>
<th>University</th>
<th>City &amp; Country</th>
<th>Academic Degree</th>
<th>Graduation Year</th>
<th>Field of Study</th>
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<tbody>
<tr>
<td>Shinshu University</td>
<td>Nagano, Japan</td>
<td>Bachelor</td>
<td>1996</td>
<td>Engineering</td>
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<tr>
<td>Shinshu University</td>
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<td>Master</td>
<td>1998</td>
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<tr>
<td>Shinshu University</td>
<td>Nagano, Japan</td>
<td>Doctor</td>
<td>2001</td>
<td>Engineering</td>
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Research Experience

<table>
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<tr>
<th>No.</th>
<th>Description</th>
<th>Period</th>
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<tbody>
<tr>
<td>1.</td>
<td>Hiroshi Isoda, Takuro Mori, Akihisa Kitamori, et.al: JSPS Grant-in-Aid for Scientific Research (B), Development of Timber-RC composite floor system for expanding wood utilization to mid and high-rise buildings.</td>
<td>2016-</td>
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</tbody>
</table>
survival strength of joint and members for wooden construction damaged by bio-deterioration.


5. Takuro Mori: Monbukagaku-sho Research Grant Encouragement (A), Development of Reinforcement of Large Finger Jointed Corner Frame connections using wooden Dowels. 2002-2003

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**Achievement**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Year</th>
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</table>
EUIS HERMIATI

Office address  : Puslit Biomaterial LIPI
                 Jl. Raya Bogor KM 46 Cibinong Bogor Indonesia 16911

Current Position : Researcher on technology of biomass conversion
E-mail            : euis.hermiati@lipi.go.id; e_hermiati@yahoo.com

Research Interest

An enthusiastic, hard-working, and interest to conduct research on the utilization of biomass for producing energy, especially bioethanol and other value added chemicals. Also interested in developing wood adhesive from renewable resources. Has special interest in the development of pretreatment technology of biomass and characterization of lignocellulosic biomass, as well as the application of adhesive research in wood industry.

Educational background

1983 : Bachelor in the field of Agricultural Product Technology, Bogor Agricultural University, Indonesia
1989 : Master of Science in the field of Food Science, Rutgers University, USA
2012 : Doctor in the field of Agroindustrial Technology, Bogor Agricultural University, Indonesia

Professional Experience

1984 – 2002 Researcher at R&D Center for Applied Physics – Indonesian Institute of Sciences
2002 – 2016 Researcher at R&D Unit for Biomaterials, Indonesian Institute of Sciences (Becoming Research Center for Biomaterials, since 2014)
2002 – 2014 Head of Biomass Conversion Research Group at the R & D Unit for Biomaterials, Indonesian Institute of Sciences
2014 - 2016 Head of Biomass Process Technology and Bioremediation at the Research Center for Biomaterials, Indonesian Institute of Sciences

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Selected publications


The 6th International Symposium of Sustainable Humanosphere
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KENJI UMEMURA

Address: Gokasho, Uji City, Kyoto Prefecture, Japan. 611-0011
Current Position: Associate Professor
E-mail: umemura@rish.kyoto-u.ac.jp

Research Area
Wood adhesives, Wood-based materials

Educational background

<table>
<thead>
<tr>
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<th>City &amp; Country</th>
<th>Academic Degree</th>
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<tr>
<td>Kinki University</td>
<td>Nara, Japan</td>
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<td>1991</td>
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<tr>
<td>Kyoto University</td>
<td>Kyoto, Japan</td>
<td>Doctor</td>
<td>1996</td>
<td>Wood science and technology</td>
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Research Experience

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<td>1.</td>
<td>Research on durability and degradation of wood adhesives</td>
<td>1998-2008</td>
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<td>2.</td>
<td>Research on utilization of chitosan for wood adhesives</td>
<td>2003-2010</td>
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<td>3.</td>
<td>Development of novel natural adhesives for wood</td>
<td>2011-</td>
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<td>4.</td>
<td>Development of wood-based materials using novel natural</td>
<td>2011-</td>
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The 6th International Symposium of Sustainable Humanosphere
Humanosphere Science School 2016
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### Achievement

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NAOKI SHINOHARA

Office Address : Gokasho, Uji, Kyoto, 611-0011, Japan
Current Position : Professor
E-mail : shino@rish.kyoto-u.ac.jp

Research Area
Microwave applied technologies

Educational background

<table>
<thead>
<tr>
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Research Experience

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DANNY HILMAN NATAWIDJAYA

Address: Research Center for Geotechnology, Indonesian Institute of Sciences (Puslit Geoteknologi - LIPI), Komplek LIPI Gd. 70, Jl. Sangkuriang, Bandung 40135
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Current Position: Senior Scientist
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Educational Background

1986 B.Sc. (S1) Geology Bandung Institute of Technology, Indonesia
1992 M.Sc (Hons) Geology University of Auckland, New Zealand
2003 Ph.D. Geology California Institute of Technology (Caltech), USA

Achievements

2016 Ahmad Bakrie Award for Science
2015 IAGI Award (for the continuity of developing applied geology) from Ikatan Ahli Geologi Indonesia
2014 Science Award - Tropi Manusia Bintang from Kantor Berita Rakyat Merdeka Online
Website: http://www.webometrics.info/en/node/96
2005 Recipient of The Sarwono Prawirohardjo Award 2005 from the Indonesian Institute of Sciences (LIPI).

The 6th International Symposium of Sustainable Humanosphere
Humanosphere Science School 2016
Bogor, 15 – 16 November 2016
Selected Publications


FUNCTION OF BORON IN PLANT CELL WALLS

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Abstract

Boron (B) is one of the 17 essential elements for plants. Deficiency of B leads to various physiological disorders including inhibited expansion of young leaves, death of meristem, and decreased seed set. Soils containing suboptimal amount of B exist worldwide, and the deficiency of this element has been one of the major constraints in crop production. It is thus significant to understand the mechanism by which B deficiency damages plants. We previously found that B in plants localizes extracellularly, and forms borate diester with a specific sugar residue in pectin, the major matrix polysaccharide of primary cell walls. The diester ties multiple chains of pectin together to form a hydrophilic gel, in which the cellulose microfibrils are embedded. We also found that cell death due to oxidative damage occurs under B deficiency. These findings together suggest that the failure to cross-link pectin with B triggers an overproduction of reactive oxygen species (ROS), and the accumulated ROS causes oxidative damages and cell death. Although the exact physiological function of the gel is yet to be elucidated, emerging evidence suggests that the integrity of pectin gel is critical for stress tolerance of plants. We are studying plant responses to B deficiency further; it will help us to understand the physiological role of pectin gel, then may contribute to an engineering of plants with better tolerance to adverse environmental conditions.

Keywords: boron; cell wall; deficiency; oxidative damage; pectin
Plant cells have the totipotency that is the ability of the plant regeneration from single cell. Plant biotechnology has developed based this plant ability. The study of plant cell and tissue culture began at the early of the 20th century. Especially, the discovery of cytokinin developed the cell and tissue culture. Skoog and Miller succeeded the formation of callus, shoot and root by regulating a balance between kinetin and IAA (indole acetic acid), namely cytokinin and auxin. Thereafter, Stewart succeeded the somatic embryogenesis from carrot cell culture, and proved the totipotency of plant.

Many plants have been tried to culture and regenerate the plant. Most crops were also the targets of culture because of their breeding. Rice is the most successful plant for cell culture among crops. At the beginning, it was difficult to culture rice cells because leaf and root were used as an explant. Cells derived from rice seed embryo let the rice cell culture succeed. Also a protoplast culture is available to use cells derived from seed. Although rice cell culture method is widely used for many experiments, other major crops e.g. wheat, barley and maize are still difficult to culture and limited.

Now, plant cell and tissue culture is an essential method for plant biotechnology. This cell and tissue culture method is applied to modern plant breeding and clonal propagation for virus free plant, the production of the secondary metabolites. Gene transfer to plant cells via Agrobacterium also requires cell culture. Here I talk about plant cell and tissue culture method as the basics of plant biotechnology.

**Keywords:** *Agrobacterium tumefaciens*; culture; gene transfer; plant cell; plant tissue
BIOINFORMATICS

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Abstract
Bioinformatics is indispensable in the current biology, especially in the research area of genome, proteome and metabolome analysis, which is called “omics”, that is, genomics, proteomics and metabolomics. The total DNA sequences available in the public databases have increased drastically during this decade due to the development of new DNA sequencing technologies known as next generation sequencing. For example, one of the commonly-used next generation sequencers, HiSeq 2500 (Illumina Inc.) produces 1 tera base/run at the maximum performance. To treat the huge datasets of DNA sequences, various technologies have been developed as a field of bioinformatics, such as assembling tiny DNA sequence pieces into long contiguous sequences with sequence homology and annotating and finding genes in the sequences. In addition to genomics, proteomics and metabolomics are dealing with comprehensive analyses of proteins and metabolites, respectively. Various types of technologies for identifying proteins extracted from biological materials combining with the genomic information of the organism have been developed. On the other hand, metabolomic analysis is still under the development. Especially comprehensive identification of metabolites is still the major challenge in the research field. Recent development of technologies for mass spectrometry helps the comprehensive analysis of metabolites. For example, an Orbitrap liquid-chromatography mass spectrometer (Thermo Fisher Scientific) detects several thousand small molecules with high resolution when a vegetable extract is analyzed. As each detected molecule is given the accurate mass value, it is possible to speculate the molecule formula of the chemical. The machine also detects the MS/MS patterns of some molecules, which are useful clues for speculating the molecular structures of the molecules. To integrate the biological data from the omics analyses, various types of databases have been constructed as a file of bioinformatics. The GeneBank (https://www.ncbi.nlm.nih.gov/genbank/) is one of the biggest database for all publicly available DNA sequences.

Keywords: use DNA sequencing, genomics, metabolomics, omics, proteomics.
LESSON LEARNED FROM MANGROVE PROGRAM IN INDONESIA

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Abstract

Indonesia as an archipelagic country more than 17,504 islands with the length of coastline estimated at 95,181 km bears mangroves from several meters to several kilometers. They grow extensively in the five big islands (Jawa, Sumatra, Kalimantan, Sulawesi, Papua). At the year of 2009, Agency of Survey Coordination and National Mapping (Bakosurtanal) of Indonesia reported the existing mangrove forest area in Indonesia of about 3,244,018 ha, however Directorate General of Land Rehabilitation and Social Forestry, Ministry of Forestry (Ditjen RLPS MoF) of Indonesia at 2007 reported about 7,758,411 ha of mangrove area in Indonesia (including existing vegetated mangrove area). It was further reported that those mangroves were 30.7% in good condition, 27.4% moderate-destroyed, and 41.9% heavy-destroyed. In order to rehabilitate destroyed mangrove ecosystems, Indonesia applies at least three type of planting designs (square planting design, zig zag planting design, and cluster planting design) and eight planting techniques (“banjar harian” technique, bamboo pole technique, guludan technique, water break technique, huge polybag technique, ditch muddy technique, huge mole technique, cluster technique). Generally, in Indonesia Rhizophora spp. are used for mangrove rehabilitation and/or restoration with the spacing of 1x1 m spending varied planting cost based on the site local condition and planting technique used. The mangrove planting ranged from about Rp. 14.2 million using propagules to Rp. 18.5 million using cultured seedlings. Recently, local community used to utilizing associated mangrove aquatic fauna for supporting their daily life as well as utilizing mangrove habitat for multipurpose uses through agroforestry techniques (silvofishery, agrosilvofishery, agrosilvopastoralfishery systems). So that, the good mangrove ecosystem serves luxurious both flora and fauna species (biodiversity) as well as their abundance for significantly supporting the welfare of coastal community.

Keywords: agroforestry technique, local community, mangrove rehabilitation, planting design, planting technique
BIOENERGY PRODUCTION POTENTIAL FROM MARGINAL LANDS

Himlal Baral* and Edi Wiraguna1,2

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2Associated Bachelor of Bogor Agricultural University (D3 IPB), Jl. Kumbang No. 14, Bogor, Indonesia;

*Corresponding author: H.Baral@cgiar.org; ediwiraguna@gmail.com

Abstract

Energy is a significant issue nowadays because fossil fuels are predicted to be unavailable in the future. In Indonesia, government plans to use bioenergy as alternative energy sources (23% of total energy consumption by 2025). Other countries, USA and Brazil produce bioenergy from food crops such as corn and sugar cane; however, this conversion can trigger competition between bioenergy and food crops, which increases hunger, food commodity prices and food insecurity. This review tries to solve the problem by classifying degraded or marginal land, in Indonesia particularly; and suggesting bioenergy crops from inedible plants. The areas can be categorized as marginal land if it has high erosion intensity, sloppy areas and low productivity by using geographical information system (GIS) tool. Moreover, bioenergy crops were chosen if they can adapt to unfavourable conditions such as sloppy areas, salinity and low pH. The result showed that 23.76 million hectares are marginal land and available to bioenergy cultivation where the largest area is South Sumatra province at 3.08 million hectares. In addition, bioenergy plants that adapt to unfavourable conditions were *Reutealistrisperma*, can grow on sloppy areas between 15% and 40%, and *Calophylluminophyllum*, adapts to saline conditions. In conclusion, the two bioenergy plants are recommended grown on degraded land but further research is needed because some areas of degraded land might be suitable for agricultural crops.

Keywords: energy; marginal land, GIS, bioenergy plants

The 6th International Symposium of Sustainable Humanosphere
Humanosphere Science School 2016
Bogor, 15 – 16 November 2016
 REVIEW ON THE ROLE OF MICRO-SATELLITE TECHNOLOGIES IN SUPPORTING SUSTAINABLE HUMANOSPHERE

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Abstract

Micro-satellites is the new trend in satellite technology. Its development cost provide advantages for new kind of Earth observation and science missions, as well as, emerging space countries’ missions. Being very limited in size and weight, micro-satellite has some limitation in delivering the mission objectives. The paper discuss the micro-satellite capacity limitations for missions related to sustainable humanosphere, i.e. environmental pollution/degradations, effect of urban developments, agricultures, and natural disasters. It also dicuss the Indonesian/LAPAN experiences in developing micro-satellite missions; its status, future opportunies, and challenges.

Keywords: micro-satellite, Earth observation missions, Indonesia space program
SAFETY OF WOODEN HOUSES TO INVESTIGATE IN KUMAMOTO EARTHQUAKE 2016

Takuro Mori1*

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Abstract

I introduce our report that the earthquake damage of the wooden houses was investigated in Kumamoto earthquake 2016. Many building and houses were damaged or collapsed by this earthquake shaking. It is also a history of building code and necessity of building performance in Japan, it has been revised several times after major earthquake occurs. In 1981, Japanese building code was revised to require twice the performance compared to the previous one. After 2000, about the wooden structure, the several connections, for example of base-column, base-sill and beam-column, need to joint by the connection with sufficient strength and stiffness was established. Therefore, when evaluated in conjunction with this change age, it could be seen that old houses = relatively low performance. Further, our investigation houses had found several damage by bio-deterioration such as the termite and the decay, and those houses were indicated larger damage compared with less bio-deterioration part. This lecture introduces that it is important to improve of earthquake resistance performance and durability, in order to continue to use safety at long term in the wooden houses.

Keywords: Earthquake resisting; earthquake damage; wooden house
WOOD ADHESIVE FROM NATURAL RUBBER LATEX

Euis Hermiati¹*, Widya Fatriasari¹, Fahriya Puspita Sari¹, and Raden Permana Budi Laksana¹

¹Research Center for Biomaterials, Indonesian Institute of Sciences, Cibinong Science Center, Cibinong-Bogor 16911, Indonesia

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Abstract

Natural rubber is a biopolymer (poly cis-1,4-isoprene) obtained after tapping rubber trees (Hevea brasiliensis). A milky white solution, called field latex, will flow from the trees. The tack property’s of natural rubber becomes a reason it was one of the earliest materials used in formulating adhesives. Natural rubber adhesives can be used in bonding different kinds of non metallic materials, such as leather, fabrics, rubber products, wood and paper. There are two types of rubber adhesives, solvent base and emulsion. Some solvents usually used are benzene, toluene and naphtha. Since the solvents are volatiles, it is important to pay attention to the vaporization of each component to prevent blushing, a condition in which the more volatile fraction of a solvent evaporates faster than the others, cause cooling on the surface, which makes the moisture from the air condensed on the glue film. Rubber emulsion is a dispersion of small rubber globules in water, which is called latex. It needs emulsifiers to maintain good dispersion of a non polar material in a polar liquid.

The performance of natural rubber as wood adhesive is usually lower than that of other wood adhesives such as formaldehyde bearing wood adhesives, due to its poor resistance to stress and heat and fair resistance to moisture. However, there are some technologies, for example blending with commercial adhesives, chemical modifications, or combinations of chemical modification and blending, that could be used to improve its performance, so that it can be used as an exterior grade wood adhesive. Blending with commercial adhesives is the easiest and the most simple way in improving adhesion quality of natural rubber. The natural rubber latex (NRL) could be blended with formaldehyde bearing adhesives, such as urea formaldehyde, melamine formaldehyde or phenol formaldehyde, as well as with non-formaldehyde adhesives, such as Aqueous Polymer Isocyanate (API) adhesive. Chemical modifications mean that the rubber is modified chemically, for example by grafting with polystyrene (PS) or polymethyl methacrylate (PMMA), or by making an epoxidized natural rubber (ENR). The modified rubber also can be blended with other commercial adhesives and produce adhesives of good bond strength.

Our study on the bonding performance of Aqueous Polymer Isocyanate (API) adhesive that was prepared from natural rubber latex (NRL) and PVA as base polymers and diisocyanate as crosslinking agent, showed that the ratio of base polymer components (NRL/PVA) affected the bonding performance of the adhesive. Higher bond strengths were observed at ratios of NRL/PVA <4 and >10 and at total solid content between 38 and 43%. Bond strengths are increased due to increase of crosslinker amount. Glue spread rate also influenced bonding strength, and the highest bonding strength was observed at glue spread rate between 250 and 350 g/m².

In other studies we investigated the effects of the addition of lignin into the base polymers on the characteristics of API adhesive and its bond performance. In these studies the base polymers of the adhesive were prepared by blending NRL, polyvinyl alcohol (PVA), and lignin isolated from black liquor of alkaline pretreatment of oil palm empty fruit bunch (OPEFB) and...
sugarcane bagasse (SB) with several compositions. The isocyanate crosslinker was added at the level of 15% of the weight of base polymer. The adhesive was used for producing plywood (using hot pressing) and laminated wood (using cold pressing). Results showed that the addition of lignin in the base polymer blends of API adhesive did not significantly affect the $T_g$ of the adhesives. However, it affected the thermal decomposition and bond performance of the adhesives. There were more residues and less homogenous adhesive solution due to the addition of lignin in the base polymer blends of API adhesives. The base polymers composition that could produce API adhesive for plywood of exterior application, with shear strength after cyclic boiling test of 0.80 N/mm$^2$ (8.16 kgf/cm$^2$), was NRL/PVA/Lignin (4/4/2). The use of more lignin in adhesive formulation decreased bond strength of plywood and laminated wood. The highest shear strength values of API adhesives obtained in this study (5.30 N/mm$^2$ or 5.30 MPa) was obtained at formula NRL/PVA/Lignin (5/4/1), and this was still lower than those previously reported by other researchers that used different types of polymers for base polymer blends, and different crosslinkers. The decrease in bond performance of plywood and laminated wood with API adhesive containing lignin was probably due to the poor miscibility of lignin solution in the base polymer blends, as well as the dominance of phenolic hydroxyl groups, instead of aliphatic hydroxyl groups in the lignin.

**Keywords:** biopolymer; lignin; natural rubber; renewable, wood adhesive.
RESEARCH OF WOOD-BASED PANELS CONSIDERING WOOD RESOURCES

Kenji Umemura1*

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*Corresponding author: umemura@rish.kyoto-u.ac.jp

Abstract

Wood-based panels are regarded as renewable and environmentally friendly materials and are indispensable as materials for architecture and furniture etc. According to FAO data, production of wood-based panels such as particleboard, plywood and fiberboard is increasing year by year. This would be due to population increase and economic development in the world, and the demand for wood-based panels is expected to increase in the future. However, global forest area is continuing to decrease, and 129 million ha was lost since 1990. Therefore, positive utilizations of plantation woods and non-wood plants is desired.

In our research group including Indonesian researchers, comparison of mechanical properties of wood-based panels manufactured from plantation and natural woods was performed. Plantation and natural woods of Shorea leprousula were used as raw materials. As a result, the physical properties of the panels manufactured from natural wood were a little superior to those of the panels from plantation wood.

The research on utilization of non-wood plants for wood-based panels has been performed by many researchers. Recently, we are researching the development of particleboard using sweet sorghum bagasse, because sweet sorghum is widely cultivated as common multi-purpose crops. In this research, natural wood adhesive such as citric acid is used, and the sustainable manufacture technology of the particleboard is investigating.

Keywords: wood resources, wood-based panels, plantation wood, non-wood plants.
WIRELESS POWER AS GAME CHANGING TECHNOLOGY

Naoki Shinohara

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Abstract

Wireless Power Transfer (WPT) is currently considered as one of game changing technologies because electricity can be transmitted wirelessly with information. The WPT has a possibility to change our life to wireless and battery-less world. Additionally, the WPT can be applied for a Solar Power Satellite (SPS) which is a future CO2-free power station in space. The SPS is one of hopeful technologies toward a sustainable humanosphere.

Theory, technologies, applications, and current R&D status of the WPT will be presented. The talk will cover both the far-field WPT via radio waves, especially beam-type and ubiquitous-type WPT, and energy harvesting from broadcasting waves. The research of the WPT was started from the far-field WPT via radio waves, in particular the microwaves in 1960s. In recent years this became a hot topic again due to the rapid growth of wireless devices. Theory and technologies of antenna and circuits will be presented in case of beam-type and ubiquitous-type WPT. The industrial applications and current R&D status of the WPT via radio waves will be also presented.

In 2015, many field WPT experiments were carried out in RISH, Kyoto University, and in Japan. One is a field WPT experiment with a very thin phased array as a power transmitter toward the SPS by support by Japanese ministry METI. The author is a chair to conduct the WPT project from 2009. The other is a demonstration of battery-less sensor system by use of a drone which carries a microwave transmitter and provides a wireless power to the ground. In this talk, the experimental results are shown.

Keywords: wireless power transfer, microwave power transfer, solar power satellite, sustainable humanospheres
EARTHQUAKE SCIENCES AND DISASTER MITIGATIONS IN INDONESIA

Danny Hilman Natawidjaja*

1Research Center for Geotechnology, Indonesian Institute of Sciences, LIPI campus, Bld#70, Jl. Sangkuriang, Bandung

*Corresponding author: danny.hilman@gmail.com

Abstract

Indonesian is one of the most tectonically active region on earth. This lecture will describe knowledge of major earthquake fault zones in Indonesia based on current state-of-art studies in the field of earthquake geology, seismology, and geodesy. The most applied disaster-mitigation practices is using earthquake-source knowledge to predict ground-motion or seismic hazard level for building code or developing earthquake-shake proof structures. The other less known hazard is potential damages due to fault-surface ruptures/deformations. Earthquake processes also shape or influence past, current, and future natural landscapes. Understanding earthquake processes, impacts, hazards and risks is crucial to develop safer human environments in the present time and the future.

Keywords: active faults, earthquake geology, seismology, paleoseismology, tectonic geodesy, seismic hazards and risks, environmental damages.
## Oral Presentation

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| 1  | DEMOGRAPHIC PARAMETERS OF LONG-TAILED MACAQUE IN THE NATURE RESERVE/NATURE PARK PANGANDARAN  
*Cory Wulan*, S.Hut, M.Si | Day 2 (Nov 16)  
Meeting Room A  
15.00-15.10                                                                 |
| 2  | THE INVOLVEMENT OF MALAY INDIGENOUS WOMEN AT DESA SUNGAI BAUNG SAROLANGUN IN UTILIZATION PANGOLIN (*Manis javanica*)  
*Novrivanti* | Day 2 (Nov 16)  
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13.40-13.50                                                                 |
| 3  | CHARACTERISTICS OF PARTICLEBOARD FROM NIPA FRONDS BONDED WITH MALTODEXTRIN AND CITRIC ACID  
*Mahdi Santoso*, *Ragil Widyorini*, *Tibertius Agus Prayitno*, and *Joko Sulistyo* | Day 1 (Nov 15)  
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15.10-15.20                                                                 |
| 4  | IMPROVEMENT PROPERTIES OF BAMBOO ORIENTED STRAND BOARD VIA STEAM MODIFICATION  
*Sena Maulana*, *Fauzi Febrianto*, *Rita Kartika Sari*, *Muhammad Galih Nurdiansyah* and *Irosepa Melindari Sembiring* | Day 1 (Nov 15)  
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15.20-15.30                                                                 |
| 5  | CHEMICAL COMPONENT CHANGE AND WETTABILITY ANALYSIS OF BETUNG BAMBOO (*Dendrocalamus asper*) STRAND UNDER VARIOUS TREATMENTS  
*Adesna Fatrawana*, *Deded S Nawawi*, *Fauzi Febrianto* and *Rita Kartika Sari* | Day 2 (Nov 16)  
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| 6  | TROPICAL WOOD AS STARTING MATERIAL IN THE PRODUCTION OF AROMATIC COMPOUNDS THROUGH CATALYTIC FAST PYROLYSIS  
*Dr. Joko Sulistyo* | Day 1 (Nov 15)  
Meeting Room A  
15.00-15.10                                                                 |
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<td>ANALYSIS OF MICROCLIMATE DISTINCTION TO COMFORT VISITORS ON GREEN OPEN IN PEKANBARU</td>
<td>Miranti Putri and Zulkarnaini</td>
<td>Day 2 (Nov 16)</td>
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<td>PROXIMATE ANALYSIS OF LIGNOCELLULOSIC MATERIAL AS ALTERNATIVE BIOENERGY RESOURCES</td>
<td>Jauhar Khabibi and Bambang Irawan</td>
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<td>9</td>
<td>CLIMATE CHANGE AND SITE FACTORS IMPACTED ON TREE GROWTH ON WEST KALIMANTAN PEATLAND FOREST: ANALYZING FROM FOREST LITTER PRODUCTION</td>
<td>Dwi Astiani and Lisa M Curran</td>
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<td>PHYSICAL PROPERTIES OF MEDANG SEREH (Cinnamomum Sp.) INDIGENOUS WOOD SPECIES FROM JAMBI PROVINCE</td>
<td>Riana Anggraini, Rahma Nur Komariah and Ana Agustina</td>
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<td><strong>Biological Science</strong></td>
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<td>1</td>
<td>THE STUDY OF PLANKTON DIVERSITY INDEX IN MUSI RIVER FLOOD PLAIN TO DETERMINE THE QUALITY OF WATERS AS HABITAT OF FISHES</td>
<td>Drs. Effendi Parlindungan Sagala, M.Si.</td>
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<td>2</td>
<td>TOXICITY OF LIQUID OIL WASTE IN MARTAPURA BARU PORT RIVER TOWARD GOLDFISH (Cyprinus carpio) SEED LC 50 – 96 HOUR</td>
<td>Widya Rizky Amalia</td>
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<td>MAKROZOOBENTHOS COMMUNITY IN DOWNSTREAM OF MUSI RIVER AT PALEMBANG CITY REGIONAL OF SOUTH SUMATERA</td>
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<td>5</td>
<td>HOW IS CLIMATE CHANGE FACILITATING SUCCESS OF INVASIVE SPECIES? <em>Chin-Cheng Yang</em></td>
<td>Chin-Cheng Yang</td>
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<td>6</td>
<td>POTENCY OF <em>Leuconostoc mesenteroides</em> AS PROBIOTIC FOR ANTI <em>Helicobacter pylori</em> AGENT  <em>Sri Rejeki Rahayuningsih</em></td>
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Abstract

Long-tailed macaque is one of 19 primate Macaca genus and its the most widely spread throughout the world. Nature Reserves / Nature Park Pananjung Pangandaran is one of the natural habitat distribution of long-tailed macaque in Indonesia. Various studies of groups of long-tailed macaques have been carried out, but the research related demographic parameters has not been done in a sustainable research. The main reason of this research was to estimate the demographic parameters of the population of long-tailed macaque in the Nature Reserve/ Nature Park Pananjung Pangandaran. This research was conducted in April 2014. Data collection was performed on demographic parameters of the 4 groups were calculated using a concentration count method. The results showed that the life opportunity of juvenile classes to sub-adult classes with the highest score is the Northern White Sands group with 0.945 and a lowest score Goa Rengganis group with 0.303. Life opportunity of sub-adult classes to adult classes with the highest score is Southern White Sands group with 0.764 and the lowest score is Northern White Sands group with 0.545. The ratio of infants and juvenile to reproductive females with the highest score is Goa Rengganis group with 0.813. Sex ratio of males to females of reproductive age in the range of the same value for the entire group was observed at 1: 1, only Goa Rengganis group has observed 1: 2.

Keywords: demography parameter, habitats, long tailed macaque
THE INVOLVEMENT OF MALAY INDIGENOUS WOMEN AT DESA SUNGAI BAUNG SAROLANGUN IN UTILIZATION PANGOLIN (*Manis javanica*)

Novriyanti*

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Abstract

The utilization pangolin as medicine, food, and animal ritual has been performed by many ethnicities in the world since the beginning. However, this information in Indonesia is still limited, especially the role of women in the utilization of pangolin. Thus, this study is important. Data about knowledge and involvement of women in pangolins utilization and the other use of natural resources were collected by open interview on married women. The results showed that the pangolin is not used by the indigenous people of Malay in Desa Sungai Baung. Thus, the role of women in the use of pangolin is not visible. However, Malay indigenous women play a role in some of activities that related to the utilization of other natural resources.

Keywords: Pangolin, the role of women, wildlife utilization, wildlife harvesting, women understanding
CHARACTERISTICS OF PARTICLEBOARD FROM NIPA FRONDS BONDED WITH MALTODEXTRIN AND CITRIC ACID

Mahdi Santoso1*, Ragil Widyorini2, Tibertius Agus Prayitno2 and Joko Sulistyo2

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Abstract

Maltodextrin and citric acid are two types of natural materials with the potential to be developed as an eco-friendly adhesive. Maltodextrin is a natural substance that is rich in hydroxyl groups and can form hydrogen bonds with lignoselulosic material, while citric acid is a polycarboxylic acid which can form an ester bond with a hydroxyl group at lignoselulosic material. The combination of maltodextrin and citric acid as natural adhesive materials can increase the ester bonds formed within the particle board. This study aims to determine the quality of the nipa frond particleboard bonded with maltodextrin/citric acid (100/0, 87.5/12.5, 75/25 and 0/100). Particleboard was made measuring 25x25 cm, the target of density g.cm\(^{-3}\) and the target thickness 1 cm. The parameters include was resin content 10% and 20%, press time 10 minute, press temperature 180°C and specific pressure 3.6 MPa. The physics and mechanics properties of particleboard was tested by standard JIS A 5908:2003 and surface roughness using Hiziroglu (1996) method. The results showed that the type of adhesive affects only on the physical properties of the particleboards. Particleboard bonded with citric acid was able to give the best results to meet most of the standards JIS A 5908: 2003. The properties of particleboard was density 0.841 g.cm\(^{-3}\); moisture content 6.71%; thickness swelling 4.58%; water absorption 38.83%; surface roughness 4.90 μm; internal bonding 0.31 MPa; modulus of rupture 9.91 MPa and modulus of elasticity 3.93 GPa.

Keywords: nipa frond particleboard, natural adhesives, maltodextrin, citric acid.
IMPROVEMENT PROPERTIES OF BAMBOO ORIENTED STRAND BOARD VIA STEAM MODIFICATION

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Abstract

Bamboo has a great potential in the substitution of wood because it is easily in obtained and it can find in the whole of Indonesia. In addition, bamboo can be developed as a raw material for some composite products such as OSB. The use of bamboo as a raw material in OSB provide some weakness such as low dimension stability. Innovations that developed to improve the properties of OSB based bamboo is by steaming the strand that modified by flushing with water and weak alkaline solution (NaOH 1%). This study aimed to analyze the effect of steam modifications on andong and betung bamboo to the physical and mechanical properties and durability of OSB. In this research through several processes. Firstly, the treatment of steam on 126 oC for 1 hour pressure of 1.4 kg/cm2 and modifications washing with water and NaOH 1% treatment. Second, OSB production and evaluating of physical-mechanical properties of OSB (JIS A 5908:2003). Testing the durability of the OSB against termite soil following the procedure of JIS K 1571 – 2004 whereas for testing resistance to dry wood termites are following procedures SNI 7207-2014. The results obtained in this study showed that the steam modification of andong and betung bamboo strand can improve dimensional stability and mechanical properties based on CSA 0437 and JIS 5908: 2003 standard, and also it can reduce the number of existing extractive strand. The results showed that elevated levels of gluten and steam modification can decrease weight loss and improve the resilience of OSB superior class.

Keywords: bamboo, oriented strand board, quality improvement, steam modification
The purpose of this research is to determine the cause of dimensional stability improvement by analyzing chemical component change and wettability aspect of betung bamboo strands under steam, steam + water rinse and steam + 1% NaOH rinse. Strands were steamed at 126 °C for 1 hour at a pressure of 0.14 MPa. Strands then separated into 3 samples. One of them didn’t rinsed, one rinsed with distillate water after steamed and the other one rinsed with 1% NaOH. After that 4 type sample treated and untreated grinded and screened into sawdust with 40-60 mesh size. Chemical components testing methods refer to TAPPI and ASTM standard, also browning methods for holocellulose and alpha-cellulose determination. Contact angle determined using rider (1998) methods. Treatments given to betung bamboo strand resulting chemical component change of betung bamboo strand that would affect the quality of finish product manufactured especially on its physical and mechanical properties. Treatments also affect the contact angle of betung bamboo strands that will resulting improvement on dimensional stability. Betung bamboo strand treated with steam + 1% NaOH has highest contact angle that can provide better dimensional stability on the finish products.

Keywords: betung bamboo, chemical components, contact angle, treated strands, wettability.
TROPICAL WOOD AS STARTING MATERIAL IN THE PRODUCTION OF AROMATIC COMPOUNDS THROUGH CATALYTIC FAST PYROLYSIS

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Abstract

Wood biomass of fast growing tree species is sustainably generated from plantation forest and timber processing industries in tropical areas. Through catalytic fast pyrolysis method, wood biomass of fast growing trees is able to be utilized as starting material in the production of aromatic compounds similar to gasoline components. In this study the formation of aromatic compounds from balsa (Ochroma sp.), sengon (Paraserianthes mollucana), eucalyptus (Eucalyptus pellita) and mangium (Acacia mangium) wood was investigated by pyrolysis-gas chromatography/mass spectrometry (Py-GC/MS). The effects of catalyst, wood to catalyst ratio and pyrolysis temperature on the formation of aromatic compounds were also evaluated. Balsa, mangium and sengon wood were potential starting material for producing aromatic compounds. Catalyst type, wood to catalyst ratio and pyrolysis temperature influenced on the aromatic compounds production in catalytic fast pyrolysis of wood.

Keywords: pyrolysis, aromatic compounds
ANALYSIS OF MICROCLIMATE DISTINCTION TO COMFORT VISITORS ON GREEN OPEN IN PEKANBARU

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Abstract

The aim of this study was to analyze differences in microclimate, the comfort index and the perception of comfort of visitors in each of the green open space. Location of the study are in three different green open space that is City Forest and Polytechnic Caltex Riau Park (PCR). The method used was a survey and observation. The sampling method is purposive sampling. The result showed that the average temperature of City forest reached 27.35ºC with 72.12% an average of humidity and 9274.67 Lux intensity of light. Furthermore, comfort index in the city forest was uncomfortable and perception comfort of visitors in good categories the day while, the lack of good are in the afternoon. The average temperature, humidity, intensity of light in the PCR Park were, 30.61ºC, 64.30%, and 16567.67 Lux, respectively. The comfort index in PCR Park was uncomfortable. Nevertheless, the perception of visitors comfort was better in the morning and poor during the day.

Keywords: Open Public Space, Microclimate, Visitors Comfort.
PROXIMATE ANALYSIS OF LIGNOCELLULOSIC MATERIAL AS ALTERNATIVE BIOENERGY RESOURCES

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Abstract

A species and plant part have the different abilities to absorb and keep the carbon in a forest ecosystem. The content of fixed carbon in the forest biomass shows the suitability as bioenergy resources. Biomass with higher fixed carbon content can produce more energy. The proximate analysis was conducted with 9 types of lignocellulosic materials, such as Tectona grandis wood, Acacia mangium wood, Toona sureni wood, T. grandis bark, A. mangium bark, T. sureni bark, Gigantochloa verticillata, Gigantochloa apus, and Dendrocalamus asper. Proximate analysis shows the moisture content and volatile content are ranged between 9.79–18.26% and 60.05–79.60%, respectively. The ash content and fixed carbon shows the range 0.53–7.02% and 11.94–32.93%, respectively. The bark has the highest fixed carbon content than the other lignocellulosic materials. T. sureni bark and G. verticillata have the potential to be developed as an alternative source of bioenergy.

Keywords: proximate analysis; lignocellulosic; fixed carbon; bioenergy
CLIMATE CHANGE AND SITE FACTORS IMPACTED ON TREE GROWTH ON WEST KALIMANTAN PEATLAND FOREST: ANALYZING FROM FOREST LITTER PRODUCTION

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ABSTRACT

Strengthening research on forest carbon balance in peatland forest area is required to continuously support forest dynamics as well as carbon credit mechanism widely in tropical peatland forests in Indonesia. Empirical measurements on partial part of carbon budget, including tree growth has not been carried out especially on peatland forest. Besides, the growth in detail as a complement of empirical data that refer to a science basis is needed. This study aimed to determine leaves' growth which is a partial of biomass growth that can be measured from the production of tree litters in peatland forests of West Kalimantan. A total of 48 traps litter size of 70 cm x 70 cm were placed systematically on peatland forests landscape, stratified with forest level of degradation. Collecting and weighing the production of litter (leaves and twigs) were performed every 2 weeks for 3 years (2008-2011) and continued for 2 years in 2013-2015. Litters were collected, dry weight measured, and analyzed for carbon content. The results showed mean annual litter production of $7.26 \pm 0.22$ ton ha$^{-1}$ yr$^{-1}$. The biomass increased significantly in El-Nino years in 2009 and 2014. Analysis of several site factors affecting leave biomass growth showed that rainfall, Leaf Area Index, N content in the soil, and total biomass production had significant impacts on litter production. The results suggested that the impact of climate change such as droughts, forest degradation and the total N content in peat soils affected the vegetative growth of trees in this tropical peatland forest.

Keywords: Carbon budget, El-Nino event, Leaf Area Index, leave biomass, peatland forests.

The 6th International Symposium of Sustainable Humanosphere
Humansosphere Science School 2016
Bogor, 15 – 16 November 2016
PHYSICAL PROPERTIES OF MEDANG SEREH (Cinnamomum Sp.) INDIGENOUS WOOD SPECIES FROM JAMBI PROVINCE

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Medang Sereh (Cinnamomum sp.) is one of commercial and indigenous species in Jambi Province. It is important to explore physical properties of wood because the research about Medang wood still limited and affected to its utilization less effective and efficient. This research was carried out to examine the physical properties of Medang Sereh (Cinnamomum sp.) from sapwood and heartwood related in wood position in trunk (base, middle, and top). The physical testing (green moisture content, wood density, specific gravity, volumetric swelling, and volumetric shrinkage) conducted refers to American Standard (ASTM 143-94, 2007). The results showed that there is slightly differences of green moisture content in heartwood of base was 84.43%, and the other positions of heartwood and sapwood has similar green moisture content. The results of wood density, specific gravity, volumetric swelling, and volumetric shrinkage showed that there are no differences of sapwood and heartwood in trunk position were 0.62-0.69 g/cm³, 0.55-0.61, 9.75-11.80%, and 10.49-11.94% respectively.

Keywords: heartwood, Medang Sereh, physical properties, sapwood, wood position
BIOLOGICAL SCIENCE
THE STUDY OF PLANKTON DIVERSITY INDEX IN MUSI RIVER FLOOD PLAIN TO DETERMINE THE QUALITY OF WATER AS HABITAT OF FISHES

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Abstract

The flood plain of water River Musi had many functions, a partly, namely as habitat of fishes. Existence plankton community as diversity and its densities so very important to supply much nutrition for foodstuff the juvenile of fishes. According to my research some years to prove that at water of wetland like Musi River always accumulate much organic matter even though from domestic or natural material. Much of natural process works in the waters of rivers by much plankton organism. According to my research in these years can expose the relation between the populations of several fishes and biodiversity and population of plankton diversities. Based on my research, the population of plankton in downstream of Musi Rivers in Palembang Regional so deplete and the diversity also mediately. These conditions determinate the population of fishes become lower from time ago until now. The probability of these cases pertaining to some physical and chemical factors which give effect to quality of waters of Musi River. The population of plankton communities at these research 31 up 124 plankton/ liter. The diversity index of plankton communities was 2.84 up to 3.62. The species of fishes were 40 species which found during research in three months from June until September 2016.

Keywords: Musi Rivers, plankton communities, fishes.
MAKROZOBENTHOS COMMUNITY IN DOWNSTREAM OF MUSI RIVER AT PALEMBANG CITY REGIONAL OF SOUTH SUMATERA

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Abstract

The study of macrozoobenthos community at some parts of waters Musi River around Palembang City has been conducted from August 2016. The purpose of this study was to compare macrozoobenthos community based on differences of microhabitat locations that include composition, abundance, diversity index, dominance indices and similarity indices of some research stations around of Musi River in Palembang City. The macrozoobenthos sampling performed by the method of purposive sampling at four observation stations with three points sampling each stations using the purposive random sampling method. Physical and chemical parameters of sediments and waters include light penetration, depth, sediment texture, sediment pH, C organic sediment, phosphate organic sediment, dissolved oxygen (DO), nitrate, phosphate, ammonium, iron (Fe) and sulphate. The research results point out that makrozoobenthos compositions dominated by Shellfishes and Oligochaeta. The highest of total abundance for makrozoobenthos found in Kemarau Island with micro habitat type was 3,600 individu/m². According to Shannon index and based on the analysis results, had been proved that the index of diversity for four sampling sites makrozoobenthos August 2016 was ranged from 0.0 up to 1.08. Base to the results that the condition of the macrozoobenthos community can be said into the unstable criteria (1.00 < 2.00). This research can discover there was dominant genus namely Corbicula, but macrozoobenthos communities are also relatively similar between stations. The abundance of Corbicula because there were the accumulation organic matter which create from some algae that living at surface of bottom. In addition, there are differences in the factors of physics, chemistries and aquatic sediments affecting each observation station.

Keywords: Corbicula, Macrozoobenthos, Musi River, Palembang
Abstract
Oils product has important life values, used for vehicle and factories. But, as we also known oils waste has negative impact and need specializing treatments. Oil contains many of chemicals mass such as hydro carbon and sulfur work to lubricate metals, also containing residual fuel and heavy metals. If it carelessly discarded every chemical mass would attach to the soil or mixed with water. It will be absorbed by plants or animals as consumption. In Martapura Baru Port river, there are ships from Java Sea and around Borneo that anchored which is need to be more observed that is activity of oil waste disposal into the water. It is not match with Storage Criteria and Collection of Waste Oil and Lubricants BAPEDAL.Nu.KEP-225/BAPEDAL/08/1996 that have been done for a long time by ship crew at night. The toxicity degree determined through full scale test towards goldfish seed by adding liquid oil waste on concentration 0 ml/L, 32 ml/L, 42 ml/L, 56 ml/L, 75 ml/L and 87 ml/L. Shortly after exposure, seed of *C. carpio* showed more than LC$_{50}$ – 96 hour. River condition that polluted by waste has serious toxicity degree for living creatures, oil waste classified into heavy metal pollutant where the toxicity work as barrier of physiological enzyme system and caused the metabolic process interrupted as also will accumulated to the organs.

Keywords: *Cyprinus carpio, heavy metals, Martapura Baru Port, oil waste*
Abstract
The Almond moth, *Ephestia cautella* (Walker) is the important and dangerous pest in stored product especially cereal and grain. The experiment of delayed mating and sex ratio copulation conducted in order no comprehensive study in similar topics. This method be expected as effective method in future for controlling almond moth *E. cautella*. The result of experiment on biological performance are the longevity of *E. cautella* in artificial media 50 days, males are shorter lived than female. The egg hatching period 4-5 days, male larvae period longer (12 days) than female (9 days), pupal period of males are 12 days and female 10 days, while adult life span of males are 6 days and female 8 days. Sex ratio of mating influenced by the fecundity, where the densities of male caused increased fecundity rate. Delay in mating up to 3 days caused decreased fecundity, since delayed 5 days caused increasing fecundity. The physiological of female are affecting to fecundity during delay in mating.

**Keywords:** biological performance, copulation, sex ratio, fecundity, *Ephestia cautella*
HOW IS CLIMATE CHANGE FACILITATING SUCCESS OF INVASIVE SPECIES?

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Abstract

While climate change and biological invasions are among the greatest threats to ecosystem sustainability, the interplays between the two global drivers and their consequences remain overlooked. Climate change is expected to alter precipitation and temperature patterns that likely induce significant disturbance and stressor on both native and invasive species. However, invasive species in general are known with greater adaptability to habitat disturbance and to a broader range of environmental conditions, which may favor their survival and proliferation over native species when facing climate change. This talk therefore is to review several case studies regarding how biological invasion can be facilitated by climate change, followed by some results showing behavioral and physiological specialization of invasive ants as an adaptive strategy to cope with extreme conditions. Application of the results also will be discussed in light of future development of control strategy.

Keywords: climate change; invasive species
POTENCY OF *Leuconostoc mesenteroides* AS PROBIOTIC FOR ANTI *Helicobacter pylori* AGENT

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Abstract

*Helicobacter pylori* often found in patients with chronic gastritis despite standard medical treatment with antacids and antibiotics. *Leuconostoc mesenteroides* is one of bacteria has potential as probiotic for anti *H. pylori* used for gastritis treatment and it’s isolated from gabbage (*Brassica oleracea* L.). This study was conducted to characterize the probiotic from gabbage as an anti *H. pylori* caused gastritis and gastric cancer probiotic bacteria and II. Characterization of potential probiotic candidates as anti *H. pylori*. Identification of bacteria is done with the API test and analysis of 16S rDNA, the characterization of anti *H.pylori* probiotics include acidic pH resistance tests, bile salts resistance test, anti microbial test (inhibition zone) and the probiotic bacteria adhesion test against *H. pylori*. The study was descriptive and experimental. The research design used was complete randomized design factorial pattern and the results were analyzed by ANOVA (a.05) and significant results were tested with Duncans multiple range (a.05). The parameters measured were the adhesion ability of probiotic bacteria against *H. pylori* and the width of the inhibition zone (mm). The results were obtained as a potential probiotic anti *H. pylori* are *Leuconostoc mesenteroides*, *Lactobacillus delbrueckii* and *Bacillus licheniformis* and it can be concluded that all probiotics candidates are able to agglomerate *H. pylori* but *Leuconostoc mesenteroides* inhibited *H. pylori* is Ø 34.0 mm greater than other.

Keywords: Gastritis; Probiotic; *Helicobacter pylori*; *Leuconostoc mesenteroides* and *Brassica oleracea* L.
DECOLORIZATION AND DETOXIFICATION OF SYNTHETIC DYES BY A COMBINATION OF ACTIVATED CARBON WITH IMMOBILIZED FUNGI IN BIOREACTOR SYSTEM

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Abstract
Decolorization capabilities of several absorbents and immobilized fungal co-culture were investigated in a bioreactor system. A combination of activated carbon with immobilized fungi showed effective decolorization of Reactive Green 19. Furthermore, a combination with 2-phases form more preferable to enhance the decolorization than 1-phase form. Several dyes such as Reactive Green 19, Reactive Orange 64 (RO64), Reactive Red 222, and Reactive Violet 5 showed reducing detoxification after treated by the combination. This study offers a potential strategy to decolorize and detoxify dye wastewater from textile industries.

Keywords: decolorization
ANTIFEEDANT ACTIVITIES OF FIVE EXTRACTS OF SELECTED PLANTS AGAINST LARVAE OF GRAYAK CATERPILLAR
(Spodoptera litura Fabricius, 1775)

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Abstract

This research was carried out to investigate antifeedant activities of five plant extracts against larvae of Spodoptera litura F. Plants that were used in this research are Pterocarpus indicus, Centella asiatica, Calophyllum inophyllum, Alstonia scholaris, and Lantana camara. In this study, it was aimed to find effectively minimum concentration that has antifeedant properties against larvae S. litura and to investigate the best extract with antifeedant properties. This research took advantage of leaf disk method with choice and no choice test. The obtained data were the average broad leaves that were consumed by the larvae. The data were analysed by using non parametric statistics of Mann-Whitney U. The results showed that the effective minimum concentrations showed the antifeedant properties, where extract of C.asiatica, C.inophyllum, A.scholaris and L.camara were active at concentration of 625 ppm for the choice test. However, extract of P.indicus did not show the effective minimum concentration for the antifeedant properties. Based on total value of antifeedant coefficient, it was found that C.asiatica was the best extract with antifeedant properties. At concentration of 2500 ppm, coefficient of antifeedant activity has been categorised as a good one with total value of antifeedant coefficient in a range of 101%-150%.

Keywords: antifeedant, Alstonia scholaris, Calophyllum inophyllum, Centella asiatica, Lantana camara, Pterocarpus indicus, Spodoptera litura
**USING ARBUSCULA MYCORRIZHA AND BIONUTRISI ON GROWTH AND SECONDARY METABOLITE OF VINCA (Catharanthus roseus (L.) G. Don.)**

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**Abstract**

Vinca (Catharanthus roseus (L.) G. Don) is a plant that capable of producing secondary metabolites such as alkaloids. Medical practice propound that most of the alkaloid has value due to pharmacological and physiological activities so widely used in the medical field. This study tested the effect of arbuscula mycorrhizha (MA) and Bionutrisi to the growth and production of secondary metabolites produced on C. roseus (L.) G. Don. The study was conducted by an experimental method using a completely randomized design, with four treatments, 1. Plants as a control; 2. plants with inoculation MA; 3. plants with bionutrisi and 4. plants with the combination of inoculation MA and Bionutrisi. Each treatment was repeated 10 times. Observations of growth include the number of leaves, plant height, and root volume. The result of growth were analyzed with ANOVA. The content of secondary metabolites were analyzed using Gas Chromatography - Mass Spectroskopy (GC-MS). The results of research on plant growth with combination inoculation of MA and bionutrisi has a significant effect on the number of leaves, plant height and root volume. C. roseus (L.) G. Don planted with inoculation of MA and bionutrisi have many kinds of secondary metabolites. It shows that the inoculation of MA and bionutrisi gives a positive influence on the growth and secondary metabolite of Vinca (C. roseus (L.) G. Don.).

**Keywords:** Bionutrisi, Arbuscula mycorrhiza, Secondary metabolite, Vinca
EFFECTS OF ALKALINE HYDROGEN PEROXIDE PRETREATMENT METHOD ON CHEMICAL COMPOSITION AND ENZYMATIC HYDROLYSIS OF SWEET SORGHUM BAGASSE

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Abstract

Sweet sorghum bagasse (SSB) obtained after juice extraction is a potential feedstock for fermentable sugars production. Several research groups have already reported their SSB pretreatment, but there is still need to find a suitable pretreatment technique for improving enzymatic saccharification of SSB. Hence, the research aim is to determine the effects of alkaline hydrogen peroxide pretreatment method on chemical composition and enzymatic hydrolysis of SSB. This study included the preparation of raw materials SSB, SSB composition analysis including proximate and the composition of fibre (cellulose, hemicelluloses, and lignin) analysis after pretreatment. The alkaline hydrogen peroxide pretreatment for determining the best condition were concentration of hydrogen peroxide (1, 3, 5, 7 and 9 %), temperature (30, 40, 50 and 60 ºC), and stirring time 1, 3, 6, 12 and 24 hours). The chemical composition changes in pretreated solid fractions and morphology were analyzed using SEM. Furthermore, the effectiveness of pretreatment was examined by comparing with the reducing sugar yielded in enzymatic hydrolysis of SSB by using cellulase. The results showed that the alteration of chemical composition was affected by alkaline hydrogen peroxide pretreatment particularly in lignin and hemicelluloses removal. The best condition of H2O2 pretreatment produced 5.06 g/L of reducing sugar and 5.25 g/L of total sugar. This result was achieved by using 7% of hydrogen peroxide, 40 ºC and 12 hours of stirring. The degree of polymerisation was 1.04, therefore it is concluded that 96.4% of total sugar were monosaccharides. The pretreatment result is supported by SEM analysis which showed the crystalline structure of fiber already broken by this pretreatment.

Keywords: alkaline hydrogen peroxide, enzymatic hydrolysis, pretreatment, sweet sorghum bagasse (SSB)
THE CARBON SEQUESTRATION POTENCY AND NUTRIENT CONTENT OF WILD MACROALGAE Sargassum polycystum IN PANJANG ISLAND, BANTEN BAY

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Abstract

The research about the carbon sequestration potency and nutrient content of wild macroalgae Sargassum polycystum in Panjang Island, Banten Bay was held from October until November 2014. The research was aimed to estimate carbon sequestration and nutrient content in S. polycystum. The observation of growth rate and carbon sequestration used thallus marking method in 30 macroalgae shoots everyday for 7 days. Macroalgae was analyzed its nutrient content. The results of the research showed that estimation carbon sequestration by S. polycystum 0,0081 gC/day. Macroalgae S. polycystum contained 6,84% carbon, 1,72% nitrogen, and 0,009% phosphor.

Keywords: Sargassum polycystum; carbon; nutrient
INVENTORY OF INSECT ON FRUIT OF Ficus hispida AND Ficus racemosa IN IPB DARMAGA

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Abstract

Ficus is one of the keystone species that are important for the survival of tropical rain forest ecosystem. Insects is the one of the species that requires ficus to breed. Ficus hispida and F. racemosa is several species of ficus in Indonesia that did not yet have known all kinds of insects that breed in ficus fruit. This study aims to inventory species of insect in order to provide information about species that breed in ficus fruit. There were 25 fig collected from a single fig tree based on visual appearance and touching the fig directly on campus IPB Darmaga. Those insects found in F. hispida are Ceratosolen solmsi, Phylotrypesis sp., and Apocrypta sp1. As for insects found in F. racemosa are C. fuscipect, Apocryptophagus sp., and Apocrypta sp2. The abundance of Ceratosolen sp. has dominated number of insects found on both species F. hispida and F. racemosa. Ceratosolen sp. is an insect pollinator of ficus so that the abundance dominated in one ficus fruit. As for Phylotrypesis sp., Apocrypta sp1, Apocrypta sp2, and Apocryptophagus sp. are non-pollinator insects that are parasitic so the individual abundance of that species more less than Ceratosolen sp.

Keywords: Ceratosolen sp., Ficus sp., insects pollinator
ANALYSIS OF GUSA GENE EXPRESSION IN RICE DRIVEN BY PUTATIVE CELL-SPECIFIC PROMOTERS FROM SORGHUM

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Abstract

An increase in the amount of the more soluble polysaccharides in the plant cell wall has been proposed as a feasible strategy to accentuate the yield of biofuels from plant biomass. Therefore, provision of increased amounts of more easily accessible fermentable sugars, from a polysaccharide like (1,3;1,4)-\(
\beta\)
-glucan requires overexpression of the synthase genes. In transgenic plants this is likely to require a carefully regulated approach in an appropriate tissue or cell type-specific manner to avoid deleterious phenotypic effects. Here, the use of putative cell-specific promoters from the C\textsubscript{4} grass sorghum, was investigated. Five sorghum putative mesophyll-specific promoters \textit{SbCA1pro}, \textit{SbCA2pro}, \textit{SbCA4pro}, \textit{SbPPCK1pro} and \textit{SbPPCK4pro} were selected, amplified, cloned and fused with the \textit{uidA} reporter gene encoding a \(\beta\)-glucuronidase (GUS) enzyme. The fused promoter: \textit{uidA} constructs were transformed into \textit{Oryza sativa} using \textit{Agrobacterium}-mediated stable transformation and lines were tested for GUS activity using a histochemical assay. Reporter gene activity, at variable levels, was observed in rice transgenic lines. Micrographs of transgenic rice leaf transverse sections showed that the \textit{SbCA2} promoter drives GUS expression in a mesophyll-specific manner.

Keywords: \textit{Sorghum}; \textit{Agrobacterium}-mediated transformation; promoter; \textit{C}_4 photosynthetic genes; (1,3;1,4)-\(\beta\)-glucan
THE EFFECT OF MANURE DOSE OF QUAIL (*Coturnix coturnix japonica*) on *Daphnia* sp DENSITY

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Abstract

*Daphnia* sp. is one of nutritious natural feed organisms that is fond of by fish in larva stadia. In order to ensure the availability of *Daphnia* sp., it is necessary to conduct cultivation process using organic fertilizer. The increasing availability of *Coturnix coturnix japonica* manure can be utilized in the cultivation of *Daphnia* sp. This study was intended to know the effect of *C. japonica* manure utilization toward the population density of *Daphnia* sp. and the dose of *C. japonica* manure that provided the highest impact on the density of *Daphnia* sp. The method used in this study was an experimental method with 7 treatments and 3 repetitions. The result showed that the utilization of *C. japonica* manure gave effect to the population growth of *Daphnia* sp. with a significance value of 0.000 (P <0.005) in the two-line Anova test. The result of Duncan’s test indicated that the dosage of 3.6 g/l (P4) *C. japonica* manure was the most optimal with the highest population density of 804 individual *Daphnia* sp./l reached at the tenth day. Water quality at the time of research had medium temperature at the range 22.3-24.7°C; dissolved oxygen 4-6 mg/l; pH 7.5-8; and ammonia 0.0-1.0 mg/l.

**Keywords:** *Daphnia* sp., Density, *Coturnix coturnix japonica* manure
Abstract

The new kind of El Nino phenomenon that known as El Nino Modoki has occurred more frequently during recent decades. It causes different impacts on rainfall in regions near Pacific compared with conventional El Nino. Thus, it is interesting to investigate El Nino Modoki spatial impacts on rainfall in Eastern Indonesia especially in Papua region. This study analyzes composite of Sea Surface Temperature (SST) in the equatorial Pacific using Hadley Centre Sea Ice and Sea Surface Temperature (HadISST) data and precipitation in Papua region using Global Precipitation Climatology Centre (GPCC) data reanalysis in the period of 1979-2010. That composite analyses have a purpose to proving the El Nino Modoki SST anomalies spatial pattern and identify rainfall anomalies spatial pattern in Papua during El Nino Modoki event. Then Singular Value Decomposition (SVD) analysis used to calculate the fraction of squared covariance between SST anomalies in the equatorial Pacific and rainfall anomalies over Papua. The composite analyses of SST and rainfall anomalies during MAM show reduction in rainfall over northern Papua and increase in rainfall over southern Papua, which consistent with SVD analysis. The SVD analysis of SST and rainfall reveals El Nino Modoki in second mode that accounts for 2.64 of the square covariance fraction on anomali rainfall in Papua.

Keywords: El Nino Modoki; Papua; anomaly SST; anomaly rainfall
EL NIÑO, DIPOLE MODE AND SEA SURFACE TEMPERATURE ANOMALY IMPACT IN 1991 TO MONTHLY RAINFALL CHARACTERISTIC IN MAKASSAR

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Abstract

The amount of rainfall in every dry and wet seasons are not always in normal, but it can be in under or above of the normal. The controllers factor of the rainfall that can influence in Indonesia such as global factors like El Nino events in Tropical Pacific and Dipole Mode events in Indian Ocean, synoptic factors not only Asian and Australian Monsoon but also sea surface temperature of Indonesia, and local factor like sea surface temperature around the region. This study examines the influence of those factors to monthly rainfall characteristic in Makassar, South Sulawesi from June to December in 1991 when moderate El Nino and neutral Dipole Mode occurred. It uses rainfall data from Agency for Meteorology Climatology and Geophysics Region IV Makassar on June to December in 1991 and the normal rainfall data from 1986-2010. Furthermore, the reanalysis data of sea surface temperature anomaly in Nino 3.4 area (5N - 5S and 190E - 240E), sea surface temperature in Indian Ocean in West (10N - 10S and 50E - 70E) and Southeast (0- 10S and 90E - 110E) anomaly, sea surface temperature anomaly of Indonesia (8N - 12S and 96E - 142E) and sea surface temperature anomaly around Makassar strait (4S - 6S and 117.5E - 120E) from Interactive Tool for Analysis of the Climate System (ITACS), developed by Japan Meteorological Agency (JMA) and using The Grid Analysis and Display System (GrADS) for analyzing spatial data. The characteristics of monthly rainfall in Makassar in 1991 are under normal with 73.95 % on December, but rainfall measured 452 mm even Nino 3.4 index reached its peak (+1.7). It means that local sea surface temperature and Asia Monsoon take control the rainfall during moderate El Nino. However, it might be drier in wet season when El Nino being stronger.

Keywords: El Niño; Dipole Mode; ITACS; Sea Surface Temperature Anomaly; Monthly Rainfall Characteristic
THE DETERMINATION OF INITIAL OF RAINY SEASON AROUND EQUATORIAL REGION USING HOWI

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Abstract

Determination of initial of rainy season is very important to many purposes. One of them is to efficiency to implementation time of rain-making for purpose of fire forest burnout. This study aims to determine early rainy season in Riau province (3° N - 1.5° S, 100° – 104° E) where many fire forest occur in 2015. The data used is forecast data of surface rainfall of ECMWF (European Center for Medium Range Weather Forecast) with resolution 0.25° x 0.25° from 1 January to 31 December 2015. HOWI method (Hydrological Onset and Withdrawal Index) is applied for the purpose above on 15 coordinate in Riau Province. The result shows that this method is not easy applied because very random compare with the simple method of BMKG (National Agency of Meteorology, Climatology and Geophysics).

Keywords: HOWI method, initial rainy season, ECMWF, equator
RELATIONSHIP BETWEEN SLOPE AND LANDUSE ON LANDSLIDES SUSCEPTIBILITY IN PASIRWANGI, GARUT, JAWA BARAT

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Abstract

Garut regency is one of regencies in Indonesia with the high threat of disasters. Natural disasters that have occurred in Garut are flash floods and landslides. Flash floods last occurred in June 2016 caused by improper management of the environment. In addition to flash floods, Garut also have the potential of landslide in the upper stream. Landslide is an event that most often occurs in Garut regency from 2002 to 2012 with 73 events (BPBDs Kab. Garut, 2014). This research was conducted in the District of Pasirwangi located in the upper stream of Garut. The topography of the area has a slope of 15-25% with a height of 1,244.58 meters above sea level. With the highland potential in Pasirwangi make the landuse of this area is dominated by 30% of rice fields, 28% mixed farms, and 20% settlements. The purpose of this study was to determine the relationship between slope and landuse on susceptibility to landslides. Data slope taken through field measurements on each landform. Landslide susceptibility map was derived using the weighting method in landslide’s parameters, namely landuse, slope, landform, soil type, and surface geology. In azimuth of 195°N, segments 1, 2, 3, 5, 6, 8, and 9 are at high susceptibility zone, while the segment 4 and 7 in the zone of moderate impact. In azimuth of 115°N, segments 1, 2, 7, 8, and 9 are at high susceptibility zone, while segment 3, 4, 5, and 6 are in the zone of moderate impact. This results shows that the more oblique slope, the less land cover, and even developed area, then the greater susceptibility.

Keywords: landslide; landuse; Pasirwangi; slope; susceptibility
THE DESCRIPTION OF ATMOSPHERIC PARAMETERS DUE TO
WATERSPOUT IN TARAKAN AUGUST 26th 2015 (NORTH KALIMANTAN-
INDONESIA)

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Abstract

On August 26th 2015 at 00.35 UTC, fair weather waterspout was observed in Tarakan’s
sea (2.5 miles offshore from north west Juwata International Airport runway). That
phenomenon did not cause victim at the time but the citizen has to be watchful because the
same phenomenon caused victims in Lombok strain, Indonesia in 2003. Based on the
hazard potency and caused by the analysis of waterspout is still rare in Indonesia, this
analysis come to describe the atmospheric parameters condition when the phenomenon
occured in Tarakan. This analysis used SST anomaly, streamline, Himawari canal IR
satellite, and sounding data for description of atmospheric condition. The result showed
that based on sea temperature anomaly analysis, the warmer value of SST anomaly could
be the source of convective cloud development. Based on satellite analysis, the cloud top
temperature detected were consecutively 21,3°C; 19,8°C;18,8°C at 00.00; 00.20; and 00.40
UTC. Based on streamline analysis, there was a low pressure in East Philippines which
had a role as a trigger of shearline in North Kalimantan. The last, based on potential energy
analysis in North Kalimantan, CAPE value indicated a big potential energy which can be
a trigger for convective cloud development. It showed in this case that 1-2 days before
phenomenon, the CAPE value increased continually. On the other hand, other stability
indexes was not describe waterspout phenomenon appropriately.

Keywords: atmospheric parameters; Indonesia; Tarakan; waterspout
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Abstract

Research on the influence of El Nino and La Nina during 30 years is focused in Biak. Rainfall data (1981-2010) is based on Biak Meteorological Station observation. ENSO activity and its teleconnection to the variability of monthly rainfall has been evaluated by analysing the response of the monthly rainfall and ENSO-related activities through the comparison of normal monthly rainfall and ENSO events composites. During El Nino, Biak monthly rainfall tends to decrease until it reaches 42.55% which took place in October. While, La Nina tends to leave positive impact on Biak monthly rainfall of up to 54.27%, which occurred in September. The influence of El Nino and La Nina most to the seasonal rainfall occurs in the SON as a transition period from dry to rainy season. Correlation analysis between Biak monthly rainfall and Nino 3.4 index during the period reveals that ENSO activity gives negative impact on Biak monthly rainfall with the highest correlation coefficient occurred in October, reaching -0.55. This number that indicated a moderate correlation.

Keywords: el nino, la nina, biak rainfall.
Severe Hail Index (SHI) is a detection and prediction method of hail that defined as a function of the vertical integration of weighted thermal reflectivity profile storm cell. SHI provides three indices in the form of an index of probability of hail (at any size) in units Jm$^{-1}$s$^{-1}$, the probability of severe hail in units %, and forecast the maximum size hail that reached the surface in millimeters (mm). The value WT (Warning Threshold) or threshold hail probability index for each size depends on the level of a freezing level. The aim of this study is simulating the SHI method as a predictor and detector of hail events in Indonesia. Of the 13 events of hail obtained, maximum value index of probability of hail for each size was 269 Jm$^{-1}$s$^{-1}$ and the minimum value of 0 Jm$^{-1}$s$^{-1}$, the maximum value of the index of probability of severe hail amounted to 64.4% and the minimum value of 0%, while the maximum value forecasting the maximum size hailstones reached 63.76 mm and a minimum of 8.25 mm. Simulations carried out by comparing the value SHI with WT is then used to determine the value of POD (Possibility of Detection), CSI (Critical Success Index), and the FAR (False Alarm Ratio). POD in this simulation values obtained 0.307 and 0.230, FAR 0.0, and CSI 0307. FAR worth 0.0 shows this method has a very small error rate for detecting or memperdiksi their huajans but its value is still relatively low, so this method is also quite difficult to detect ekstenseni hail on the ground. The simulation results show that the need for modifications to the formulation of the WT to improve the performance of SHI method in detecting and predicting the occurrence of hail.

**Keywords:** Severe Hail Index (SHI), Doppler weather radar, hail
IDENTIFICATION OF DIURNAL RAINFALL PATTERN CHANGES IN CASE OF FLOODING IN THE NORTHERN COAST OF WEST JAVA IN 2014

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Abstract

Documentation regarding events of Jakarta flooding in 2007 and 2013 showed heavy rains occurred in the morning until noon for a couple days on the coastal area. These indicated that the events related to a change in diurnal patterns of rainfall over land. This study was conducted to confirm the changing on diurnal rainfall pattern in the case of flooding in the northern West Java on 17 January 2014 using hourly 3B41RT rainfall data from TRMM satellite. Research results show significant changes in phase and amplitude of diurnal patterns of rainfall occurred in the north coast of West Java during 16-21 January 2014. This change was shown through opposite phase of diurnal rainfall pattern over north coastal area, which the larger amplitude of maximum rainfall was reached in early morning. In land, phase of diurnal rainfall cycle has changes from diurnal to semidiurnal with peaks of rainfall occurs in the mornings and evenings. Genesis of flooding on 17 January along the northern coast of West Java preceded by heavy rainfall persistently which occurred during 18 hours on 16-17 January and it was supposed changed the cycle of diurnal rainfall average during January 2014.

Keywords: Diurnal rainfall, Changing, Flooding, West Java, 2014
RAINFALL ESTIMATES USING AUTO-ESTIMATOR BASED ON CLOUD TOP TEMPERATURE OF HIMAWARI 8 SATELLITE TO RAINFALL OBSERVATION IN PANGKALPINANG METEOROLOGICAL STATION

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Abstract

The rainfall rate estimates method needs to be developed in Indonesia because its high rate of variabilities. The rainfall rate estimates method is used to predict the potential of rainfall occurs in an area at a certain moment. Rainfall rate estimates method, called auto-estimator, is constituted by algorithm calculation which utilizes cloud top temperature data from Himawari 8 satellite. Weather satellite is satellite which serves to monitor and capture real time weather behavior which occurs on the earth’s surface. The function of weather satellite are identifying clouds types, measuring wind direction and speed, tracking the tropical cyclon, measuring sea surface temperature, estimating rainfall, etc. This paper is written to determine the validity and accuracy of the auto-estimator method in predicting the rainfall rate on Pangkalpinang Meteorological Station which is located at 2.160 °N dan 106.140 °E. The data used are three months daily rainfall data of Himawari 8 Satellite from January to March 2016. And as the verification data of the result of algorithm calculation, actual daily rainfall data from observation on Pangkalpinang Meteorological Station is used. The results from this study show that the cold tops clouds produce more rainfall than those with warmer tops. The results also show the underestimate value between rainfall estimate calculation and actual rainfall observation on Pangkalpinang Meteorological Station. The correlation between the data compared is 0.7, means that it has positive relevancy, and the rate of the relevancy is moderate, with the RMSE (Root Mean Square Error) calculated is 68.7 mm.

Keywords: estimate, rainfall, auto-estimator
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Abstract

Measurement of ionospheric total electron content (TEC) by using the ground-based GPS receivers is now widely used. We refer to it as GPS-TEC. As there are always several GPS satellites available for the measurement, it is a very good tool for constant monitoring of the ionosphere. One of the most dense and wide network of the GPS network is GEONET operated by Geospatial Information Authority of Japan (GSI). This is the network of more than 1200 points over Japan. We have been developing 3D tomography of the ionospheric plasma density from the GEONET data. This tomography technique uses a constrained least squares fit to reconstruct the electron density distributions. Recently we further develop the software system to conduct the GPS-TEC analysis in the realtime basis. In this system we collect “every second” GPS data from GEONET, estimate satellite and receiver biases for true TEC measurement, and obtain 3D tomography reconstruction of the ionosphere every 15 minutes with 10 minutes latency. We will show current status of our development for the 3D tomography analysis of the ionospheric plasma density over Japan.

Keywords: 3D tomography, ionosphere, GPS, Total Electron Content, TEC
COMMUNITY-BASED DEVELOPMENT AND SOCIAL ECONOMIC SCIENCE
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Abstract
Watershed management is an important aspect in supporting the preservation of the surrounding area. The function of the upstream region as a water catchment area must be maintained by keeping the area utilization does not exceed the carrying capacity of the environment. The role of the community in the surrounding area of the watershed to be important in the effort to preserve the watershed function. This study aims to analyze the potential of local institutional support in watershed management. The research was a case study in which data were collected through interviews, focus group discussions and participant observation. The data analysis was conducted using problem tree analysis (Groenendijk, 2003 in Granatri) then presented descriptively with a framework approach Situation-Structure-Behaviour-Performance (Kartodihardjo et al. 2004). This study shows that the Cisadane upstream is still regarded as free goods that is open access where everyone is free to exploit the natural resources that exist in it freely. It is associated with the condition existing which shows the interdependence between the government, private sector and the communities involved in the use of shared resources. The behavior of the parties regarding the utilization of the watershed affect the existing condition of the watershed; where performance management Cisadane upstream subzone yet provide maximum results because management is still ongoing sectoral.

Keywords: Institutional Local, watershed management, sub-watersheds Cisadane upstream
THE ANALYSIS OF MAGOSTEEN WEST JAVA FARMER MARKETING CHANNEL

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Abstract

Indonesian Mangosteen export value and volume trend has increasing trend and need to develop. The marketing channel that was chosen by the farmer, holds major contribution. The objective of this study was to analyze the factors that influencing the mangosteen farmer marketing channel in West Java that chosen by those farmers. The data analyzed by logistic regression. The data collected from 315 farmers by interviews and structured questionnaires in Bogor and Tasikmalaya district. The results of this study were: The sum of farmer who sold their mangosteen through direct marketing was 15.53 percent and 84.47 sold it to the indirect marketing. The major variable that influencing the choice of marketing channel were price and the good agriculture practice that they done. This study recommend that farmers can enhance their marketing capacity by the application of GAP on their mangosteen farm to increase their quantity, quality and also price.

Keywords: mangosteen; marketing channel; price; GAP
Abstract

Sustainability of integrated agriculture development system between agriculture, cattle and fisheries is a network which is interconnected as input-output one to another. Rural development in an integrated sector of agribusiness cluster show a lot of dynamic about social, economy, and even more technology. Poor governance of its dynamic can lead to a contra productive situation or conflict. Development of social institution which can reduce the dynamic volatility become the success key in integrated rural development. Institution improvement is addressed to a collective system, so that creation of value added which is the aim of the integrated development can be reached. This research using system thinking approach that analyze the complexity of rural development dynamic between agriculture, cattle, fisheries and social institution as an important thing in achieving the goals of community development at Japara, Kabupaten Kuningan.

Keywords: integrated agriculture, social institution, rural development, collective system, system thinking
ORGANIC RICE DEVELOPMENT: HOW SOCIAL-ECOLOGICAL SYSTEM PERSPECTIVE COULD CONTRIBUTE

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Abstract

In line with growing awareness towards healthy life, economic viability and environmental sustainability, organic rice development has become one of the most influential interests in Indonesian agricultural development. Several programs have been delivered by the government in order to foster this development. Organic rice development brought about integrating a complex relationship between social, economic, political, ecological and biophysical aspects to guide actors’ decision making. This paper aims to briefly describe the process of organic rice development at a sub district in Purwakarta Regency, an organic rice development area in West Java, from social ecological system perspective using system thinking approach. The research shows that integration among actors, institutions and learning processes is necessary. It is started from the description of technology needed, social relation and interaction among involved actors, and ultimately describes how social ecological system perspective could contribute to improve organic rice development in the location.

Keywords: organic rice, social-ecological system, system thinking
THE ROLE OF BRAIN GAIN ACTORS IN SELF RELIANCE IN THE SOCIAL SYSTEM AND RURAL AGROBUSINESS ECOSYSTEM

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Abstract

Social gaps and crisis in Indonesian rural space are influenced by several factors such as aging, low farmers’ regeneration rate, and the high rate of urbanization, which drains the availability of young potential human resources in the rural area. Human Ecology perspective sees that the return of young work-force from the urban to rural area (internal brain gain) is one of the forms of self-reliance and adaptation towards homeostatic condition. This paper aims to analyse the role of brain gain actors in balancing rural social system and agribusiness ecosystem. The study is a case study, which applies qualitative approach of system thinking paradigm. The information was gained through in-depth interview with young brain gain actors and rural institutions representatives. The result shows that the presence of young skilled and educated brain gain actors in their home village has enhanced its social system and ecosystem, leading both systems toward sustainability. The balance was created due to the varieties of actors’ business activities in on-farm (primary), off-farm (secondary), and non-farm (tertiary) areas. Primary actors are proven to have roles in the development of agribusiness (socio-technic-economy), while secondary and tertiary actors play role in diversification of business activities which generate employment and environmental conservations (socio-technic-ecology). Moreover, the activities of those actors are complementary and having a positive feed-back loop. A well-planned brain gain can be an alternative solution to strengthen the resilience, dynamics, and sustainability of rural agribusiness.

Keywords: brain gain, self-reliance, social system, ecosystem, rural agribusiness
MACRO-MICRO LINKAGES ON AGRICULTURAL DEVELOPMENT, A CASE STUDY IN GIANYAR, BALI, INDONESIA

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Abstract
This paper aims to describe the macro-micro linkages in agriculture development in Gianyar, Bali, Indonesia. This study focuses on the agricultural development paths and heterogeneity of perspectives towards it, which influence farming styles of farmers. The study was a case study which allows flexible responses to social processes evoked by the events. Ethnography approach in the Macro-micro linkages analysis provides a comprehensive understanding of community perceptions and what was happening in the community. Data were collected through various methods, including participant observation, in-depth interviews, and document analysis. The results show that structural elements in Gianyar’s agriculture pose hindrances and opportunities, creating rooms for manoeuvre and influencing farmer’s ability in exercising their agency. Some farmers were able to exercise their agency in choosing which structures to be attached to, and which farming styles to practice. This condition led to heterogeneity of perspectives toward agricultural development paths. Respectively, it contributed to the emergence of different farming styles and farming strategies in the micro level. Furthermore, this paper is not only about the differences in perspective on agricultural development, but also about the liberty of generating alternative ideas for farming, the capability and knowledgeability of farmers that could be the seed of endogenous agriculture development.

Keywords: agricultural development, macro-micro linkages, farming styles, perspectives.
ESTIMATION OF IN-PLANE BENDING STRENGTH OF CLT WITH DIFFERENT NUMBER OF LAYERS

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Abstract

A simulation model based on Monte-Carlo method was developed to estimate in-plane bending strength of cross laminated timber (CLT). The model used mechanical characteristics of lamina obtained from edgewise bending test of them. Simulation result was compared with the result of experiment on CLT beam without any defect. The test result indicated that the bending strength decreases increasing number of effective layer as reported in some previous researches. The model reproduced this tendency by employing weakest link theory. Simulated and experimental value showed a good agreement when effect of knots is excluded in calculation. On the other hand, when it is included, simulated value was much lower than experimental one.

Keywords: cross laminated timber, in-plane bending strength, Monte-Carlo method, simulation
POSTER PRESENTATION

FOREST SCIENCE

The 6th International Symposium of Sustainable Humanosphere
Humanosphere Science School 2016
Bogor, 15 – 16 November 2016
COMPETITIVE RELATIONSHIP BETWEEN WEED AND TREE SAPLING SPECIES OF TAMAN BURU MASIGIN KAREUMBI RESTORATION SITE

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Abstract

Forest restoration is an effort to regain structure, diversity, and productivity of a degraded forest. In forest restoration, weed management and species compatibility analysis for land condition are among the necessary things needed for the restoration program’s success. Forest restoration programs have already been done by many stakeholders using various methods. One of those stakeholders is Taman Buru Masigit Kareumbi (TBMK), a conservation area that implements a forest restoration program named Wali Pohon. This program started in 2008 and until 2011 has already planted more than 150,000 trees and counting. One of the problems faced by this program is the high rate of seedling mortality, which is up to 22 – 65%. This is caused by many factors, such as inappropriate weed management and restoration species selection. The purpose of this research is to determine the interaction pattern between weed and tree seedling, and to determine the influence of weed cover to tree seedling growth in a forest restoration planting plot. The data is taken from a 3 m × 3 m sub-plot in a 10 m × 10 m plot which is distributed across three different blocks. The determination of plot allocation is based on planting plot area. Vegetation and growth data are taken from the plot within three months. The competition pattern is simulated through a Lotka–Volterra competition equation that is modified for weed and tree seedling competition. The simulation uses the assumptions that the plot has not been not treated within three years, and species growth is linear. The result shows that Ageratina riparia is the most suppressing weed species followed by Eupatorium inulifolium, Calliandra callothyrsus and Etlingera coccinea. The relationship between weed cover rate and tree seedling growth rate is valued by r = –0.9836.

Keywords: Mortality rate, competition, growth rate, Lotka-Volterra equation, population change.
THE LEVEL OF CO2 UPTAKE BY SEEDLING IN PEAT SWAMP FOREST SEBANGAU

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Abstract

Peat swamp forests are degraded when it will let go of CO2 into the atmosphere. Peat swamp forest vegetation has diversity that much. Besides, it also has the ability to absorb CO2 from the forest floor. This study measured the ability of seedlings to absorb the CO2 generated by peat. Based on this research the type of vegetation at the seedling stage ramin able to absorb the highest CO2 level from the forest floor.

Keywords: peat swamp, CO2, Sebangau, seedling
EXPLORATION OF WOOD SPECIES IN SUMBA ISLAND, EAST NUSA TENGGARA AND THEIR POTENTIAL AS MATERIAL FOR BUILDING CONSTRUCTION

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Abstract

Sumba Island is a part of Wallace region which located in between Asia and Australia continents, therefore it has a lot of endemic flora and fauna species. The aim of this study is to determine the potential of wood species in Sumba Island which can be developed as raw material for building construction. The wood samples were taken from every plot by wood increment borer at diameter breast height (dbh). The physical properties (moisture content, density, and shrinkage) were measured to determine the wood strength classes. The results showed that several wood species from Sumba Island such as Laru (Micromelum minutum); Kanunu (Drypetes sp.); Kayarak (Magnolia sp.); Lobhung (Syzygium antisepticum); Kawau (Daphniphyllum sp.); and Mitiwundung (Psychotria leptothyrsa) are classified in strength class II. It indicated that they could be developed as wood material for building construction.

Keywords: exploration; physical properties; Sumba Island; timber construction
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Abstract

Corn stalks are considered as agricultural by products that abundant and continuously available in Indonesia. The study aimed to investigate bulk density, moisture content and particle distribution of particleboard that produced from corn stalk and urea-phenol formaldehyde adhesive. Bulk density calculated by measuring the weight before and after overnight drying of the raw material. Particle distribution calculated by sieving the raw material using different sieve size starts from 1680 µm to 180 µm. Particles that restrained in each sieve size were measured for its weight and length range. Moisture content was measured by calculating initial weight and oven dry weight of the particles. The results show that the bulk density of particle is 0.210 g/cm³, with moisture content 11.2%. For particle distribution, 54.69% of particle size is 500 µm followed by 1680 µm (25.09%), 250 µm (16.15%), and 180 µm (2.05%).

Keywords: bulk density, corn stalk, moisture content, particle distribution, particleboard.
IN-VITRO ASSAY OF NEEM SEED FORMULATION AGAINST *\textit{Fusarium oxysporum}, CAUSAL AGENT OF BASAL PLATE ROT ON ONION

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Abstract

Basal plate rot disease caused by \textit{Fusarium oxysporum} is one of the most important diseases of onion in Indonesia. Fungicide application especially as soil drench, increased cost of onion production and may be dangerous for environment. One of technique to suppress the spread of pathogen is using natural resources that effective, degradable, and ecology friendly for environment. Antifungal effects of neem seed formulation were examined by in vitro assay against \textit{Fusarium oxysporum}. Results indicated that neem seed formulation inhibited the growth of fungi, although the rate of inhibition varied with different concentrations. Its indicated that neem seed formulation were potential to develop as antifungal.

Keywords: Antifungal activity, \textit{Fusarium oxysporum}, basal plate rot, neem, onion
Abstract

Packaging a product associated with microbes is one of the things that need attention because it is associated with the microbial survival. In this study three kinds of container (plastic, cup, and bottle) are used as packaging for the paste inoculum of biocellulose. The parameters analyzed were within this cell viability and its ability to form bioselulosa of paste inoculum in 3 kinds of packaging for 28 weeks. As a result, Acetobacter sp. RMG-2 cells viability of three packaging looks likely to decline in line with long storage. Viability of Acetobacter sp. RMG-2 cells the highest during the storage of 28 weeks recorded 5,8 x 10^8 cfu/mL on the cup packaging. Thickness and dry weight biocellulosa on plastic cup retrieved 0,1 cm and 0,4 grams respectively.

Keywords: Acetobacter sp RMG-2, paste inoculums, 3 kinds of packaging
BIOREMEDIATION OF SPENT BLEACHING EARTH (SBE) USING INDIGENOUS LIPOLYTIC BACTERIA CONSORTIUM WITH NUTRIENT AND BULKING AGENT ADDITION

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Abstract

Bioremediation is one of the ways that can be used to treat the waste of SBE which is solid waste that contains 20-30% residue. SBE waste categorized as B3 waste, so that should be handled the SBE waste that was danger to the environment. The bacteria that are used to manage waste SBE is a consorcium of bacterial lipolytic indigen that the performance can be optimized by the addition of nutrients and bulking agent. This aims of study was to determine the effect ratio of nutrients (C: N: P: K), the concentration of bulking agent (time (weeks) as well as the interaction between the ratio of nutrients (C: N: P: K), the concentration of bulking agent (and the optimal time to support the activity of bacterial cells to degrade the waste oil in SBE and predict the time required to reduce levels of up to 1. The result was the interaction without nutrient, concentrations of bulking agent 15s the best combination to treatment the SBE waste because it can produce a high percentage of oil degradation which was equal to 98.67% within 4 weeks. The decrease in oil content of up to 1% in SBE waste predictable lasted for 35 days.

Keywords: bioremediation, bulking agent, lipolytic bacteria, spent bleaching earth
THE PHYLOGENETIC RELATIONSHIP AMONG VARIETIES LOCAL RICE OF SOUTH SUMATRA BASED ON ITS rDNA SEQUENCES

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Abstract

South Sumatra is a province that has the potential to develop agriculture, especially on marginal land such as wetlands and swampy tidal land to increase crop productivity. One of the success factors for the development of marginal land that is the use of quality seeds of local rice. Selection of plants to be used as a parent can be accelerated by using molecular markers so that the characteristics of the plant can be identified quickly. A molecular approach used is to do DNA sequencing directly detectable and inheritance can be known. Genetic and physical map of the DNA sequencing molecular make finding many that strongly adrift with a trait that became a target in plant breeding. In the phylogenetic, a group of organisms whose members have much in common character is considered to have a very close relationship and it is estimated descended from a common ancestor; ancestor and all its derivatives will form a monophyletic group. Variation of DNA sequences of the ITS (Internal transcribed spacer) region can be used as a molecular character to determine the phylogenetic relationship of different varieties local rice of South Sumatra. DNA was isolated from leaves of plant and then amplified using ITS A and ITS B primers. Nucleotide sequences were identified using Sequence Scanner Software Program version 1.0, nucleotide sequences from 18S, ITS1, 5.8S, ITS2 and 26S region, that has been merged using EditSeq and SegMan in software Suite for Sequence Analysis DNASTAR Lasergene DM version 3.0.25. The results of study showed that DNA fragments ranging in size from 782-810 bp. Different pattern of DNA fragments indicated polymorphism among varieties local rice of South Sumatra. Based on the results of the ITS rDNA sequencing and phylogenetic tree analysis.

Keywords: Phylogenetic relationship, ITS region, varieties local rice of South Sumatra
DEVELOPMENT OF GRASS BIOMASS PLANTS WITH HIGHER-HEATING VALUE-ALTERING LIGNIN COMPOSITION AND CONTENT BY GENE MODIFICATION

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Abstract

For establishing an economical feasible biorefinery system using biomass, cost-effective utilization of lignin is one of the major issues. Lignin is an important resource especially for solid biofuel applications because of its potentially high heating value, and therefore, altering lignin structure or increasing lignin content are promising strategy to upgrade biomass utilization. In this context, we have been studied on lignin engineering using rice (Oryza sativa) as a model plant for Poaceae species, in particular to obtain fundamental knowledge for improving the properties of grass biomass crops. Lignin is mainly composed of three types of aromatic component, p-hydroxyphenyl (H), guaiacyl (G), and syringyl (S) units. The lignin H/G/S composition ratio has been identified as an important structural trait that impacts various biomass properties. Herein, we showed that down-regulation of two aromatic hydroxylase gene expressions, i.e., CAld5H and C3’H in rice plants resulted a significant increase in G or H lignin composition, which had higher carbon contents than S lignin, compared with wild-type rice plants. Lignin content is positively or negatively regulated by transcription factors (TFs). We therefore attempted to enrich lignin by modulating these expressions. First, lignin-enriched rice lines were generated by over-expressing the TFs which positively regulated the lignin biosynthesis, and they showed there higher lignin contents compared with wild-type plants. Now, we are focusing on putative suppressor TFs of the lignin biosynthesis and proceeding to generate loss-of-function mutants in which these TFs do not work.

Keywords: Lignin, Oryza sativa, Transcription factor, H/G/S ratio
BIOLOGICAL DIVERSITY CONTRIBUTION TO REDUCING CO2 IN THE ATMOSPHERE 5: CO2 ABSORPTION OF HIGHLAND AND LOWLAND TREE SPECIES AT DIFFERENT LEVEL OF LIGHT INTENSITIES

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Abstract

Biological diversity can make a significant contribution to reducing greenhouse gases in the atmosphere. Forest ecosystem can both be sources and sinks of CO2. Thus, the trees in a forest stand form an essential part in the functioning of the terrestrial biosphere, especially in the carbon cycle. Yet tree photosynthesis is far less studied than crop photosynthesis for several reasons: the large number of species; difficulty in measuring photosynthesis of entire trees or of forest stands. This research aims to assess the contribution of biological diversity in the absorption of carbon dioxide (CO2) from the atmosphere by analyzing the physiological characteristics that are related to CO2 absorption such as photosynthesis, transpiration, stomatal conductance, leaf chlorophyll content of tree species native to tropical highland and lowland forest ecosystems at different light intensities. This research was conducted at Cibinong Science Center LIPI. Two treatment factors applied were three levels of shading: 0%, 55%, 75% and tree species. The experiment was arranged in Randomized Block Design with five replicates. Result of the experiment revealed that there was a wide range of variation of CO2 assimilation rate between tree species. The overall CO2 absorption rate ranged between 3 – 37 µmolm⁻²s⁻¹, the highest rate was reached by (Nyamplung) (37 µmolm⁻²s⁻¹), followed by (Kopo) (28 µmolm⁻²s⁻¹) at 0% shade. highland trees perform better at lower light intensities or shade condition (55% and 75% shade) and lowland trees performed better under higher light intensity (0% shade). The rate of CO2 assimilation was affected by incident radiation and thus the photon flux (Q leaf). Correlation between CO2 assimilation and Q leaf under certain environmental condition was considerably high. Incident radiation and Q leaf also affected stomatal conductance and thus rate of transpiration.

Keywords: Biological diversity, CO2, photosynthesis, light intensity
EFFECT OF ADDITION *Spirulina fusiformis* POWDER IN DIET TO ENHANCE COLOR BRIGHTNESS OF GOLDFISH (*Carassius auratus* L.)

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Abstract

Goldfish (*Carassius auratus* L.) is one of people favourite of freshwater fish due to their interesting colors. The color of ornamental fish is one attraction that can affect the aesthetic and economic value. Increase in brightness of colors on a goldfish can be achieved by adding a color-enhancing substances as a source of carotenoids in the feed. One of microalgae which contain carotenoid compounds is *Spirulina* sp. The purpose of this research is to determine the effect of *S.* fusiform powder in the feed to the brightness of the color of goldfish and get additional concentration *S.*fusiformis powder which can increase the optimum brightness. The experiment has done in Completely Randomized Design (CRD) single factor with four treatments and six replications. Concentration of *S.*fusiformis powder given were 135 while control were given feeding without *S.*fusiformis powder. Observation of the color brightness level is done visually by using Toca Color Finder (TCF). The result was analyzed statistic by ANOVA. Statistic analyzes showed that *S.* fusiform powder is added to the feed can improve the brightness of the color of goldfish. The addition of 3. fusiform powder in feed can increase the brightness of the color of goldfish maximum.

**Keywords:** Carotenoids, color brightness, diet, goldfish, *S. fusiformis*
CHARACTERISTICS OF THE KIBACETA (*Clausena excavata* Burm. F.) LEAF UNDER DIFFERENT LIGHT INTENSITY IN PANANJUNG PANGANDARAN-NATURE RESERVE

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Abstract

This study was conducted to determine the characteristics of anatomy, morphology and chlorophyll content of Kibaceta (*Clausena excavata*) leaf based on the differences in light intensity at the Pananjung Pangandaran Nature Reserve. The method used was a survey method for determining the location of sampling. The location was determined by the presence of *C. excavata* plants namely in two areas that have a different light intensity. Two of these locations were Cikamal (the open area with light intensity of 52,500 lux) and Ciborok (the shaded area with light intensity of 233 lux). The results showed that the average thickness of leaves, leaf area, stomata density, thickness of palisade and chlorophyll content of leaves in the open area (Cikamal) were 0.14 mm, 10.08 cm², 483.00 mm² and 32.44 μm, and 14.72 CCI, respectively, whereas in the shaded area (Ciborok) were 0.11 mm, 13.85 cm², 246.66 mm², 27.88 μm and 33.84 CCI, respectively.

**Keywords:** chlorophyll content, density of stomata, open area, shaded area
EFFECT OF COMPOST AND ORGANIC LIQUID FERTILIZER ON *Vatica pauciflora* Blume SEEDLING GROWTH

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Abstract

*Vatica pauciflora* Blume is a member of the Dipterocarpaceae family. The genus *Vatica* is placed in the Dipterocarpoideae, the largest subfamily in the family Dipterocarpaceae. This species has become rare in nature and is on the IUCN endangered list (*Endangered A1c ver 2.3*). However, *V. pauciflora* has high potential as a producer of Non Timber Forest Products (NTFPs). The bark has several compounds that are useful as antioxidants and perhaps for other pharmaceutical purposes. *Ex situ* propagation of the species is a desirable step in the further research into this potential. To enhance the growth rate of seedlings in such *ex situ* cultivation, organic fertilizers can be an environmentally friendly source of soil nutrients. The research described here aimed to determine the effect of compost (Bioposka®) and liquid organic fertilizer (Beyonic®) on *V. pauciflora* seedling growth. Treatments consisted of two factors: (1) applied organic liquid fertilizer (Beyonic®) at four rates, and (2) five rates of compost (Bioposka®) incorporated in the growing medium. The four rates of liquid fertilizer dissolved in water were 0 ml / control (C1), 100 ml (C2), 200 ml (C3), and 300 ml (C4). The five rates of compost included in the growing medium (soil: rice husks: compost) were K1 (1: 1: 0) (Control), K2 (1: 1: 1), K3 (1: 1: 2), K4 (1: 1: 3) and K5 (1: 1: 4). The results showed that adding composting (Bioposka®) to the growing medium significantly increased the growth rate of *V. pauciflora* seedlings. The best soil medium mix was K2 (1: 1: 1). The addition of organic liquid fertilizer (Beyonic®) did not significantly influence the height and stem diameter growth of *V. pauciflora* seedlings.

Keywords: Compost, liquid organic fertilizer, seedling growth. *Vatica pauciflora*. 

The 6th International Symposium of Sustainable Humanosphere
Humansphere Science School 2016
Bogor, 15 – 16 November 2016

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LABORATORY BIOASSAYS OF *Metarhizium* spp AND *Beauveria* spp AGAINST *Tenebrio molitor* larvae

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Abstract

Entomopathogenic fungi such as genera *Metarhizium* and *Beauveria* are known for their potential for pest control and pathogenic against insects. Six isolates each of genera *Metarhizium* and *Beauveria* were evaluated for their pathogenicity against *T. molitor* larvae or mealworm using dip method. After 2 weeks, all isolates of *Beauveria* caused more than 70% mortality of larvae and isolate FD-*Beauveria bassiana* infected 100%. Meanwhile, all isolates *Metarhizium* caused all larvae were infected.

Keywords: *Metarhizium; Beauveria; pathogenicity; entomopathogenic fungi; Tenebrio molitor*
OPTIMIZATION OF OIL PALM EMPTY FRUIT BUNCH (OPEFB) PRETREATED OXALIC ACID ASSISTED MICROWAVE PRETREATMENT USING RESPONSE SURFACE METHODOLOGY FOR BIOETHANOL PRODUCTION

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Abstract

Oil palm empty fruit bunch (OPEFB) is a potential lignosellulosic biomass that can be used as raw material for bioethanol production. The conversion of biomass into maximum yield of sugar, an important step for the bioethanol production, requires optimum pretreatment. The objective of this study is to determine the optimum variables conditions (pretreatment time, pretreatment temperature and acid concentration) to maximize the reducing sugar yield per biomass to be yeast fermented by using Response surface methodology (RSM) design. The treatment of OPEFB on microwave assisted acid pretreatment with 1.13% oxalic acid at 190°C for 3.01 minutes exhibited optimum results and obtained a maximum yield of reducing sugar per biomass as much as 34.20%.

Keywords: microwave, oil palm empty fruit bunch, oxalic acid, response surface methodology, pretreatment
The Need for True Green Solvent to Assure Environmental Friendly Biopesticide in Neem Plant (Azadirachta indica A. Juss) Crude Extract Formulation

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Abstract

Neem plant, Azadirachta indica possess considerable potential as pesticide alternative due to its environmental safety level. Problem arise in the formulation of neem plant crude extract using solvent which is not environmentally friendly. Purpose of the research is an examination of neem plant crude extract formulated by green solvent which is known to be more secure to environmental and human health. The previous experiment of acute oral toxicity of 5000 mg/kgBW neem plant crude extract formulation with green solvent as solvent had yielded visible clinical signs after 1 hour treatment namely anxiety, weakness, asphyxiate, and hyperlacrimation. These clinical signs were followed by 40 animal test lives through. Hence, according to Annex 3 of 420 OECD the level of administered dose which culminates on ≥ 40 mortalities is lethal. It encourages the defeasance of green solvent in the following remade formulation. The test is conducted on 2 – 3 weeks DDY mice in three groups of treatment namely control group, surfactant treatment group, and formulated neem without solvent and the mortality rate was recorded through 14 days observation. No clinical sign is observed and 100% survival rate in all three groups.

Keywords: solvent
APPLICATION BIOFERTILIZERS SOIL FUNGUS BIOVAM - LIPI TO SUPPORT PLANT GROWTH JACKFRUIT

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Abstract

Exploiting the potential of microbes as biofertilizer product is a technology in improving soil conditions, helping the availability of nutrients for plants etc. One of them, potential beneficiaries of soil fungi that we are familiar with biofertilizer products BIO VAM - LIPI is one activity Biovillage program - LIPI. One of them, the application BIOVAM - LIPI support for jackfruit plant growth. The research result shows that the application of biofertilizer BIOVAM - LIPI significantly different at a given plant biofertilizer treatment of parameter plant height and diameter, at the age of 10 months, and compared with a control plant is a plant that is not given the treatment of biofertilizers. The result showed significant differences. Back to nature and slowly but surely, the expression used in the utilization potential microbial is basic research. Socialization microbial utilization potential is one of the technology's potential microbial given and informed in the villages to farmers. The fact to change the mindset of farmers who undeniably become a thing that is not easy to keep harness biofertilizer for soil conditions need to be known in advance, farmers do not want to lose and have more confidence in chemical fertilizers Utilization of microbial potential BIOVAM - LIPI expected to compete and generate a profitable crop production. A comfortable environment, do not use any chemical fertilizers, organic food and environmentally friendly being targeted biovillage program.

Keywords: biofertilizer; soil fungi; potential microbial; organic food; environmentally friendly
STRAIN IMPROVEMENT COMPARISON OF ISOLATE H2 BETWEEN NITRIC ACID MUTATION AND UV RAYS MUTATION

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Abstract

Strain improvement could be done by using chemical and physical radiation. This research aimed to compare studies of strain improvement between nitric acid mutation and UV rays mutation for IAA hormone production of H2 isolate. Nitric acid mutation were conducted with some different treatment time such as 0, 30, 60, 90 and 120 min whereas UV rays mutation such as 0, 10, 20 and 30 min. Colonies are grown from the treatment subsequently measured for IAA production. Nitric acid mutan and UV rays mutan could produce IAA hormone within a range 79.31 µg mL\(^{-1}\) to 96.16 µg mL\(^{-1}\) and 64.45 µg mL\(^{-1}\) to 73.83µg mL\(^{-1}\), respectively. Mutan of nitric acid could produce a higher IAA hormone compared with mutan of UV rays.

Keywords: comparison, mutation, nitric acid, strain improvement, uv-rays

The 6th International Symposium of Sustainable Humanosphere
Humanosphere Science School 2016
Bogor, 15 – 16 November 2016
STUDY OF Beauveria sp. AND Paecilomyces sp. EXTRACTS AGAINST Spodoptera litura F. (LEPIDOPTERA, NOCTUIDAE)

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Abstract

The sustainable use of pesticides to overcome the attack of armyworm (Spodoptera litura F.) on vegetable crops in Indonesia has been caused the bad impact on health and the environment. Today, the development of biological agents as an alternative to reduce the use of pesticides have been done, one of them is the utilization of entomopathogenic fungi. However, studies how the pesticides effect of the fermented extract of entomopathogenic fungi toward various stages of S. litura larvae is still unknown. This study aims to determine the effectiveness of the extract entomopathogenic fungi including two types of fungi, they are Beauveria sp. and Paecilomyces sp. against instar 4 of S. litura larvae. The extracts of entomopathogenic fungi produced through the fermentation process using a combination of Czapex-dox broth with 10% yeast extract. Bioassay on S. litura had been done by spraying and baiting methods. The mortality rate of S. litura larvae that treated with the extract of Beauveria sp. through spraying and baiting method was higher than treated with Paecilomyces sp. (≥60% and 30-40%). There is no significant difference in the percentage of larval mortality between spraying and baiting methods, but the mortality rate of S. larvae using both methods showed significantly different with control (p<0.05).

Keywords: Beauveria sp.; fermentation; mortality; Paecilomyces sp.; Spodoptera litura
ISOLATION OF OIL DEGRADING BACTERIA FROM THE TERRESTRIAL SITES OF MINAS, RIAU AND THE PRE SCREENING OF THE ISOLATES ON THE SIMPLE POLYCYCLIC AROMATIC HYDROCARBON

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Oil pollutant in terrestrial site can be sourced from production processes such as oil drilling and refinery processes in Oil Company. In the present study, we isolated native bacteria from several samples of soil and oil from gathering station sites in Minas, Riau, Indonesia. The sampling sites comprised disposal, well, and block area of the station. The isolation was carried out by enrichment method using Bushnell Haas (BH) medium. We successfully collected 117 pure bacterial isolates from those three samples. Further, the isolates were screened on naphthalene containing medium by sublimation method. From 117 isolates selected, we obtained 44 isolates that were potential as naphthalene degrading bacteria.

Key words: oil, bacteria, terrestrial, napthalene, sublimation
COMPARISON OF SHF AND SSF PROCESS FOR BIOETHANOL PRODUCTION FROM PRETREATED OIL PALM EMPTY FRUIT BUNCH (OPEFB)

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Abstract
Second generation of bioethanols are obtained from non-food biomass such as residue from forestry, industry or agriculture. Oil palm empty fruit bunch (OPEFB) is a potential agriculture residue that can be used as raw material for bioethanol production. Ethanol production from lignocellulosic biomass requires three major process namely pretreatment, hydrolysis and fermentation. In this study, OPEFB was pretreated by using microwave assisted acid with 1.13% oxalic acid at 190°C for 3.01 minutes and obtained a maximum yield of reducing sugar per biomass as much as 34.20%. Two different process of enzymatic hydrolysis, Separated Hydrolysis and Fermentation (SHF) and Simultaneous Saccharification and Fermentation (SSF) were tested. The enzymatic hydrolysis was carried out with cellulase enzyme and fermentation with Saccharomyces cerevisiae yeast.

Keywords: bioethanol, fermentation, oil palm empty fruit bunch, SHF, SSF
Fungal Pathogenicity and Profile Cuticle Damage Caused by Entomopathogenic Fungus

Metarhizium anisopliae Infection Against To Oxya japonica (Orthoptera: Acrididae)

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Abstract

Resistance is one of impacts that arising from the use of synthetic insecticides, and it’s became a major problem in agriculture. This encourages the application of integrated pest management including through biological control method. One of the biological agent known great potential in controlling the pest population is Metarhizium anisopliae. Entomopathogenic fungus is known as natural enemies of insects. The necessary information about the pathogenicity of the biological agent is very important in developing the M. anisopliae applications. Based on this, the research was conducted to find out the infected pathogenicity of M. anisopliae against Oxya japonica (Orthoptera: Acrididae). The Research was used a completely randomized design with single factor, the concentration fungal infection, and the parameters was letal time of O. japonica. The results was showed that concentration fungal infection was effected the letal time of O. japonica significantly (P <0.05), which is the shortest time of death occurred at the highest concentration fungal infection. Observed symptoms of fungal infection against to O. japonica was showed through changes in morphology and behavior of O. japonica infected. Furthermore, the profile longitudinal incision of Histologic cuticle was observed, there was cuticle degradation in the area of hyphae penetration. The hyphae was growth through the cuticle tissue forming mycelium that filled hemocoel. Its growth was resulted in damage to the structures of hemocoel inner tissues.

Keywords: Metarhizium anisopliae, Oxya japonica, pathogenicity, letal time, concentration fungal infection, profile cuticle damage
Evaluation of Non-Saccharomyces cerevisiae Strains Isolated from Marine for Stresses in Bioethanol Fermentation

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Abstract

We already reported the results of the isolation and identification of yeasts from Bali and Lombok sea waters. Two isolates of them were reported capable to produce of bioethanol. The important parameter in bioethanol industrial fermentation are resistance yeast to osmotic pressure and inhibitors compounds. This study was investigated of non-Saccharomyces cerevisiae yeast of Debaryomyces etchellsii LBF-3-0034 and Aureobasidium pullulans LBF-3-0074 characters on glucose and inhibitors effect. These isolates were consumed of glucose until 120 mM. Furthermore, these isolates could growth on several inhibitors, as 5-hydroxymethyl-2-furaldehyde (5-HMF), furfural, acetic acid, formic acid and levulinic acid. The compounds are potent that damage cell wall and membrane, inhibit cell growth, reduce enzyme activities, break down DNA, inhibit protein and RNA synthesis, and reduce ethanol production. Based on these result, two strains of yeast as potential for bioethanol fermentation.

Keywords: bioethanol, inhibitors, marine, osmotic, yeast.
XYLANASE FROM POTENTIAL INDIGENOUS ACTINOMYCETES ISOLATES TO PRODUCE XYLOOLIGOSACCHARIDE

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Abstract

Microbes degrading lignocellulose has been studied since many years ago. The microbes are bacteria, actinomycetes, and fungi. Actinomycetes has been known capable to degrade lignocellulose because it has cellulase and hemicellulase such as xylanase and mannanase. In this study, we evaluate the potency of xylanase from indigenous actinomycetes isolates ID05-609 to produce xylooligosaccharide. The actinomycetes was inoculated in rich medium and checked the clear zone in congo red in two variation of pH, 5 and 6. The optimum pH was pH 6, then be used to produce the enzyme. Enzyme activity of crude enzyme was 1.502 U/mL. The enzyme was dialized, and the enzyme activity was 2.273 U/mL. Hydrolysis was applied toward commercial birchwood xylan. The product of hydrolysis was measured for the reduction sugar, total sugar, and the pattern of degradation was checked on thin layer chromatography (TLC). TLC showed that xylanase from isolate ID05-609 can degrade the xylan toward xylose, xylobiose, and xylooligosaccharide, such as xylotriose, xylotetraose, xylopentaose, xylohexaose. The pattern showed that the type of enzyme was endo-xylanase because it degrade the xylan polymer randomly.

Keywords: actinomycetes; xylanase; xylooligosaccharide
INVITRO LARVACIDAL ACTIVITY OF BACTERIAL CELL CULTURE AND SUPERNATANT AGAINST MOSQUITO LARVAE

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Abstract

This study aimed to examine larvacidal activity of entomopathogenic bacteria isolated from Spodoptera litura dead pupae against Culex sp larvae. They were Serratia sp.SP4, Bacillus thuringensis and Staphylococcus sciuri SP3. Two different types of inoculant were used, diluted culture cell and supernatant. Dilution rate used was from $10^{-4}$ to $10^{-7}$. Different types of inoculant were used as initial investigation of larvacidal activity of isolated bacteria. The result showed both types of inoculant were adequately active as larvacidal agent. Further study is needed to investigate the specific larvacidal mechanism.

Keywords: mosquito larvae; Culex sp; larvacidal; entomopathogenic bacteria
THE POTENCY OF ENDOPHYTIC FUNGI ISOLATED FROM TARO (Colocasia esculenta (L.) Schott) AS PLANT GROWTH PROMOTING AGENT

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Abstract

Endophytic fungi are fungi that live in plant tissues without causing disease symptom in plants. Endophytic fungi can produce secondary metabolite which can be used as plant growth hormones and biocontrol agent. The aims of this study is to isolate endophytic fungal from taro var. Bogor, Bentul and Kaliurang and screen their ability to produce the IAA hormone and against Fusarium oxysporum. Nineteen endophytic fungi have been isolated from taro, 7 isolates obtained from var. Bentul, 8 isolates from var. Kaliurang and 4 isolates from var. Bogor. The result on production of growth promoting hormone indicated that only three isolates were able to produce IAA varied from 0.27 – 9.24 mg/l. The result of antagonism test showed that three isolates were able against Fusarium oxysporum with percentage inhibition varied from 23.64 – 36.36%.

Keywords: endophytic fungi, taro, IAA hormone, Fusarium oxysporum
Determination of Relationship Between Cloud Top Brightness Temperature of Himawari-8 Satellite IR1 Data and Rainfall Events on February 2016 at Perak I Surabaya Meteorological Station

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Abstract

For the convective cloud situation, there is an assumption that lower cloud top temperature is associated with heavier rainfall. Research of relationship between rainfall and satellite data can be done through the analysis of cloud top brightness temperature which showed on 10.4μm channel furthermore can be utilized to estimate the amount of precipitation in the future. This paper aims to determine and analyze the relationship between the average of cloud top brightness temperature from Himawari-8 satellite IR1 data with the rainfall per hour data were observed on February 2016 at Perak I Surabaya Meteorological Station. The results of the analysis can be used for determine the distribution and the character of cloud top brightness temperature values during rain events at the sites. Analysis of the relationship is done by using warmer or colder average cloud top brightness temperature than -50oC treshold and divide it into several groups events. The result shows that from 154 rainfall events data there are 60 (38.96%) events of the total rain events are accompanied by colder average cloud top brightness temperature than -50°C, and there are 94 (61.04%) events of the total rain events are accompanied by the warmer average cloud top brightness temperature than -50°C. In general can be said that with the warmer average cloud top brightness temperature than -50oC, rain in the region of Perak I Surabaya Meteorological Station still can occur. The condition occurs in two circumstance, those are when in the same period time of rain there are colder or warmer cloud top brightness temperature than -50°C. The result of the the analysis for precipitation cloud characteristic shows that for the rain event which not accompanied by colder cloud top temperature than -50°C can occurs because an parallax error of cloud observation angle. This parallax error causes the cloud with top cloud temperature value colder than -50oC not exactly detected above the interest area.

Keywords: brightness temperature, precipitation, rainfall, satellite, and top cloud
HAZARD OF DECREASE IN RICE PRODUCTION DUE TO CLIMATE CHANGE IN THE AREA OF RICE PRODUCTION CENTER IN WEST JAVA

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Abstract

One of the factors causing the decline in rice production is the impact of climate change. Research on hazard decline in rice production due to climate change has been implemented in the area of Rice Production Center in West Java. This study aims to assess the level of hazard of the decline in rice production and identify areas that hazard level of the decline in rice production at high or very high level. Research methods using survey, interviews, public hearings, and the collection of data from some relevant sources. The results of this study are presented in the form of spatial maps using GIS software. The results of this study indicate that to some extent in the area of Rice Production Center in West Java has experienced climate change shown by the changing patterns of rainfall, rain day, the distribution of annual rainfall, and annual rainfall has decreased tendency that there are some areas become drier as the Lelea and Lohbener sub-district. Hazard of the decline in harvested area of paddy rice in the area of Rice Production Center in West Java average of 77.0 ha per year. While hazard of the decline in rice production in the region average of 926.1 tons per year. In the area of Rice Production Center in West Java decreased harvested area of paddy rice above 100 ha/year occurred in the Pangkalan, Teluk Jambe Barat, Cilamaya Kulon, Tirtajaya, and Batujaya (Karawang District); Cisalak, Dawuan, Pabuaran, Patokbesi, Pagaden, Cipunagara, Compreng, Ciasem, Pusakanagara, and Pusakajaya (Subang District); and Tukdana, Sriyeg, Pasekan, Shukra, and Patrol (Indramayu District). In the region decreased rice production over 1000 tons/ha occurred in the Teluk Jambe Barat, Banyusari, Telagasari, Karawang Timur, Rawamerta, Kutawaluya, Pedes, Tirtajaya, Batujaya, and Pakis Jaya (Karawang District); Cisalak, Dawuan, Pabuaran, and Pusakanagara (Subang District); and Tukdana (Indramayu District).

Keywords: climate change, hazard, rice production
COMPARISON OF HISTORICAL EARTHQUAKE DATA IN INDONESIA FROM 1900 TO 1960

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Abstract

Indonesia suffers from numerous earthquakes in recent years and it is an urgent task to construct damage reduction system for human safety. It is important to clarify the historical large earthquakes in Indonesia as well as to analyze recent earthquakes. In this study, earthquake databases and historical materials were used to analyze earthquake in Indonesia from 1900 to 1960. Four databases are publicly available, the Bulletin by International Seismological Centre, Earthquake Catalog by United States Geological Survey, Earthquake Database by Geoscience Australia and Catalog of Damaging Earthquakes in the World by Dr. Tokuji Utsu. Historical materials from Dutch colonial era, “Natuurkundig Tijdschrift voor Nederlandsch Indie (Physical Journals of Netherlands India)”, it is the series of natural scientific reports published annually from 1850 to 1940. It contains the explanation of earthquake damage situation. Method is to compare the earthquake occurred in 1900 to 1960 by using databases and historical description. In each database, common information is listed such as date, time, a latitude-longitude location and magnitude scale. After 1960s, an amount of earthquake data gradually increased due to development of seismic observation. On the other hand, in the early twentieth century, not all earthquake events are listed in each database. In the historical materials, earthquake description from 1900 to 1938 is focused in this study. The results indicate that not all earthquake events are on the list of each database especially earthquakes occurred in the early twentieth century. Under the situation of undeveloped seismic observation system at that time, historical material is one of the important data sources to clarify the historical earthquakes occurred in Indonesia.

Keywords: earthquake
HOTSPOT TEMPERATURE ESTIMATION BASED ON HIMAWARI-8 USING MODIS

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Abstract

Himawari-8 data are used by BMKG for operational purposes. Himawari-8 channel IR-4 can be used to monitor the temperature of the heat source. Himawari-8 satellite image data channel IR-4 is used satellite data dated August 12 to 15, 2015 at 06 UTC. MODIS data is used as reference in the form of coordinates of hot spots on August 12 to 14, 2015 at 06 UTC. On the coordinates of the point value of temperature observed by Himawari-8 satellite imagery using SATAID applications. Analysis of the results obtained limit temperature values (threshold) are considered hot spots on Himawari-8 satellite images is 35°C. This value is obtained after the temperature observed on the Himawari-8 satellite image coordinates of hot spots obtained from MODIS sensing began 12–14 August, 2015, then the temperature values obtained were made on average. The threshold tested on IR4 Himawari-8 satellite image dated August 15, 2015 as a point coordinates of hot spots based sensing by satellite Himawari-8.

Keywords: Satellite, Himawari-8, Hotspot, Threshold, SATAID

The 6th International Symposium of Sustainable Humanosphere
Humanosphere Science School 2016
Bogor, 15 – 16 November 2016
SATELLITE IMAGE ANALYSIS BY USING SATAID
(CASE STUDY OF HEAVY RAIN AT MERAUKE, JANUARY 8th 2013)

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Abstract

According to BMKG, very heavy rainfall is defined as rainfall greater than 100 mm in 24 hours. On 8 January 2013, Mopah Meteorological Station – Merauke recorded 281 mm of rainfall. BOM analysis on January 8th 2013 at 12 UTC showed Eddy location around the southern part of Papua Island to Arafura Sea. Satellite image MTSAT analysis by using SATAID from IR channel showed cloud cover over Merauke starting from 16.00 UTC until 23.00 UTC. From WV channel, we could clearly observe larger amount of water vapor content at 18.00 UTC to 23.00 UTC. According to IR-4 channel, cloud top temperature over Merauke was measured as -29.8\textdegree C and reached the lowest temperature at 19.00 UTC as -71.0\textdegree C. According to NWP analysis, the wind blow dominantly from the west on the northern part of Papua and from the south over the southern part of Papua. The wind pattern causes shear over Merauke area. Split window analysis at 17.00 UTC until 22.00 UTC over Merauke can be identified as CB cloud. We can conclude that heavy rain at Merauke on January 8th 2013 was caused by CB cloud.

Keywords: Heavy rain, CB cloud, channel, SATAID, Split Window

The 6\textsuperscript{th} International Symposium of Sustainable Humanosphere
Humanosphere Science School 2016
Bogor, 15 – 16 November 2016
INFLUENCE GLOBAL PREDICTORS OF EL NIÑO AND DIPOLE MODE ANALYSIS CONCERNING MONTHLY RAINFALL VARIABILITY BASED ON OBSERVATION DATA 1981-2010 IN BIAK, WEST PAPUA

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Abstract

Indonesia is well known as one of tropic region in the world. Based on information from Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG) there are three factors to control rainfall in Indonesia such as ENSO (El Niño Southern Oscillation), Dipole Mode Index, and Indonesian Sea Surface Temperature. Generally climate global predictor El Niño and Dipole Mode positive will cause a decreasing of rainfall intensity in most region of Indonesia. This study examines the influence of those factors for monthly rainfall variability on July-September in Biak, West Papua. The data used in this research is monthly rainfall from Frans Kaisepo Meteorological Stations with period from 1981-2010, Nino 3.4 index and Indian Oscillation Dipole (IOD) from Interactive Tool for Analysis of the Climate System (ITACS) and using The Grid Analysis and Display System (GrADS) for analyzing spatial data. The main method used in this research is correlation analysis. The research showed rainfall variability in July-September with period from 1981-2010, it caused by predictor El Niño and Dipole Mode July-September. The influence of El Niño is bigger than Dipole Mode predictor. However, there are certain times when the predictor has no effect at all. It is caused by local factor such as Sea Surface Temperature and topography condition in Biak, West Papua.

Keywords: El Niño; Dipole Mode; Monthly Rainfall Variability
COMMUNITY-BASED DEVELOPMENT AND SOCIAL ECONOMIC SCIENCE
ANTI DENTIFICATION OF LEADING SECTORS IN NORTH SUMATRA

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Abstract

Agriculture plays an important role in improving the regional economy, as measured by the increase in the value of Gross Regional Domestic Product (GRDP) Province and Gross Domestic Product (GDP) National. Its roles include as a provider of employment, food producers, the potential market for other sectors, foreign exchange, a provider of raw materials for the industrial sector, a provider of employment and the safety valve during the economic crisis. This research used descriptive analysis method. the GDP of North Sumatra Province and the countrys GDP by Industrial Origin at Constant Basic Prices 2000 period 2000-2014 were used as the data. Location Quotient (LQ) and Dynamic Location Quotient (DLQ) were used as Analysis tool. Location Quotient (LQ) aimed to find out the basic and the non-bases sectors in North Sumatra Province. While Dynamic Location Quotient (DLQ) aimed to determine the repositioning of the economic sector (sector base and non-base). LQ analysis results indicated the economic sector that became basis sectors in North Sumatra province were known to have 5 (five) sector ; 1. The agriculture sector, 2. electricity, gas and water supply sectors, 3. The building sector, 4. trade, hotels and restaurants sectors 5. Transport and communications sector. As for the non-basis in North Sumatra province were: 1. The mining and quarrying sector, 2. Manufacturing sector 3. financial sector, leasing and business services sectors and 4. The services sector. Results of the analysis DLQ against economic sector showed that there is three sectors into sectors basis in the future in which have a coefficient DLQ> 1, these sectors are 1. The mining and quarrying sector, 2. Industrial and processing sector and 3. The building sector

Keywords : Location Quotient, Dynamic Location Quotient, and Economic Sector
PROCESSING WASTE PAPER FOR ART PAPER IN BIOVILLAGE CONCEPT PERSPECTIVE

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Abstract

To manage the cibinong science center Botanical garden (CSC-BG) more effective, especially in the waste management, biovillage concept is a promising approach. There are three key points in biovillage concept including integrated program, zero waste zone, and storefront activities. Clustering system based on suitability program is used to build integrated activities amongst research center in CSC-BG. Research center for Biomaterials LIPI has tried to contribute in creating added value from waste paper. Processing waste paper producing from administrative and research activities for art paper is simple technology approach. It has possibility to apply in educational environment, household, factory, or office zone. Classification wastes based on their types is first step to utilize them effectively. To better obtain the recycling paper properties, the addition of virgin fiber as source long fiber to reinforce is required. The art paper can be used for various derived art products. And these products have potency to be financial sources to drive the economy of surrounding communities in CSC-BG. It is expected for future, biovillage concept in CSC-BG can used as model to apply in other region.

Keywords: art paper; CSC-BG; waste paper; recycling technology; biovillage concept
DESIGN SOFTWARE FOR PULSE OXIMETER ACCURACY TESTING USING LabVIEW

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Abstract

Pulse oximeter is one important tool in monitoring the breathing of patients in hospitals. This tool works by reading blood oxygen saturation (SaO2) blood indirectly using sensors Photoplethysmographic (PPG). With such a very important function, it is necessary to test the accuracy of a pulse oximeter while monitoring the patient's condition. There are currently testing the pulse oximeter is based on ISO 80601-2-61. At ISO 80601-2-61, subclause 201.12.1.101, are required to do testing of the accuracy of the sensor contained in a pulse oximeter. P2SMTP - LIPI tests the accuracy of a pulse oximeter sensor simulator with the help of a pulse oximeter simulator to replace the functionality of human blood. In this study has been made LabView software that facilitate the testing of a pulse oximeter sensor accuracy by controlling the output of a pulse oximeter simulator using computer and report the results of testing osimeter pulse. The system has been created can be used to determine the accuracy of SpO2. The test system can be used to determine the approximate value of the accuracy of a pulse oximeter easily and quickly, before the blood sample test conducted in accordance with the standards.

Keywords: testing; pulse oximetry;LabView